United States
Department of
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Final Environmental Impact Statement

Revised Land and Resource Management Plan

Kisatchie National Forest

Abstract

FINAL ENVIRONMENTAL IMPACT STATEMENT FOR THE REVISED LAND AND RESOURCE MANAGEMENT PLAN

KISATCHIE NATIONAL FOREST

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Abstract: Seven alternatives for revision of the Land and Resource Management Plan for the Kisatchie National Forest (Forest Plan) are described and compared in this final environmental impact statement (FEIS). The alternatives are labeled A, B, C, D, Modified D, E, and F. Alternative A is the no action alternative, representing implementation of the current (1985) Forest Plan, as amended. Alternative B emphasizes production of forest products. Alternative C emphasizes enhancement of noncommodity or amenity values such as recreation, visual quality, and plant and wildlife habitats. Alternatives D and Modified D emphasize the restoration of natural plant communities to sites they occupied prior to European settlement. Alternative E emphasizes management of hardwoods and mixed stands of hardwood and pine. Alternative F emphasizes establishment or improvement of wildlife habitats for a full range of native species. *Alternative D was modified between draft and final to address comments received from the public. Alternative Modified D has been identified as the Forest Service's selected alternative in this FEIS.*

August 1999

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Organization of the Documents

Chapter 0

BASIC STRUCTURE

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BASIC STRUCTURE

Commonly the text of documents like these is subdivided and arranged in an outline form to organize the material presented. According to the importance of a given section of text, the headings and subheadings of this document are arranged with the type treated this way:

TOP LEVEL
SECOND LEVEL
THIRD LEVEL
Fourth level
Fifth level

ATTENTION GETTERS

The use of bullets (▶) and run-in subheads (*bold type leading off a paragraph, as has been done in the chapter descriptions that begin in the adjacent column*) are universal in this text. Features like these denote no particular position or importance; instead they are simple attention-getters which have been used as needed at any level.

GENERAL LAYOUT

Notice the three column layout. Two wide columns are used for text. The third, narrower, column serves two functions: First, it provides a means of supplementing the page numbers, facilitating your ability to navigate through these documents without repeated reference to the table of contents. Second, it offers additional page space to permit more flexibility in layout; for example, at times when a larger space is needed for displaying an expanded table or figure that illustrates some portion of the text.

In addition to the heading and subheading structure shown and explained above, the third column features a unique method of tipping the reader at a glance about the kind of information on a given page. When introducing a new section that requires a heading, its title will also appear in the third column in black; i.e.: SUBJECT. If that section or subject matter continues beyond the page where it originally appeared, the title in the third column accompanying that text will be "dimmed"; i.e.: SUBJECT. This treatment is used consistently to indicate the presence of subject matter.

PAGE NUMBERING

Finally, the page numbering scheme is simple. It employs sets of numbers or letter-number pairs like these: 6–10 or B–2. The first letter or number in each set denotes the chapter or appendix, and the second number indicates the page. The page numbering restarts in each chapter or appendix.

ENVIRONMENTAL IMPACT STATEMENT STRUCTURE

The final environmental statement is divided into eight numbered chapters, followed by the appendices.

Chapter 1, Purpose and Need for Action: Describes the purpose and need for preparing this environmental impact statement, the scope of the decisions to be made, the location and description of the planning area, and the issues and concerns to be addressed by revision of the Kisatchie National Forest's land and resources management plan (Forest Plan).

Chapter 2, Alternatives, Including the Proposed Action: Presents alternatives for managing the Kisatchie National Forest, including how the alternatives were developed, the range of alternatives, alternatives considered in detail, and a comparison of the alternatives.

ENVIRONMENTAL IMPACT STATEMENT STRUCTURE

SUMMARY OF THE FINAL ENVIRONMENTAL IMPACT STATEMENT

MAP PACKET

Chapter 3, Affected Environment: Describes the existing environment of the areas affected by the alternatives, including descriptions of the physical, biological, social, and economic characteristics of the areas.

Chapter 4, Environmental Consequences: Provides the scientific and analytic basis for comparing the alternatives and presents the anticipated environmental effects as a result of implementation of the alternatives.

Chapter 5, List of Preparers: Identifies the interdisciplinary planning team members and describes their roles in the preparation of the planning documents.

Chapter 6, Forest Plan Revision Mailing List: Identifies agencies, organizations, and individuals to whom copies of the planning documents have been sent or delivered.

Chapter 7, Glossary of Terms, Commonly Used Acronyms, and Abbreviations: Contains definitions of terms and abbreviations.

Chapter 8, Bibliography of Literature Cited: Identifies reference material referred to in the environmental impact statement.

Appendices: the following appendices contain additional detailed information relating to the final environmental impact statement.

- *Appendix A*, Issues, Concerns, and Opportunities
- *Appendix B*, The Analysis Process
- *Appendix C*, Roadless Area Evaluations
- *Appendix D*, Wild & Scenic River Evaluations
- *Appendix E*, Wild & Scenic River Suitability
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- *Appendix K*, Comment Letters and Responses (Bound Separately)

SUMMARY OF THE FINAL ENVIRONMENTAL IMPACT STATEMENT

The summary is a brief document that provides an overview of the material contained in the final environmental impact statement.

MAP PACKET

The map packet contains a full-color map portraying allocations of management areas for the selected alternative. This map was created using basic resource information layers that were constructed and imaged electronically in a geographic information system (GIS). A graphics application package was then used to further enhance the output. The maps for Alternatives A-D and E-F (that were enclosed with the Draft EIS and did not change between the Draft and Final EIS) are not included in the map packet.

PLAN STRUCTURE

The revised Forest Plan is divided into five chapters and various appendices.

Chapter 1, Introduction: Describes the purpose of the Forest Plan, its relationship to other documents, and its structure. It contains a description of the Forest, a summary of the analysis of the management situation, and Plan responses to the significant issues identified during the planning process.

Chapter 2, Forestwide Direction: Defines Forestwide goals, desired future conditions, objectives, and standards and guidelines.

Chapter 3, Management Area Direction: Defines management area and sub-management area goals, desired future conditions, and standards and guidelines.

Chapter 4, Implementation of the Forest Plan: Contains information on how the revised Forest Plan will be implemented and how amendments and / or revisions will occur.

Chapter 5, Monitoring and Evaluation: Chapter 5 details the requirements for monitoring and evaluating the implementation of the revised Forest Plan.

Appendices: The following appendices contain additional detailed information relating to the revised Forest Plan:

- *Appendix A*, Estimated Outputs and Activities
- *Appendix B*, Timber Suitability Analysis
- *Appendix C*, Forest Plan Budget
- *Appendix D*, Mineral Operations
- *Appendix E*, Old-growth Desired Future Conditions
- *Appendix F*, Monitoring Summary Tables
- *Appendix G*, Glossary of Terms, Commonly Used Acronyms, and Abbreviations.

PLAN STRUCTURE

Chapter 1

Purpose and Need for Action

INTRODUCTION

This document is called a final environmental impact statement (FEIS). It presents the analysis of seven alternatives for managing the land and resources of the Kisatchie National Forest. It also describes the affected environment and discloses significant environmental effects of the alternatives considered. Finally, it shows how each alternative responds to issues.

The companion to this document is a revised *Forest Land and Resource Management Plan* (Forest Plan). The Forest Plan presents a detailed disclosure of the alternative that the Forest Service recommends for implementation.

THE PURPOSE

The purpose of these documents is to provide a revised Forest Plan which will guide all of the resource management activities on the Kisatchie National Forest for the next 10 to 15 years. This meets the objectives of federal laws, regulations, and policy.

Forest plans provide for multiple use and sustained yield of goods and services from national forests, in ways that maximize long-term net public benefits in an environmentally sound manner. The national forest land and resource management planning process is described at Title 36, Part 219, *Code of Federal Regulations* (CFR).

THE NEED FOR ACTION

National forest land and resource management planning is a process for developing, adopting, and revising forest plans for each national forest. Forest plans are required by the Forest and Rangeland Renewable Resources Planning Act of 1974 (RPA), as amended by the National Forest Management Act of 1976 (NFMA).

The NFMA regulations require forest plans to be revised on a 10–15 year cycle or sooner for significant changes of conditions or demands in the plan coverage area. The regulations also require forest supervisors to review the conditions on lands covered by a forest plan at least every five years, to determine whether significant change has occurred.

The Kisatchie National Forest's current Forest Plan was finalized November 4, 1985. To date there have been 17 nonsignificant amendments and 1 correction to the current Forest Plan.

In 1990 forest managers compiled the first four years of monitoring data for all resources. In 1991, monitoring data were evaluated and compared with results anticipated by the Forest Plan. From this, the *5-Year Review Report* and *Highlights* revealed a need to revise the Forest Plan, based on these major factors:

- Reduced land available for timber production due to natural events and changing direction during the first plan period.
- Updated stand selection, predicting timber sales for 1991–95.
- Effects of the 1985–86 southern pine beetle epidemic.
- Existing and proposed Red-cockaded Woodpecker management direction.
- Effects of Forest Plan amendments.
- Need to add, delete, clarify, or amend Forest Plan standards and guidelines.
- Need to evaluate additional management areas.

Since the 5-Year Review such issues as *maintenance or restoration of biodiversity*, *old-growth forests*, *ecosystem management*, and *restoration of deteriorated ecosystems* have emerged locally, regionally, and nationally. This reinforces the need to reexamine the current Forest Plan.

FOREST PLAN DEVELOPMENT
THE PROPOSED ACTION
SCOPE OF THE REVISION AND DECISIONS TO BE MADE
RELATIONSHIP TO OTHER DOCUMENTS
LOCATION AND GENERAL DESCRIPTION OF THE PLANNING AREA

FOREST PLAN DEVELOPMENT

The process for developing forest plans is specified in NFMA regulations, *36 CFR 219.12*.

The forest supervisor is responsible for the development and implementation of the Forest Plan, as well as the preparation of the environmental impact statement (EIS) for the Forest Plan. The forest supervisor appoints and oversees the interdisciplinary team which develops a forest plan and EIS.

A forest plan is developed using the following 10 steps:

- Identify the purpose and need
- Prepare planning criteria
- Inventory data and collect information
- Analyze the management situation
- Formulate alternatives
- Estimate effects of alternatives
- Evaluate alternatives
- Recommend a preferred alternative
- Approve plan and implement
- Monitor and evaluate

THE PROPOSED ACTION

The Forest Service proposes to revise the Kisatchie National Forest's 1985 Forest Plan. It will address the needs identified during the 5-Year Review, the significant issues raised during the issue identification process, the results of a continuous monitoring and evaluation program, and to affirm continuation of the management direction from the existing Forest Plan which is not specifically changed by the revision.

SCOPE OF THE REVISION AND DECISIONS TO BE MADE

This document is prepared in accordance with the National Environmental Policy Act of 1969 (NEPA). It provides the programmatic direction and guidance for future decisions of site-specific projects and actions, at which point the irreversible and irretrievable commitment of resources is usually made, ***40 CFR 1502.20***.

The scope of the revision and decisions to be made in the revised Forest Plan are:

- Establishment of forestwide multiple-use goals and objectives, ***36 CFR 219.11 (b)***.
- Establishment of forestwide management requirements (standards and guidelines), ***36 CFR 219.27***.
- Establishment of management areas and management area direction, including desired future condition statements, ***36 CFR 219.11(c)***.
- Determination of land that is suitable for timber production, ***36 CFR 219.14***.
- Establishment of allowable sale quantity (ASQ) for timber, ***36 CFR 219.16***.
- Inventory, evaluate, and recommend potential wilderness, ***36 CFR 219.17***.
- Inventory, evaluate, and recommend potential wild and scenic rivers.
- Determination of lands that will be available for gas and oil leasing, and the leasing decision on specific lands nominated to the Bureau of Land Management, ***36 CFR 228.102(d)*** and ***(e)***.
- Establishment of monitoring and evaluation requirements, ***36 CFR 219.11(d)*** and ***219.12(k)***.

RELATIONSHIP TO OTHER DOCUMENTS

This document incorporates by reference (***40 CFR 1502.21***) the management direction and environmental analysis from the following regional programmatic decisions:

- The *Final Environmental Impact Statement* (FEIS) *and Record of Decision* (ROD) *for Suppression of Southern Pine Beetle*, April 1987, as amended;
- The *FEIS and ROD for Vegetation Management in the Coastal Plain / Piedmont*, January 1989, as amended; and
- The *FEIS and ROD for* the *Management of the Red-cockaded Woodpecker and its Habitat on National Forests in the Southern Region*, June 1995.

LOCATION AND GENERAL DESCRIPTION OF THE PLANNING AREA

The boundary of the Kisatchie National Forest encompasses approximately 1,024,659 acres, of which 603,769 acres are national forest land. The Forest consists of five ranger districts located within Claiborne, Grant, Natchitoches, Rapides, Vernon, Webster, and Winn Parishes of west-central and northwestern Louisiana.

The Forest headquarters is the forest supervisor's office in Pineville. District offices are located in Bentley, Boyce, Homer, Natchitoches, and Winnfield. Please see figure 1–1 on page 1–4.

The area is predominately rural in character. The forest is generally within a 2.5-hour drive of Shreveport and Baton Rouge, and within 4 hours of New Orleans.

Louisiana is generally considered typical coastal plain. The forest's topography ranges from hilly to undulating on the uplands, to level on stream terraces and floodplains. Elevations range from 80 feet above sea level in floodplains and undulate from 200 to 425 feet above sea level in the Kisatchie Hills. The general slope of the area is southward to the Gulf of Mexico.

Most soils in the Forest area are highly weathered, acidic, and have low nutrient status. Soil productivity, however, is generally high because soils are generally deep with abundant plant-available moisture.

The climate of the area is subtropical. Weather is highly variable. Annual rainfall averages 59 inches. Summer temperatures range from 85° to 95° Fahrenheit (F.) in the afternoons and 65° to 75° F. in the early morning hours. Winter temperatures range from 55° to 65° F. in the afternoons and 40° to 50° F. in the early morning hours. The average annual temperature is 68° F. and the average humidity is 74 percent.

Located within the Forest boundaries today are four broad historically present plant or vegetation communities: *longleaf pine*, *shortleaf pine / oak-hickory*, *mixed hardwood / loblolly pine*, and *riparian*. These communities are situated within nine landtype associations, which will be referred to as LTAs: *high terrace rolling uplands*, *Kisatchie sandstone hills*, *undulating clayey uplands*, *alluvial floodplains* and *stream terraces*, *Winn rolling uplands*, *Fort Polk rolling uplands*, *Red River alluvial plains*, *Caney Lakes loamy uplands*, and *north Louisiana clayey hills*.

IDENTIFYING THE ISSUES

The forest planning process is guided by the public issues and management concerns which reflect the different preferences of individuals and groups, and the physical, biological, and legal limits on forest management. By identifying issues and concerns, the Forest Service can determine what the public wants in goods, services, uses, and environmental conditions.

The forest planning interdisciplinary team (IDT) first compiled a list of preliminary issues. They drew from the results of the 5-Year Review; a review of the appeal of the current Plan; ongoing monitoring and evaluation; and internal issue identification meetings involving personnel from the Kisatchie National Forest, the Southern Research Station, and Forest Health.

The notice of intent (NOI) to prepare the EIS for the Forest Plan revision was published in the *Federal Register* on August 4, 1993, with a 60-day comment period, which ended on October 1, 1993. The NOI contained the list of preliminary issues determined through internal scoping, as described above.

The *Planner*, the Kisatchie's planning newsletter, was distributed one week later, also with a 60-day comment period, which ended on October 8, 1993. Approximately 1,300 copies of the *Planner* were mailed to individuals, nonprofit interest groups, elected officials, businesses, industry, and academic institutions, as well as local, state, and other federal agencies, on the Forest Plan mailing list. Copies were also available at each ranger district office and the supervisor's office.

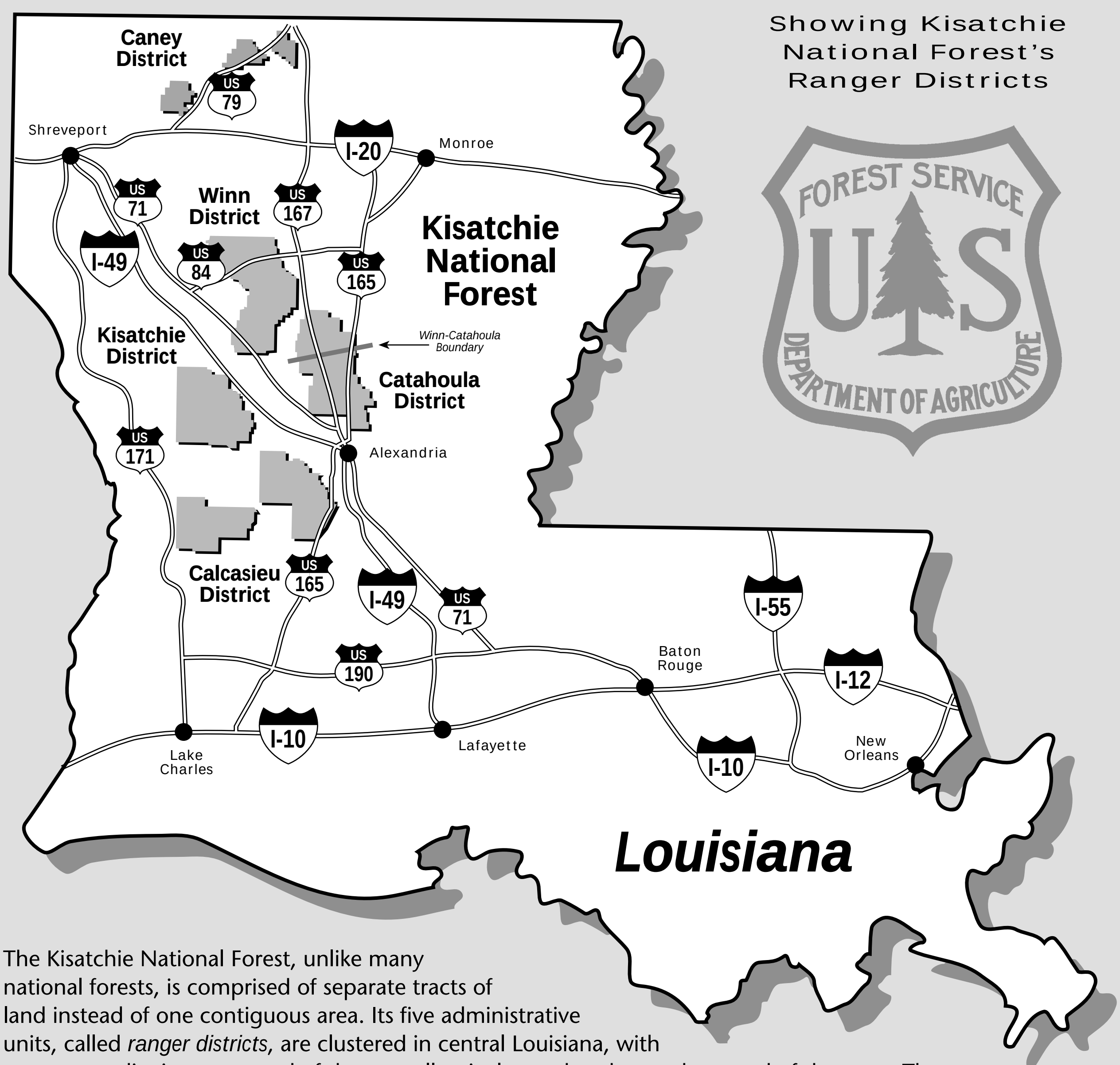
Major news articles announcing our revision effort appeared in the Alexandria, Baton Rouge, and Shreveport newspapers.

During the period of August 16–25, 1993 our public affairs personnel conducted a statewide print and electronic media tour. They visited all major population centers in the state and distributed copies of the *Planner* newsletter to the media.

During the period September 15–24, 1993 open houses were conducted on each ranger district.

The Forest received a total of 152 responses in the form of letters and telephone calls during the public comment period. A total of 737 issues and concerns were identified within the 152 responses. Of those, 167 issues and concerns were beyond the scope of what a Forest Plan revision can accomplish. Issues and concerns that were outside the scope of a Forest Plan revision fall into the following categories: beyond forest authority; being handled by other government agencies; something that can be handled administratively; not feasible to resolve; no opportunity to resolve in the planning process; no issues identified; or the comment deals with the planning process itself. These issues and concerns were not

FIGURE 1–1, FOREST VICINITY MAP



The Kisatchie National Forest, unlike many national forests, is comprised of separate tracts of land instead of one contiguous area. Its five administrative units, called *ranger districts*, are clustered in central Louisiana, with one ranger district composed of three small units located at the northern end of the state. The Forest's districts are located in the following parishes and municipalities: *Caney* – Claiborne / Webster, Homer; *Catahoula* – Grant / Rapides, Bentley; *Calcasieu* – Rapides / Vernon, Boyce; *Kisatchie* – Natchitoches, Natchitoches; *Vernon* – Vernon, Leesville; *Winn* – Winn / Grant / Natchitoches, Winnfield.

lost, they were forwarded to the appropriate officials for review.

The remaining 570 issues and concerns were used to develop a range of issues to be addressed in the Kisatchie's Forest Plan revision. A total of 13 significant issue statements were identified.

Appendix A of this FEIS provides a detailed explanation of the public involvement process used to identify issues and concerns for this Forest Plan revision.

ISSUES TO BE ADDRESSED IN THE FOREST PLAN

The following are the 13 significant issues to be addressed by the Kisatchie's Forest Plan revision. These issues reflect input from both the public and Forest Service personnel. They identify subjects of widespread interest concerning management of the Kisatchie National Forest.

Each issue group is followed by a brief narrative description, expressed in the form of a planning question. In most issue groups, the narrative description is followed by a list of facets, also expressed as a question, that further clarify the issue. These facets summarize the comments received within each group during the comment period and help to focus on the major aspects of the issue.

ISSUE #1: TIMBER SUPPLY

How will the needs for other resources affect timber harvest levels on the Forest and how will the change in allowable sale quantity (ASQ) affect local economies?

A. What will be the Forest's ASQ and how will it be affected due to coordination with other resource activities — for example, Red-cockaded Woodpecker (RCW) management, streamside management zones (SMZs), southern pine beetle (SPB) infestations, unsuitable lands, old growth, mussels, and other factors?

B. What lands should not be designated as suitable for timber production — for example, lakesides, trails, recreation areas and other sensitive areas?

C. How will changes in timber harvest levels affect the local economy, especially jobs and income?

ISSUE #2: BIOLOGICAL DIVERSITY

What forest management direction and standards and guidelines should be implemented to maintain or improve biological diversity?

A. What management direction and standards and guidelines should be implemented to conserve and maintain rare or sensitive plant and animal communities — for example, bogs, registry areas, barrens, prairies? What research is required to properly manage these areas? What, if any, recreation uses should be permitted in these areas?

B. What management direction and standards and guidelines can be implemented to maintain research natural areas (RNAs)? What criteria should be used to select additional RNAs? What, if any, recreation uses should be allowed in RNAs?

C. What management direction and standards and guidelines should be implemented to recover, restore and conserve the threatened, endangered, sensitive, and conservation species occurring on the Kisatchie National Forest? What, if any, forest management practices or activities are necessary to aid recovery of the Louisiana black bear?

D. To what extent should longleaf pine, cypress, and the other naturally occurring forested landscapes and natural communities of central Louisiana be restored?

E. What measures should be implemented to identify, protect and maintain a forest component possessing old-growth characteristics?

ISSUE #2: BIOLOGICAL DIVERSITY

ISSUE #3: LAND USE

ISSUE #4: MINERALS DEVELOPMENT

ISSUE #5: RANGE / GRAZING

ISSUE #6: RED-COCKADED WOODPECKER

F. What are the effects of pine straw raking and harvest; and to what extent should this practice be permitted to occur?

G. Are pre-European settlement conditions a valid biodiversity benchmark? If so, how much, if any, of the Forest should be managed for pre-European settlement conditions. Can it be done? How long will it take? How much will it cost?

H. To what extent should desirable nonnative vegetation be introduced or allowed on the forest?

I. What measures should be taken to maintain, protect, and improve biological diversity?

ISSUE #3: LAND USE

What are appropriate uses of National Forest System lands with respect to special uses, military training, landfills, large land exchanges and acquisitions, and easements?

A. What priority level should be given to acquiring land tracts involving wetlands, rare or sensitive natural communities or species including Red-cockaded Woodpecker habitat linkages?

B. Should the management direction for former military Camps Livingston and Claiborne be different than the general forest area?

C. How can the Forest minimize the effects of special-use easements on other resource management goals?

D. How much of the Vernon Unit of the Calcasieu District's military limited use land should be used for more intensive military ground and training activities by the Department of the Army?

ISSUE #4: MINERALS DEVELOPMENT

To what extent should the Forest provide opportunities for mineral development? Should the forest modify its direction on oil, gas, and common variety minerals, including Forest Service use?

ISSUE #5: RANGE / GRAZING

How much of the Forest should be allocated and managed for livestock forage in light of declining use trends?

A. What impact would the elimination of the range management program have on current and future range permittees, other resources and forest programs?

B. How much of the Forest should be allocated to range development?

C. What impacts will livestock use have on plant and animal communities?

ISSUE #6: RED-COCKADED WOODPECKER

Consistent with the regional direction, how should the Red-cockaded Woodpecker (RCW) and its habitat be managed to provide for long-term viable RCW populations on the Forest?

A. How much of the Kisatchie National Forest's lands should be allocated to RCW management?

B. What direct habitat improvements and management practices will best meet the needs of the RCW?

C. How are the RCW clusters / habitat within the wilderness to be managed?

D. What SPB suppression activities should be allowed within RCW habitat — for example, should cavity trees and foraging areas be protected?

ISSUE #7: RECREATION

What variety of outdoor recreation experiences should the Forest provide and how will they affect other forest resources and the local economy?

A. How should off-road vehicles (ORVs) be managed on the Forest to provide recreation opportunities and protect other resources?

B. Should additional recreation opportunities be offered at scattered locations across the Forest — for example, outdoor and cultural resource interpretation facilities; hiking, horseback, mountain bike and all terrain vehicles (ATV) trails; watchable wildlife projects, hunter camps, public shooting ranges, additional walk-in hunting areas, and rental cabins? What kinds of facilities and experiences should be provided at the Forests' campgrounds? How and where are we going to provide for the physically challenged recreationist?

C. What type of management direction is needed along trails to protect their visual corridors?

D. Should Cunningham Brake roadless area be recommended for wilderness study? How will designation affect use of other resources?

E. Should Castor Creek, Drakes Creek, Kisatchie Bayou, Whiskey Chitto Creek, East Fork Sixmile Creek, and West Fork Sixmile Creek be recommended for designation as national wild & scenic rivers? How will designation affect the use of other resources?

F. How will the availability of recreational activities, especially hunting, affect the local economy?

ISSUE #8: RIPARIAN

What measures are needed to designate and protect riparian / wetland areas and streamside management zone resources?

A. How wide should riparian management zones be to protect riparian dependent resources on perennial, intermittent, and ephemeral streams?

B. How will resource values associated with riparian areas be protected? What additional measures are needed to minimize the impact of upland management activities on streams?

C. What, if any, special consideration should be given to those streams wholly or partially on national forest lands that are designated as State natural and scenic streams?

D. How will water quality and aquatic habitat be maintained to protect the Louisiana pearlshell mussel?

ISSUE #9: FOREST ROADS

How should the Forest's road system be managed to meet resource needs and provide adequate public access?

A. What minimum density of local roads is required to provide permanent, effective access to national forest lands for all resource management needs? Of this amount, what portion should be managed as "open for motor vehicle use" (continuous or seasonal) for dispersed recreation? What monitoring is required?

B. What effects will road construction and reconstruction have on other resources?

ISSUE #7: RECREATION

ISSUE #8: RIPARIAN

ISSUE #9: FOREST ROADS

ISSUE #10: PRESCRIBED BURNING

ISSUE #11: SILVICULTURE

ISSUE #12: WILDLIFE AND FISH

ISSUE #13: FOREST HEALTH

ISSUE #10: PRESCRIBED BURNING

What will be the role of prescribed fire in achieving forest management goals and objectives?

A. To what extent, at what time of year, and at what frequencies will prescribed fire be used to manipulate forest conditions — for example, habitat management areas (HMAs) vs. preserves vs. general forest? How many acres and what size blocks can or will be burned during the growing season?

B. What should be the future direction for prescribed burning on sensitive Kisatchie soils?

C. Should prescribed fire be used to manage the Kisatchie Hills Wilderness?

D. How will plants and animals be affected by prescribed burning, especially growing season burning?

E. To what extent should plow lines be used? How will they affect the use or protection of resources?

ISSUE #11: SILVICULTURE

How will the application of various silvicultural systems and management practices affect the condition of other forest resources and sustainability of overall forest health?

A. How will the use of the two-aged and uneven-aged silvicultural systems affect timber and non-timber resources; and how well does this system duplicate natural processes?

B. How will the mix of rotation ages and harvest cutting methods for even-aged and two-aged management affect habitat and visual diversity, timber productivity, and duplication of natural processes?

C. How do current tree harvest and site preparation methods affect the long-term sustenance of forest resources and overall forest health?

D. What management direction should guide ecosystem management and the use of landscape ecology principles?

E. What cutting methods and practices are silviculturally and socially acceptable in bottomland hardwood forest types?

F. What is the future role of herbicide use in forest management?

G. How should we manage hardwoods within pine stands and to what extent should mixtures of pines be managed?

ISSUE #12: WILDLIFE AND FISH

How much and what kinds of wildlife and fish habitats should the forest provide for a diverse wildlife program?

A. What should be the future management direction for the two national wildlife management preserves? Should it be consistent between the two preserves?

B. What wildlife and / or fisheries programs and management activities need to be expanded upon, reduced or otherwise modified to provide adequate habitat for native wildlife and fish? What should be the future hunting and fishing opportunities offered on the forest? Should we reexamine the need for wildlife food plots, openings and linear strips? What is the future of the featured species concept? Should greater emphasis be placed on neotropical migratory birds (NTMBs) and other nongame wildlife species?

C. How should upland hardwood species be managed to adequately meet the needs of wildlife?

D. What array of management and ecological indicators are appropriate to effectively monitor habitat health and response to management?

ISSUE #13: FOREST HEALTH

What forest management practices are necessary to maintain or improve forest health, especially protection from insects and diseases?

PLANNING RECORDS

Additional background information, maps, and supporting documents used in the Kisatchie National Forest land management plan revision process are contained in the planning records. These records are maintained at the Forest Supervisor's office as required by ***36 CFR 219.10 (h)***. The planning record in its entirety is incorporated here by reference. Specific records are referenced throughout the FEIS and Forest Plan as appropriate.

The planning records are available for review during regular business hours. Please write or call the Kisatchie National Forest. *Address*: USDA Forest Service, Forest Plan Revision, 2500 Shreveport Highway, Pineville, Louisiana 71360. *Telephone number*: 318-473-7160.

Chapter 7 of this FEIS is a glossary that defines many of the terms used in this document and in the Forest Plan. Chapter 8 lists literature and references cited in the FEIS.

PLANNING RECORDS

Alternatives, Including the Proposed Action

Chapter 2

PURPOSE AND ORGANIZATION

Chapter 2 presents alternatives for managing the Kisatchie National Forest. The chapter is divided into five major sections:

- Changes made between Draft and Final documents
- Development of the alternatives
- Range of alternatives
- Alternatives considered in detail
- Comparison of the alternatives

CHANGES MADE BETWEEN DRAFT AND FINAL DOCUMENTS

The Draft EIS and Proposed Revised Forest Plan documents were available for public review for approximately 3 months (November, 1997 through January, 1998). The public review process and comments received during the review period are described in the Final EIS Chapter 1 (Purpose and Need for Action), Appendix A (Issues, Concerns, and Opportunities), and in Appendix K (Comment letters and responses). After the public comment period had closed and the comments reviewed, the Forest interdisciplinary team (IDT) explored ways to respond to the concerns of the public.

Comments suggested that:

- Alternatives be modified;
- Alternatives be developed or evaluated that were not given serious consideration in the Draft EIS;
- Analysis presented in the Draft EIS be supplemented, modified, or improved; and,
- Factual corrections be made in information or data used in the analysis.

After reviewing these comments, the IDT and Forest management team agreed on changes that should be made in the Final EIS. In most cases, the changes involved minor re-analysis of methods and data common to all alternatives. A new alternative, Alternative Modified D (Mod D), was developed based on the public response to specific issues and the proposed resolution of those issues raised in the Draft EIS. The new alternative proposes different land management prescriptions and standards and guidelines from the set of alternatives analyzed in the Draft EIS. The Proposed Revised Forest Plan was changed to reflect the changes between Alternative D, the Draft preferred alternative, and Alternative Mod D. A detailed list of responses and changes can be found in Appendix K. The Revised Forest Plan and the Final EIS were submitted to the Regional Forester for review.

The following is a summary of the major changes made between the Draft and Final EIS to respond to concerns raised during the public comment period:

- Alternative Mod D was added to the set of alternatives largely in response to comments on Alternative D, the Draft EIS perferred alternative. Information from the original Alternative D was left in the text and tables of the Final EIS in order to help identify changes between the preferred alternatives in the Draft and Final EIS's.
- The FORPLAN forestwide planning model used for much of the Draft EIS analyses was modified to accomodate changes in land allocation, management prescription, and mitigation proposed in the Mod D alternative. The most substantive changes were the allocation of approxi-

CHANGES MADE BETWEEN DRAFT AND FINAL DOCUMENTS

mately 15,000 additional acres of managed old-growth patches and 2,000 additional acres of Special Interest Areas. Effects of these changes are shown in Chapter 4 of the Final EIS.

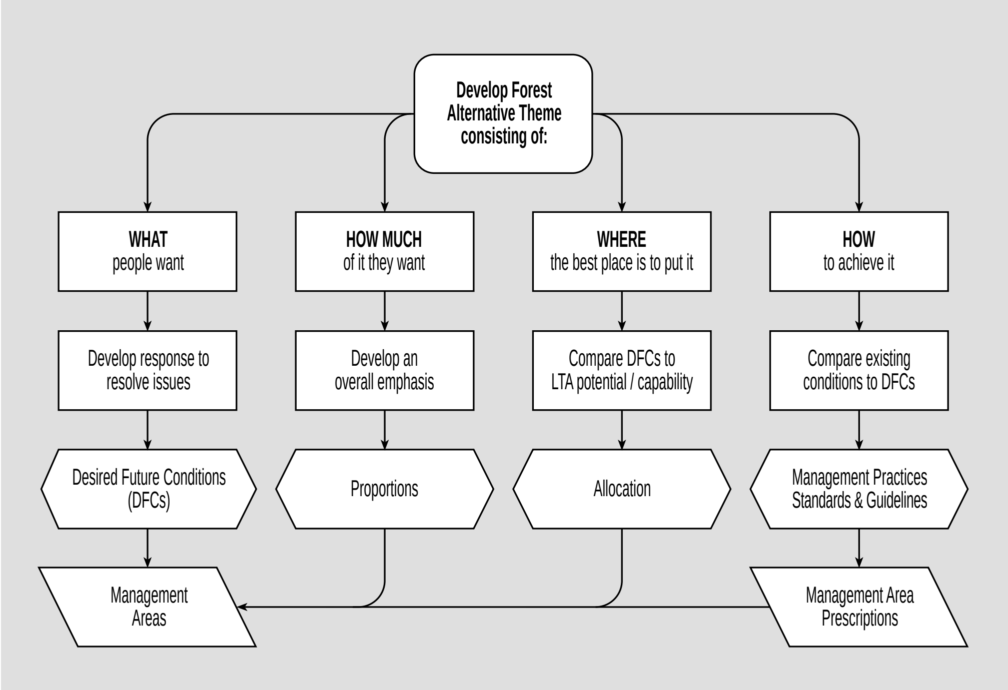
- Modifications were made to the Draft alternatives in order to provide a wider range of oil and gas leasing choices, address internal management concerns, and better analyze the effects of leasing on the Forest. Acres available for leasing now range from none (Alternative C) to the amount currently available for leasing (Alternative A). Also, the application of No Surface Occupancy (NSO) and Controlled Surface Use (CSU) stipulations in leases now vary in accordance with the theme, or emphasis, of the alternative. Chapter 2 of the Final EIS explains the differences in the alternatives' mitigation practices and Chapter 4 describes the expected effects to resources between alternatives.

- The acres shown as Streamside Habitat Protection Zones (SHPZS) and Riparian Area Protection Zones (RAPZS) in the FORPLAN model were reduced by 8,600 acres. These acres are SHPZS and RAPZS within Research Natural Areas, developed recreation sites, Special Interest Areas, State Registry Natural Areas, and Saline Bayou Wild and Scenic River Corridor. They were modeled to utilize a more restrictive management prescription, specific to these special emphasis areas, instead of the general prescription used for most of the other streamside areas.

- Additional information has been added to Chapter 3 of the Final EIS that explains how recent military proposals relate to this Revised Plan decision and the environmental analyses. Because a decision of whether or not to allow increased use of the southern portion of the Vernon Unit is not expected until after the Record of Decision for this Revised Plan, any changes to Forest allocations or Desired Future Conditions would amend the Revised Plan. The environmental analysis accompanying that decision would evaluate the effects to the Forest's ability to meet it's goals and objectives.

- The budget level described in Appendix C of the Forest Plan was lowered and is compared to current (FY99) levels, which represents a historic annual operating budget. Overall, the planned budget is approximately 33% higher than the historic budget level. Some areas, like minerals and geology management, are expected to be lower; however, some areas, like recreation construction projects,

FIGURE 2–1, DEVELOPMENT OF AN ALTERNATIVE



threatened and endangered species habitat management, and heritage resource management, are expected to increase in order to fully implement the Plan Revision's objectives. If budget levels stay near the historic level, a proportionate reduction in Plan outputs for those resource areas can be expected.

- The timber suitability analysis was recomputed using updated resource information from our Geographical Information System. Minor changes were made in the proportions of unsuitable acreage classes on the Forest for all the alternatives. The final acres of timber-suitable lands did not change, however, for any of the Draft EIS alternatives.

- The species selected as management indicators were revisited. Monitoring and evaluation requirements for management indicator species were also clarified to conform with current regional and national direction.

DEVELOPMENT OF THE ALTERNATIVES

An alternative is a strategy that guides the management of the land and resources of the Forest from its current state to a desired condition in the future.

The primary goal in formulating alternatives is to provide a basis for identifying the alternative that comes nearest to maximizing net public benefits, consistent with resource integration and management requirements of the implementing regulations for the National Forest Management Act [***36 CFR 219.12*** (*f*)].

A range of alternatives was analyzed for consideration as possible forest plans for the Kisatchie National Forest. Each alternative represents a different management emphasis for the Forest. They are designed to address the significant issues and concerns that were identified during the planning process. Each alternative provides a different mixture of goods and services for the public and a different combination of resource outputs, land uses and environmental effects. The alternatives were developed according to National Environmental Policy Act (NEPA) procedures (***40 CFR 1502***).

PROCESS USED TO DEVELOP ALTERNATIVES

Alternative development began with analysis of the 13 significant issues raised during the planning process. These issues are described in Chapter 1 and Appendix A of this final environmental impact statement (FEIS). The issues were characterized as to their potential impact on alternative development. Three types of issues were recognized:

- Driving issues containing a great amount of variability or conflict, around which an alternative theme could be developed.

- Modifying issues, which could be used to further refine the emphasis of an alternative theme.

- Additional issues of limited extent or influence, which could apply equally to all alternatives.

Driving issues, such as commodity production, amenity values, or wildlife habitats, served as the core for development of an alternative theme. Modifying issues such as the amount of old-growth forest, the extent of uneven-aged management, or the amount and variety of recreational experiences contributed to the overall emphasis of an alternative theme.

The combination of a driving issue with those modifying issues considered to be compatible in terms of resource emphasis, conditions, and eventual outcomes became the basis for developing a desired future condition (DFC).

A DFC statement is a narrative description of the land and resource conditions which are expected to occur when goals and objectives for an area are fully achieved. It includes information on the forest appearance, landscape alterations, associated wildlife, and the potential for human experience.

A set of DFC statements were developed which could conceivably resolve all issues raised during the planning process. These DFCs essentially describe *what* people wanted.

The next step was to build a set of management alternatives that responded in various ways to *how much* people wanted of each DFC, and *where* it should occur on the Forest. This was done by allocating the full range of DFCs in varying proportions to the entire Forest area, for each alternative theme.

DEVELOPMENT OF THE ALTERNATIVES

PROCESS USED TO DEVELOP ALTERNATIVES

MANAGEMENT PRESCRIPTIONS AND MANAGEMENT AREAS

MANAGEMENT AREA 1 — FOREST PRODUCTS

The landtype association (LTA) level of the National Hierarchical Framework of Ecological Units (national hierarchy) guided on-the-ground allocation of DFCs. The LTAs provided critical information about the potential capability of an area to eventually meet that DFC in terms of ecological feasibility and economic efficiency. For a more complete discussion of the Kisatchie's use of the national hierarchy and LTAs, see Chapter 3.

The DFCs were allocated at the landscape scale. The proportion of land allocated to each DFC and the placement of the DFCs on the Forest varied to fit the theme associated with each management alternative. Thus, alternatives were based upon the mix and extent of DFCs within them; and DFCs were based upon all significant issues raised during the planning process.

An alternative theme not only describes *what*, *where*, and *how much* is wanted, but its DFCs also provide insights into *how* to achieve it. Each narrative description serves as an integrated template for generating more specific technical resource management direction. The combination of the area allocated to a DFC and the resource management direction, or management area prescription, required to achieve it becomes a management area. See figure 2–1.

MANAGEMENT PRESCRIPTIONS AND MANAGEMENT AREAS

All alternatives have a set of goals and objectives, and consist of a combination of *management areas*. Management areas are relatively large areas with unique locations having common management direction called management area *prescriptions*. Management area prescriptions are composed of specific activities or practices scheduled for application on the management area and designed to achieve stated objectives. Each prescription also has an associated set of standards and guidelines which provide rules, constraints, and the usual course of action needed to implement proposed activities. The management area prescription with its associated activities, practices, standards, and guidelines is the operational link in achieving the DFC for a particular management area.

The Final EIS alternatives recognize 13 possible management areas. Some management areas are further subdivided into sub-management areas, to recognize:

- Differences in management intensity to produce varying levels of outcomes or outputs.
- Differences in time frames needed to meet management area goals.
- Differences in the inherent capability of the land which recognizes areas of common response to an overall management strategy. These areas were identified based on the application of the LTA level from the national hierarchy.

The land area of the Forest is allocated to management areas differently in each alternative. Tables 2–1 through 2–7 display the allocation of Forest land to management areas for each alternative. Due to variations in alternative themes, alternatives do not necessarily allocate land to all 13 management area types. Detailed prescriptions for management areas can be found in Chapter 3 of the Forest Plan. Following is a brief description of each management area and sub-management areas they may contain.

MANAGEMENT AREA 1 — FOREST PRODUCTS

Overall emphasis would be on providing high levels of commodity outputs. The focus of forest management activities and practices would be on producing vigorously growing stands of pine sawtimber. Additional wood fiber products would be produced through periodic stand-tending activities and the salvaging of dead and dying trees. Prescribed burning is applied infrequently and to a limited extent during the dormant season. The predominant silvicultural system is even-aged management. All perennial and intermittent streams receive a minimum buffer of 50 feet on each side of the stream channel to protect water quality, riparian areas, and aquatic and streamside habitats. Management Area 1 contains 3 sub-management areas:

Sub-management Area 1A

Emphasis would be on producing the highest sustainable level of wood products at minimum cost while providing minimal protection of other resources. The rotation age is 50 years for all pine stands, 80 years for upland hardwood stands, and 100 years for bottomland hardwood stands. The primary regeneration method is clearcutting, with openings up to 80 acres allowed.

Sub-management Area 1B

Emphasis would be on producing and sustaining high levels of wood products. Other resources would receive a moderate level of protection during timber management activities. The rotation age is 50 years for slash pine stands, 60 years for all other pine stands, 100 years for upland hardwood stands, and 120 years for bottomland hardwood stands. The primary regeneration methods are clearcutting and seed-tree, with openings up to 80 acres allowed.

Sub-management Area 1C

Emphasis would be on producing and sustaining a high level of a mixture of commodity outputs. Other resources would receive a moderate level of protection during management activities. The rotation age is 50 years for slash pine stands, 70 years for all other pine stands, 100 years for upland hardwood stands, and 120 years for bottomland hardwood stands. The primary regeneration methods are seed-tree and shelterwood, with openings up to 40 acres allowed.

MANAGEMENT AREA 2 — AMENITY VALUES

Overall emphasis would be on protecting and enhancing non-market resources and values. Commodity outputs would be considered as secondary and occur as by-products of management practices. Forest management practices and activities would be focused on protecting, maintaining or enhancing amenity values, such as recreation, visual quality, wildlife and plant habitats. The area would offer the highest level of recreational opportunities and experiences in a relatively undisturbed or natural setting. There would be no sustained production of forest products, although some cutting of trees would be allowed to improve overall stand characteristics for amenity reasons or to salvage or control large natural mortality events such as wildfire, windthrow, or southern pine beetle. No silvicultural system is applied, and no rotation ages are set. The regeneration methods of group and single-tree selection are allowed to meet specific amenity resource objectives. All perennial and a large number of the intermittent streams receive a minimum buffer of 100 feet on each side of the stream channel to protect water quality, riparian areas, and aquatic and streamside habitats. Management Area 2 contains 4 sub-management areas:

Sub-management Area 2AL

Emphasis would be on protecting and enhancing non-market resources and values associated with longleaf pine dominated landscapes while allowing the highest level of landscape-wide alteration, such as prescribed fire and stand improvement practices. Prescribed fire is applied every 2–5 years, with increased emphasis on growing season burns.

Sub-management Area 2AS

Emphasis would be on protecting and enhancing non-market resources and values associated with shortleaf pine / oak-hickory dominated landscapes while allowing the highest level of landscape-wide alteration. Prescribed fire is applied every 7–10 years.

Sub-management Area 2AM

Emphasis would be on protecting and enhancing non-market resources and values associated with mixed hardwood-loblolly pine dominated landscapes while allowing the highest level of landscape-wide alteration. Prescribed fire is applied every 15–20 years.

Sub-management Area 2B

Emphasis would be on protecting and enhancing non-market resources and values while allowing a moderate level of landscape-wide alteration. Prescribed fire is applied infrequently and to a limited extent.

DEVELOPMENT OF THE ALTERNATIVES

MANAGEMENT PRESCRIPTIONS AND MANAGEMENT AREAS

MANAGEMENT AREA 3 — NATIVE COMMUNITY RESTORATION

MANAGEMENT AREA 3 — NATIVE COMMUNITY RESTORATION

Overall emphasis would be on restoring and maintaining the composition, structure and processes that formed the major landscape plant communities on those LTAs where they occurred prior to the large scale logging of the early 1900s. Rare and unique natural plant communities embedded within these landscapes would benefit from management activities. The predominant silvicultural system is even-aged management. All perennial and intermittent streams receive a minimum buffer of 100 feet on each side of the stream channel to protect water quality, riparian areas, and aquatic and streamside habitats. Management Area 3 contains 6 sub-management areas:

Sub-management Area 3BL

Emphasis would be on restoring native fire-dependent longleaf pine communities in an intermediate time period while providing a moderate level of protection to other resources. Prescribed fire is applied every 2–5 years, with increased emphasis on growing season burns. The rotation age is 70 years for all pine and pine-hardwood stands, 100 years for hardwood-pine and upland hardwood stands, and 120 years for bottomland hardwood stands. The primary regeneration method is clearcutting, with openings up to 80 acres allowed.

Sub-management Area 3BS

Emphasis would be on restoring native shortleaf pine / oak-hickory communities in an intermediate time period while providing a moderate level of protection of other resources. Prescribed fire is applied every 7–10 years. The rotation age is 70 years for all pine and pine-hardwood stands, 100 years for hardwood-pine and upland hardwood stands, and 120 years for bottomland hardwood stands. The primary regeneration method is clearcutting, with openings up to 80 acres allowed.

Sub-management Area 3BM

Emphasis would be on restoring native mixed hardwood-loblolly pine communities in an intermediate time period while providing a moderate level of protection of other resources. Prescribed fire is applied every 15–20 years. The rotation age is 70 years for all pine and pine-hardwood stands, 100 years for hardwood-pine and upland hardwood stands, and 120 years for bottomland hardwood stands. The primary regeneration method is clearcutting, with openings up to 80 acres allowed.

Sub-management Area 3CL

Emphasis would be on restoring native, fire dependent longleaf pine communities in an extended time period while providing a moderate to maximum level of protection of other resources. Prescribed fire is applied every 2–5 years, with increased emphasis on growing season burns. The rotation age is 100 years for all pine and pine-hardwood stands, 130 years for hardwood-pine and upland hardwood stands, and 150 years for bottomland hardwood stands. The primary regeneration method is clearcutting, with openings up to 40 acres allowed.

Sub-management Area 3CS

Emphasis would be on restoring native shortleaf pine / oak-hickory communities in an extended time period while providing a moderate to maximum level of protection of other resources. Prescribed fire is applied every 7–10 years. The rotation age is 100 years for all pine and pine-hardwood stands, 130 years for hardwood-pine and upland hardwood stands, and 150 years for bottomland hardwood stands. The primary regeneration method is clearcutting, with openings up to 40 acres allowed.

Sub-management Area 3CM

Emphasis would be on restoring native mixed hardwood-loblolly pine communities in an extended time period while providing a moderate to maximum level of protection of other resources. Prescribed fire is applied every 15–20 years. The rotation age is 100 years for all pine and pine-hardwood stands, 130 years for hardwood-pine and upland hardwood stands, and 150 years for bottomland hardwood stands. The primary regeneration method is clearcutting, with openings up to 40 acres allowed.

MANAGEMENT AREA 4 — RED-COCKADED WOODPECKER HABITAT AND AMENITY VALUES

Overall emphasis would be on managing Red-cockaded Woodpecker (RCW) habitat to achieve established population objectives. Forest management practices and activities would focus on protecting, maintaining or enhancing amenity values, such as recreation, visual quality, plant and wildlife habitats. The area would offer the highest level of recreational opportunities and experiences in a relatively undisturbed or natural setting. There would be no sustained production of forest products, although some cutting of trees would be allowed to improve overall stand characteristics for amenity reasons or to salvage or control large natural mortality events such as wildfire, windthrow, or southern pine beetle. Commodity outputs would be considered as secondary and occur as by-products of management practices. No silvicultural system is applied, and no rotation ages are set. The regeneration methods of group and single-tree selection are allowed to meet specific amenity resource objectives, especially to produce and maintain RCW habitat. All perennial and intermittent streams receive a minimum buffer of 100 feet on each side of the stream channel to protect water quality, riparian areas, and aquatic and streamside habitats. Management Area 4 contains 3 sub-management areas:

Sub-management Area 4AL

Emphasis would be on managing for optimal RCW habitat and on protecting and enhancing non-market resources and values associated with landscapes dominated by longleaf pine, while allowing the highest level of landscape-wide alteration. Prescribed fire is applied every 2–5 years, with some emphasis on growing season burns.

Sub-management Area 4AS

Emphasis would be on managing for suitable RCW habitat and on protecting and enhancing non-market resources and values associated with landscapes dominated by shortleaf pine / oak-hickory, while allowing the highest level of landscape-wide alteration. Prescribed fire is applied every 5–10 years.

Sub-management Area 4AM

Emphasis would be to manage RCW habitat and to protect and enhance non-market resources and values associated with landscapes dominated by mixed hardwood-loblolly pine, while allowing the highest level of landscape-wide alteration. Prescribed fire is applied every 10–15 years, to maintain or improve RCW habitat conditions where possible.

MANAGEMENT AREA 5 — RED-COCKADED WOODPECKER AND NATIVE COMMUNITY RESTORATION

Overall emphasis would be on managing RCW habitat to achieve established population objectives. Forest management activities and practices would be focused on restoring and maintaining the composition, structure, and processes that formed major landscape plant communities on those LTAs where they occurred prior to the large scale logging of the early 1900s. Rare and unique natural plant communities embedded within these landscapes would benefit from management activities. The predominant silvicultural system is even-aged management. All perennial and intermittent streams receive a minimum buffer of 100 feet on each side of the stream channel to protect water quality, riparian areas, and aquatic and streamside habitats. Management Area 5 contains 3 sub-management areas:

Sub-management Area 5CL

Emphasis would be on managing for optimal RCW habitat and on restoring native fire-dependent longleaf pine communities for an extended period while protecting other resources at a moderate-to-maximum level. Rotation age for longleaf pine and pine-hardwood stands is 120 years; 130 years for hardwood-pine and upland hardwood stands; and 150 years for bottomland hardwood stands. Prescribed fire is applied every 2–5 years, with increased emphasis on growing season burns. The primary regeneration method is clearcutting with reserves, with openings up to 40 acres allowed.

Sub-management Area 5CS

Emphasis would be on managing for suitable RCW habitat and on restoring native shortleaf pine / oak-hickory communities in an extended time period while providing a moderate to maximum level of protection of other resources. Rotation age for shortleaf pine and pine-hardwood stands is 120 years, 130 years for hardwood-pine and upland hardwood stands, and 150 years for bottomland hardwood stands. Prescribed fire is applied every 5–10 years. The primary regeneration method is clearcutting with reserves, with openings up to 25 acres allowed.

Sub-management Area 5CM

Emphasis would be on managing RCW habitat and on restoring native mixed hardwood-loblolly pine communities for an extended period while protecting other resources at a moderate-to-maximum level. Rotation age for loblolly pine and pine-hardwood stands is 100 years; 130 years for hardwood-pine and upland hardwood stands; and 150 years for bottomland hardwood stands. Prescribed fire is applied every 10–15 years, to maintain or improve RCW habitat conditions wherever possible. The primary regeneration method is shelterwood with reserves, with openings up to 25 acres allowed.

MANAGEMENT AREA 6 — RED-COCKADED WOODPECKER AND WILDLIFE HABITATS

Overall emphasis would be on managing RCW habitat to achieve established population objectives. Forest management activities and practices would focus on creating and managing those habitat mosaics, conditions and attributes most beneficial to indigenous wildlife communities. The predominant silvicultural system is even-aged management. All perennial and intermittent streams receive a minimum buffer of 150 feet on each side of the stream channel to protect water quality, riparian areas, and aquatic and streamside habitats. Management Area 6 contains 2 sub-management areas:

Sub-management Area 6BL

Emphasis would be on managing for optimal RCW habitat and on producing high quality wildlife habitats within open, frequently burned landscapes. Other resources would be provided a moderate to maximum level of protection. The rotation age for longleaf pine and pine-hardwood stands is 120 years, 130 years for hardwood-pine and upland hardwood stands, and 150 years for bottomland hardwood stands. Prescribed fire is applied every 2–5 years, with increased emphasis on growing season burns. The primary regeneration methods are clearcutting with reserves, with openings up to 40 acres; and shelterwood with reserves, with openings up to 25 acres.

Sub-management Area 6BS

Emphasis would be on managing for suitable RCW habitat and on producing high quality wildlife habitats within mixed pine-hardwood landscapes. Other resources would be provided a moderate to maximum level of protection. The rotation age for shortleaf pine and pine-hardwood stands is 120 years, 130 years for hardwood-pine and upland hardwood stands, and 150 years for bottomland hardwood stands. Prescribed fire is applied every 5–10 years. The primary regeneration methods are clearcutting with reserves and shelterwood with reserves, with openings up to 25 acres allowed.

MANAGEMENT AREA 7 — HARDWOODS

Overall emphasis would be on providing high levels of hardwood composition, featuring hard mast producers. The primary focus of forest practices and activities would be on improving the composition of hardwoods in all forested stands. A large majority of the area would be managed as hardwood or mixed stands of hardwoods and pines. Those wildlife species that are associated with habitats containing an increased component of hardwood, especially hard mast producers, would benefit from this management strategy. The predominant silvicultural system is even-aged management. The rotation age for all pine and pine-hardwood stands is 100 years, 130 years for all mixed hardwood-pine and upland hardwood stands, and 150 years for bottomland hardwood stands. The primary regeneration method is shelterwood with reserves, with openings up to 25 acres allowed. Prescribed fire is rarely applied and limited in extent. All perennial and intermittent streams receive a minimum buffer of 100 feet on each side of the stream channel to protect water quality, riparian areas, and aquatic and streamside habitats.

MANAGEMENT AREA 8 — WILDLIFE HABITATS

Overall emphasis would be on providing a wide range of favorable habitats for all native and desirable nonnative wildlife. Forest management activities and practices would focus on creating and managing those habitat mosaics, conditions and attributes most beneficial to indigenous wildlife communities. The predominant silvicultural system is even-aged management. The rotation age for all pine and pine-hardwood stands is 100 years, 130 years for all mixed hardwood-pine and upland hardwood stands, and 150 years for bottomland hardwood stands. All perennial and intermittent streams receive a minimum buffer of 150 feet on each side of the stream channel to protect water quality, riparian areas, and aquatic and streamside habitats. Management Area 8 contains 4 sub-management areas:

Sub-management Area 8BL

Emphasis would be on producing high quality wildlife habitats created within open, frequently burned landscapes. Other resources would be provided a moderate-to-maximum level of protection. Prescribed fire is applied every 2–5 years, with increased emphasis on growing season burns. The primary regeneration methods are clearcutting with reserves and shelterwood, with openings up to 25 acres allowed.

Sub-management Area 8BS

Emphasis would be on producing high quality wildlife habitats created within mixed pine-hardwood landscapes. Other resources would be provided a moderate-to-maximum level of protection. Prescribed fire is applied every 7–10 years. The primary regeneration methods are clearcutting with reserves and shelterwood, with openings up to 25 acres allowed.

Sub-management Area 8BM

Emphasis would be on producing high quality wildlife habitats created within mixed hardwood-pine landscapes. Other resources would be provided a moderate to maximum level of protection. Prescribed fire is applied every 15–20 years. The primary regeneration methods are clearcutting with reserves and shelterwood, with openings up to 25 acres allowed.

Sub-management Area 8C

Emphasis would be on producing a mixture of high-quality wildlife habitats. Other resources would be given a moderate-to-maximum level of protection. Prescribed fire is applied to pine or pine-hardwood stands every 5–10 years to maintain or improve wildlife habitat conditions. The primary regeneration methods are seed-tree and shelterwood, with openings up to 40 acres allowed.

MANAGEMENT AREA 9 — MILITARY INTENSIVE USE

Overall military intensive use emphasis would be on small arms firing ranges, tank firing ranges, artillery range impact areas, bombing range, maneuver areas, and other related military facilities. This management area consists of Fort Polk and Peason Ridge Military Intensive Use Areas and the Claiborne U.S. Air Force Bombing and Gunnery Range. The Forest Service role would be secondary to military activities. In coordination with the military, forest management practices and activities would focus on allowing near-normal operations and on protecting and maintaining basic resource values to limit off-site impacts. Recreation opportunities would be limited by the needs and scheduling of the military. Hunting use may occur on a case-by-case basis. There would be no sustained production of timber products, but silvicultural practices may be carried out for stand health, regeneration, habitat improvement, or salvage purposes. Management Area 9 contains 2 sub-management areas:

Sub-management Area 9DL

Emphasis would be on managing RCW habitat and on producing the highest quality wildlife habitats created within open, frequently burned longleaf pine landscapes. Management activities would only be accomplished in coordination with the military.

Sub-management Area 9E

Emphasis would be on producing and sustaining a mixture of commodity outputs. Management activities would only be accomplished in coordination with the military.

MANAGEMENT AREA 10 — NATIONAL SCENIC RIVERS

Overall emphasis would be to provide a variety of recreational and other public uses. Forest management activities and practices would focus on protecting and enhancing the values for which a river was designated as a National Scenic River. Management Area 10 contains 2 sub-management areas:

Sub-management Area 10DM

Emphasis would be on managing the national scenic river and corridor while protecting some areas of marginal RCW habitat.

Sub-management Area 10EM

Emphasis would be on managing the national scenic river and corridor.

MANAGEMENT AREA 11 — NATIONAL WILDLIFE MANAGEMENT PRESERVES

Overall emphasis would be on managing wildlife habitats and providing dispersed recreation opportunities in the National Catahoula and Red Dirt Wildlife Management Preserves. Forest management activities and practices would be focused on creating and managing those habitat mosaics, conditions and attributes most beneficial to native wildlife communities and to provide conditions which sustain healthy, huntable populations of indigenous game species. The predominant silvicultural system is even-aged management. The primary regeneration methods are clearcutting with reserves and shelterwood, with openings up to 25 acres allowed. All perennial and intermittent streams receive a minimum buffer of 150 feet on each side of the stream channel to protect water quality, riparian areas, and aquatic and streamside habitats. Management Area 11 contains 4 sub-management areas:

Sub-management Area 11DL

Emphasis would be on managing for optimal RCW habitat. Forest management practices and activities would be focused on creating and managing those habitat mosaics, conditions and attributes most beneficial to the wildlife communities reliant upon open, frequently burned longleaf pine landscapes. The rotation age for longleaf pine and pine-hardwood stands is 120 years, 150 years for hardwood-pine and upland hardwood stands, and 170 years for bottomland hardwood stands. Prescribed fire is applied every 2–5 years, with increased emphasis on growing season burns.

Sub-management Area 11DS

Emphasis would be on managing for suitable RCW habitat. Forest management practices and activities would focus on creating and managing habitat mosaics, conditions, and attributes most beneficial to wildlife communities that rely on shortleaf pine / oak-hickory landscapes. Stand rotation age for shortleaf pine and pine-hardwood is 120 years, 150 years for hardwood-pine and upland hardwood, and 170 years for bottomland hardwood. Prescribed fire is applied every 5–10 years.

Sub-management Area 11DM

Emphasis would be on managing RCW habitat. Forest management practices and activities would focus on creating and managing those habitat mosaics, conditions, and attributes most beneficial to the wildlife communities that rely on mixed hardwood-loblolly pine landscapes. Stand rotation age for loblolly pine and pine-hardwood is 100 years, 150 years for hardwood-pine and upland hardwood, and 170 years for bottomland hardwood. Prescribed fire is applied every 10–15 years, to maintain or improve RCW habitat conditions wherever possible.

Sub-management Area 11E

Emphasis would be on providing the highest levels of hardwood stands and mixed stands of hardwoods and pines. Featured hardwoods would be those which produce hard mast. Stand rotation age for pine-hardwood is 100 years, 150 years for mixed hardwood-pine and upland hardwood, and 170 years for bottomland hardwood. Prescribed fire is rarely applied and limited in extent.

MANAGEMENT AREA 12 — PALUSTRIS EXPERIMENTAL FOREST

Overall emphasis would be on conducting research to improve southern pine regeneration through improved growth and yield procedures and other forest management techniques which enhance values of water, timber, and related forest resources. There would be no sustained production of timber products, however, silvicultural practices may be carried out for experimental purposes, stand health, regeneration or salvage purposes. Management Area 12 contains 2 sub-management areas:

Sub-management Area 12D

Emphasis would be on continuing research activities for southern pine forests while managing RCW habitat.

Sub-management Area 12E

Emphasis would be on continuing research activities for southern pine forests.

MANAGEMENT AREA 13 — KISATCHIE HILLS WILDERNESS

Overall emphasis would be on maintaining and protecting the enduring resource of wilderness as one of the Forest's multiple uses while providing a wide range of wildlife and plant habitats. The wilderness character would be perpetuated to provide for public values such as opportunities for scientific study, education, solitude, physical and mental challenge, and primitive recreation experiences.

RANGE OF ALTERNATIVES

USE OF BENCHMARKS

ESTABLISHING A RANGE OF ALTERNATIVES

ALTERNATIVES ELIMINATED FROM FURTHER DETAILED STUDY

MAXIMUM SUSTAINABLE ANNUAL REVENUE

RANGE OF ALTERNATIVES

USE OF BENCHMARKS

Benchmark analysis defines the range within which alternatives can be constructed [***36 CFR 219.12*** (*e*) (*1*)]. Benchmarks display physical, ecological, and technical capabilities. They are not limited by Forest Service policy or budget, discretionary constraints, or spatial feasibility. Benchmarks are physically and technically implementable, but may not be operationally feasible. They are not alternatives in one sense because they do not provide a total integrated program of management. Benchmarks provide reference points for comparing alternatives. Appendix B discusses each benchmark modeled.

ESTABLISHING A RANGE OF ALTERNATIVES

The National Forest Management Act (**NFMA**) requires the development and analysis of a broad range of reasonable alternatives responding to issues, concerns and opportunities identified during the forest planning process. Physical characteristics, laws, regulation and policy limit the range of alternatives. Preexisting conditions and / or land allocations may also affect the ability to resolve multiple issues on those land areas.

For a variety of reasons several relatively large Forest areas were previously recognized and established. The 1985 Forest Plan allocated them to separate management areas, which are brought forward into this Forest Plan revision process. They are:

- Kisatchie Hills Wilderness
- The Saline Bayou National Scenic River and its corridor
- Military intensive use areas
- Palustris Experimental Forest
- National Catahoula and Red Dirt Wildlife Management Preserves

The *Final Environmental Impact Statement for the Management of the Red-cockaded Woodpecker and its Habitat on National Forests in the Southern Region* (**RCW FEIS**) provided new regional long-term direction for the management of this bird and its habitat. It also established five tentative habitat management areas (**HMA**) on the Forest. Only those **DFC** statements compatible with the management requirements of the **RCW FEIS** were available for allocation within **HMAs**. Although the emphasis within a particular **HMA** varied by alternative, the ability of these areas to respond to some issues was limited. All alternatives comply with regional **RCW** direction.

A broad range of reasonable alternatives has been considered in this document, based on the following criteria:

- Alternatives are distributed between minimum and maximum benchmarks.
- Alternatives respond to issues and concerns raised during the planning process.
- Alternatives respond to regional management direction.
- A variety of management practices would be applied in the various alternatives.
- A range of outputs would be produced between alternatives.

ALTERNATIVES ELIMINATED FROM FURTHER DETAILED STUDY

Eleven alternatives were considered during the analysis process. Four were eliminated from detailed study. The following briefly describes each of those and discusses the reason for its elimination.

MAXIMUM SUSTAINABLE ANNUAL REVENUE

This alternative would maximize the sustainable annual revenue from all sources of goods and services provided from the Forest.

Reason for elimination

Although **NFMA** requires a forest plan to use a cost effective approach to managing a national forest, it also requires managing for multiple resources, not just commodity resources. This alternative was eliminated from further detailed study because it did not adequately respond to the 13 significant issues raised during the planning process.

Regulations require that each national forest develop benchmarks in order to show comparisons with alternatives. Maximizing sustainable annual revenue was evaluated as a benchmark and is portrayed in Appendix B.

MAXIMUM BIOLOGICAL FOR TIMBER PRODUCTION

This alternative would produce timber to the maximum biological potential of the land.

Reason for elimination

The NFMA requires that forest plans manage for multiple resources, not just commodity resources. This alternative was eliminated from further detailed study because it did not adequately respond to the 13 significant issues raised during the planning process. Regulations require that each national forest develop benchmarks in order to show comparisons with alternatives. Maximizing biological potential for timber production was evaluated as a benchmark and is portrayed in Appendix B.

AN ALTERNATIVE BASED ON THE 1985 REGIONAL WILDLIFE MANAGEMENT HANDBOOK

Management for the RCW in this alternative would be based on direction from the *1985 Regional Wildlife Management Handbook*.

Reason for elimination

Direction in the *1985 Regional Wildlife Management Handbook* has been superceded by new regional direction. An alternative that evaluates effects under the old direction would not be a viable choice for management of the Forest. Although this information may be of interest as a means of comparison, it is not required by NEPA or NFMA. Implementation of this alternative would violate law and does not represent a no action alternative or a NFMA benchmark.

As stated in the *Record of Decision for Management of the Red-cockaded Woodpecker and its Habitat on National Forests in the Southern Region*, the U.S. Fish & Wildlife Service — in a May 19, 1995 letter of concurrence on the alternatives — rendered a determination that using 1985 handbook direction as a long-term strategy for managing RCW habitat would jeopardize viability of the species.

A FOREST AND RANGELAND RENEWABLE RESOURCES PLANNING ACT (RPA) ALTERNATIVE BASED ON REGIONAL GUIDE RESOURCE OBJECTIVES

This alternative would respond to and incorporate the RPA program tentative resource objectives for each national forest as displayed in the regional guide.

Reason for elimination

At the current time there are no regional guide objectives stated for individual resources. The RPA program provided policy and program guidance instead of resource production targets for individual administrative regions (USDA, 1990). The strategic emphasis of the RPA program was used in the development of goals and objectives for each of the action alternatives being evaluated in this FEIS.

RANGE OF ALTERNATIVES

ALTERNATIVES ELIMINATED FROM FURTHER DETAILED STUDY

MAXIMUM SUSTAINABLE ANNUAL REVENUE

MAXIMUM BIOLOGICAL FOR TIMBER PRODUCTION

AN ALTERNATIVE BASED ON THE 1985 REGIONAL WILDLIFE MANAGEMENT HANDBOOK

A FOREST AND RANGELAND RENEWABLE RESOURCES PLANNING ACT ALTERNATIVE BASED ON REGIONAL GUIDE RESOURCE OBJECTIVES

ALTERNATIVES CONSIDERED IN DETAIL

INTRODUCTION

DIRECTION COMMON TO ALL ACTION ALTERNATIVES

ALTERNATIVES CONSIDERED IN DETAIL

INTRODUCTION

Seven alternatives are considered in detail, including no action, which would continue management under the 1985 Forest Plan as amended. Six action alternatives were developed in response to issues and concerns identified during the planning process.

Each alternative combines land allocations, management practices, and activity schedules which when implemented would result in a unique set of resource outputs and environmental consequences. Each alternative was designed to be fully implementable and achievable.

DIRECTION COMMON TO ALL ACTION ALTERNATIVES

All action alternatives represent the ecosystem management philosophy, a concept that has grown and evolved for several years. This approach fully incorporates existing ecological principles into all resource management strategies and activities. It is the appropriate next step in the evolution of sustainable resource management (**Sexton, 1995**).

The ecosystem approach is a method for sustaining or restoring natural systems and their functions and values. It is goal driven and based on a collaboratively developed vision of desired future conditions that integrates ecological, economic, and social factors. It is applied within a geographic framework defined primarily by ecological boundaries. The goal of the ecosystem approach is to restore and sustain the health, productivity, and biological diversity of ecosystems and the overall quality of life through a natural resource management approach that fully meets human wants, needs, and values (**Interagency Ecosystem Management Task Force, 1995**).

This requires integrating and evaluating the physical, biological, and human dimensions of ecosystems at a variety of scales. See figure 2–2. Development and use of the national hierarchy provides a physical and biological foundation for taking a more ecological approach to natural resource stewardship and management, and allows for making more ecologically informed decisions.

All alternatives comply fully with applicable laws, regulation and policies. All alternatives meet the management requirements of the National Forest Management Act at ***36 CFR 219.27*** for resource protection, vegetative manipulation, silvicultural practices, even-aged management, riparian area management, soil and water conservation, and maintenance of biological diversity. All alternatives incorporate the strategic emphasis of the 1990 RPA Program.

Although the management approach, intensity, extent or output levels of individual resource areas may vary by alternative, all action alternatives address the following Forestwide goals:

- Ensure that healthy, sustainable forest ecosystems would endure for future generations by managing with the highest standards of stewardship. All alternatives protect or conserve basic soil, water, air, and land resources, and incorporate integrated pest management principles.

- Manage to provide for a variety of life by maintaining biologically diverse ecosystems and viable populations of all native and desirable nonnative plant, wildlife, fish and aquatic species. All alternatives conserve threatened, endangered, and rare species; restore and maintain ecosystems and ecological processes; identify and manage old-growth forests; and protect riparian and streamside habitat areas.

ALTERNATIVES CONSIDERED IN DETAIL

DIRECTION COMMON TO ALL ACTION ALTERNATIVES

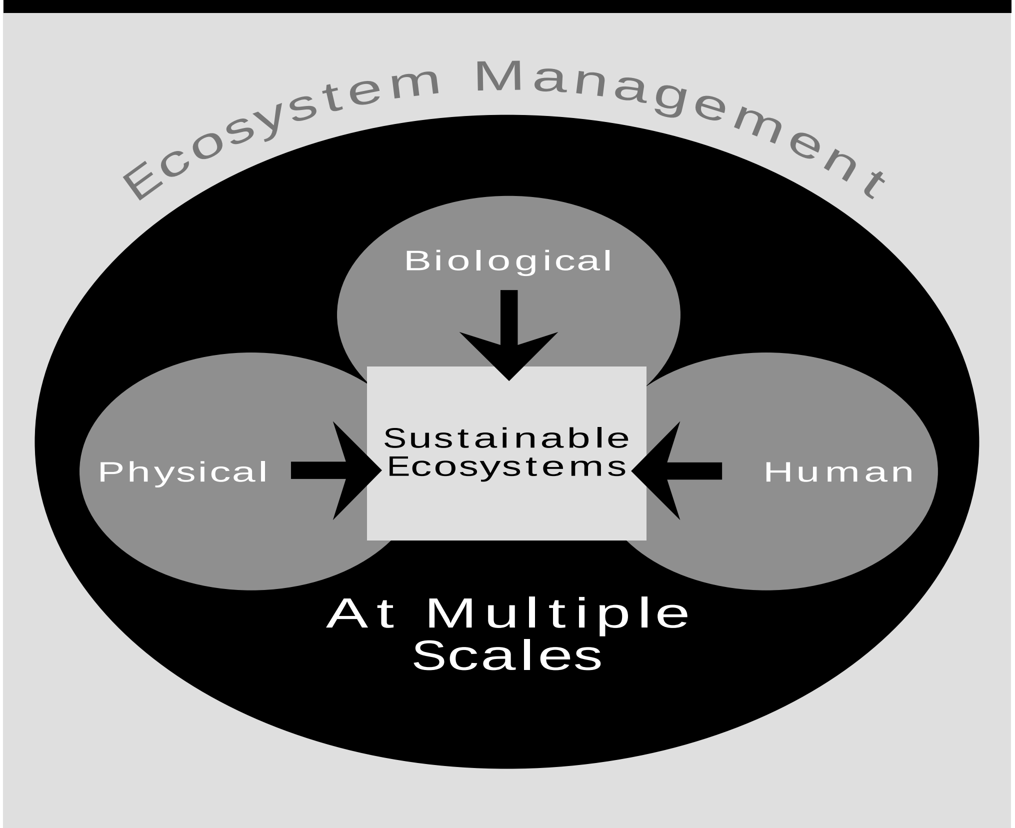
- Contribute to local community stability by providing an even flow of commodity resources in an environmentally acceptable manner. All alternatives allow for timber harvest to meet multiple-use goals and provide for stand regeneration; a limited amount of domestic livestock grazing; and provide a transportation system to meet multiple-use goals. All alternatives promote rural development and human resource programs.

- Provide for scenic quality and outdoor experiences which respond to the needs of forest users and local communities. All alternatives provide access to a wide variety of recreational opportunities and facilities.

- Manage to protect and perpetuate natural and cultural values associated with unique, rare, or irreplaceable resources. All alternatives recognize and protect historical areas, cultural sites, and areas which are of special interest because of unique geological, botanical, or zoological features.

- Allow for the application of vegetation management activities and treatments best suited to achieve a mixture of desired future conditions or to mimic natural processes. All alternatives permit the implementation and use of a variety of silvicultural systems, regeneration methods, prescribed fire applications, and vegetation management treatments needed to achieve objectives.

FIGURE 2–2, ECOSYSTEM MANAGEMENT AS A MEANS FOR SUSTAINING ECOSYSTEMS



ALTERNATIVES CONSIDERED IN DETAIL

DIRECTION COMMON TO ALL ACTION ALTERNATIVES

- Monitor to provide feedback regarding progress towards the accomplishment of Forest goals and objectives; adapt management according to new information.

- Promote collaboration between researchers and land managers to incorporate new technologies, information, and scientific methods into the decision-making process.

- Promote cooperation and coordination with other federal and state agencies, Native American tribes, organizations, and individuals. All alternatives actively seek public involvement during project planning, implementation and monitoring.

Forestwide standards and guidelines require specific resource protection measures to be used during the implementation of project activities and must be met in all situations regardless of which management prescription is used. In addition to those unique to the Kisatchie National Forest, Forestwide standards and guidelines incorporate the management direction and standards and guidelines included in:

- The *Final Environmental Impact Statement* (FEIS) and *Record of Decision* (ROD) for *Suppression of Southern Pine Beetle*, April 1987, as amended.

- The FEIS and ROD for *Vegetation Management in the Coastal Plain/Piedmont*, January 1989, as amended.

- The FEIS and ROD for the *Management of the Red-cockaded Woodpecker and its Habitat on National Forests in the Southern Region*, June 1995.

Forestwide standards and guidelines do not vary by alternative. They can be found in Chapter 2 of the revised Forest Plan.

INDIVIDUAL ALTERNATIVE DESCRIPTIONS

The following material highlights each alternative considered in detail. Each alternative is described in three parts:

- *The alternative theme portion* — giving the core philosophy used to develop that alternative.
- *The distinguishing features portion* — summarizing the amount or extent of management emphasis which characterizes each alternative.
- *The management area portion* — displaying the land allocated to each management area and sub-management area.

ALTERNATIVE A

Alternative theme

The *no action* Alternative represents implementation of the Forest's 1985 Forest Plan, as amended, with an emphasis on the restoration of longleaf, shortleaf, or other desirable native pine species within tentative red-cockaded woodpecker (RCW) habitat management areas (HMAs). It serves as a basis for comparison with the other alternatives. Under Alternative A, the Forest would be intensively managed to provide a moderate output of commodity resources and a moderately high output of non-commodity benefits.

Distinguishing features

Minerals management

All federal lands except Kisatchie Hills Wilderness is available for leasing. A No Surface Occupancy (NSO) lease stipulation would be required on all leases involving areas in the following categories where the area to be protected is larger than 40 acres: administrative sites, Research Natural Areas, State Registry Natural Areas, Special Interest Areas, the Johnson Tract experimental forest, the Air Force Bombing and Gunnery Range, the Breezy Hill No-Entry Area, the Breezy Hill No-Ground-Penetration area, scenic areas, the Saline Bayou National Scenic River Corridor, cultural resource sites, the Stuart Seed Orchard, jurisdictional wetlands, and developed recreation areas.

Prescribed fire

Prescribed fire is annually applied on up to 80,000 acres to achieve multiple resource management objectives.

Range

Approximately 140,000 acres are identified as available for domestic livestock grazing.

Recreation

The recreation management program is focused on providing a wide range of developed and dispersed recreation opportunities. Fee and non-fee areas are emphasized equally.

An estimated 85 percent of the Forest would be open to off-road vehicles (ORV); and 15 percent would be closed year-round, during a specified season, or because of military use.

Red-cockaded Woodpecker (RCW) management

Management of the RCW is based on the direction in the *Final Environmental Impact Statement* (FEIS) *and Record of Decision* (ROD) *for the Management of the Red-cockaded Woodpecker and Its Habitat on National Forests in the Southern Region*, June 1995. Approximately 303,000 acres of pine and pine-hardwood stands within the tentative HMA boundaries would be managed to meet Forest RCW population objectives.

Currently 240,000 acres of pine and pine-hardwood stands within the tentative HMAs are within 3/4 mile of RCW clusters.

Special interest areas (SIA) and research natural areas (RNA)

Two scenic SIAs are currently designated — Longleaf and Castor Creek. Cunningham Brake and Bayou Boeuf are designated RNAs.

ALTERNATIVES CONSIDERED IN DETAIL

INDIVIDUAL ALTERNATIVE DESCRIPTIONS

ALTERNATIVE A

Timber production

The average annual allowable sale quantity (ASQ) is 14.1 million cubic feet (MMCF). About 505,000 acres are identified as suitable for timber production.

Vegetation management

The even-aged silvicultural system is used, except where RCW management direction precludes it. In existing longleaf pine stands within the HMAS, approximately 37,000 acres of existing scattered longleaf stands could be managed using the uneven-aged system on lands suitable for timber production.

No old-growth forest patches are designated, but approximately 68,000 forested acres containing attributes characteristic of unmanaged old growth exist on lands considered not appropriate for timber production.

Wild and scenic rivers

Saline Bayou is managed as a national scenic river.

Wilderness

All wildfires in the Kisatchie Hills Wilderness are suppressed. Management-ignited prescribed fire is not allowed.

The Kisatchie Hills Wilderness is excluded from the tentative RCW habitat management areas (HMA). No active habitat management occurs for existing RCW cluster sites located inside the Wilderness.

Management area allocation

Please see table 2–1, next page.

TABLE 2–1, MANAGEMENT AREA ALLOCATION

Alternative A

	Management Area	Acres
1	Nonproductive land	5,600
2	Palustris Experimental Forest	7,200
3	Research natural areas	2,800
4	Kisatchie Hills Wilderness	8,700
5	Physically not suited for timber production	6,700
6	Developed recreation areas	2,600
7	Stuart Seed Orchard	400
8	Fort Polk and Peason Ridge Intensive Military Use	39,000
9	U.S. Air Force Bombing and Gunnery Range	900
10	U.S. Air Force Bombing Range Safety Fan	2,500
11	General forest area / grazing	131,200
12	General forest area / no grazing	258,600
13	Kisatchie soils	15,800
14	Breezy Hill / no entry, WW II artillery range	900
15	Breezy Hill / no ground penetration, WW II artillery range / grazing	11,400
16	Breezy Hill / no ground penetration, WW II artillery range / no grazing	5,900
17	Scenic areas	300
18	Administrative sites	100
19	Red-cockaded Woodpecker colonies and recruitment stands	14,300
20	Aquatic and riparian areas	(85,300)
21	Saline Bayou National Scenic River	5,800
22	Non-forest	13,000
23	Cultural resource sites	(600)
24	National wildlife management preserves	70,000 *
	Forest Total	**603,700**

Figure with asterisk does not include acres which overlap with Kisatchie Hills Wilderness. (XX) Acres not calculated into total.

ALTERNATIVES CONSIDERED IN DETAIL

INDIVIDUAL ALTERNATIVE DESCRIPTIONS

ALTERNATIVE B

ALTERNATIVE B

Alternative theme

Alternative B places more emphasis on the production of forest products. Less emphasis is placed on non-market values. The allocation of compatible DFCs to this alternative theme was focused on providing moderate levels of timber harvest while minimizing costs.

Distinguishing features

Minerals management

All federal lands except Kisatchie Hills Wilderness would be available for leasing. A No Surface Occupancy (NSO) lease stipulation would be required on all leases involving areas in the following categories where the area to be protected is larger than 40 acres: administrative sites, Research Natural Areas, State Registry Natural Areas, Special Interest Areas, the Johnson Tract experimental forest, the Air Force Bombing and Gunnery Range, the Breezy Hill No-Entry Area, scenic areas, the Saline Bayou National Scenic River Corridor, cultural resource sites, the Stuart Seed Orchard, jurisdictional wetlands, and developed recreation areas. A moderately restrictive Controlled Surface Use (CSU2) stipulation would be applied to the Breezy Hill No-Ground-Penetration area and all Streamside Habitat Protection Zones (SHPZS) and Riparian Area Protection Zones (RAPZS) on the rest of the Forest.

Prescribed fire

Prescribed fire would be annually applied on up to 96,000 acres to achieve multiple resource objectives.

Range

About 86,000 acres would be identified as available for domestic livestock grazing.

Recreation

The recreation management program would focus on reducing operation and maintenance costs and producing revenues through increased fees and additional designated fee areas.

An estimated 83 percent of the Forest would be open to ORVs; and 17 percent would be closed year-round, during a specified season, or because of military use.

Red-cockaded Woodpecker (RCW) management

Management of the RCW is based on direction in the *FEIS and ROD for the Management of the RCW and its Habitat on National Forests in the Southern Region*, June 1995.

Approximately 303,000 acres of pine and pine-hardwood stands would be managed to meet Forest RCW population objectives.

Special interest areas (SIA) and research natural areas (RNA)

In addition to the Longleaf and Castor Creek scenic SIAs, Cooter's Bog, Kieffer Prairie, and Whiskey Chitto areas would be designated as botanical SIAs; and the Castor Creek Scenic SIA would be expanded.

No additional RNAs would be designated.

Timber production

The average annual ASQ would be 11.9 MMCF. About 345,000 acres would be identified as suitable for timber production.

Vegetation management

Both even and uneven-aged silvicultural systems would be used. Approximately 21,000 acres would be managed in designated patches at the landscape level on lands suitable for timber production, using the uneven-aged system.

Approximately 23,000 acres would be designated and managed as old-growth forest patches, with allocation emphasis given to areas not currently suitable for timber production. An additional 213,000 forested acres, containing attributes characteristic of unmanaged old growth, exist on lands considered not appropriate for timber production.

Wild and scenic rivers

Saline Bayou would continue to be managed as a national scenic river. No other rivers would be recommended for designation.

ALTERNATIVES CONSIDERED IN DETAIL

INDIVIDUAL ALTERNATIVE DESCRIPTIONS

ALTERNATIVE B

TABLE 2–2, MANAGEMENT AND SUB-MANAGEMENT AREA ALLOCATION

Alternative B

	Management Area	Sub-Management Area	Acres
1	Forest products	*total*	**183,000**
		1A	(7,000)
		1B	(143,000)
		1C	(33,000)
2	Amenity values	*total*	**16,000**
		2AL	0
		2AS	(8,000)
		2AM	0
		2B	(8,000)
3	Native community restoration		0
4	RCW / amenity values		0
5	RCW / native community restoration	*total*	**273,000**
		5CL	(247,000)
		5CS	(13,000)
		5CM	(13,000)
6	RCW / wildlife habitats		0
7	Hardwoods		0
8	Wildlife habitats		0
9	Military intensive use	*total*	**40,000**
		9DL	(39,500)
		9E	(500)
10	National scenic rivers	*total*	**5,800**
		10DM	(2,800)
		10EM	(3,000)
11	National wildlife management preserves	*total*	**70,000**
		11DL	(29,000)
		11DS	(12,000)
		11DM	(7,000)
		11E	(22,000)
12	Palustris Experimental Forest	*total*	**7,200**
		12D	(2,600)
		12E	(4,600)
13	Kisatchie Hills Wilderness	*total*	**8,700**
		13	(8,700)
	Total Forest Acres		**603,700**

Wilderness

No additional wilderness would be designated.

All wilderness wildfires would be suppressed. Management-ignited prescribed fire would not be allowed.

The Kisatchie Hills Wilderness would be excluded from an RCW HMA. No active habitat management would occur for existing RCW cluster sites located inside the Wilderness.

Management area allocation

Please see table 2–2, above.

ALTERNATIVE C

Alternative theme

Alternative C emphasizes the enhancement of non-commodity or amenity values, such as recreation, visual quality, and plant and wildlife habitats. The allocation of compatible DFCs to this alternative theme focused on providing a wide range of recreational opportunities, scenic quality, and a mixture of plant and wildlife habitats. Timber outputs would be produced, but at a relatively low level.

Distinguishing features

Minerals management

All federal lands on the Forest would be withdrawn from leasing as existing leases expire.

Prescribed fire

Prescribed fire would be annually applied on up to 101,000 acres to achieve multiple resource objectives.

Range

About 86,000 acres would be identified as available for domestic livestock grazing.

Recreation

A high priority would be given to enhancing the quality and quantity of both developed and dispersed recreation opportunities and to protecting and enhancing scenic resources on the Forest.

An estimated 83 percent of the Forest would be open to ORVs; and 17 percent would be closed year-round, during a specified season, or because of military use.

Red-cockaded Woodpecker (RCW) management

Management of the RCW is based on direction in the *FEIS and ROD for the Management of the RCW and its Habitat on National Forests in the Southern Region*, June 1995.

Approximately 303,000 acres of pine and pine-hardwood stands would be managed to meet Forest RCW population objectives.

Special interest areas (SIA) and research natural areas (RNA)

In addition to the Longleaf and Castor Creek scenic SIAs, the Wild Azalea Seep, and Kieffer Prairie areas would be designated as botanical SIAs; the Malaudos Glen area would be designated as a scenic SIA; and the Castor Creek Scenic SIA would be expanded.

The Cooters Bog, Drakes Creek, Whiskey Chitto, and Fleming Glade areas would be designated as RNAs.

Timber production

The average annual ASQ would be 3.0 MMCF. About 100,000 acres would be identified as suitable for timber production.

Vegetation management

Both even and uneven-aged silvicultural systems would be used. About 8,000 acres would be managed in designated patches at the landscape level on lands suitable for timber production, using the uneven-aged system.

Approximately 164,000 acres would be designated and managed as old-growth forest patches, with allocation emphasis given to representation of pre-European settlement vegetation patterns. An additional 364,000 forested acres, containing attributes characteristic of unmanaged old growth, exist on lands considered not appropriate for timber production.

Wild and scenic rivers

Saline Bayou would continue to be managed as a national scenic river. Kisatchie Bayou would be recommended for national scenic river designation.

Wilderness

No additional wilderness would be designated.

Lightning-caused fires would be allowed to burn if prescribed conditions are met. All other wildfires would be suppressed. Management-ignited prescribed fire would not be allowed.

Kisatchie Hills Wilderness would be excluded from an RCW HMA. Use of hand tools would be allowed to maintain habitat conditions for active cluster sites in the wilderness.

TABLE 2–3, MANAGEMENT AND SUB-MANAGEMENT AREA ALLOCATION

Alternative C

Management Area		Sub-Management Area	Acres
1	Forest products	*total*	**35,000**
		1A	0
		1B	0
		1C	(35,000)
2	Amenity values	*total*	**122,000**
		2AL	(15,000)
		2AS	(17,000)
		2AM	(4,000)
		2B	(86,000)
3	Native community restoration		0
4	RCW / amenity values	*total*	**204,000**
		4AL	(187,000)
		4AS	(9,000)
		4AM	(8,000)
5	RCW / native community restoration	*total*	**68,000**
		5CL	(57,000)
		5CS	(4,000)
		5CM	(7,000)
6	RCW / wildlife habitats		0
7	Hardwoods	*total*	**10,000**
		7	(10,000)
8	Wildlife habitats	*total*	**27,000**
		8BL	0
		8BS	0
		8BM	0
		8C	(27,000)
9	Military intensive use	*total*	**40,000**
		9DL	(39,500)
		9E	(500)
10	National scenic rivers	*total*	**11,800**
		10DM	(8,800)
		10EM	(3,000)
11	National wildlife management preserves	*total*	**70,000**
		11DL	(29,000)
		11DS	(12,000)
		11DM	(7,000)
		11E	(22,000)
12	Palustris Experimental Forest	*total*	**7,200**
		12D	(2,600)
		12E	(4,600)
13	Kisatchie Hills Wilderness	*total*	**8,700**
		13	(8,700)
Total Forest Acres			**603,700**

Management area allocation

Please see table 2–3, above.

ALTERNATIVES CONSIDERED IN DETAIL

INDIVIDUAL ALTERNATIVE DESCRIPTIONS

ALTERNATIVE D (DRAFT PREFERRED)

ALTERNATIVE D (DRAFT PREFERRED)

Alternative theme

Alternative D was identified as the Forest Service preferred alternative in the Draft EIS. It emphasizes restoration of natural plant communities to sites they occupied prior to European settlement. The allocation of compatible DFCs to this alternative focused on reestablishing the composition, structure, and processes associated with these forested ecosystems. Commodity and amenity resource outputs from actions such as off-site species stand conversion, prescribed burning, and frequent stand improvement practices, would be relatively high under this alternative.

Distinguishing features

Minerals management

All federal lands except Kisatchie Hills Wilderness would be available for leasing. A No Surface Occupancy (NSO) lease stipulation would be required on all leases involving areas in the following categories where the area to be protected is larger than 40 acres: administrative sites, Research Natural Areas, State Registry Natural Areas, Special Interest Areas, the Johnson Tract experimental forest, the Air Force Bombing and Gunnery Range, the Breezy Hill No-Entry Area, scenic areas, within 600 feet of the Saline Bayou National Scenic River, cultural resource sites, the Stuart Seed Orchard, jurisdictional wetlands, and developed recreation areas. A highly restrictive Controlled Surface Use (CSU1) stipulation would be applied to all Streamside Habitat Protection Zones (SHPZS) on the Forest (varying in width from 50 feet to 150 feet, depending upon the adjacent management area theme), to the extent of the Riparian Area Protection Zones (RAPZS) within Louisiana pearlshell mussel sub-watersheds, and to the extent of RAPZS within management area 2 (amenity emphasis). A moderately restrictive Controlled Surface Use (CSU2) stipulation would be applied to areas outside of SHPZS within the Breezy Hill No-Ground-Penetration area, the remainder of management area 2, the remainder of Forest RAPZS, within 2,000 feet of the Longleaf Trail Scenic Byway, the U.S. Marshall Service Use Area, the Longleaf Tract experimental forest, and inside the Claiborne Safety Fan area.

Prescribed fire

Prescribed fire would be annually applied on up to 105,000 acres to achieve ecosystem restoration objectives, with increased emphasis on growing season burns.

Range

Approximately 86,000 acres would be available for domestic livestock grazing.

Recreation

The recreation management program would focus on providing a balance of high quality dispersed and natural resource dependent developed recreation opportunities. Those opportunities that encourage the interpretation and enjoyment of nature, scenery, and our cultural heritage would be featured.

An estimated 79 percent of the Forest would be open to ORVs; and 21 percent would be closed year-round, during a specified season, or because of military use.

Red-cockaded Woodpecker (RCW) management

Management of the RCW is based on direction in the *FEIS and ROD for the Management of the RCW and its Habitat on National Forests in the Southern Region*, June 1995.

Approximately 303,000 acres of pine and pine-hardwood stands would be managed to meet Forest RCW population objectives.

Special interest areas (SIA) and research natural areas (RNA)

In addition to the Longleaf and Castor Creek scenic SIAs, Cooter's Bog, Drakes Creek, Kieffer Prairie, and Whiskey Chitto areas would be designated as botanical SIAs; the Malaudos Glen area would be designated as a scenic SIA; and the Castor Creek Scenic SIA would be expanded.

No additional RNAs would be designated.

Timber production

The average annual ASQ would be 10.2 MMCF. About 312,000 acres would be identified as suitable for timber production.

Vegetation management

Both even and uneven-aged silvicultural systems would be used. Approximately 32,000 acres would be managed in designated patches at the landscape level on lands suitable for timber production, using the uneven-aged system.

Approximately 66,000 acres would be designated and managed as old-growth forest patches, with allocation emphasis given to representation of pre-European settlement vegetation patterns. An additional 218,000 forested acres, containing attributes characteristic of unmanaged old growth, exist on lands considered not appropriate for timber production.

Wild and scenic rivers

Saline Bayou would continue to be managed as a national scenic river. No other rivers would be recommended for designation.

Wilderness

No additional wilderness would be designated.

Lightning-caused fires are allowed to burn if prescribed conditions are met. All other wildfires would be suppressed. Management-ignited prescribed fire would be allowed.

The Kisatchie Hills Wilderness would be excluded from an RCW HMA. No active habitat management would occur for existing RCW cluster sites located inside the Wilderness.

Management area allocation

Please see table 2–4, next page.

ALTERNATIVES CONSIDERED IN DETAIL

INDIVIDUAL ALTERNATIVE DESCRIPTIONS

ALTERNATIVE D (DRAFT PREFERRED)

TABLE 2–4, MANAGEMENT AND SUB-MANAGEMENT AREA ALLOCATION

Alternative D

Management Area		Sub-Management Area	Acres
1	Forest products	*total*	**31,000**
		1A	0
		1B	0
		1C	(31,000)
2	Amenity values	*total*	**16,000**
		2AL	(7,000)
		2AS	(8,000)
		2AM	(1,000)
		2B	0
3	Native community restoration	*total*	**142,000**
		3BL	(61,000)
		3BS	(52,000)
		3BM	(20,000)
		3CL	(5,000)
		3CS	(2,000)
		3CM	(2,000)
4	RCW / amenity values		0
5	RCW / native community restoration	*total*	**228,000**
		5CL	(201,000)
		5CS	(13,000)
		5CM	(14,000)
6	RCW / wildlife habitats	*total*	**45,000**
		6BL	(45,000)
		6BS	0
		6BM	0
7	Hardwoods	*total*	**10,000**
		7	(10,000)
8	Wildlife habitats		0
9	Military intensive use	*total*	**40,000**
		9DL	(39,500)
		9E	(500)
10	National scenic rivers	*total*	**5,800**
		10DM	(2,800)
		10EM	(3,000)
11	National wildlife management preserves	*total*	**70,000**
		11DL	(29,000)
		11DS	(12,000)
		11DM	(7,000)
		11E	(22,000)
12	Palustris Experimental Forest	*total*	**7,200**
		12D	(2,600)
		12E	(4,600)
13	Kisatchie Hills Wilderness		**8,700**
		13	(8,700)
Total Forest Acres			**603,700**

ALTERNATIVE MODIFIED D (FINAL PREFERRED)

Alternative theme

Alternative Modified D is the Forest Service preferred alternative (developed in greater detail in the revised Forest Plan). Like the original Alternative D, it emphasizes restoration of natural plant communities to sites they occupied prior to European settlement. The allocation of compatible DFCs to this alternative focused on reestablishing the composition, structure, and processes associated with these forested ecosystems. Commodity and amenity resource outputs from actions such as off-site species stand conversion, prescribed burning, and frequent stand improvement practices would be relatively high under this alternative.

Distinguishing features

Minerals management

All federal lands except Kisatchie Hills Wilderness would be available for leasing. A No Surface Occupancy (NSO) lease stipulation would be required on all leases involving areas in the following categories where the area to be protected is larger than 40 acres: administrative sites, Research Natural Areas, State Registry Natural Areas, Special Interest Areas, the Johnson Tract experimental forest, the Air Force Bombing and Gunnery Range, the Breezy Hill No-Entry Area, scenic areas, within 600 feet of the Saline Bayou National Scenic River, cultural resource sites, the Stuart Seed Orchard, jurisdictional wetlands, and developed recreation areas. A highly restrictive Controlled Surface Use (CSU1) stipulation would be applied to all Streamside Habitat Protection Zones (SHPZS) on the Forest (varying in width from 50 feet to 150 feet, depending upon the adjacent management area theme), to the extent of the Riparian Area Protection Zones (RAPZS) within Louisiana pearlshell mussel sub-watersheds, and to the extent of RAPZS within management area 2 (amenity emphasis). A moderately restrictive Controlled Surface Use (CSU2) stipulation would be applied to areas outside of SHPZS within the Breezy Hill No-Ground-Penetration area, the remainder of management area 2, the remainder of Forest RAPZS, within 2,000 feet of the Longleaf Trail Scenic Byway, the U.S. Marshall Service Use Area, the Longleaf Tract experimental forest, and inside the Claiborne Safety Fan area.

Prescribed fire

Prescribed fire would be annually applied on up to 105,000 acres to achieve ecosystem restoration objectives, with increased emphasis on growing season burns.

Range

Approximately 86,000 acres would be available for domestic livestock grazing.

Recreation

The recreation management program would focus on providing a balance of high quality dispersed and natural resource dependent developed recreation opportunities. Those opportunities that encourage the interpretation and enjoyment of nature, scenery, and our cultural heritage would be featured.

An estimated 78 percent of the Forest would be open to ORVs; and 22 percent would be closed year-round, during a specified season, or because of military use.

Red-cockaded Woodpecker (RCW) management

Management of the RCW is based on direction in the *FEIS and ROD for the Management of the RCW and its Habitat on National Forests in the Southern Region*, June 1995.

Approximately 303,000 acres of pine and pine-hardwood stands would be managed to meet Forest RCW population objectives.

Special interest areas (SIA) and research natural areas (RNA)

In addition to the Longleaf and Castor Creek scenic SIAs, Cooter's Bog, Drakes Creek, Kieffer Prairie, Tancock Prairie and Whiskey Chitto areas would be designated as botanical SIAs; the Malaudos Glen area would be designated as a scenic SIA; the Bayou Luce area would be designated as a geological SIA; and the Castor Creek Scenic SIA would be expanded.

No additional RNAs would be designated.

ALTERNATIVES CONSIDERED IN DETAIL

INDIVIDUAL ALTERNATIVE DESCRIPTIONS

ALTERNATIVE MODIFIED D (FINAL PREFERRED)

Timber production

The average annual ASQ would be 9.69 MMCF. About 308,889 acres would be identified as suitable for timber production.

Vegetation management

Both even and uneven-aged silvicultural systems would be used. Approximately 32,000 acres would be managed in designated patches at the landscape level on lands suitable for timber production, using the uneven-aged system.

Approximately 81,000 acres would be designated and managed as old-growth forest patches, with allocation emphasis given to representation of pre-European settlement vegetation patterns. An additional 215,000 forested acres, containing attributes characteristic of unmanaged old growth, exist on lands considered not appropriate for timber production.

Wild and scenic rivers

Saline Bayou would continue to be managed as a national scenic river. No other rivers would be recommended for designation.

Wilderness

No additional wilderness would be designated.

Lightning-caused fires are allowed to burn if prescribed conditions are met. All other wildfires would be suppressed. Management-ignited prescribed fire would be allowed.

The Kisatchie Hills Wilderness would be excluded from an RCW HMA. No active habitat management would occur for existing RCW cluster sites located inside the Wilderness.

Management area allocation

Please see table 2–5, next page.

ALTERNATIVES CONSIDERED IN DETAIL

INDIVIDUAL ALTERNATIVE DESCRIPTIONS

ALTERNATIVE MODIFIED D (FINAL PREFERRED)

TABLE 2–5, MANAGEMENT AND SUB-MANAGEMENT AREA ALLOCATION

Alternative Modified D

Management Area		Sub-Management Area	Acres
1	Forest products	*total*	**31,000**
		1A	0
		1B	0
		1C	(31,000)
2	Amenity values	*total*	**16,000**
		2AL	(7,000)
		2AS	(8,000)
		2AM	(1,000)
		2B	0
3	Native community restoration	*total*	**142,000**
		3BL	(61,000)
		3BS	(52,000)
		3BM	(20,000)
		3CL	(5,000)
		3CS	(2,000)
		3CM	(2,000)
4	RCW / amenity values		0
5	RCW / native community restoration	*total*	**228,000**
		5CL	(201,000)
		5CS	(13,000)
		5CM	(14,000)
6	RCW / wildlife habitats	*total*	**45,000**
		6BL	(45,000)
		6BS	0
		6BM	0
7	Hardwoods	*total*	**10,000**
		7	(10,000)
8	Wildlife habitats		0
9	Military intensive use	*total*	**40,000**
		9DL	(39,500)
		9E	(500)
10	National scenic rivers	*total*	**5,800**
		10DM	(2,800)
		10EM	(3,000)
11	National wildlife management preserves	*total*	**70,000**
		11DL	(29,000)
		11DS	(12,000)
		11DM	(7,000)
		11E	(22,000)
12	Palustris Experimental Forest	*total*	**7,200**
		12D	(2,600)
		12E	(4,600)
13	Kisatchie Hills Wilderness		**8,700**
		13	(8,700)
Total Forest Acres			**603,700**

ALTERNATIVES CONSIDERED IN DETAIL

INDIVIDUAL ALTERNATIVE DESCRIPTIONS

ALTERNATIVE E

ALTERNATIVE E

Alternative Theme

Alternative E emphasizes the management of hardwoods and mixed stands of hardwoods and pines. The allocation of compatible DFCs to this alternative focused on increasing the number of hardwood stands, mixed stands, and hardwoods within pine stands to provide for visual quality enhancement, hard mast production, and wildlife habitat improvement. Commodity outputs would be provided at moderate levels.

Distinguishing features

Minerals management

All federal lands would be available for leasing except Kisatchie Hills Wilderness, and lands within management areas 2 and 4 (amenity emphasis). A No Surface Occupancy (NSO) lease stipulation would be required on all leases involving areas in the following categories where the area to be protected is larger than 40 acres: administrative sites, Research Natural Areas, State Registry Natural Areas, Special Interest Areas, the Johnson Tract experimental forest, the Air Force Bombing and Gunnery Range, the Breezy Hill No-Entry Area, scenic areas, within 600 feet of the Saline Bayou National Scenic River, cultural resource sites, the Stuart Seed Orchard, jurisdictional wetlands, and developed recreation areas. A highly restrictive Controlled Surface Use (CSU1) stipulation would be applied to all Streamside Habitat Protection Zones (SHPZS) on the Forest (varying in width from 50 feet to 150 feet, depending upon the adjacent management area theme), and to the extent of the Riparian Area Protection Zones (RAPZS) within Louisiana pearlshell mussel sub-watersheds. A moderately restrictive Controlled Surface Use (CSU2) stipulation would be applied to areas outside of SHPZS within the Breezy Hill No-Ground-Penetration area, the remainder of Forest RAPZS, within 2,000 feet of the Longleaf Trail Scenic Byway, the U.S. Marshall Service Use Area, the Longleaf Tract experimental forest, and inside the Claiborne Safety Fan area.

Prescribed fire

Prescribed fire would be annually applied on up to 94,000 acres to achieve multiple resource objectives.

Range

Approximately 86,000 acres would be identified as available for domestic livestock grazing.

Recreation

The recreation management program would focus on providing a balance of high quality dispersed and natural resource dependent developed recreation opportunities. Those opportunities that encourage the interpretation and enjoyment of nature, scenery, and our cultural heritage would be featured.

An estimated 77 percent of the Forest would be open to ORVs; and 23 percent would be closed year-round, during a specified season, or because of military use.

Red-cockaded Woodpecker (RCW) management

Management of the RCW is based on direction in the *FEIS and ROD for the Management of the RCW and its Habitat on National Forests in the Southern Region*, June 1995.

Approximately 303,000 acres of pine and pine-hardwood stands would be managed to meet Forest RCW population objectives.

Special interest areas (SIA) and research natural areas (RNA)

In addition to the Longleaf and Castor Creek scenic SIAs, Cooter's Bog, Drakes Creek, Kieffer Prairie, and Whiskey Chitto areas would be designated as botanical SIAs; the Malaudos Glen area would be designated as a scenic SIA; and the Castor Creek Scenic SIA would be expanded.

No additional RNAs would be designated.

Timber production

The average annual ASQ would be 8.9 MMCF. About 316,000 acres would be identified as suitable for timber production.

Vegetation management

Both even and uneven-aged silvicultural systems would be used. Approximately 34,000 acres would be managed in designated patches at the landscape level on lands suitable for timber production, using the uneven-aged system.

Approximately 60,000 acres would be designated and managed as old-growth forest patches, with allocation emphasis given to hardwood community representation. An additional 221,000 forested acres, containing attributes characteristic of unmanaged old growth, exist on lands considered not appropriate for timber production.

Wild and scenic rivers

Saline Bayou would continue to be managed as a national scenic river. No other rivers would be recommended for designation.

Wilderness

No additional wilderness would be designated.

All wilderness wildfires would be suppressed. Management-ignited prescribed fire would not be allowed.

The Kisatchie Hills Wilderness would be excluded from an RCW HMA. No active habitat management would occur for existing RCW cluster sites located inside the Wilderness.

Management area allocation

Please see table 2–6, next page.

ALTERNATIVES CONSIDERED IN DETAIL

INDIVIDUAL ALTERNATIVE DESCRIPTIONS

ALTERNATIVE E

TABLE 2–6, MANAGEMENT AND SUB-MANAGEMENT AREA ALLOCATION

Alternative E

Management Area		Sub-Management Area	Acres
1	Forest products	*total*	**43,000**
		1A	0
		1B	0
		1C	(43,000)
2	Amenity values	*total*	**18,000**
		2AL	0
		2AS	0
		2AM	(6,000)
		2B	(12,000)
3	Native community restoration		0
4	RCW / amenity values		0
5	RCW / native community restoration	*total*	**273,000**
		5CL	(247,000)
		5CS	(13,000)
		5CM	(13,000)
6	RCW / wildlife habitats		0
7	Hardwoods	*total*	**138,000**
		7	(138,000)
8	Wildlife habitats		0
9	Military intensive use	*total*	**40,000**
		9DL	(39,500)
		9E	(500)
10	National scenic rivers	*total*	**5,800**
		10DM	(2,800)
		10EM	(3,000)
11	National wildlife management preserves	*total*	**70,000**
		11DL	(29,000)
		11DS	(12,000)
		11DM	(7,000)
		11E	(22,000)
12	Palustris Experimental Forest	*total*	**7,200**
		12D	(2,600)
		12E	(4,600)
13	Kisatchie Hills Wilderness		**8,700**
		13	(8,700)
Total Forest Acres			**603,700**

ALTERNATIVE F

Alternative theme

Alternative F emphasizes the establishment or improvement of wildlife habitats for a full range of native species. The allocation of compatible DFCs to this alternative focused on providing habitat conditions and attributes necessary to maintain viable populations of all native game and nongame species. Commodity and amenity resource outputs through the creation and maintenance of landscape habitats would occur at moderate levels.

Distinguishing features

Minerals management

All federal lands would be available for leasing except Kisatchie Hills Wilderness, and lands within management areas 2 and 4 (amenity emphasis). A No Surface Occupancy (NSO) lease stipulation would be required on all leases involving areas in the following categories where the area to be protected is larger than 40 acres: administrative sites, Research Natural Areas, State Registry Natural Areas, Special Interest Areas, the Johnson Tract experimental forest, the Air Force Bombing and Gunnery Range, the Breezy Hill No-Entry Area, scenic areas, within 600 feet of the Saline Bayou National Scenic River, cultural resource sites, the Stuart Seed Orchard, jurisdictional wetlands, and developed recreation areas. A highly restrictive Controlled Surface Use (CSU1) stipulation would be applied to all Streamside Habitat Protection Zones (SHPZS) on the Forest (varying in width from 50 feet to 150 feet, depending upon the adjacent management area theme), and to the extent of the Riparian Area Protection Zones (RAPZS) within Louisiana pearlshell mussel sub-watersheds. A moderately restrictive Controlled Surface Use (CSU2) stipulation would be applied to areas outside of SHPZS within the Breezy Hill No-Ground-Penetration area, the remainder of Forest RAPZS, within 2,000 feet of the Longleaf Trail Scenic Byway, the U.S. Marshall Service Use Area, the Longleaf Tract experimental forest, and inside the Claiborne Safety Fan area.

Prescribed fire

Prescribed fire would be annually applied on up to 108,000 acres to maintain and improve wildlife habitat conditions.

Range

Approximately 86,000 acres would be identified as available for domestic livestock grazing.

Recreation

The recreation management program would focus on providing high quality dispersed and natural resource dependent developed recreation opportunities based on protecting and enhancing both consumptive and non-consumptive wildlife opportunities.

An estimated 77 percent of the Forest would be open to ORVs; and 23 percent would be closed year-round, during a specified season, or because of military use.

Red-cockaded Woodpecker (RCW) management

Management of the RCW is based on direction in the *FEIS and ROD for the Management of the RCW and its Habitat on National Forests in the Southern Region*, June 1995.

Approximately 303,000 acres of pine and pine-hardwood stands would be managed to meet Forest RCW population objectives.

Special interest areas (SIA) and research natural areas (RNA)

In addition to the Longleaf and Castor Creek scenic SIAs, Wild Azalea Seep, and Kieffer Prairie would be designated as botanical SIAs; the Malaudos Glen area would be designated as a scenic SIA; and the Castor Creek Scenic SIA would be expanded.

The Cooters Bog, Drakes Creek, Whiskey Chitto, and Fleming Glade areas would be designated as RNAs.

Timber production

The average annual ASQ would be 8.1 MMCF. About 278,000 acres would be identified as suitable for timber production.

Vegetation management

Both even and uneven-aged silvicultural systems would be used. About 41,000 acres would be managed in designated patches at the landscape level on lands suitable for timber production, using the uneven-aged system.

Approximately 92,000 acres would be designated and managed as old-growth forest patches, with allocation emphasis given to representation of pre-European settlement vegetation patterns. An additional 233,000 forested acres, containing attributes characteristic of unmanaged old growth, exist on lands considered not appropriate for timber production.

Wild and scenic rivers

Saline Bayou would continue to be managed as a national scenic river. No other rivers would be recommended for designation.

Wilderness

No additional wilderness would be designated.

Lightning-caused fires are allowed to burn if prescribed conditions are met. All other wildfires would be suppressed. Management-ignited prescribed fire would be allowed.

The Kisatchie Hills Wilderness would be excluded from an RCW HMA. Use of hand tools within active cluster sites — and prescribed fire — would be allowed to maintain habitat conditions inside the Wilderness.

Management area allocation

Please see table 2–7, next page.

TABLE 2–7, MANAGEMENT AND SUB-MANAGEMENT AREA ALLOCATION

Alternative F

Management Area		Sub-Management Area	Acres
1	Forest products	*total*	**26,000**
		1A	0
		1B	0
		1C	(26,000)
2	Amenity values	*total*	**23,000**
		2AL	(8,000)
		2AS	(13,000)
		2AM	(2,000)
		2B	0
3	Native community restoration		0
4	RCW / amenity values		0
5	RCW / native community restoration	*total*	**218,000**
		5CL	(181,000)
		5CS	(19,000)
		5CM	(18,000)
6	RCW / wildlife habitats	*total*	**84,000**
		6BL	(83,500)
		6BS	(500)
		6BM	0
7	Hardwoods	*total*	**26,000**
		7	(26,000)
8	Wildlife habitats	*total*	**95,000**
		8BL	(59,000)
		8BS	(31,000)
		8BM	(5,000)
		8C	0
9	Military intensive use	*total*	**40,000**
		9DL	(39,500)
		9E	(500)
10	National scenic rivers	*total*	**5,800**
		10DM	(2,800)
		10EM	(3,000)
11	National wildlife management preserves	*total*	**70,000**
		11DL	(29,000)
		11DS	(10,000)
		11DM	(7,000)
		11E	(24,000)
12	Palustris Experimental Forest	*total*	**7,200**
		12D	(2,600)
		12E	(4,600)
13	Kisatchie Hills Wilderness	*total*	**8,700**
		13	(8,700)
Total Forest Acres			**603,700**

COMPARISON OF ALTERNATIVES

MANAGEMENT AREA ALLOCATIONS

COMPARISON OF ALTERNATIVES

This section presents the alternatives in a manner designed to facilitate comparison. Comparisons are presented in graphic, tabular and written form, with the intent of condensing a great deal of complex information into a format which allows efficient and effective comparison of alternatives.

The first two tables display by alternative the management area allocations and lands suitable for timber production. The remaining comparisons are organized under the issue they address.

Much of the information used to compare alternatives is contained in this chapter and Chapter 4 of this document. In this chapter, comparisons are made of how each alternative responds to the significant issues. Only facets that are easily quantifiable and vary significantly by alternative are displayed. Chapter 4 contains a complete discussion of the environmental consequences of implementing the alternatives and their response to all issue facets. In addition, Chapter 3 describes the existing environment that would be affected by the implementation of the alternatives. Where additional information can be found in the appendices or in the planning records for the Forest Plan, a reference is included in the discussion.

MANAGEMENT AREA ALLOCATIONS

Table 2–8 summarizes the management area and sub-management area allocations. You will note that Alternative A, has no entries in this table. As the *no action* alternative, it represents the Forest's 1985 Forest Plan as amended, which defined management areas under a different concept than is being proposed in the revised Forest Plan. Generally, it defined a number of small and specific management areas, but relegated most of the Forest to general management in management areas 11 (general forest / grazing), and 12 (general forest / no grazing). Within these areas, there were smaller, scattered areas where different emphases should be applied. Table 2–1 earlier in this chapter provides a breakdown of Alternative A.

Management areas in the action alternatives are predominately defined using an ecological landscape concept. Relatively large areas with unique locations are delineated to recognize differences in management intensity, time frames, and the inherent capability of the land, utilizing the landtype association level of the national hierarchy of ecological units. Thirteen management areas and forty-two sub-management areas carry forward the management direction set by these alternatives. No alternative allocates lands to all thirteen management areas. Instead, management area allocations are driven by the theme of a particular alternative.

TABLE 2–8, MANAGEMENT AREA ALLOCATIONS

Comparison of Alternatives, Displayed in Acres

Management Area	Alt A	Alt B	Alt C	Alt D	Mod D	Alt E	Alt F
1 Forest products	N/A	**183,000**	**35,000**	**31,000**	**31,000**	**43,000**	**26,000**
1A	N/A	(7,000)					
1B	N/A	(143,000)					
1C	N/A	(33,000)	(35,000)	(31,000)	(31,000)	(43,000)	(26,000)
2 Amenity values	N/A	**16,000**	**122,000**	**16,000**	**16,000**	**18,000**	**23,000**
2AL	N/A		(15,000)	(7,000)	(7,000)		(8,000)
2AS	N/A	(8,000)	(17,000)	(8,000)	(8,000)		(13,000)
2AM	N/A		(4,000)	(1,000)	(1,000)	(6,000)	(2,000)
2B	N/A	(8,000)	(86,000)			(12,000)	
3 Native community restoration	N/A			**142,000**	**142,000**		
3BL	N/A			(61,000)	(61,000)		
3BS	N/A			(52,000)	(52,000)		
3BM	N/A			(20,000)	(20,000)		
3CL	N/A			(5,000)	(5,000)		
3CS	N/A			(2,000)	(2,000)		
3CM	N/A			(2,000)	(2,000)		
4 RCW / amenity values	N/A		**204,000**				
4AL	N/A		187,000				
4AS	N/A		9,000				
4AM	N/A		8,000				
5 RCW / native community restoration	N/A	**273,000**	**68,000**	**228,000**	**228,000**	**273,000**	**218,000**
5CL	N/A	(247,000)	(57,000)	(201,000)	(201,000)	(247,000)	(181,000)
5CS	N/A	(13,000)	(4,000)	(13,000)	(13,000)	(13,000)	(19,000)
5CM	N/A	(13,000)	(7,000)	(14,000)	(14,000)	(13,000)	(18,000)
6 RCW / wildlife habitats	N/A			**45,000**	**45,000**		**84,000**
6BL	N/A			(45,000)	(45,000)		(83,500)
6BS	N/A						(500)
6BM	N/A						
7 Hardwoods	N/A		**10,000**	**10,000**	**10,000**	**138,000**	**26,000**
8 Wildlife habitats	N/A		**27,000**				**95,000**
8BL	N/A						(59,000)
8BS	N/A						(31,000)
8BM	N/A						(5,000)
8C	N/A		(27,000)				
9 Military intensive use	N/A	**40,000**	**40,000**	**40,000**	**40,000**	**40,000**	**40,000**
9DL	N/A	(39,500)	(39,500)	(39,500)	(39,500)	(39,500)	(39,500)
9E	N/A	(500)	(500)	(500)	(500)	(500)	(500)
10 National scenic rivers	N/A	**5,800**	**11,800**	**5,800**	**5,800**	**5,800**	**5,800**
10DM	N/A	(2,800)	(8,800)	(2,800)	(2,800)	(2,800)	(2,800)
10EM	N/A	(3,000)	(3,000)	(3,000)	(3,000)	(3,000)	(3,000)
11 National wildlife mgmt. preserves	N/A	**70,000**	**70,000**	**70,000**	**70,000**	**70,000**	**70,000**
11DL	N/A	(29,000)	(29,000)	(29,000)	(29,000)	(29,000)	(29,000)
11DS	N/A	(12,000)	(12,000)	(12,000)	(12,000)	(12,000)	(10,000)
11DM	N/A	(7,000)	(7,000)	(7,000)	(7,000)	(7,000)	(7,000)
11E	N/A	(22,000)	(22,000)	(22,000)	(22,000)	(22,000)	(24,000)
12 Palustris Experimental Forest	N/A	**7,200**	**7,200**	**7,200**	**7,200**	**7,200**	**7,200**
12D	N/A	(2,600)	(2,600)	(2,600)	(2,600)	(2,600)	(2,600)
12E	N/A	(4,600)	(4,600)	(4,600)	(4,600)	(4,600)	(4,600)
13 Kisatchie Hills Wilderness	N/A	**8,700**	**8,700**	**8,700**	**8,700**	**8,700**	**8,700**

COMPARISON OF ALTERNATIVES

LANDS SUITABLE FOR TIMBER PRODUCTION

LANDS SUITABLE FOR TIMBER PRODUCTION

Table 2–9 displays the determination of lands suitable for timber production.

TABLE 2–9, DETERMINATION OF LANDS SUITABLE FOR TIMBER PRODUCTION[1]

Displayed by Land Class and Alternative

	Land Classification	Alt A	Alt B	Alt C	Alt D	Mod D	Alt E	Alt F
1	Non-Forest land (includes water)	11,477	11,477	11,477	11,477	11,477	11,477	11,477
2	Forest land	595,268	595,268	595,268	595,268	595,268	595,268	595,268
3	Forest land withdrawn from timber production	11,428	11,428	11,428	11,428	11,428	11,428	11,428
4	Forest land with inadequate information or not capable of producing crops of industrial wood [2]	4,680	4,680	4,680	4,680	4,680	4,680	4,680
5	Forest land physically unsuitable: irreversible damage likely to occur, not restockable within 5 years	2,000	2,000	2,000	2,000	2,000	2,000	2,000
6	Tentatively suitable forest land (item 2 minus items 3, 4, and 5)	577,160	577,160	577,160	577,160	577,160	577,160	577,160
7	Forest land not appropriate for timber production [3]	71,900	232,443	476,985	264,997	268,271	260,741	299,520
8	Unsuitable forest land (items 3, 4, 5, and 7)	90,008	250,551	495,093	283,105	286,379	278,849	317,628
9	Total suitable forest land (item 2 minus item 8)	505,260	344,717	100,175	312,163	308,889	316,419	277,640
10	Total national forest land [4] (items 1 and 2)	606,745	606,745	606,745	606,745	606,745	606,745	606,745

1/ Lands that can be managed for the purpose of growing, tending, harvesting, and regeneration of regulated crops of trees.

2/ Lands for which current information is inadequate to project responses to timber management. Usually applies to low-site lands.

3/ Lands identified as not appropriate for timber production due to: A assignment to other resource uses to meet Forest Plan objectives; B management requirements; and C not being cost-efficient in meeting Forest Plan objectives over the planning horizon.

4/ Acres are computed from GIS database layers. These numbers are slightly higher than official land status inventory acres (603,700 acres).

SUMMARY OF CONSEQUENCES BY ISSUE

ISSUE # 1: TIMBER SUPPLY

This issue deals with concerns over which lands are suitable for timber production, how coordination for other resources may affect timber harvest levels, and the effects of differing harvest levels on the local economy. Table 2–10 and figure 2–3 display how the alternatives may respond differently to this issue during the first decade.

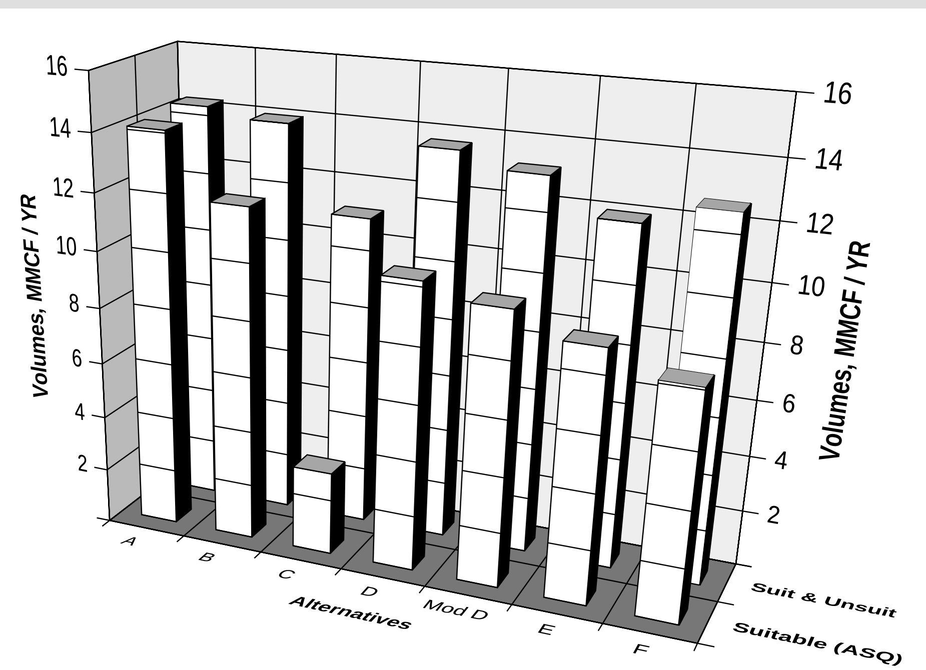
TABLE 2–10, ISSUE #1 — TIMBER SUPPLY

Displayed by Consequence and Alternative

Consequence	Alt A	Alt B	Alt C	Alt D	Mod D	Alt E	Alt F
All timber volume, suitable and unsuitable, MMCF / YR	14.3	14.0	11.1	13.7	13.2	12.0	12.7
Timber volume from suitable lands (ASQ) MMCF / YR	14.1	11.9	3.0	10.2	9.7	8.9	8.1
Suitable timber lands, M-ACRES	505	345	100	312	309	316	278
Timber-associated income to local communities, MM$ / YR	16.4	15.1	9.5	13.6	12.7	11.5	11.8
Timber-associated jobs to local communities, PERSONS / YR	482	444	270	396	369	336	339
Long-term sustained-yield * timber volume, MMCF / YR	19.8	17.2	5.1	16.5	16.4	14.7	13.4

** Long-term sustained yield is computed only for lands suitable for timber production*

FIGURE 2–3, ISSUE #1 — TIMBER VOLUMES FROM SUITABLE AND UNSUITABLE LANDS



COMPARISON OF ALTERNATIVES

SUMMARY OF CONSEQUENCES BY ISSUE

ISSUE # 2: BIOLOGICAL DIVERSITY

ISSUE # 2: BIOLOGICAL DIVERSITY

This issue deals with concerns over what management direction is needed to maintain biological diversity on the Forest. More specifically, it deals with concerns over 1) the allocation and direction for sensitive plant and animal communities and research natural areas, 2) management direction for threatened, endangered, sensitive, and conservation species, 3) restoration of naturally occurring forested landscapes, especially longleaf pine, 4) the allocation of old growth, 5) the effects of pine straw collection, and, 6) the management direction for nonnative vegetation on the Forest. Table 2–11 and figures 2–4 to 2–6 display how the alternatives may respond to some of these issue facets during the first decade.

TABLE 2–11, ISSUE #2 — BIOLOGICAL DIVERSITY

Displayed by Consequence and Alternative

Consequence	Alt A	Alt B	Alt C	Alt D	Mod D	Alt E	Alt F
Longleaf restoration, ACRES / YR	2,102	43	349	1,634	1,456	63	631
Mixed species restoration, ACRES / YR	73	47	458	166	178	730	445
Old-growth designations, M-ACRES	0	23	164	66	81	60	92
Prescribed burning, M-ACRES / YR	47.1	72.0	100.3	82.5	83.8	70.4	84.2

FIGURE 2–4, ISSUE #2 — RESTORATION OF LONGLEAF PINE AND MIXED SPECIES

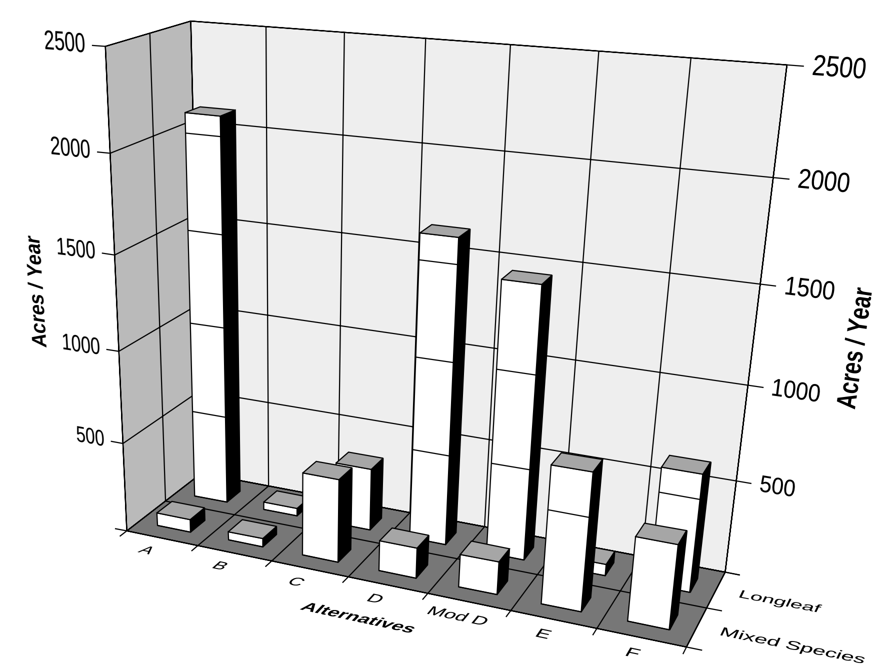


FIGURE 2–5, ISSUE #2
OLD-GROWTH DESIGNATIONS

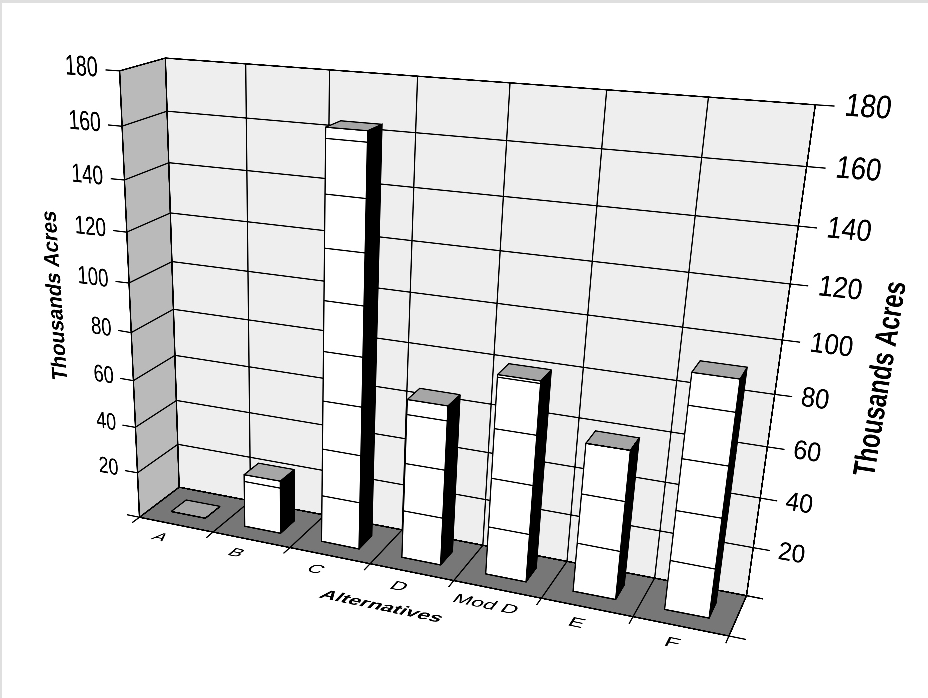
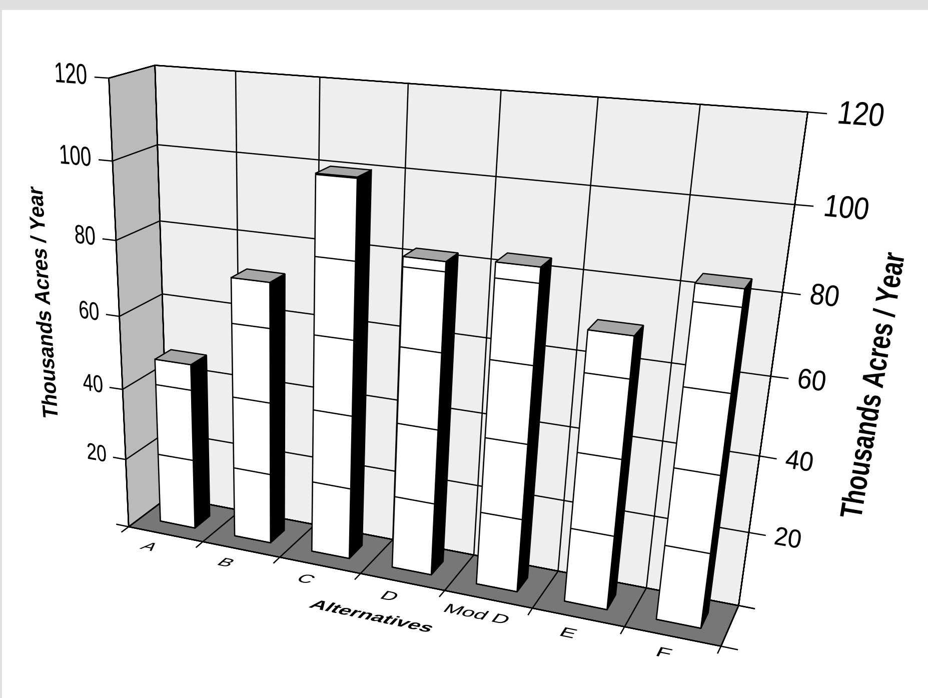


FIGURE 2–6, ISSUE #2
PRESCRIBED BURNING



COMPARISON OF ALTERNATIVES

SUMMARY OF CONSEQUENCES BY ISSUE

ISSUE # 3: LAND USE

ISSUE # 4: MINERALS DEVELOPMENT

ISSUE # 3: LAND USE

This issue deals with concerns over establishing priorities for land acquisitions involving wetlands, rare or sensitive natural communities or species; management direction for former military camps; coordinating special uses with other resources; and increased military intensive use on the Vernon Unit of the Calcasieu District. All alternatives respond to this issue similarly by establishing Forestwide mitigation measures and management direction.

A memorandum of agreement (MOA) signed by the Secretaries of Agriculture and Army directed the preparation of an environmental analysis examining more intensive use on some or all of the 45,000 acres of military limited use lands in the Vernon Unit. This process is underway. Environmental analysis will examine a range of alternatives, including amending the revised Forest Plan.

ISSUE # 4: MINERALS DEVELOPMENT

This issue deals with internal and public concerns over the extent of opportunities for minerals development, and the modification of management direction for oil, gas, and common variety minerals on the Forest. The areas available for minerals leasing and exploration vary by alternative, as shown below in table 2–12. The application of No Surface Occupancy (NSO) and Controlled Surface Use (CSU) stipulations in leases vary in accordance with the theme, or emphasis, of an alternative. A map depicting areas available for leasing and stipulation requirements for the revised Forest Plan can be found in the planning process records.

TABLE 2-12, ISSUE #4-LEASABLE OIL & GAS

Oil and Gas, Variation by Stipulation

	Alt A	Alt B	Alt C	Alt D	Mod D	Alt E	Alt F
Total acres on Forest	603,700	603,700	603,700	603,700	603,700	603,700	603,700
Acres withdrawn from leasing	8,700	8,700	603,700	8,700	8,700	26,700	31,700
Acres requiring **NSO** stipulation[1]	40,069	22,036	0	25,364	25,364	17,486	16,823
Acres requiring **CSU1** stipulation[2]	0	0	0	130,560	130,560	125,391	131,894
Acres requiring **CSU2** stipulation[3]	5,511	182,565	0	70,959	70,959	63,575	59,826

[1] No surface occupancy.
[2] Highly restrictive controlled surface use stipulation.
[3] Moderately restrictive controlled surface use stipulation.

ISSUE # 5: RANGE / GRAZING

This issue deals with concerns over the impact of the elimination of the range management program, the amount of lands allocated to range development, and livestock impacts on plant and animal communities on the Forest. All alternatives respond to this issue similarly by establishing Forestwide mitigation measures and management direction. The allocation and management of the range program does not vary significantly by alternative.

ISSUE # 6: RED-COCKADED WOODPECKER

This issue deals with concerns over what Forest direction is needed to comply with regional guidelines for managing habitat for the endangered Red-cockaded Woodpecker (RCW). It deals with concerns over 1) how much of the Forest should be allocated to RCW management, 2) what types of habitat improvements are needed, 3) how RCW clusters and habitat within the Kisatchie Hills Wilderness should be managed, and, 5) what southern pine beetle suppression activities should be allowed within RCW habitat areas. Table 2–13 displays how the alternatives may respond to some of these issue facets during the first decade.

TABLE 2–13, ISSUE #6
RED-COCKADED WOODPECKER

Displayed by Consequence and Alternative

Consequence	Alt A	Alt B	Alt C	Alt D	Mod D	Alt E	Alt F
Habitat management area (HMA) component on the Forest, %	61	61	61	61	61	61	61
Foraging area component in HMAs, %	42	42	42	42	42	42	42
RCW population objective, CLUSTERS	1,405	1,405	1,405	1,405	1,405	1,405	1,405
Foraging area assigned per cluster *within* 1.5 miles of active rcw, ACRES	118	118	118	118	118	118	118
Foraging area assigned per cluster *beyond* 1.5 miles of active rcw, ACRES	83	83	83	83	83	83	83
Natural longleaf landscape restoration, ACRES / YR	2,102	43	349	1,634	1,456	63	631
Longleaf pine habitat, all stages, M-ACRES							
@ 5 years	134	113	141	117	121	112	121
@ 45 years	199	115	143	175	169	131	148

COMPARISON OF ALTERNATIVES

SUMMARY OF CONSEQUENCES BY ISSUE

ISSUE # 7: RECREATION

ISSUE # 8: RIPARIAN

ISSUE # 7: RECREATION

This issue deals with concerns over what variety of outdoor recreation experiences should be provided on the Forest and how they may affect the local community. Particularly, it deals with concerns over 1) use of off-road vehicles, 2) the need for additional recreational experiences and facilities, 3) the management of trail corridors, 4) designation of additional wilderness and wild & scenic rivers, and, 5) the effects of recreational activities on the local economy. Table 2–14 and figure 2–7 display how the alternatives may respond to some of these issue facets during the first decade.

ISSUE # 8: RIPARIAN

This issue deals with concerns over what management direction is needed to designate and protect riparian / wetland areas on the Forest. It deals with concerns over 1) the width of streamside management zones, 2) management direction needed to protect riparian associated values, including the Louisiana pearlshell mussel, and, 3) management direction needed for State natural and scenic streams that traverse national forest lands. Table 2–15 displays how the alternatives may respond to some of these issue facets during the first decade. Streamside protection in table 2-15 includes both riparian area protection zones and streamside habitat protection zones.

TABLE 2–14, ISSUE #7 — RECREATION

Displayed by Consequence and Alternative

Consequence	Alt A	Alt B	Alt C	Alt D	Mod D	Alt E	Alt F
ORV use closed, % OF FOREST	15	17	17	21	22	23	23
ORV use open, % OF FOREST	85	83	83	79	78	77	77
Top priority trail construction, MILES	66		176	129	193.5	86	121
Recreation capacity *– reasonable, MRVDs	2,163	2,785	2,431	2,504	2,354	2,570	2,456
Recreation use *– expected, MRVDs	497	478	534	503	513	512	518
Recreation-associated jobs to local community, PERSON-YEARS	429	413	461	435	439	442	447
Recreation-associated income to local community, MM$ / YR	10.5	10.1	11.2	10.6	10.7	10.8	10.9

*Dispersed recreation

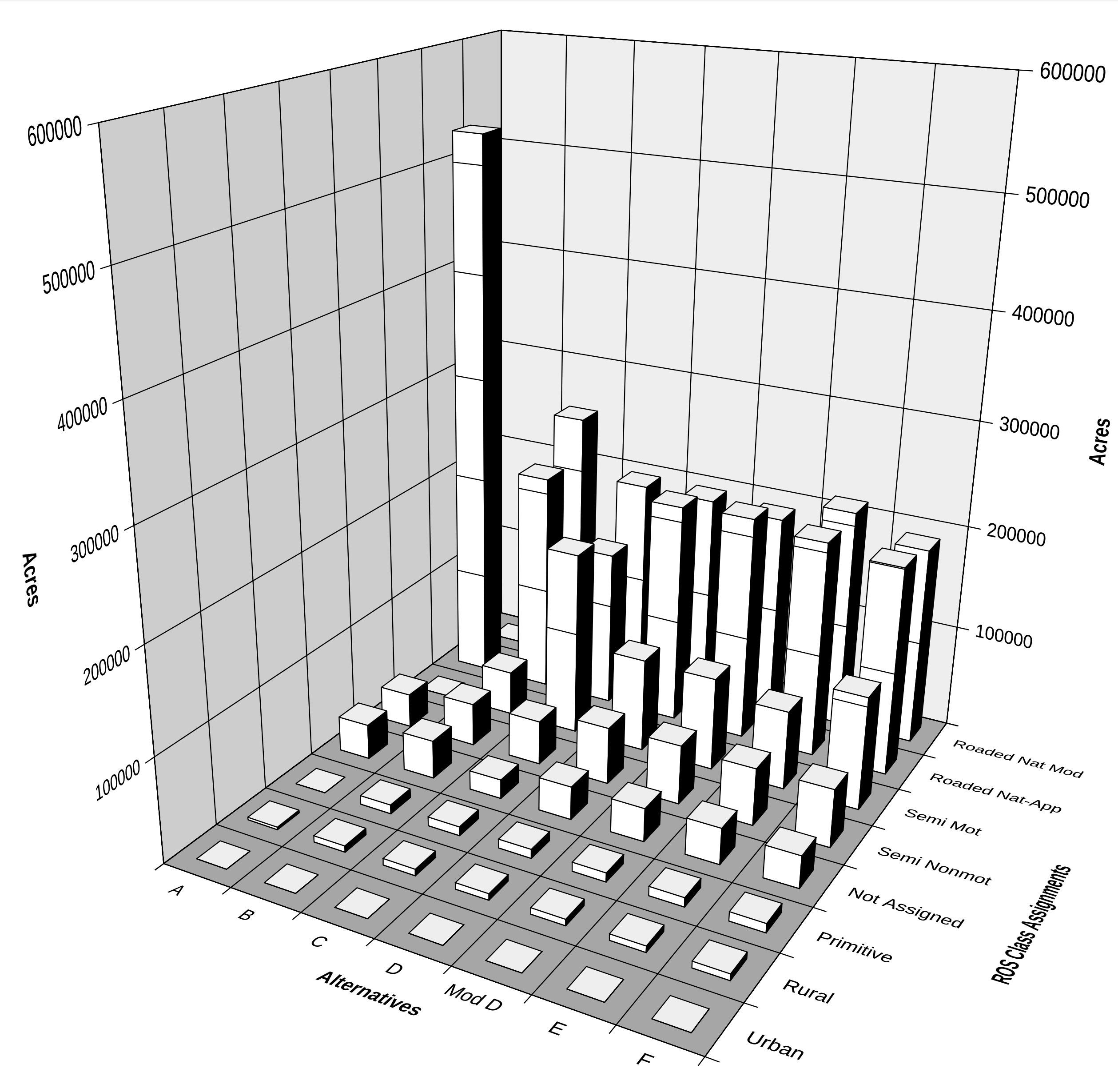
TABLE 2–15, ISSUE #8 — RIPARIAN

Displayed by Consequence and Alternative

Consequence	Alt A	Alt B	Alt C	Alt D	Mod D	Alt E	Alt F
Streamside protection, M-ACRES	79	172	183	182	174	181	189

FIGURE 2–7, ISSUE #7 — FOREST ROS CLASS ASSIGNMENTS IN ACRES

Displayed by Alternative



COMPARISON OF ALTERNATIVES

SUMMARY OF CONSEQUENCES BY ISSUE

ISSUE # 9: FOREST ROADS

ISSUE # 10: PRESCRIBED BURNING

ISSUE # 9: FOREST ROADS

This issue deals with concerns over what management direction is needed to manage and maintain the road system on the Forest and what effects may occur to other resources. Table 2–16 displays how the alternatives may respond to this issue during the first decade.

ISSUE # 10: PRESCRIBED BURNING

This issue deals with concerns over what management direction is needed to achieve management goals using prescribed fire on the Forest. More specifically, it deals with concerns over 1) the extent and seasonal use of prescribed fire on the general forest, within the HMAs, within the Kisatchie Hills Wilderness, and within the wildlife management preserves; and 2) the use of plow lines in conjunction with prescribed burning practices. Table 2–17 and figure 2–8 display how the alternatives may respond to some of these issue facets during the first decade.

TABLE 2–16, ISSUE #9 — FOREST ROADS

Displayed by Consequence and Alternative

Consequence	Alt A	Alt B	Alt C	Alt D	Mod D	Alt E	Alt F
Primitive and nonmotorized ROS assignments, M-ACRES	33	50	51	64	66	64	65
Timber local road construction, MILES / YR	8.2	6.5	1.9	6.3	6.2	6.1	5.8
Timber local road reconstruction, MILES / YR	159	126	37	122	120	118	111
Timber road construction / reconstruction soil loss, M-TONS / YR	12	9	2	9	9	9	8

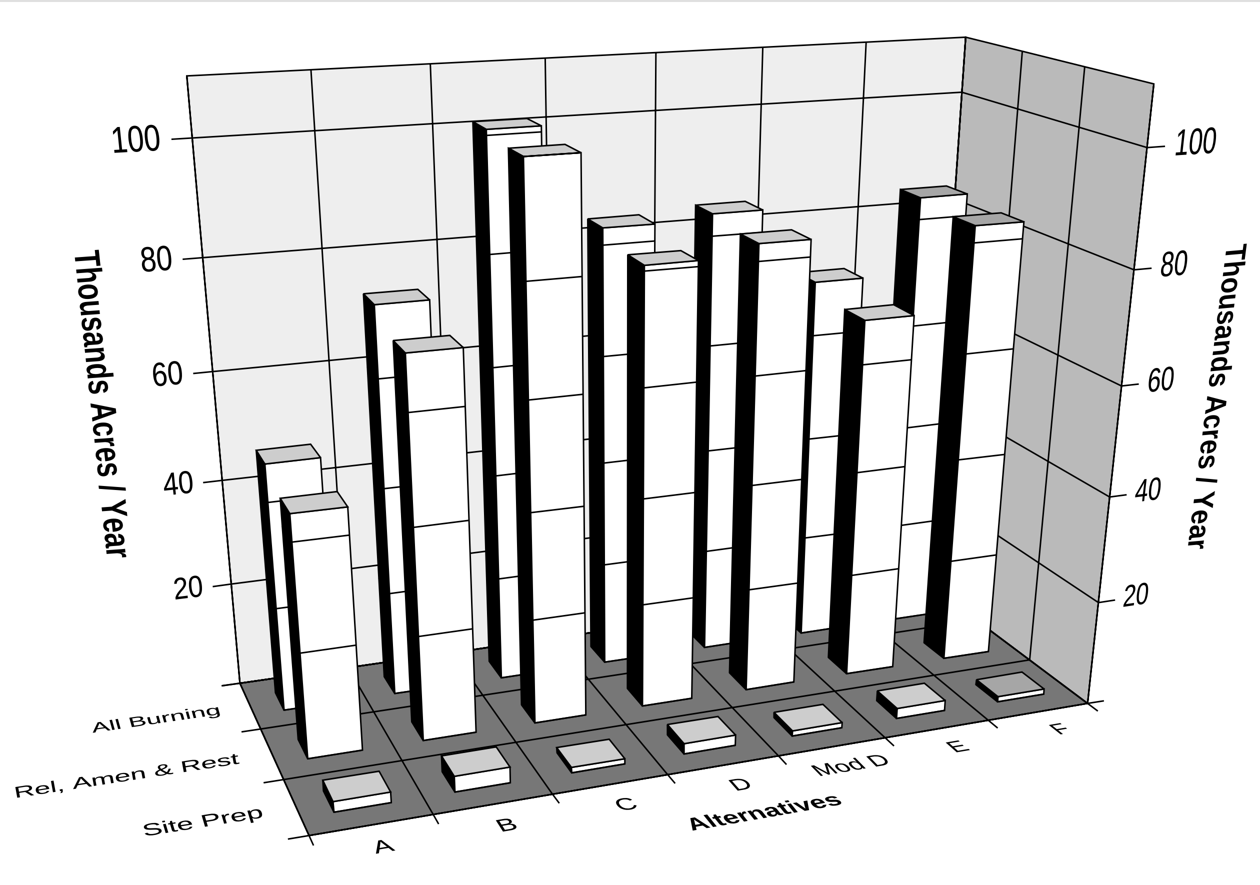
TABLE 2–17, ISSUE #10 — PRESCRIBED BURNING

Displayed by Consequence and Alternative

Consequence	Alt A	Alt B	Alt C	Alt D	Mod D	Alt E	Alt F
Wilderness wildfires suppressed?	YES	YES	YES	YES	YES	YES	YES
Management-ignited prescribed fire allowed in wilderness?	NO	NO	NO	YES	YES	NO	YES
Lightning-ignited prescribed fire allowed in wilderness?	NO	NO	YES	YES	YES	NO	YES
Prescribed burning for amenity values, release and restoration, M-ACRES / YR	45	70	100	81	83	68	83
Prescribed burning for site preparation, M-ACRES / YR	2	3	1	2	1	2	1
All prescribed burning, M-ACRES / YR	47	73	101	83	84	70	84

FIGURE 2–8, ISSUE #10
PRESCRIBED BURNING FOR VARYING PURPOSES

Displayed by Alternative and General Purpose



COMPARISON OF ALTERNATIVES

SUMMARY OF CONSEQUENCES BY ISSUE

ISSUE # 10: PRESCRIBED BURNING

COMPARISON OF ALTERNATIVES

SUMMARY OF CONSEQUENCES BY ISSUE

ISSUE # 11: SILVICULTURE

ISSUE # 11: SILVICULTURE

This issue deals with concerns over which silvicultural systems and management practices should be used on the Forest and what effects they may have on other resources. It deals with concerns over 1) use of the uneven-aged silvicultural system and its effects, 2) rotation ages, regeneration methods, and site preparation methods for even-aged management and its effects, 3) effects on landscape ecology, 4) methods and practices for managing bottomland hardwood and within-stand hardwoods, and, 5) use of herbicides and their effects on other Forest resources. Table 2–18 displays how the alternatives may respond to some of these issue facets during the first decade. Harvests coming from unsuitable lands are unscheduled volumes expected as a result of vegetation manipulation to meet other resource objectives. These estimates will fluctuate from period to period.

TABLE 2–18, ISSUE #11 — SILVICULTURE

Displayed by Consequence and Alternative

Consequence	Alt A	Alt B	Alt C	Alt D	Mod D	Alt E	Alt F
Uneven-aged management on suitable timber lands*, M-ACRES	37	21	8	32	29	34	41
Uneven-aged management on unsuitable timber lands, M-ACRES	70	237	493	273	279	267	308
Even-aged management on suitable timber lands, M-ACRES	468	305	92	280	280	270	235
Even-aged management on unsuitable timber lands, M-ACRES	32	26	13	22	20	24	21
Custodial (low-level) timber management, M-ACRES		20	1	0	0	12	2
Site preparation, ACRES / YR	2,176	1,787	377	1,586	1,414	1,136	987
Planting, ACRES / YR	2,176	905	202	1,577	1,406	796	803
Precommercial thinning, ACRES / YR		1,332	283	13	11	650	189
Chemical release, ACRES / YR	870	1,075	238	637	568	705	400
Conversion from pine to mixed forest type, ACRES / YR	73	47	458	166	178	730	445
Conversion to longleaf pine forest type, ACRES / YR	2,102	43	349	1,634	1,456	63	631

*Uneven-aged management for Alternative A occurs in longleaf stands scattered throughout the HMAs. For the other alternatives, consolidated landscape-size patches are designated for uneven-aged management.

ISSUE # 12: WILDLIFE AND FISH

This issue deals with concerns about the management direction needed to provide diverse wildlife and fish habitat on the Forest. Specifically, it deals with concerns over 1) the direction for the two wildlife management preserves; 2) habitat management direction for game and nongame species, including neotropical migratory birds; 3) management direction for the spatial arrangement of upland hardwood species; and 4) the choice of ecological and management indicators to effectively monitor habitat health and response to management on the Forest. Table 2–19 and figures 2–9 through 2–16 display how the alternatives may respond to some of these issue facets during the first decade.

TABLE 2–19, ISSUE #12 — WILDLIFE AND FISH

Displayed by Consequence and Alternative

Consequence	Alt A	Alt B	Alt C	Alt D	Mod D	Alt E	Alt F
Percent of Forest in HMA	61	61	61	61	61	61	61
Percent of HMAs in tentative foraging	42	42	42	42	42	42	42
RCW population objective, clusters	1,405	1,405	1,405	1,405	1,405	1,405	1,405
Even-aged component of wildlife management preserves, %	69	42	23	26	25	15	12
Streamside habitat protection, M-ACRES	79	172	183	182	174	181	189
Hardwood emphasis (hardwood forest type and streamside habitat), M-ACRES	136	187	198	202	192	275	213
Quality habitat for deer, M-ACRES	225	225	242	273	266	242	254
Quality habitat for turkey, M-ACRES	328	308	335	387	385	338	352
Quality habitat for quail, M-ACRES	182	112	143	152	157	118	141
Quality habitat for fox squirrel, M-ACRES	153	210	236	228	224	227	238
Quality habitat for gray squirrel, M-ACRES	83	174	193	187	181	187	194
MI habitat – longleaf pine, all stages, M-ACRES							
@ 5 years	134	113	141	117	121	112	121
@ 45 years	199	115	143	175	169	131	148
MI habitat – shortleaf pine / oak-hickory, early stages, M-ACRES							
@ 5 years	1	1	0	0	0	0	0
@ 45 years	3	4	3	3	5	9	1
MI habitat – shortleaf pine / oak-hickory, mid-late stages, M-ACRES							
@ 5 years	17	12	27	15	16	19	17
@ 45 years	14	10	27	14	15	21	17
MI habitat – mixed hardwood-loblolly pine, early stages, M-ACRES							
@ 5 years	56	46	21	43	42	42	28
@ 45 years	4	24	6	8	11	15	8
MI habitat – mixed hardwood-loblolly pine, mid-late stages, M-ACRES							
@ 5 years	320	262	225	247	252	250	248
@ 45 years	308	281	235	221	230	246	239
MI habitat – riparian, small streams, M-ACRES							
@ 5 years	39	79	92	89	85	89	96
@ 45 years	39	79	92	89	85	89	96
MI habitat – riparian, large streams, M-ACRES							
@ 5 years	40	94	101	96	92	96	96
@ 45 years	40	94	101	96	92	96	96

FIGURE 2–9, ISSUE #12 — QUALITY HABITAT FOR PRIMARY DEMAND SPECIES

Displayed by Alternative and Species

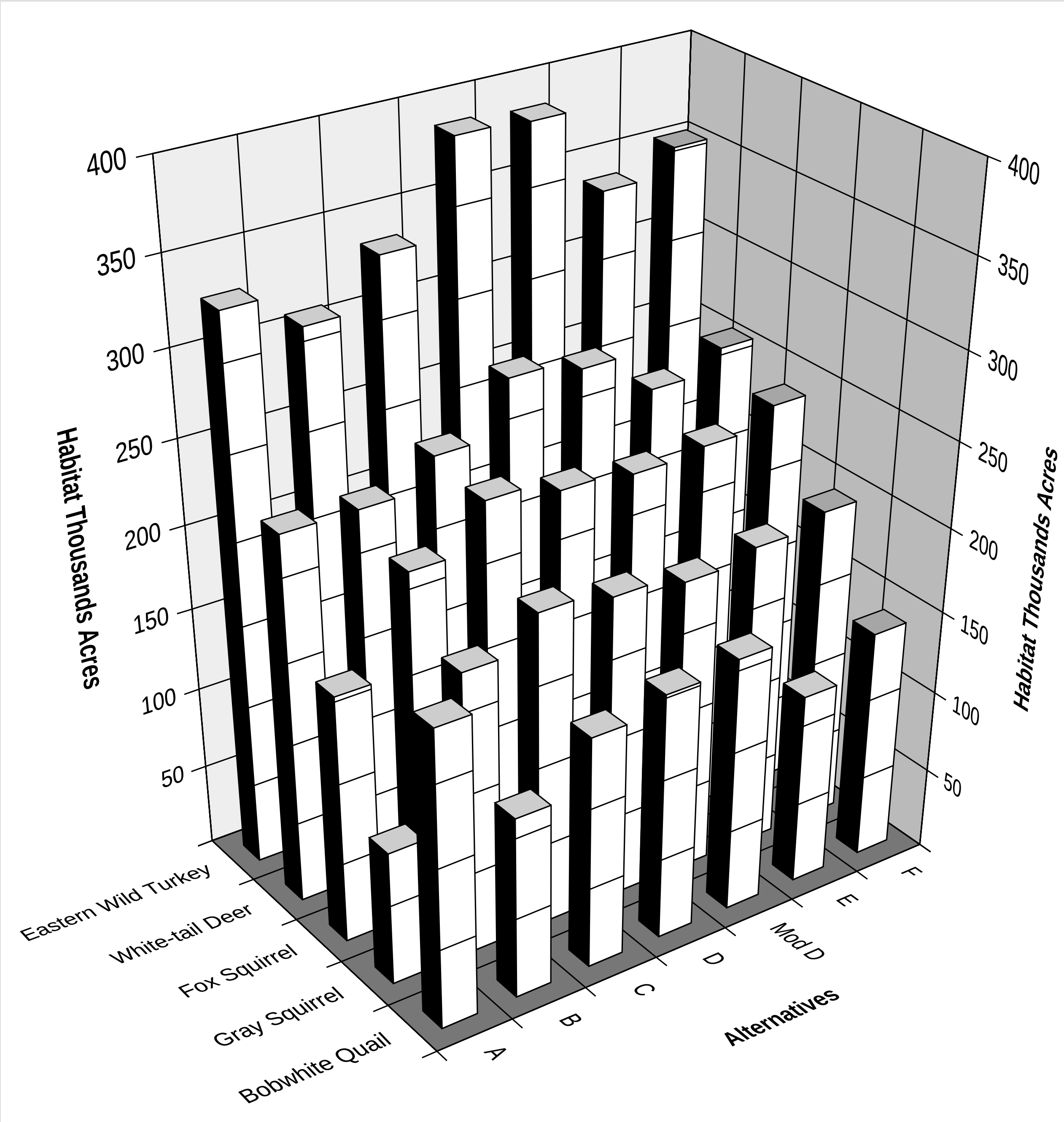


FIGURE 2–10, HABITAT CHANGES EXPECTED FOR MANAGEMENT INDICATORS, BY ALTERNATIVE

Longleaf Pine, All Stages

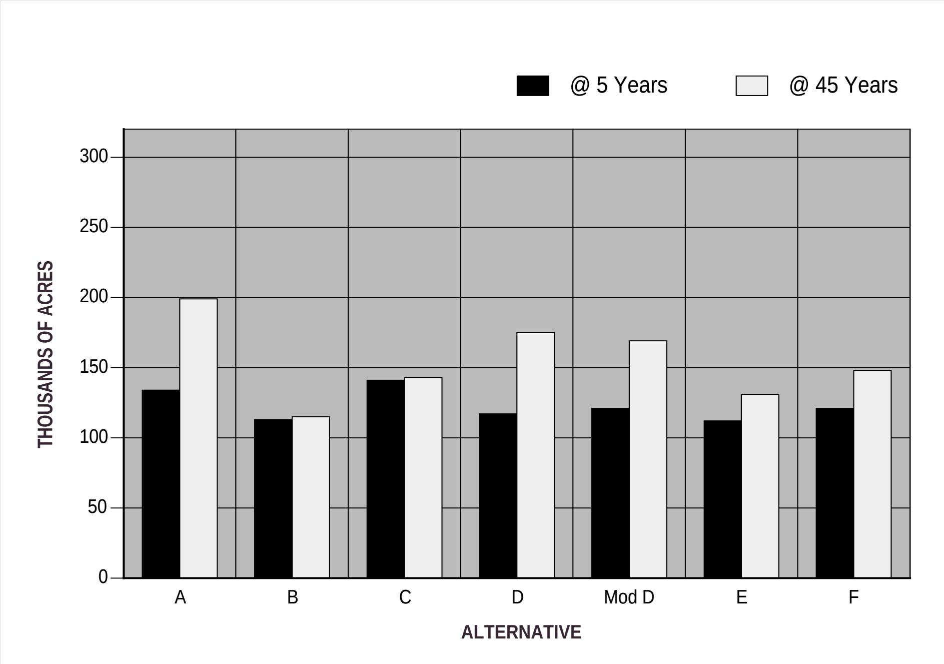
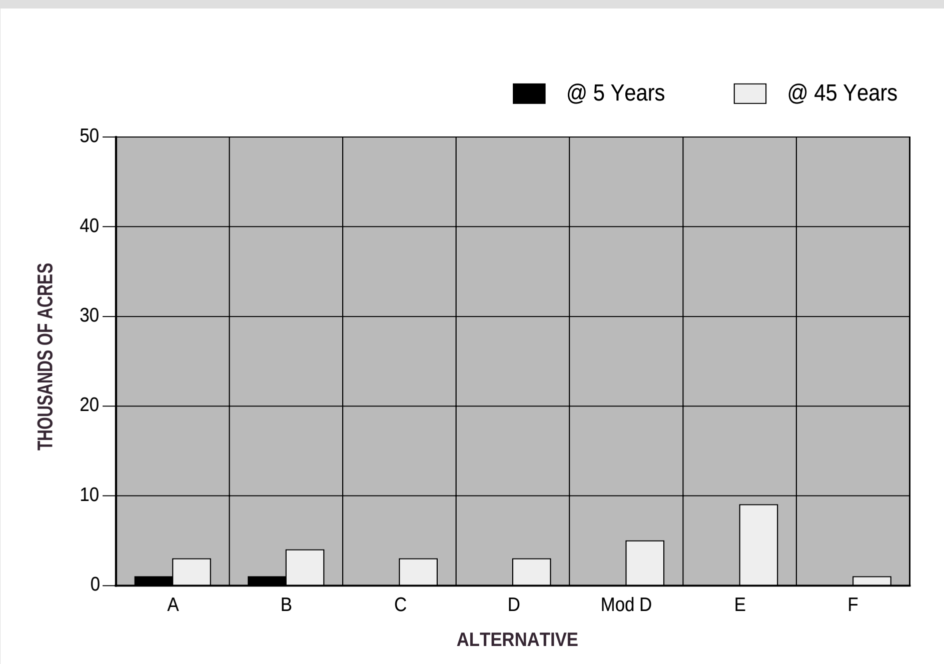


FIGURE 2–11, HABITAT CHANGES EXPECTED FOR MANAGEMENT INDICATORS, BY ALTERNATIVE

Shortleaf Pine / Oak-Hickory, Early Stages



COMPARISON OF ALTERNATIVES

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FIGURE 2–12, HABITAT CHANGES EXPECTED FOR MANAGEMENT INDICATORS, BY ALTERNATIVE

Shortleaf Pine / Oak-Hickory, Mid-Late Stages

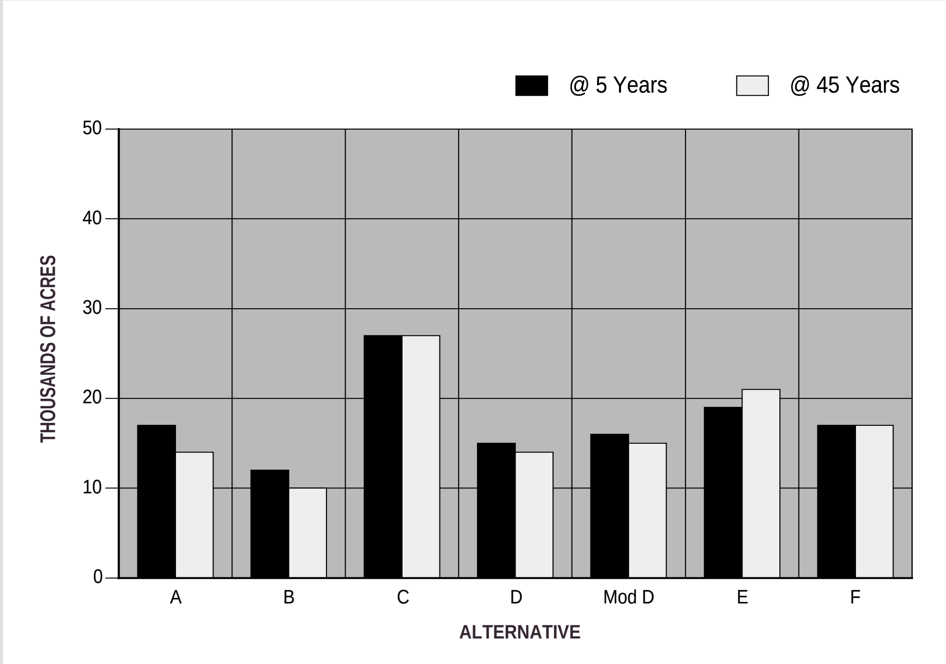


FIGURE 2–13, HABITAT CHANGES EXPECTED FOR MANAGEMENT INDICATORS, BY ALTERNATIVE

Mixed Hardwood-Loblolly Pine, Early Stages

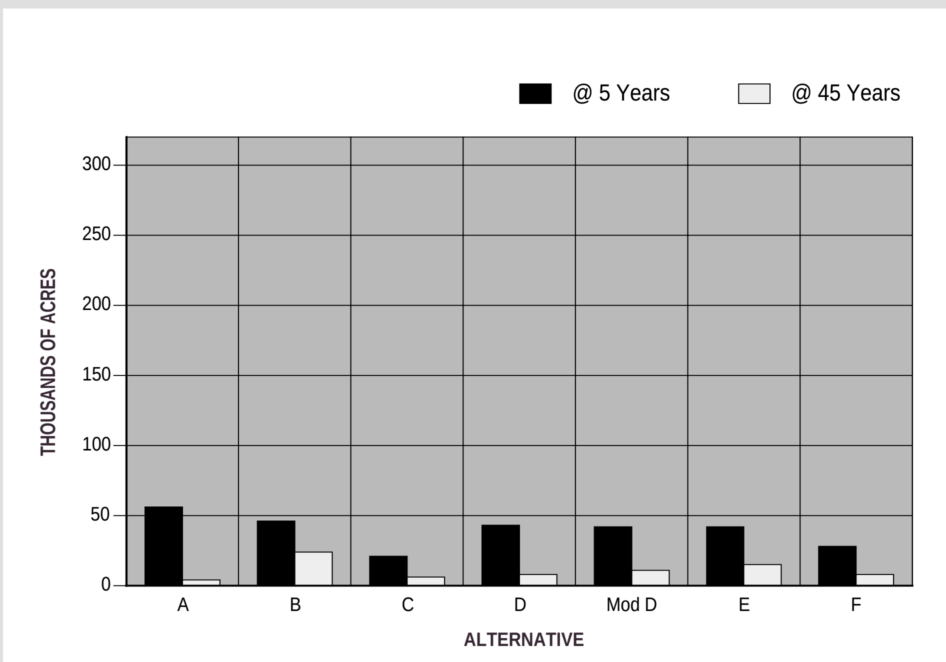


FIGURE 2–14, HABITAT CHANGES EXPECTED FOR MANAGEMENT INDICATORS, BY ALTERNATIVE

Mixed Hardwood-Loblolly Pine, Mid-Late Stages

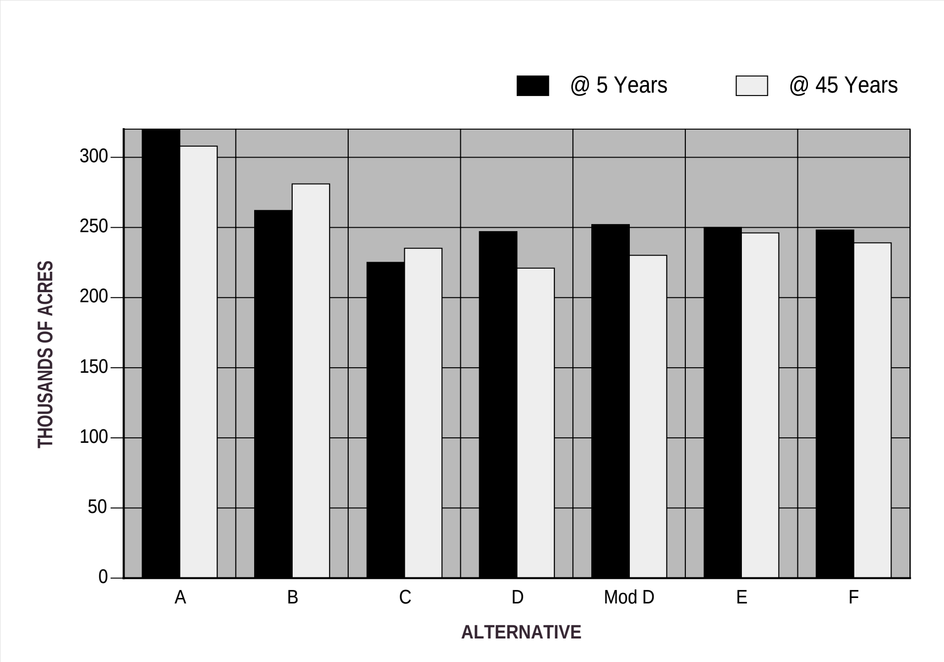
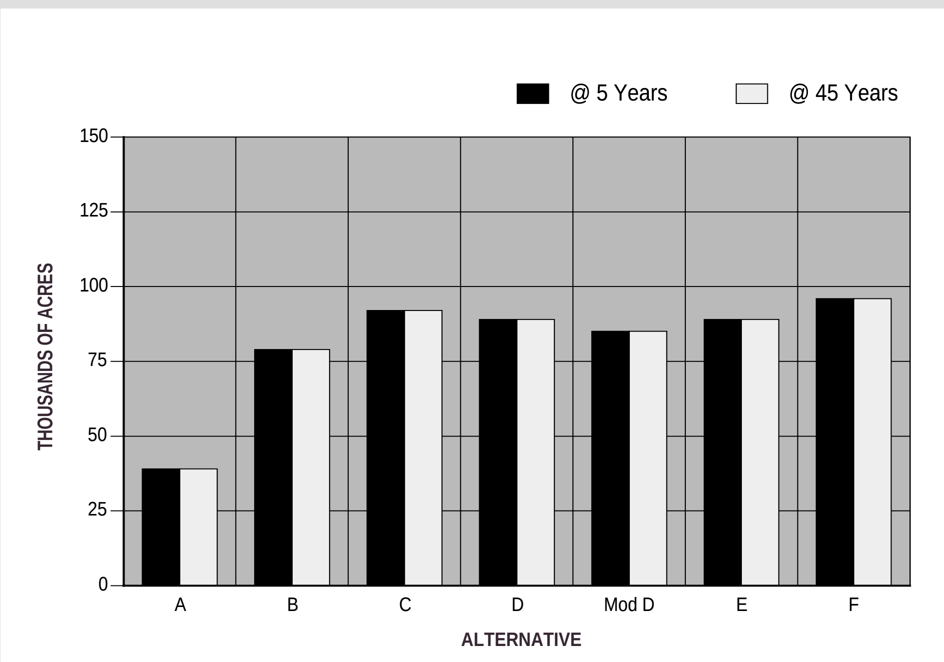


FIGURE 2–15, HABITAT CHANGES EXPECTED FOR MANAGEMENT INDICATORS, BY ALTERNATIVE

Riparian, Small Streams



COMPARISON OF ALTERNATIVES

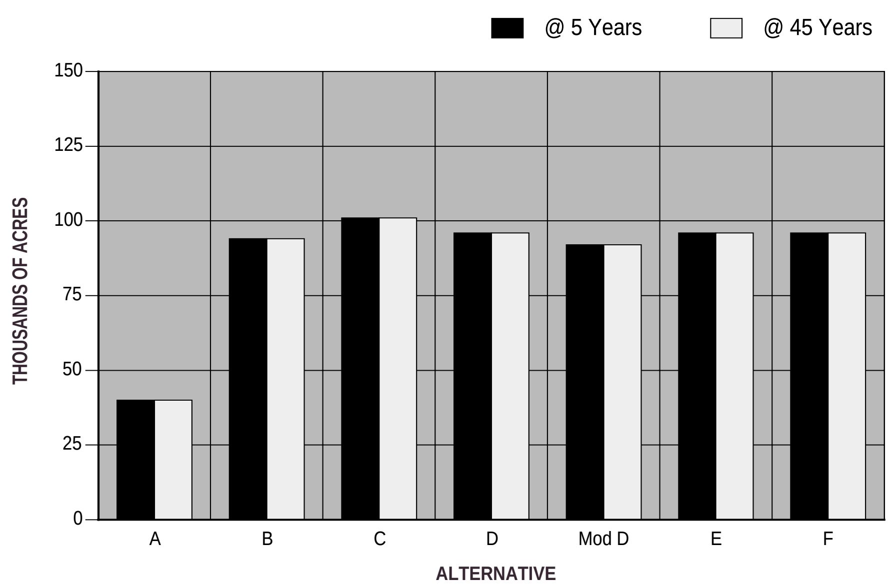
SUMMARY OF CONSEQUENCES BY ISSUE

ISSUE # 12: WILDLIFE AND FISH

ISSUE # 13: FOREST HEALTH

FIGURE 2–16, HABITAT CHANGES EXPECTED FOR MANAGEMENT INDICATORS, BY ALTERNATIVE

Riparian, Large Streams



ISSUE # 13: FOREST HEALTH

This issue deals with concerns over the improvement of forest health on the Forest, especially protection from insects and diseases. The restoration of natural landscape communities, predominantly longleaf pine, and the reduction of high hazard southern pine beetle stands respond to this issue. Table 2–20 displays how the alternatives may respond to some of these issue facets during the first decade.

TABLE 2–20, ISSUE #13 — FOREST HEALTH

Displayed by Consequence and Alternative

Consequence	Alt A	Alt B	Alt C	Alt D	Mod D	Alt E	Alt F
Native longleaf landscape restoration, ACRES / YR	2,102	43	349	1,634	1,456	63	631
High-hazard SPB stands* harvested, M-ACRES / YR	3.6	4.1	0.9	1.1	1.1	1.3	0.9

** Yellow pine forest types, 50 years or older, with basal areas greater than or equal to 120 square feet per acre.*

Chapter 3

Affected Environment

INTRODUCTION

PURPOSE

Chapter 3 describes the existing environment of the areas affected by the alternatives. Descriptions include physical, biological, social and economic characteristics. This chapter should help reviewers understand the effects of implementing each alternative described in Chapter 2. Also it is the base line for the environmental consequences presented in Chapter 4.

ORGANIZATION

Chapter 3 begins with a description of the Forest Service National Hierarchical Framework of Ecological Units, and its use and importance to resource planning. The location of the Kisatchie National Forest within the broadest scales of the hierarchy is briefly described. This is followed by a more detailed description of the Forest at subregional and landscape scales.

ECOSYSTEM MANAGEMENT AND ECOLOGICAL CLASSIFICATION

In 1992 the Forest Service committed to using an ecological approach to managing national forests and grasslands. This concept, termed *ecosystem management*, focuses on blending the needs of people with management that will sustain forest ecosystems (**Robertson, 1992**).

A critical first step in planning and implementing the ecosystem management concept was the development of a consistent approach to ecosystem classification and mapping (**McNab and Avers, 1994**). As a result, a nationwide effort was undertaken to develop a system for classifying ecological units.

Ecological classification is a system by which land and water at various scales are classified and stratified through integrating information about geology, landform, soils, water, vegetation, and climate. These classifications represent homogeneous units having similarities among their resource capabilities and relationships.

In 1993 the Forest Service completed the development of the *National Hierarchical Framework of Ecological Units*. This hierarchy then became a tool to provide a more ecological and scientific basis in implementing ecosystem management (**Ecomap, 1993**).

In resource planning, this hierarchy is useful for:

- Evaluating the inherent capability of land and water resources.
- Predicting changes occurring over time.
- Evaluating effects of management.
- Allocating land to management areas.
- Selecting the appropriate management indicators.
- Discussing and analyzing ecosystems and biodiversity at multiple scales.

In resolving issues, the hierarchy improves our ability to describe desired future conditions for management areas in terms of ecosystem composition, structure, and function. It is used in this Chapter to describe the affected environment. In Chapter 4 it provides an ecological context for a more specific and sensitive effects analysis.

DESCRIPTIONS OF ECOLOGICAL UNITS

The national hierarchy is comprised of four planning and analysis scales: *ecoregions*, *subregions*, *landscape*, and *land units*. The scales are further divided into *domains*, *divisions*, *provinces*, *sections*, *subsections*, *landtype associations*, *landtypes*, and *landtype phases*. These are detailed in table 3–1, displayed on the following page.

Louisiana and the Kisatchie National Forest lie within the Humid Temperate Domain, the Subtropical Division, and the Outer Coastal Plain Mixed Forest, Southeastern Mixed Forest, and Lower Missis-

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DESCRIPTIONS OF ECOLOGICAL UNITS

sippi Riverine Forest Provinces. This is illustrated by figure 3–1.

Figure 3–2 on page 3–4 displays the *provinces*, *sections*, and *subsections* in Louisiana. The Kisatchie National Forest falls within the three provinces occurring in Louisiana.

The Outer Coastal Plain Mixed Forest Province contains most of the Forest — 94 percent. Within that province, the Forest falls into the *Coastal Plains and Flatwoods, Western Gulf Section*; and the *Western Coastal Plains Subsection*. The Coastal Plains and Flatwoods, Western Gulf Section, is segregated from the rest of the province at the Mississippi River. This is because of the biological barrier created by the river. It is also due to the variation occurring on the western fringe of this broad vegetation region. The Western Coastal Plains Subsection consists of the rolling hills of west-central Louisiana and portions of east Texas. Although the uplands of this area were historically dominated by longleaf pine communities typical to acidic loams, they included significant areas of shortleaf pine / oak-hickory on less acid, clayey soils; mixed hardwood-loblolly pine on stream terraces, and riparian forest on alluvial floodplains.

Five percent of the Forest lies within the Southeastern Mixed Forest Province. This province is that portion of the southern gulf coastal plain immediately adjacent to and inland from the *Outer Coastal Plain Mixed Forest Province*. In this province, the Forest falls within *Mid Coastal Plains, Western Section* and the *South Central Arkansas Subsection*. The Mid-Coastal Plains, Western Section is also split from the rest of the province at the Mississippi River because of the biological barrier created by the river and the variation occurring on the western fringe of this broad vegetation region. The South Central Arkansas Subsection includes the rolling hills of northwestern Louisiana, portions of east Texas, and Southern Arkansas. The predominant forest canopy was a mixture of shortleaf and loblolly pines, upland oaks, and hickories.

TABLE 3–1, FOREST SERVICE HIERARCHICAL FRAMEWORK

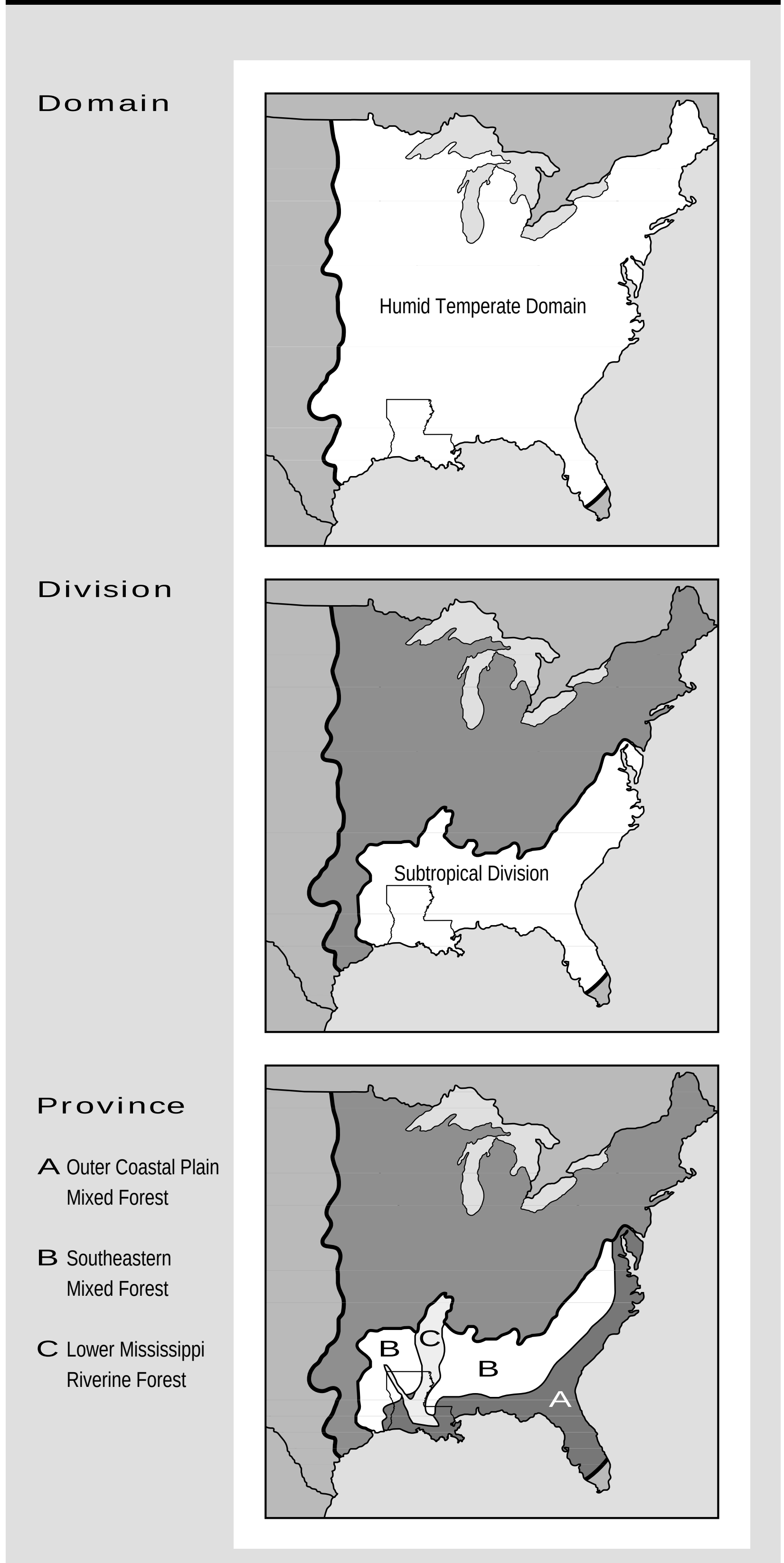
National Hierarchy of Ecological Units

Planning and Analysis Scale	Ecological Units	Purpose, Objectives, and General Use	General Size Range
Ecoregion			
Global	Domain	Broad applicability for modeling and sampling, strategic planning and assessment, and international planning	Millions to tens of thousands of square miles
Continental	Division		
Regional	Province		
Subregion	Section ••• Subsection	Strategic, multiforest, statewide, and multiagency analysis and assessment	Thousands to tens of square miles
Landscape	Landtype association	Forest, area-wide planning, and watershed analysis	Thousands to hundreds of acres
Land Unit	Landtype ••• Landtype phase	Project and management area planning and analysis	Hundreds to less than ten acres

Source: *ECOMAP, 1993.*

One percent of the Forest is within the Lower Mississippi Riverine Forest Province. This province consists of floodplains and low terraces of the Mississippi River, south of its confluence with the Ohio River. Within this province, the Forest falls within the Mississippi Alluvial Basin Section and the Red River Alluvial Plain Subsection. The Mississippi Alluvial Basin Section includes the relatively level bottomland and backswamps created by the meandering belts of the Mississippi, Red, and Arkansas Rivers. Soils are fertile and productive. The Red River Alluvial Plain Subsection contains the recent alluvium and natural levees confined to the bottomlands and backswamps associated with the Red River of central Louisiana. The original overstory vegetation was dominated by species associated with bottomland hardwood forests and cypress-tupelo swamps.

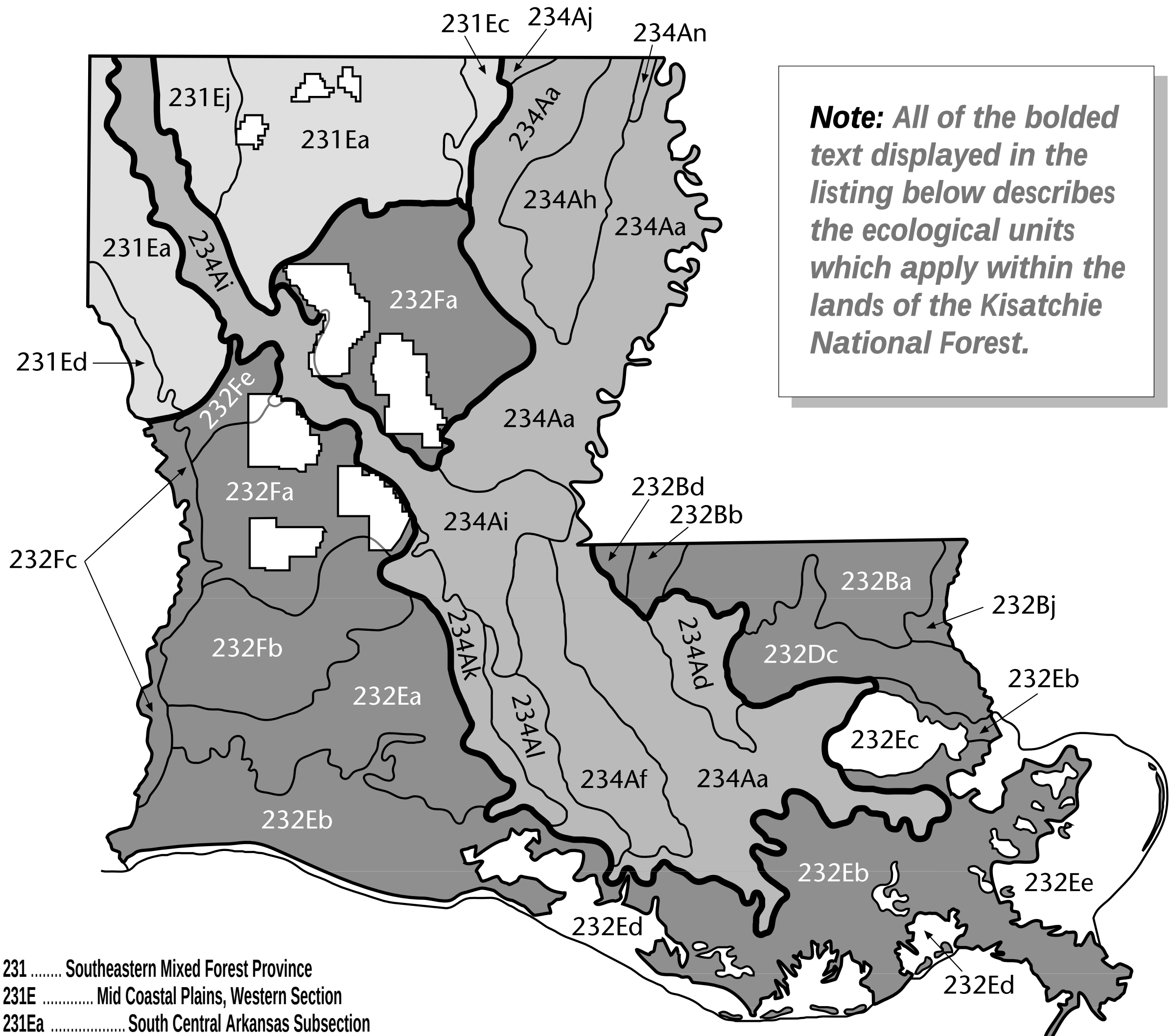
FIGURE 3–1, HIERARCHY OF ECOREGIONS



Source: *Hierarchy of ecoregions at a range of scales, R.G. Bailey, 1994.*

FIGURE 3–2, PROVINCES, SECTIONS, AND SUBSECTIONS

Ecological Divisions of Louisiana



Note: ***All of the bolded text displayed in the listing below describes the ecological units which apply within the lands of the Kisatchie National Forest.***

231 .... **Southeastern Mixed Forest Province**
231E .... **Mid Coastal Plains, Western Section**
231Ea .... **South Central Arkansas Subsection**
231Ec .... Ouachita Alluvial Valley Subsection
231Ed .... Sabine Alluvial Valley Subsection
231Ej .... South Central Arkansas Flatwoods Subsection

232 .... **Outer Coastal Plain Mixed Forest Province**
232B .... Coastal Plains and Flatwoods, Lower Section
232Ba .... Fragipan Loam Hills Subsection
232Bb .... Southern Loessial Plains Subsection
232Bd .... Southern Deep Loess Hills and Bluffs Subsection
232Bj .... Southern Loam Hills Subsection
232D .... Florida Coastal Lowlands (Western) Section
232Dc .... Gulf Coastal Flatwoods, Bays, and Barrier Islands Subsection
232E .... Louisiana Coast Prairies and Marshes Section
232Ea .... Gulf Coast Prairies Subsection
232Eb .... Gulf Coast Marshes and Inland Bays Subsection
232Ec .... Lake Ponchartrain Subsection
232Ed .... Gulf Coast Bays and Islands Subsection
232Ee .... Lake Borgne, Sounds and Islands Subsection

232F .... **Coastal Plains and Flatwoods, Western Gulf Section**
232Fa .... **Western Coastal Plains Subsection**
232Fb .... Southwest Flatwoods Subsection
232Fc .... Lower Sabine Alluvial Valley Subsection
232Fe .... Piney Woods Transition Subsection

234 .... **Lower Mississippi Riverine Forest Province**
234A .... **Mississippi Alluvial Basin Section**
234Aa .... Southern Mississippi River Alluvial Plain Subsection
234Ad .... Baton Rouge Terrace Subsection
234Af .... Atchafalaya Alluvial Plain Subsection
234Ah .... Mason Ridge Subsection
234Ai .... **Red River Alluvial Plain Subsection**
234Aj .... Bastrop Ridge Subsection
234Ak .... Opelousas Ridge Subsection
234Al .... Teche Terrace Subsection
234An .... North Mississippi River Alluvial Plain Subsection

GENERAL FOREST SETTING

PHYSICAL ENVIRONMENT

CLIMATE

GENERAL FOREST SETTING

The general forest setting discussion provides a more detailed description of the Forest at the subregional scale (section / subsection levels) of the hierarchy. Components described include the *physical environment*, *biological environment*, *land use and improvements*, *social and economic environment*, and *commodity production*. A discussion of the Forest at the landscape scale (landtype association level) follows the general forest setting descriptions.

PHYSICAL ENVIRONMENT

CLIMATE

Background

Climate is fundamental in the development of the forest environment and, consequently, affects forest management. Climatic factors bear strongly upon vegetation patterns and growth, animal habitats, and soil development. Recreation experiences and opportunities are also influenced by climate. Weather patterns influence the distribution of airborne particles and compounds, hence, the air quality of the Forest and surrounding communities. Weather patterns also dictate rainfall distribution and the frequency and intensity of storm events. Road construction and maintenance, timber harvesting and reforestation, prescribed burning, and many other forest management activities may be affected by weather conditions.

Current conditions

The climate of the Forest is considered subtropical. Weather here is highly variable. It is affected alternately by flows of cold dry air moving southward and by warm moist air moving northward off the Gulf of Mexico. Transitions from one flow to another frequently bring significant, sometimes abrupt, weather changes. Summer temperatures range from 85˚F. to 95˚F. during the afternoon, and 65˚F. to 75˚F. in the early morning. The winters are generally mild, and only rarely are there days when the temperature fails to rise above freezing. Average winter temperatures range from 55˚F. to 65˚F. in the afternoon, and from 40˚F. to 50˚F. in the early morning hours. The annual temperature in the Forest averages about 68˚F., and the mean relative humidity is about 74 percent. Prevailing winds blow from the south or southeast, making the influence of moist gulf air a dominant factor.

Rainfall, mainly in the form of showers, occurs on about 2 of every 7 days throughout the year. The annual rainfall averages about 59 inches. During the rainy season from December to March, the average rainfall is 28 inches. Annual summer precipitation, June through September, is approximately 16 inches. Rainfall is generally brief but intense in summer, with lesser intensities and greater duration during the winter. The measured pH of rainfall in central and northern Louisiana averages 4.8. In the winter, the Forest has a high water table, generally within 3 feet of the surface. In the summer, the water table is usually more than 6 feet beneath the surface.

Hurricane season is from June through November. Hurricanes or tropical storms with the potential to reach central and northern Louisiana generally occur from August to mid-October. Rainfall amounts vary with the storms, ranging from a trace to a record 22 inches for a 3-day period in 1922. Moderate to severe flooding is sometimes associated with these storms.

Tornadoes can develop any time of the year, but the primary season is from March to May. Their occurrence is most common in April. A second tornado season takes place from November to January. Intense, localized rainfall is often associated with these storms. March to May is the season when extensive thunderstorms with rainfall amounts exceeding 10 inches per storm is often seen.

Future trends

The Forest Service sees global climatic change as a potentially serious resource situation. This is recognized in the *RPA Assessment of the Forest and Rangeland Situation of the United States—1993 Update* (USDA, 1994).

There are many unanswered questions concerning this worldwide issue. According to the *1994 Report of the Forest Service*, research is being conducted nationally and internationally to assess the impacts of climate change on the health and productivity of forest ecosystems. At this time the impacts to forest ecosystems that are brought about by climatic change and variability remain undetermined.

GENERAL FOREST SETTING

PHYSICAL ENVIRONMENT

AIR

AIR

Background

As with climate, air influences the scenic and recreational qualities of the Forest and its neighboring communities. It also directly affects forest ecosystems.

In 1977 the Clean Air Act amendments established 3 classes of air quality, to protect visibility and other air quality-related values from significant deterioration in designated areas. Class I air quality standards are the strictest in the country. The Act designated national wilderness areas of more than 5,000 acres as mandatory Class I if they existed as of August 7, 1977, the date of the Act. All remaining national forest lands were designated as Class II.

The only wilderness on the Kisatchie National Forest is Kisatchie Hills, established in 1980. All lands on the Forest are therefore categorized as Class II areas.

The U.S. Environmental Protection Agency (EPA) was given the authority for air quality protection with the provision to delegate this authority to the State as appropriate under U.S. law. The Louisiana Department of Environmental Quality (LDEQ) has been delegated most of the authority for air quality protection in Louisiana. However, the State Forester's office coordinates all prescribed burning in the State. Louisiana has developed a set of voluntary smoke management guidelines for this voluntary program.

Current conditions

The LDEQ considers the entire Forest to meet all national ambient air quality standards (*standards*) as set by the EPA.

Smoke from prescribed burning and wildfires causes the most noticeable impact to air quality. This is a temporary condition to which the Forest as well as other state and federal agencies, industry, and private landowners contribute.

Forest Service prescribed burning is planned, scheduled, and conducted to minimize air quality impacts and smoke intrusions into smoke-sensitive areas.

To minimize impacts from smoke the Forest uses a combination of the State guidelines and the smoke screening process developed by the Southern Forest Fire Laboratory at Macon, Georgia, and published in the *Southern Forestry Smoke Management Guidebook* (**USDA Forest Service Technical Report SE–10, December 1976**).

Particulate matter less than 2.5 microns in diameter, known as ***PM2.5***, is the wood smoke pollutant of concern. There are standards for **PM2.5**. When Forest Service smoke screening guidelines are followed no off-site violation of standards should occur. For additional information on prescribed burning and fire in general, see the following section on *Fire*.

It is estimated that the average natural background visibility range for the eastern United States varies from 65 to 121 miles. The average annual standard visual range (SVR) for the Kisatchie National Forest is estimated to be 18 miles. Visibility is poorest in the summer (15 miles SVR) and greatest in the spring (20 miles SVR). The bulk of this visibility reduction is due to man-made sulfur emissions.

Some 1970's monitoring in Grant Parish indicated that ozone levels might be exceeding standards. As a result, EPA required further monitoring to demonstrate that the parish was within acceptable ozone levels. The monitoring site was established at the Catahoula Ranger District work center. The LDEQ completed monitoring in 1993. The EPA in February of 1993 gave the LDEQ permission to stop monitoring because the standards had not been exceeded.

Grant Parish was declared an attainment area with limited maintenance for ozone on October 17, 1995 by the EPA. With limited maintenance there are no emission limits set. The Forest Service has made the appropriate conformity determination as required by the Clean Air Act amendments of 1990.

While being less than the standards, the ozone concentrations measured at the Catahoula work center were of sufficient potential to affect vegetation. Ozone is the most widespread air pollutant in the United States, causing more plant damage than any other (**Skelly, 1987**).

Future trends

Levels of prescribed burning may increase in the future. Smoke from prescribed fire, ozone levels, and other air pollutants continue to be issues.

While all of the Kisatchie National Forest is considered within acceptable levels, air pollutants could still affect Forest resources.

Impacts on aquatic and terrestrial resources have been observed even at concentrations within acceptable standards. Interagency cooperation should be encouraged to provide the research necessary to remove the unknowns concerning air quality and forest ecosystem interactions. Monitoring of forest health would be needed to assess ozone effects and the present health of the Forest as well as long-term trends.

GEOLOGY, TOPOGRAPHY AND SOILS

Background

Along with climate, geology plays a primary role in defining the Forest environment. Deposition and weathering of geologic material over time has produced the Forest's topography and landscapes as well as its soil parent material. The recharge potential of aquifers is indicated by surface geology.

The Forest's topography ranges from hilly to undulating on the uplands, and level on stream terraces and floodplains. Elevations range from 80 feet above mean sea level (MSL) in floodplains to 200 to 425 feet above MSL in the Kisatchie Hills. The central Louisiana area slopes generally southward to the Gulf of Mexico.

The terraces and plains in the southern and central portions of the Forest consist of Pleistocene terrace deposits. Tertiary sediments of the Catahoula, Vicksburg, Jackson, Claiborne, Cockfield, and Cook Mountain formations make up the upland hills of the Forest's northern portions. Miocene sediments of the Fleming formation occur in outcrops and in thin belts paralleling drainages. Recent Holocene alluvial deposits are located in river and stream floodplains.

Soils are a fundamental component of the Forest environment. They are generally considered nonrenewable resources because of the length of time required for their formation. The diverse soils on the Forest were produced by the interaction of climate, living organisms, geologic parent material, relief, and landscape position.

Current conditions

Most soils in the Forest are highly weathered, acidic, and have low nutrient status. Their productivity is generally high, however, because they are generally deep with high available moisture. Soil productivity for any plant species depends on the plant's requirements relative to such properties as available water, nutrients, pH, drainage, textures, and landscape position.

In general, deep alluvial soils are the most productive for most pine and hardwood tree species and many midstory and understory plant species. Dry sandy upland soils and soils with restricted rooting depths — such as Kisatchie soils — are the least productive for many plant species. However, these soils may favor the establishment of species which require less competition, such as longleaf pine.

Erosion and compaction can adversely affect the productivity of soils. Most of the Forest's soils can be compacted to a degree potentially degrading their ability to produce optimum growth.

The Forest's soils have been intensively classified and mapped according to the criteria for Order II soil surveys. These soil surveys identify soil properties which are used to determine soil suitability for a variety of management practices and to indicate necessary mitigation. Soil properties also indicate ecological potential.

Standards and guidelines have been developed to reduce or mitigate the potential impacts of soil erosion or compaction. Erosion control guidelines generally set forth time frames, methods for revegetation of disturbed sites, and erosion control practices based on erosion potential. To overcome the compaction problems related to certain management activities, guidelines associated with compaction and rutting potential identify time periods and soil moisture conditions when the soil can support specific practices and methods.

Future trends

Continued demand is anticipated for many forest resources that depend on soil productivity. Future productivity could be influenced by the effects of management practices. Accelerated surface soil erosion and excessive compaction would be expected to continue as management concerns.

FIGURE 3–3, WATERSHEDS OF KISATCHIE NATIONAL FOREST RANGER DISTRICTS

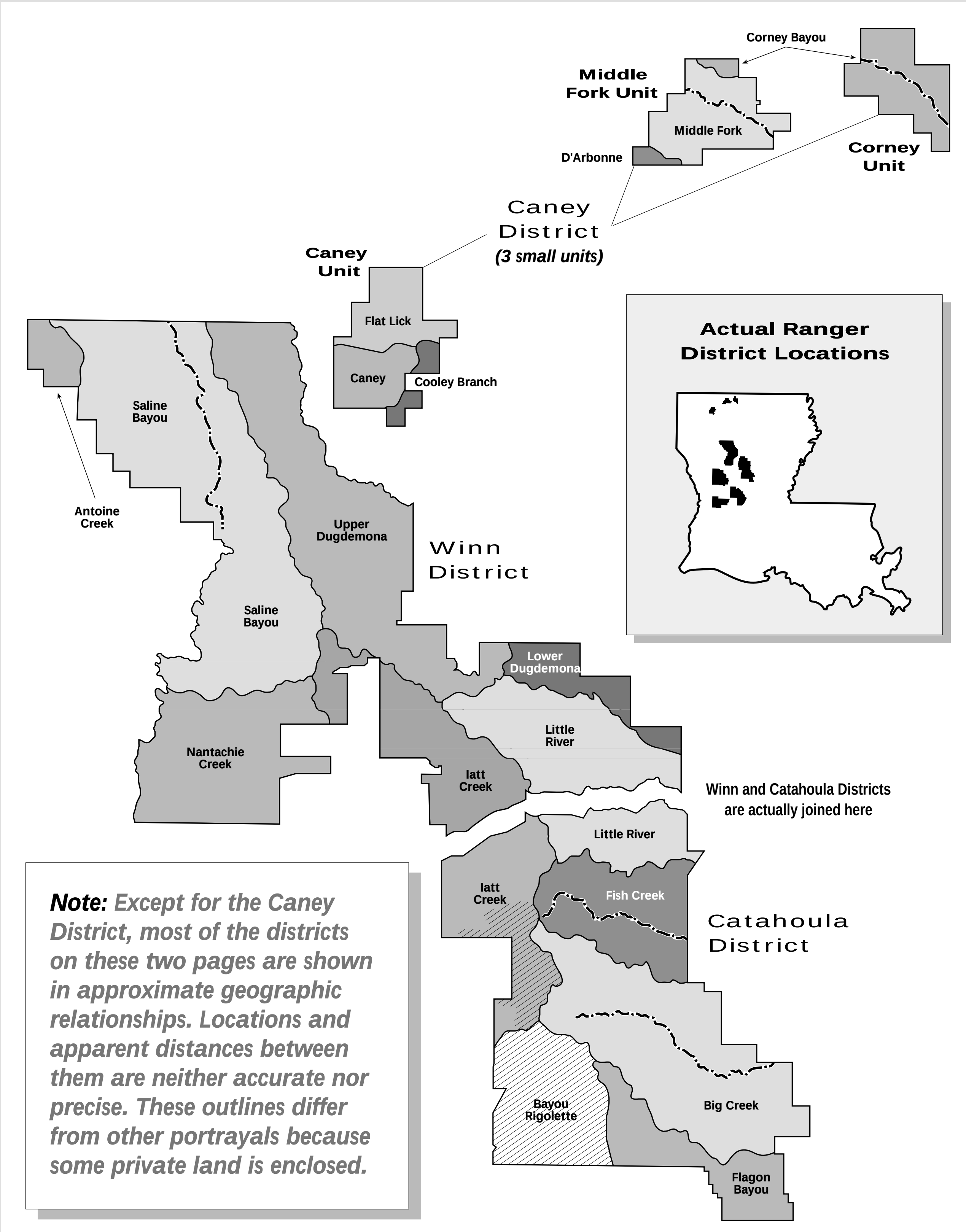
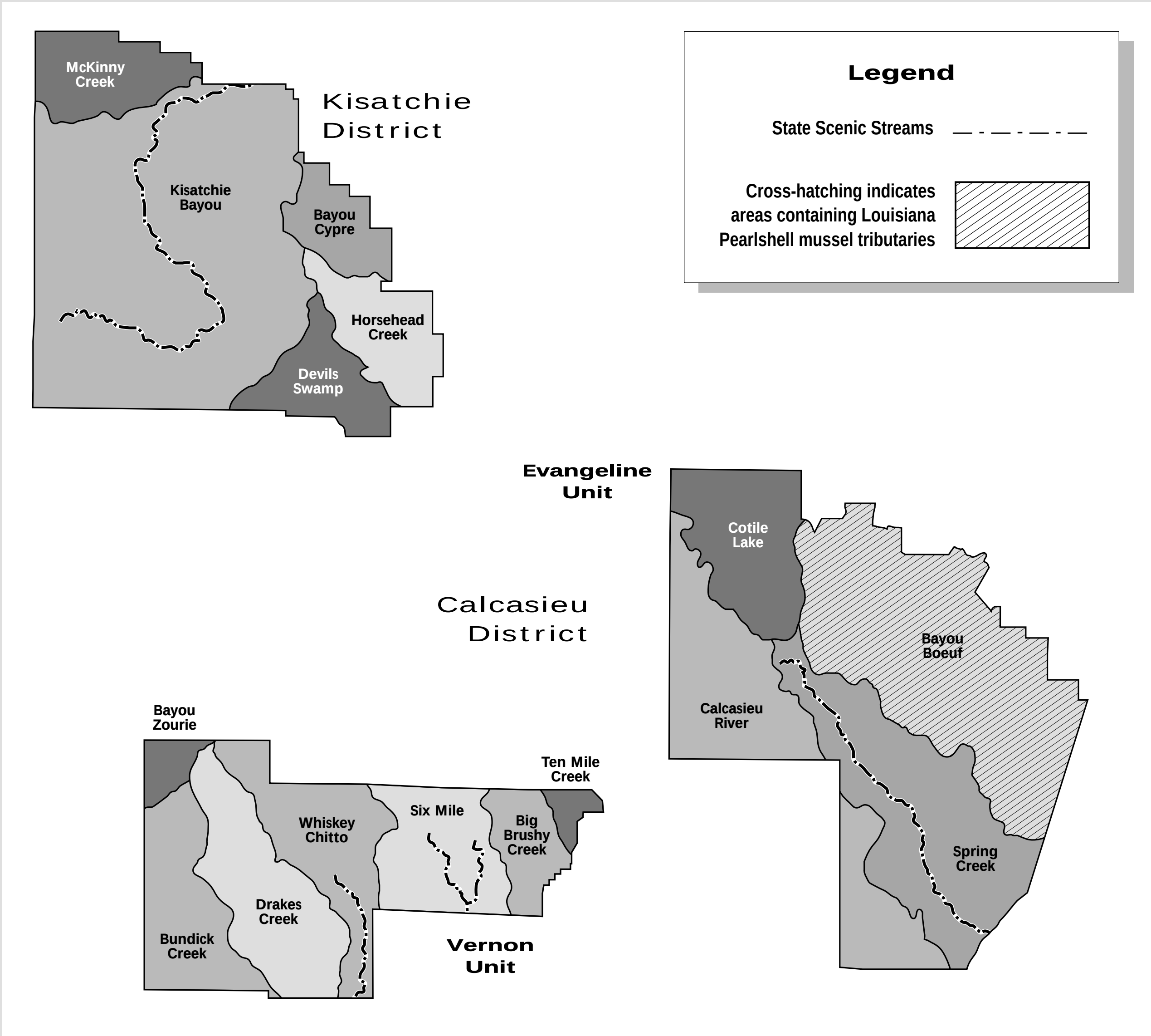


FIGURE 3–3, WATERSHEDS OF KISATCHIE NATIONAL FOREST RANGER DISTRICTS



GENERAL FOREST SETTING

PHYSICAL ENVIRONMENT

WATER

Water quality

WATER

Background

The Kisatchie National Forest lies within 2 water resource regions: the lower Mississippi and the Arkansas-Red-White. The Forest lies within 3 water quality management basins: the Calcasieu River Basin, the Ouachita River Basin, and the Red River Basin. The Forest contains 35 watersheds within these drainage basins. This information is displayed in figure 3–3.

Current conditions

Water quality

The essential water quality parameters for streams within the Forest are measured chlorides, sulfates, total dissolved solids, dissolved oxygen, the pH factor, temperature, and fecal coliform. See table 3–2 on page 3–10. Data collected by the U.S. Geological Survey and the Forest Service show almost all the Forest's surface water meeting or exceeding standards set for recommended

GENERAL FOREST SETTING

PHYSICAL ENVIRONMENT

WATER

Water quality

stream uses. Surface water failing to meet quality standards is found in areas whose watersheds are degraded. Areas of such land would continue receiving treatment during this planning period.

The numerical criteria for water quality parameters depend on stream classification. Water originating on or passing through the Forest generally has met the numerical criteria for these parameters. Fecal coliform is the parameter most commonly exceeded. This generally occurs after periods of long intense rains which flush watersheds. Values return to normal within a few days after rain. The source of fecal coliform is unknown. Total dissolved solids and chlorides have run high in watersheds with energy mineral extraction activities, as compared to those where there is no mineral activity, but have not exceeded stream standards.

The primary Forest areas contributing disproportionate amounts of sediment are the Kisatchie District's *Kisatchie soils*, military use areas with severely disturbed surfaces, roads, and borrow and gravel pits. Attempts to reduce the sediment yields from these areas are continuing.

Sedimentation resulting from channel instability and increased runoff contributes to overall coastal plains sediment yield. No data indicates what portion of the sediment load in surrounding streams is caused by onsite erosion and what percentage is caused by channel instability. By implementing mitigation measures of the standards and guidelines, sediment resulting from surface erosion can be held to acceptable levels.

Table 3–3 indicates the degree of support for designated uses of waterbody subsegments with watersheds on the Forest as indicated by the Louisiana Department of Environmental Quality (LDEQ) Water Quality Inventory assessment. This report and table provide the status of stream water quality management subsegments for the State's non-point source pollution program. Degree of support is based on values obtained at monitoring stations for nine water quality parameters. These values are compared with established criteria to determine support for designated uses. According to LDEQ monitoring, Kisatchie Bayou fails to meet designated uses. It is the only stream on the Forest monitored by LDEQ. Fecal coliform, low pH, total dissolved solids, and turbidity are the problems. Sources and causes of the failure to meet standards are undetermined. The "not supporting" designations of other streams are believed to be caused by downstream or off-Forest sources.

Louisiana's Unified Watershed Assessment is based on existing information from LDEQ's biennial Water Quality Inventory assessment. The LDEQ assessment designates the water quality degree of support for designated uses of each waterbody subsegment. The information from each subsegment and associated watershed was aggregated to as-

TABLE 3–2, WATER QUALITY PARAMETERS

	Chlorides (mg / l)	Sulfates (mg / l)	Dissolved Oxygen (mg / l)	pH Factor	Fecal Coliform (per 100 ml)	Temp. (in C)	Total Dissolved Solids (mg / l)
Forest Average	3.4	7.0	9.3	5.9	164	14	46
Range of State Water Quality Standards (low) [1, 2]	20	9	2	6.0	200	30	79
Range of State Water Quality Standards (high) [2]	500	750	3	9.5	[3] 2000	max 35	500

1/ Range based on water quality standards for Louisiana streams in the Ouachita, Red River, and Calcasieu River Basins.

2/ State water quality standards apply to all state waters. Natural waters may have characteristics outside the limits established by those criteria.

3/ Ten percent of the total samples taken in any 30-day period cannot exceed this limit.

TABLE 3–3, DEGREE OF SUPPORT FOR DESIGNATED USES OF WATERBODY SUBSEGMENTS

Waterbody Subsegment	Stream/Waterbody	PCR	SCR	FWP	ONR	Comments
030102	Calcasieu River (Devils Swamp)	F	F	F	F	
030502	Whiskey Chitto Creek (Drakes Creek)	F	F	F	F	
030503	East and West Forks, Six-Mile Creek	F	F	F		
030504	East and West Forks					
	Six-Mile Creek (Big Brushy)	F	F	F	F	
030505	Ten-Mile Creek	F	F	F	F	
030506	Bundicks Creek	F	F	F		
060101	Spring Creek	N	F	F	P	1
060208	Bayou Beouf	N	F	N		1
080607	Corney Bayou	F	F	F	F	
080608	Corney Lake	F	F	F		
080609	Corney Bayou	P	F	N	F	
080610	Middle Fork Bayou D'Arbonne	N	F	N	P	
081401	Upper Dugdemona River	N	F	F		1
081402	Lower Dugdemona River	P	F	F		1
081601	Little River	N	F	P	N	1
081602	Bear Creek	N	P	P	N	
081606	Fish Creek	F	F	F	F	
081608	Big Creek	F	F	F	F	
100501	Dorcheat Bayou	P	F	N		2
	Flat Lick Creek,					
	Cooley Branch,					
100503	Caney Creek	F	F	F		
100504	Caney Lakes	F	F	F		
100702	Black Lake Bayou	P	P	N		2
	Antoine Creek,					
100801	Saline Bayou	N	F	N	F	1
100802	Saline Lake	F	F	F		
100901	Nantachie Creek	F	F	F		
101101	Cane River	F	F	F		
	Bayou Cypre,					
	Horsehead Creek,					
101103	Kisatchie Bayou	N	P	P	N	
101201	Cotile Lake	F	F	F		
101301	Bayou Rigolette	F	F	F		
101302	Iatt Lake	P	F	F		1
101303	Iatt Creek	F	F	F		

Designated Uses .
PCR = *primary contact recreation*
SCR = *secondary contact recreation*
FWP = *fish and wildlife propagation*
ONR = *outstanding natural resource*

Degrees of Support
F = *fully supporting*
P = *partially supporting*
N = *not supporting*

Comments
1 = *source of impairment off-Forest*
2 = *stream not on Forest*

Source: *Water Quality Management Plan, 1996 Water Quality Inventory, vol. 5, part B, Louisiana Dept. of Environmental Quality, Office of Water Resources.*

GENERAL FOREST SETTING

PHYSICAL ENVIRONMENT

WATER

Water quality

Ground water

Water quantity

sign a watershed category to the larger U.S. Geologic Survey 8-digit Hydrologic Unit Code (HUC) watershed. Since most restoration and implementation projects are located within smaller watersheds, the State's subsegment assessment of degree of support for designated uses will continue to be utilized in setting priorities. Additional priority will be given to watersheds containing threatened and endangered species and/or scenic streams.

The LDEQ has committed to a schedule for development of Total Maximum Daily Loads (TMDL), with plans to focus on two or three river basins a year. For 1998-2000, the target basins are the Merenteau River Basin, Vermilion-Teche River Basin, Calcasieu River Basin, and Ouachita River Basin. The Red River Basin will be monitored in 2002.

Ground water

Summaries of ground water data accumulated by the U.S. Geological Survey indicate that most ground water is of sufficient quality for domestic use. The most common problems are iron, which can cause undesirable stains; and hydrogen sulfide gas, which produces an objectionable odor.

In central Louisiana, freshwater is contained in Eocene, Miocene, Pliocene, and Pleistocene sands. Sources of recharge are rain falling on outcrop areas and downward seepage of rainfall through permeable overlying Pleistocene and recent deposits. Most of the upland areas on the Forest which contain deep well-drained soils have a high aquifer recharge potential.

The capacities of well fields depend upon aquifer characteristics and the efficiency of well construction and development. Specific well capacities range from a low of 0.7 gallon per minute per foot (GPM / FT) to a high of 18.0 GPM / FT. Coefficients of transmissibility range from 1,400 to 60,000 gallons per day per square foot (GPD / SQ FT), with an average of 16,000 in Miocene aquifers to 1,000 to 2,000 GPD / SQ FT in Pleistocene aquifers.

Water quantity

The average surface yield from the 35 sub-watersheds is approximately 896,287 acre-feet annually, which is approximately 1.5 acre-feet for each national forest acre. This total volume varies annually, depending on climatic conditions and management practices within the sub-watershed.

Little surface water in this area is used for domestic and industrial purposes. Ground water is used for municipal water supplies. The primary consumptive use of surface water is for livestock and wildlife. The primary in-stream, non-consumptive users are fisheries and recreation.

The total consumptive and non-consumptive use of surface and ground water on or

TABLE 3–4, MUNICIPAL WATER SOURCES ON THE KISATCHIE NATIONAL FOREST

USER	Population	Type	District	Location
City of Alexandria	60,000	Well field	Calcasieu	T2N, R3W & T2N, R1W & 3N,2W
Gardner Community Water Assn.	2,500	Well field	Calcasieu	NW 1/4 Sec. 6, T3N, R3W
EMC Water System Inc.	600	Well field	Calcasieu	E 1/2, SW 1/4, SW 1/4, Sec. 28, T2N, R3W
West Winn Water System Inc.	300	Well field	Winn	SE 1/2, NW 1/4, Sec. 34, T11N, R5W
Red Hill Waterworks Inc.	375	Well field	Winn	NW 1/4, SW 1/4, SW 1/4, Sec. 1, T9N, R2W
South Grant Water System Inc.	1,300	Well field	Catahoula	W 1/2, NW Sec. 8, T6N, R1W
Rapides Water District No. 3	5,500	Weir	Catahoula	SW 1/4, NW 1/4, Sec. 5, T6N, R1E

associated with the Forest is roughly 313,295 acre-feet. The Forest administers 7 special-use permits for municipal water systems, which utilize nearly 6.8 billion gallons of water per year. See table 3-4, Municipal Water Sources on the Forest. The largest special-use permit is for the City of Alexandria, which demands about 6 billion gallons annually. All except one of the special uses are for groundwater systems. Rapides Water District No. 3 supplies water from Big Creek. The Big Creek watershed contains about 58,500 acres, most of which is national forest land. There are approximately 62 miles of primary transmission water pipelines and associated rights-of-way. In addition, public drinking water is supplied at 5 recreation sites from waterwells on the Forest.

The Forest has not yet determined in-stream flow requirements. Louisiana is a "Riparian Doctrine" state wherein water rights are acquired along with riparian land, unless an instrument of conveyance limits or restricts riparian rights. For this reason, there should be no problem in obtaining water rights for in-stream fish, wildlife, and recreation flow requirements. The Forest has approximately 5,500 miles of stream channels and 4,500 surface-acres of water.

In general, the 5,500 miles of stream channel are considered to be intermittent or perennial streams, in that they have a defined channel which lies below the ground water table at least during the wet season. Forest streams have been classified by order. In general, order 1 through 3 streams have no continuous year-round flow. Order 1 streams may only flow 2 to 3 months out of the year, whereas order 3 and 4 streams may flow for 6 to 10 months and only stop flowing during the dry season. Order 5 and higher streams generally flow continuously year round, except during periods of extended drought. The approximate breakdown of stream channel by stream order is as follows:

- Order 1 — 2,800 miles
- Order 2 — 1,300 miles
- Order 3 — 700 miles
- Order 4 — 300 miles
- Order 5 — 200 miles
- Order 6 — 50 miles
- Order 7 — 50 miles

Floodplains & wetlands

There are roughly 67,000 acres of mapped alluvial floodplains on the Forest. Additional acres of relatively narrow floodplains occur along many smaller streams. These floodplains are the flat or level landform on either side of a stream channel. They consist of alluvial soils which are hydric, seasonally wet, or at least occasionally flooded. These landforms and their associated aquatic and vegetation communities comprise the majority of the Forest's riparian areas. Management direction for these areas is aimed at maintaining or improving aquatic and riparian ecosystems and water quality. Minimizing risks to flood loss and public safety are additional management concerns on 100-year floodplains on the Forest.

Of the wetland communities on the Forest, 9,300 acres have been identified and mapped as jurisdictional wetlands. Management direction for wetlands is focused on preventing their loss or degradation.

Future trends

The low demand for surface water is expected to continue. The demand for high-quality ground water should increase to serve population and industry growth.

GENERAL FOREST SETTING

PHYSICAL ENVIRONMENT

FIRE

Historical perspective

FIRE

Background

Historical perspective

Throughout the gulf coastal plains, fire has played a key role in the development of forest ecosystems. Fire influences many components of the forest environment — plant species and communities, insects, parasites and fungi, and wildlife habitat patterns and populations. The frequency, duration, intensity, and extent of fires bear on major ecosystem processes and characteristics such as nutrient cycling, energy flow, succession, diversity, productivity, and stability.

Wildfire is among the oldest of natural phenomena. As a product of lightning, wildland fire traces its origin to the early development of terrestrial vegetation and the evolution of the atmosphere. Coal bed fossil evidence of wildfire dates to 345 million years ago during the Carboniferous Period of the Paleozoic Era (**Pyne, 1982**).

Current data indicate that humans entered what is now Louisiana and the fire scene at least 12,000 years ago. They became another "fire agent" in the Southeast by exerting influence on the "seasonality, frequency, intensity, and selectivity" of fire (**Komarek, 1974; Neumann, 1984; Lewis, 1985**). Although a growing body of evidence suggests that human-caused fires contributed greatly to pre-European vegetation communities and patterns, the full extent of their effect remains unclear.

Lightning-ignited forest wildfires occurred prior to the settlers of the historic period, even before the arrival of Native Americans. Throughout the United States, lightning strikes annually average about 10 per square mile, but produce relatively few fire starts due to associated rain (**Wahlenberg, 1946**). Differential figures, however, are relative to seasonality for the number of strike-related fires. Statistics from Florida — the state that experiences the most thunderstorms per day (**USDA, 1941**) — show that lightning fires there peak in May and June, even though thunderstorm occurrence is greater in July and August (**Komarek, 1964; Robbins and Myers, 1989**). Currently, there are no published references for strike-fire seasonal relationships for the West Gulf Coastal Plain. While experts cannot draw direct inferences about local fire seasonality from data from the East Gulf Coastal Plain, we can say that there are definite differences between the occurrence of seasonal lightning strikes and fires caused by lightning.

Even though relatively few lightning strikes resulted in fires, these ignitions generally tended to burn unrestricted over large areas, especially in pre-horticultural Native American times (about 1000 BC and earlier), because only river and stream bottoms provided firebreaks. This situation likely began to change as Native Americans increased their dependence on managed food crops, and the need for larger open areas devoted to horticulture / agriculture, as well as clearings created by tree removal for housing and heating purposes (**Plog, 1982**).

Written records of early European explorers' observations suggest that by at least 1500 AD, Native Americans across the nation had cleared tens of millions of acres for crops (**McCleery, 1994**). There is evidence that vast areas of the North American forest land-

TABLE 3–5, PRESCRIBED BURNING ACCOMPLISHMENT

Displayed Annually by Purpose

	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Average
Fuel mgt	39,104	28,470	24,524	28,420	24,065	25,249	34,778	39,603	17,070	42,983	57,728	32,909
Range	12,156	15,098	15,218	16,294	15,976	11,279	6,253	3,136	3,258	11,783	3,469	10,356
Wildlife	11,734	11,537	18,740	21,188	17,407	20,868	15,564	15,311	10,799	15,207	27,616	16,906
Brown-spot	0	0	0	186	228	911	1,379	1,710	1,948	2,253	1,617	930
Site prep	3,308	2,430	5,739	3,151	4,274	2,328	1,527	1,681	939	1,623	1,514	2,592
T & E species	6,423	3,555	5,770	4,859	12,990	10,989	11,756	11,135	8,028	9,730	7,441	8,425
Total	**72,725**	**61,090**	**69,991**	**74,098**	**74,940**	**71,624**	**71,257**	**72,576**	**42,042**	**83,579**	**99,385**	**72,119**

scape "…were, at the time of European contact, open parklike stands shaped by short-interval, low-intensity fires, often set purposefully by humans" (**McCleery, 1994**).

A remaining question is the regularity of natural or cultural fire regimes in the prehistoric landscape. Without further hard data we can only say this: early Europeans recorded Native Americans burning selected areas annually, every other year, or in intervals as long as 5 years (**Williams, 1995**). Conditions recorded in the Southeast by early travelers often depicted open, pine-dominated landscapes that were likely subjected to frequent, regular fire in order to achieve an open condition (**Kalisz, et al, 1986; Williams, 1989; McCleery, 1994**).

So, our information shows numerous reasons for Native American burning: to facilitate hunting and crop growth and yield, for fire-proofing areas, insect collection, pest management, warfare, or for clearing travelways or riparian areas (**Williams, 1995**). In contrast, 17th- to early 20th-Century settlers burned mostly for land clearing and agriculture.

Regardless of ignition source, fire was a frequent recurring event that took place on these landscapes for centuries.

Wildfire suppression

After the turn of the century, fire suppression efforts affected fire occurrence patterns. In particular, potentially large stand-replacement fires were generally suppressed at smaller acreages. Since 1931 average fire size has remained about the same, even though the annual total occurrence and acreage burned have varied considerably. Significantly, however, since 1931 the total annual Forest wildfire acreage has decreased from about 10 percent of the Forest's total land area to about 0.2 percent while the total national forest acreage has increased from less than 100,000 acres to over 600,000 acres.

Today, 96 percent of all wildfires in the South result from humans and 4 percent from lightning. Most fires are of low to moderate intensity and are suppressed at a small size. This is a result of frequent and widespread prescribed burning that keeps forest fuels at low energy levels, and fire suppression organizations with mechanized fire suppression equipment. The majority of human-caused fires are arson-related, averaging about 70 percent. The largest and most intense fire in recent history, how-

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Wildfire suppression


Prescribed burning

ever, was probably lightning-caused: 7,500 acres burned within the 8,700-acre Kisatchie Hills Wilderness in April 1987.

Generally open, parklike stands of mature timber covered the Forest prior to European settlement. These stands have gradually been altered by timber management practices and fire protection. Much of what was once natural longleaf pine country is now dominated by stands of loblolly pine. This is due to extensive fire protection and stand conversion to faster-growing and easier-to-regenerate species. These activities have created a mosaic landscape of clearings, age classes, and vegetation patterns.

Historically, prescribed burning has been the most common management tool used to reduce dead and live natural fuels, to prepare sites for planting, and to stimulate lower plants and forbs for wildlife and range forage production. Most burning was done during the winter (dormant) season on the Forest until 1992, when growing season burning was introduced.

An aerial ignition technique introduced recently helps keep per-acre costs at a reasonable level and allows more acres to be done with fewer persons.

Current conditions

Prescribed burning

Annually the Forest employs prescribed fire on an average of 72,119 acres, as shown in table 3–5. Winter prescribed burning has long been an effective tool for controlling the hazardous buildup of fine forest fuels (leaves, pine needles, twigs, limbs, forbs, and grasses) and for wildlife and range management. Today fire is also used during the growing season to restore natural plant communities on the landscape, and to manipulate the floristic composition and structure of selected forest stands. Growing season burns are now used to manage certain fire-related forest communities such as calcareous prairies, pitcher plant bogs, and red-cockaded woodpecker cluster sites. This has increased the flexibility and effectiveness of prescribed fire as a tool in the Forest's many fire-dependent ecosystems, especially longleaf pine.

Wildfire suppression

Extreme burning conditions on the Kisatchie are the exception rather than the rule. The most important reasons for this are the low-energy ground fuels — primarily grass and pine needles — frequent rainfall, and a program of intensive prescribed burning that maintains fuels at low hazard levels.

The Forest averages about 83 wildfires per year, 75 of which are human-caused. These fires burn an average of 2,505 national forest and 653 private acres annually. These figures are based on the previous 5-year average, 1994-1998.

The response to wildfire on the Forest is based on resource and property values, threat to life, fuel types, existing and predicted weather conditions, safety, other wildfire activity, and cost effectiveness. Wildfires that threaten life or property are responded to immediately. Planned initial attack would consider the impact of smoke on public health and welfare. Suppression responses would be pre-planned and documented in a fire action plan. The National Fire Management System (NFMAS) is the tool used in planning and developing forest fire suppression direction. Selected suppression responses would be evaluated for each wildfire or prescribed natural fire prior to each burning period. If the response is no longer consistent with fire management direction the fire would be suppressed.

Suppression strategies appropriate to meet management direction range from direct control, to minimizing acreage burned, to more indirect methods of containment and confinement. Surveillance may be appropriate with Forest Supervisor approval. Wildfires are not managed to accomplish resource objectives.

A wide variety of techniques and practices are currently used to minimize resource loss and suppression costs from wildland fires. The Forest maintains no detection resources, instead relying on the Louisiana Office of Forestry to provide detection under terms set forth in a cooperative agreement between the two agencies.

The State employs a system of aerial and fixed detection resources to provide national forest coverage. Due to the Forest's extensive road system and sophisticated communications systems now in widespread use, Forest visitors, contractors, and permittees have become a significant part of the total detection system. While increased use of the Forest raises the risk of human-caused fires, it also contributes to early detection — and in some cases, suppression of small fires. The increasing presence of rural fire departments also contributes to overall early detection and suppression of small fires.

The fire organization is equipped with modern mechanized fire fighting equipment, including tractor-plow units, used for plowing bare-earth firelines around wildfires, and small engines, some of which use foam. Helicopters and large air tankers are sometimes used, but are considered less cost-efficient than a tractor-plow unit.

Tractor-plow units are by far the most common suppression tool. An exception is Kisatchie Hills Wilderness, where preferred methods of suppression emphasize minimum-impact-suppression techniques using hand tools such as rakes, flaps, axes, shovels, backpack pumps, and aerial or ground delivery of water and retardants.

A cooperative agreement and annual fire action plan is maintained with the State. This agreement specifies initial attack responsibilities for all lands within and directly adjacent to the Forest. It also provides for cooperation between agencies.

The Forest operates a State coordination center that is responsible for coordinating most fire activities for all federal land management agencies in the State, including the National Park Service and the U.S. Fish & Wildlife Service.

Future trends

The biological effects of fire profoundly influence the composition, structure, and function of forest ecosystems. In the prolonged absence of periodic, low-intensity fire, these ecosystems would undergo rapid changes in species composition and structure. These, in turn, often become predisposing factors to epidemic insect and disease outbreaks and severe stand-replacement wildfires. Sustaining short-interval fire-adapted ecosystems on the Forest is expected to be a difficult future challenge.

Prescribed fire, despite concerns about its use, remains an important, ecologically appropriate management tool. Both natural fuels and artificially produced management-activity fuels must be managed over time to meet long-term resource management objectives. Artificially produced fuels have been of little concern, because of the small volume generated, but may have to be managed in the future. The EPA states, in their 1998 policy document entitled *Interim Air Quality Policy on Wildland and Prescribed Fires,* that while future air quality concerns from prescribed fire may arise, the EPA is on record stating that fire should function, as nearly as possible, in its natural role in maintaining healthy wildland ecosystems and to protect human health and welfare by mitigating the impacts of air pollutant emissions on air quality and visibility.

Fire suppression capability remains a vital cornerstone of the Forest Service mission as fire-related ecosystems continue to approach high-risk conditions and as private development continues to expand at the wildland-urban interface.

Expected increases in the use of the Forest would provide additional opportunities for public contact. To maintain the low levels of human-caused fire, cooperative fire prevention efforts with local fire departments and the State would continue.

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BIOLOGICAL ENVIRONMENT

INTRODUCTION

The next three sections of this chapter discuss the biological elements of the Kisatchie National Forest environment. Vegetation, wildlife, and fish and aquatic organisms collectively represent the Forest's overall biological diversity. See Appendix H for scientific names of plants and animals mentioned in this text.

The maintenance of biological diversity within the Kisatchie's planning area is an important issue to be addressed by decisions made within its Forest Plan revision. The implementing regulations of the National Forest Management Act of 1976 (NFMA) require each national forest to manage its lands in a manner that will maintain viable populations of all native and desired nonnative species in habitats distributed throughout their geographic range. In this context a viable population contains an adequate number of reproductive individuals appropriately distributed within the planning area to ensure the long-term existence of the species.

The Act further requires each national forest to manage for and maintain a diversity of plant and animal communities and to protect critical habitat for appropriate threatened and endangered species (36 CFR 219.27). Thus, NFMA management requirements provide basic direction requiring each national forest to manage habitats within its planning area for biological diversity.

Biological diversity may be defined as the variety of life in an area, including the variety of genes, species, plant and animal communities, ecosystems, and the processes through which individual organisms interact with one another and their environments. The biodiversity of central Louisiana prior to European settlement was a product of climate, geology, topography, and natural processes.

By managing for the natural diversity of forest composition, structure, and function at the appropriate scales, it is assumed that the needs of the greatest number of species would be addressed, including those that we know little or nothing about — such as certain insects, fungi, and inconspicuous plants. Conservation of all species collectively can best be attained by focusing on ecosystems, landscapes, and communities rather than on individual species. In recent years this has become known as the coarse-filter approach to managing for biological diversity.

A goal of the Kisatchie is to ensure the maintenance or improvement of its native biological diversity at all levels. Ecosystem restoration and management are fundamental to achieving this goal. One of the most important aspects to this approach is restoring, maintaining, and / or mimicking ecological processes to the greatest degree practicable. Examples of important ecological processes include nutrient cycling, habitat turnover rates, hydrology, competition, predation, and a variety of disturbance factors.

The disturbance regimes in an area are fundamental to shaping landscape vegetation composition and patterns and subsequently wildlife habitat conditions. Although natural disturbances such as floods, wind storms, insect infestations and diseases were important occurrences on these landscapes, fire frequency and intensity appear to be the keystone ecological process shaping life in the west gulf coastal plain prior to European settlement.

Individual national forests are also required by NFMA regulations to select appropriate *management indicators* (MI) to represent the wildlife, fisheries, and botanical resources during the development of a forest plan. Management indicators may include plant or animal species, groups of species, communities, or special habitats selected for emphasis in planning and program implementation. Priority for MI selection is given to:

- Endangered, threatened, sensitive, and other rare species for which there is a viability concern.
- Species or groups of species with special or demanding habitat needs.
- Unique or under-represented plant and animal communities.
- Species commonly hunted, fished, viewed, or photographed.
- Species which serve as true ecological indicators of ecosystem health.
- Species or groups of species whose population changes are believed to indicate effects of management activities on other species of the same major biological community.

Management indicators which best represent the issues, concerns, and opportunities are chosen to provide the basis for developing desired future condition statements, and the goals and objectives related to wildlife, fish, and botanical resources. These are monitored during forest plan implementation in order to assess effects of management activities on their populations and the populations of other species with similar habitat needs which they may represent.

The selection of management indicators represents a fine-filter approach to multiple-species management. Within the context of ecosystem management, a combination of the coarse-filter and fine-filter approaches to species management may provide one of the best overall strategies for the conservation of biological diversity.

Management indicators representing the wildlife, fish, and botanical resources of the Kisatchie are identified in the following sections of this chapter.

VEGETATION

Background

General vegetation

The subtropical climate and the geology of the west gulf coastal plain combine to produce the environment for the flora of the Kisatchie National Forest. The plants making up the flora thrive in geologically new land of Recent and Pleistocene origin toward the coast and in inland riverine flood plains. To the north and west, both on and off the Forest, slightly older Tertiary uplands support the flora. Like most areas, the Forest flora contains plant representatives of adjoining regions. Coastal plain and tropical species outnumber western and northern plants.

Four major landscape communities comprise the Kisatchie National Forest. These forest communities include longleaf pine, shortleaf pine / oak-hickory, mixed hardwood-loblolly pine, and riparian.

Two atlases (MacRoberts 1984, 1988, 1989 and Thomas and Allen 1993, 1996, 1998) provide information on the distribution of Louisiana flora generally. A Forest Service database gives a district-by-district plant distribution list.

Small-scale or inclusional plant communities, such as hillside bogs, cypress swamps, sandy woodlands, or calcareous prairies are found embedded within these major landscape forest communities. The Louisiana Department of Wildlife and Fisheries' Natural Heritage Program currently recognizes 16 natural plant communities on the Forest — 7 are within the palustrine system and 9 are within the terrestrial. Five publications of the Louisiana Department of Wildlife and Fisheries (**Grace & Smith, 1995; Williams & Smith, 1995; Hart & Lester, 1993; Martin & Smith, 1991 and 1993**) give descriptions of these communities. Each volume provides a survey and description of one or two districts of the Kisatchie's natural plant communities. These five documents serve as a basis for the natural plant community descriptions throughout this document.

Longleaf pine forests — The longleaf pine ecosystem was the dominant plant community occupying approximately 60–65 percent of what is today the Kisatchie National Forest. Longleaf pine is the keystone species in a complex of fire-dependent plant communities. It is estimated that light surface fires swept through these landscapes once every 1 to 5 years. This fire frequency was essential to perpetuation of these communities (**Martin & Smith, 1993**). The diverse ground cover makes longleaf pine ecosystems among the most species-rich plant communities in the United States.

The original range of the longleaf pine forests encompassed about 92 million acres, stretching from southeastern Virginia to eastern Texas. Texas and Louisiana were thought to have had the densest stands over the most extensive areas (**Outcalt 1997**). Longleaf pine has been intensively exploited since colonial times. Today less than 3.3 million acres of longleaf forest remain. An approximate ownership pattern has been identified as follows: forest industry — 18 percent; public lands — 31 percent; and private landowners — 51 percent (**Outcalt 1994**).

Outcalt (**1997**), in comparing changes in forest inventory data from 1985 to 1995 found that the decline of longleaf forest has continued in Louisiana. While 10 of the 19 parishes in which longleaf was known to occur still contained detectable amounts of longleaf forest type, the greatest remaining amount of longleaf forest type occurs in Vernon and Beauregard parishes. Although longleaf forests have remained stable on public lands in the West Gulf Coastal Plain of

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Louisiana, he noted that forest industry has less longleaf forest than in 1985 and losses have also continued from privately owned lands in Louisiana.

Bridges and Orzell (1989) described in detail the natural range, floristic composition, and status of longleaf pine communities in the West Gulf Coastal Plain. They recognized the floristic distinctiveness of the West Gulf Coastal Plain, noting that most studies of community composition have compared these longleaf pine communities to those occurring in the Atlantic and East Gulf Coastal Plain and considered them floristic examples of more eastern types of communities.

Longleaf pine dominates the overstory on uplands within the longleaf pine plant community. The generally open or absent midstory sometimes contains scattered individuals and clustered groups of scrub oak stems. The diverse herbaceous ground cover frequently includes bluestem grasses, panic grasses, nutrush, sunflowers, golden asters, partridge pea, milkpea, and bracken fern.

Longleaf pine forest often encompasses smaller areas of several community types, including the intertwined riparian forest along smaller streams and drainages. Small sites of hardwood slope forest, shortleaf pine / oak-hickory forest, and mixed hardwood-loblolly pine forest occur on mesic sideslopes and stream terraces within the landscape. Some areas with deep, sandy soils tending to droughtiness support unique sandy woodland communities.

In addition, areas such as Fleming Glades on the Evangeline Unit of the Calcasieu District or the sandstone glades and barrens of the Kisatchie District dot the Forest. Wetland habitats such as hillside bogs, wooded seeps, and bayhead swamps provide unique habitats for other plants.

Shortleaf pine / oak-hickory forests — Shortleaf pine / oak-hickory forests dominated northern Louisiana as well as large portions of the Forest — especially to the north. Approximately 15 to 20 percent of what is now the Kisatchie National Forest was occupied by these forests. The frequency of fire was considerably less than in longleaf forests. The estimated pre-European fire frequency for shortleaf pine / oak-hickory forests was once every 5 to 15 years. This fire regime probably generated open-canopied mixed pine-hardwood forests (Martin & Smith, 1993).

The overstory canopy typically includes shortleaf pine, southern red oak, black oak, post oak, persimmon, pignut hickory, black hickory, and mockernut hickory. The vertically diverse midstory consists of regenerating overstory species as well as huckleberries, flowering dogwood, hawthorns, french mulberry, winged elm and other species. Various species of grasses, asters, goldenrod, sunflowers, and milkweeds thrive in open areas with sparse midstories.

Shortleaf pine / oak-hickory forests contain several specialized smaller communities, including wooded seeps and bayhead

Pitcher plant bog

swamps similar to such areas of the longleaf pine forest. Also, riparian forest areas weave through these forests. This mixed-species forest includes communities of hardwood slope forest on smaller sites that have drier or wetter conditions than the general area.

The calcareous forests and prairies of the Winn District lie within this community type. On this District both the *Keiffer Prairies* and *Tancock Priaries* (located west of Packton, Louisiana) support assemblages of plants, including several rare species unique to Louisiana. Similarly, the sandy woodlands of this community add much to the diversity of the Kisatchie's flora.

Mixed hardwood-loblolly pine forests — The mixed hardwood-loblolly pine forests were limited in extent within the Kisatchie National Forest. They occupied approximately 5 to 10 percent of the Forest. They generally occurred on mesic slopes between uplands and streams, and on broad stream terraces (second bottoms) along some larger streams. Low-intensity fires swept through these forests infrequently and probably occurred less than once every 15 to 20 years.

Overstory species generally include loblolly pine, white oak, swamp chestnut oak, water oak, cherrybark oak, laurel oak, sweetgum, southern magnolia, and beech. American holly, winged elm, ironwood, flowering dogwood, eastern hophornbeam, wild grapes, greenbrier, and coral honeysuckle typically makeup the midstory. A variety of ferns, composites, violets, vines, mosses, lichens, and liverworts grow in the understory.

Mixed hardwood-loblolly pine forests support smaller, specialized communities, including wooded seeps and bayhead swamps, sandy woodlands, hardwood slope forests and riparian forest areas.

Riparian forests — Riparian forests comprised approximately 15 to 20 percent of what is today the Kisatchie National Forest. The composition and structure of riparian forests are largely based upon the frequency, duration, depth, and timing of periodic flooding (**Martin & Smith, 1993**).

Small-stream riparian forests occur on the annual floodplains of permanent small- to intermediate-sized streams. The canopy composition is a diverse variety of hardwoods which may include white oak, swamp chestnut oak, water oak, laurel oak, pignut hickory, shagbark hickory, beech, southern magnolia, sweetbay, and others. Loblolly pine is usually present and some shortleaf pine may also occur.

Where intermediate-sized streams and their associated floodplains grade into larger streams and broader floodplains, the riparian forest overstory may include bottomland hardwood species such as cherrybark oak, nutall oak, overcup oak, water oak, willow oak, water hickory, water ash, water locust, and sycamore. Bottomland hardwood forests and cypress swamps may occur within riparian forests.

Ironwood, eastern hophornbeam, swamp dogwood, wild azalea, American holly and other small trees and shrubs — as well as regenerating overstory species — occupy the midstory. The sparse understory supports some varieties of ferns, mosses, sedges, vines, and flowering plants.

Rare plants

Many plants tolerate a wide range of conditions. They therefore occur commonly and cover wide areas. The plant communities of the Kisatchie National Forest change as environmental conditions vary. Changes in land uses, including fire exclusion, farming, timbering, and other activities have most likely altered the abundance of many plant species on the Forest. Changes in habitat conditions have caused some plants to become rare, while others have likely always been rare and limited to specialized habitats.

Species that survive in extreme habitats often become rare if habitat conditions change. Some tolerate life in habitats too harsh for common plants. Others have adapted to specific niches in specialized habitats. Species which grow only in calcareous prairies, for example, depend on specific soil types, fire regimes, and the absence of an overstory for their continued existence, and survive drought better than woodland herbaceous species. Some plants are adapted to life on rock outcrops, in riparian forests, or in sandy woodlands. Certain species have specific survival requirements that can be satisfied only by bogs with wetland soils.

While these plants survive under harsh conditions, they often cannot tolerate changes in their habitat. For example, if a road altered the water flow into a bog, causing the bog to dry out, the habitat could

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be changed to the extent that upland plants invade the bog, displacing the wetland species. When humans modify these habitats over wide areas, such plants become even more scarce.

In order to thrive, some rare plant species may depend on the disturbance created by fire. Fire reduces competition because it kills some species. To effectively seed-in and grow, many herbaceous plants native to the longleaf ecosystem need fire-created open spaces that have been bared to mineral soil. Decades of effective fire suppression have limited the open spaces these plants need, thereby causing them to drift toward rarity.

Exotic pest plants

The number of plant species growing in Louisiana has increased dramatically (by 25 percent) since the time of Columbus. Thomas and Allen (**1993, 1996, 1998**) reported 3,249 plants for Louisiana, including 2,423 native kinds and 826 introduced ones. The introduced species category includes the following types: 1) naturalized exotics not native to the southeastern United States, accidentally introduced, or known or suspected to have been introduced by man via agricultural or horticultural practices; these are persistent species which have established populations and are reproducing as if native, 2) naturalized species native to the southeastern United States but not considered native to Louisiana, 3) non-native adventive species which have not yet become widely established (**Thomas and Allen, 1993**).

Most of these introduced species have gained a solid foothold in Louisiana. Many are weedy species. The seeds often arrive with agricultural products, such as in soil with other plants, in shipments of hay, as seeds unintentionally or intentionally shipped from other countries, or as weed seeds attached to animals in various ways while the animals are being transported to Louisiana. Several of these weedy introduced species come from climates similar to Louisiana's and are well adapted to life in Louisiana. Often, when the weed arrives, other species associated with it, which kept it under control in foreign lands, do not arrive with the weed. Without those natural controls, the weedy species is free to expand in Louisiana's climate. The result is the introduction of an "exotic pest plant" which comes to Louisiana habitats, often free from its associated biologically-controlling diseases and insects.

Current conditions

General vegetation

The Forest's four major landscape forest communities have been altered or reduced from what historically occurred — as described in the previous section. The greatest changes occurred in the uplands, where few remnant patches of old-growth forest remain. The loss of old-growth forest conditions over most of the Forest has generally resulted in the reduction of old cavity trees, snags, and rotting logs. These forests, which were predominantly uneven-aged prior to European settlement (**Martin and Smith, 1993**), are now largely fragmented into mostly young, even-aged patches. Also, introduced and native weeds have increased across the Forest.

Within each of the Forest's four major landscape communities, old-growth community types have been tentatively identified based on their existing forest cover type. Eleven old-growth communities potentially exist on the Forest. They were identified using the classification and inventory direction found in the **Guidance for Conserving and Restoring Old-Growth Forest Communities on National Forests in the Southern Region (R8 Old-Growth Guidance).** Preliminary and potentially existing examples of the old-growth communities can be found in greater detail for the preferred alternative in Appendix E of the revised Forest Plan.

Today, longleaf pine forests occupy approximately 33 percent of the area on which they once occurred. Loblolly and slash pine plantations replaced these forests. The fire regime on many of the remaining longleaf pine stands has been altered in frequency and timing, resulting in the invasion of other pines, hardwoods, and shrubs, as well as the apparent loss of herbaceous species diversity.

Shortleaf pine / oak-hickory forests have been altered in that existing forest canopies are relatively closed, the within-canopy hardwoods are generally absent, and the shortleaf pine component has been greatly reduced. These alterations have occurred on greater than 80 percent of these forests.

The area once occupied by mixed hardwood-loblolly pine forests has also been substantially changed. Loblolly pine now dominates the overstories of these forests and the previously prevalent within-canopy hardwood composition is now missing or greatly reduced on over 50 percent of the area.

Most riparian forests are little altered from their historical condition. Many retain the same basic structure and composition; however, most show signs of loblolly pine removal.

Today, the forested acres on the Kisatchie National Forest are classified as 77 percent pine, 7 percent bottomland hardwood, 6 percent upland hardwood, 10 percent mixed hardwood-pine and mixed pine-hardwood. The age class distribution of the Forest is displayed in table 3–6 below.

Threatened, endangered, sensitive, and other rare plants

No federally listed threatened or endangered plants occur on the Forest. A threatened plant called geocarpon (*Geocarpon minimum*), however, grows on unique soils only a few miles from the Winn District boundary near Georgetown.

The Forest tracks 19 sensitive species and 58 conservation species. This is illustrated in table 3–7. Generally speaking, the sensitive species list includes species rare throughout their range, while conservation species occur more commonly outside Louisiana but are rare within the State. In a few cases these conservation species occur at only one or a few sites in Louisiana or on the Forest. Species are listed and delisted as additional information becomes available, so periodic revisions to the list are necessary.

An individual species' status, distribution, and subsequent designation is based upon occurrence records, information and knowledge of the Forest Service, U.S. Fish & Wildlife Service, the state Natural Heritage Program, and The Nature Conservancy.

Sensitive and conservation plant species occur in a variety of Forest habitats. A *generalized* habitat breakdown follows:

- Sandy woodlands — 15 species
- Mesic slopes and bottomland forests — 14
- Hillside bogs, longleaf pine flatwood savannahs, bayhead swamps and baygalls — 12
- Calcareous prairies — 11
- Upland longleaf pine forests — 6
- Limestone outcrops (historic site) — 4
- Sandstone glades and barrens — 4
- Calcareous forest streamsides — 2
- Other habitats —9

Following the lead of the state Natural Heritage Program, the Forest recognizes eight rare natural plant communities which provide habitat for many rare species. Of the 16 natural plant communities recognized by the Heritage Program as existing on the Forest, these eight were selected because they are considered to be imperiled within the State, harbor listed rare plant species, and/or occur more frequently on the Forest than elsewhere in the State. The following community list is not meant to match the preceeding generalized list of rare plant habitats, nor to provide an exhaustive description for all rare plant habitats on the Forest. Details of such habitats can be found in a wide variety of scientific literature, some of

TABLE 3–6, CURRENT AGE CLASS DISTRIBUTION IN ACRES

Age Class	Loblolly Pine	Shortleaf Pine	Slash Pine	Longleaf Pine	Mixed Types	Upland Hwd	Bottomland Hwd	Forestwide Percent
0–10	38,880	938	618	13,614	1,571	522	311	9
11–20	50,535	62	1,967	6,685	5,690	1,318	1,293	11
21–30	30,679	865	5,425	3,494	1,861	1,434	1,371	8
31–40	27,825	505	7,976	6,086	1,581	845	760	8
41–50	19,246	384	4,952	9,795	2,128	2,372	2,158	7
51–60	44,185	2,094	8,765	33,377	7,954	5,676	5,032	18
61–70	43,277	3,089	9,612	28,160	14,968	8,967	10,408	20
71–80	12,481	1,928	18	18,272	13,469	6,949	11,559	10
81+	15,382	4,790	11	4,162	12,667	5,480	12,045	9
Total	**282,490**	**14,655**	**39,344**	**123,645**	**61,889**	**33,563**	**44,937**	**100**

Note: the column of mixed types above includes pine-hardwood and hardwood-pine

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TABLE 3–7, THREATENED, ENDANGERED, SENSITIVE, AND CONSERVATION PLANT SPECIES

Kisatchie National Forest, May 1999

Common Name	Designation	Habitat / Forest Occurrence
Ferns, mosses, and primitive plants		
Alabama lip-fern*	C	Limestone outcrops
Black-stemmed spleenwort*	C	Limestone outcrops
Hairy lip-fern	C	Rock outcrops in upland woodlands
Maidenhair spleenwort*	C	Limestone outcrops
Nodding clubmoss	C	Hillside bogs and longleaf pine flatwood savannahs
Purple cliff-brake fern*	C	Limestone outcrops
Riddell's spikemoss	C	Sandy woodlands and sandstone glades and barrens
Dicots — flowering plants		
American pinesap	C	Calcareous forests, mesic slopes, bottomland forests
Awl-shaped scurf-pea	C	Sandy woodlands
Barbed rattlesnake root	S	Mesic slopes and bottomland forests
Broad-leaved Barbara's buttons	S	Sandy banks of large streams
Broomrape	C	Upland longleaf pine forest
Calyciphilic flame flower	C	Sandstone glades and barrens
Clammy weed	C	Sandy woodlands
Climbing magnolia	S	Mesic slopes and bottomland forests
Cupleaf beardtongue	C	Sandy woodlands
Drummond's nailwort	C	Sandy woodlands
Feverwort	C	Deciduous or mixed woods and openings
Grass-of-parnassus	S	Pine-hardwwod forest ravine seep
Ground-plum	C	Calcareous prairies
Long-leaved wild buckwheat	C	Sandy woodlands
Louisiana bluestar	S	Mesic slopes and bottomland forests
Louisiana squarehead	C	Sandy woodlands
Narrow-leaved milkweed	C	Calcareous prairies
October jointweed	C	Sandy woodlands
Prairie redroot	C	Bottomland forests
Purple bluet	C	Calcareous prairies
Purple coneflower	C	Calcareous prairies
Robbin's phacelia	C	Sandy woodlands
Sabine coneflower	S	Hillside bogs and bayhead swamps
Shooting star	C	Mesic slopes, bottomland forests, and calcareous woodlands
Slender gay-feather	S	Upland longleaf pine forest
Slender heliotrope	C	Calcareous prairies
Small-flowered flame flower	C	Sandstone glades and barrens
Southern jointweed	C	Sandy woodlands
Soxman's milkvetch	S	Sandy woodlands
Staggerbush	C	Swamps, flatwoods, creek bottoms
Viperina	C	Sandy woodlands
Wedge-leaved Whitlow grass	C	Sandy woodlands
Wild geranium	C	Bottomland forests
Yellow pimpernel	C	Calcareous forest streamsides
Yellowroot	C	Mesic slopes and bottomland forests

THREATENED, ENDANGERED, SENSITIVE, AND CONSERVATION PLANT SPECIES (CONTINUED)

Monocots — grasses, sedges, lilies, orchids, and related plants

Bearded grass-pink	C	Hillside bogs
Black snakeroot	C	Hillside bogs and bayhead swamps
Bog button	S	Hillside bogs and longleaf pine flatwood savannahs
Bog moss	C	Bayhead swamps
Carolina purpletop	S	Upland longleaf pine forests
Comb's redtop panic grass	C	Upland longleaf pine forests
Crested coral-root	C	Mesic slopes and bottomland forests
Drummond's yellow-eyed grass	S	Hillside bogs and longleaf pine flatwood savannahs
Epiphytic sedge	S	Cypress stumps in swamps and beaver ponds
False Solomon's seal*	C	Mesic slopes
Great Plains ladies'-tresses	C	Calcareous prairies
Harper's yellow-eyed grass	S	Hillside bogs and longleaf pine flatwood savannahs
June grass	C	Calcareous prairies
Kentucky lady's slipper	S	Mesic slopes and bottomland forests
Large beakrush	S	Hillside bogs and longleaf pine flatwood savannahs
Mead's sedge	C	Sandstone glades and barrens and calcareous prairies
Millet beakrush	C	Seeps
Mohlenbrock's umbrella sedge	S	Sandy woodlands
Mohr's bluestem	C	Hillside bogs
Nodding pogonia	C	Mesic slopes and bottomland forests
Northern burmannia	C	Baygalls and bayhead swamps
Oklahoma grass-pink	S	Hillside bogs, mesic pine and oak forests
Ozark dropseed	C	Calcareous prairies
Pineland yellow-eyed grass	C	Wet forests
Prairie cordgrass	C	Salt flats
Roughhair panic grass*	C	Upland longleaf pine forests
Sessile-leaved bellwort	C	Mesic slopes and bottomland forests
Shortbeak baldsedge	C	Lakebank and adjacent salt mines
Small-toothed sedge	C	Calcareous prairies
Texas sunnybell	S	Sandstone glades and barrens
Tussock sedge*	C	Wetlands
White-fringed orchid	C	Hillside bogs and longleaf pine flatwood savannahs
Wild coco	S	Upland longleaf pine forests
Wild hyacinth	C	Calcareous forest streamsides
Wiry witch grass	C	Calcareous prairies

***Designation key**: C = conservation species; S = sensitive species; *= indicates historic species, not seen on the Forest for at least 20 years.*

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which is listed in the literature cited for this document. Following is a brief discussion of selected natural communities.

Hillside bogs — Often referred to as pitcher plant bogs, hillside bogs flourish on seepy hillsides in hilly terrain. Herbs dominate the plant community of these open, mostly treeless, continually moist areas. Sedges, grasses, and yellow pitcher plants dominate the dense, continuous and floristically rich herbaceous ground cover. Hillside bogs usually cover less than an acre in size, but on rare occasions may exceed 10 acres. As with the longleaf pine forests within which these communities are embedded, bogs evolved with frequent fire events. Estimates suggest less than 2,000 acres of relatively intact hillside bogs occur in western and central Louisiana. GIS mapping shows 2,391 acres identified as bog habitat on the Forest, in 493 bogs. Most bogs range from fair to excellent in condition. By District, the numbers of mapped bogs currently in GIS include: the Vernon Unit of the Calcasieu, 299; Kisatchie, 174; Winn, 15; and Catahoula, 5. The floristics and distribution of hillside bogs have been studied extensively on the Kisatchie National Forest (Parker, 1990, MacRoberts and MacRoberts, 1988, 1990, 1991a, 1991b, 1992b, 1993b, 1996a). Proposed management for bogs was developed by Platt et al (1990). Rare plants found in hillside bogs include:

- Bearded grass-pink
- Black snakeroot
- Bluejoint panicum
- Bog button
- Drummond's yellow-eyed grass
- Harper's yellow-eyed grass
- Large beakrush
- Large-leaved rose gentian
- Nodding clubmoss
- Sabine coneflower
- White-fringed orchid
- Yellow fringeless orchid

Longleaf pine flatwood savannahs — This community covers flat to gently undulating flatlands where the water table lies at or near the surface most of the year. This results in surface soils usually saturated in winter, early spring, and periodically through the growing season. Variable densities of longleaf pine, with a herbaceous ground cover that is dense, continuous, and floristically similar to that of a hillside bog dominate this plant community. Like hillside bogs, the longleaf pine flatwood savannah evolved with a frequent fire regime resulting in a fire-driven natural plant community. Although this community once dominated a large portion of southwestern Louisiana, high quality examples within this region are uncommon-to-rare. On the Forest, it occurred on the Vernon Unit of the Calcasieu District, and in limited amounts on the Kisatchie and Catahoula Districts, and the Evangeline Unit of the Calcasieu District. The southwestern and eastern portions of the Vernon Unit once supported quite extensive longleaf pine flatwood savannah. Although much of the former longleaf pine flatwood savannah on the Vernon were converted to slash pine plantations decades ago, the quality of the herbaceous ground cover remains fairly high. This community is floristically very similar if not identical to bogs, and the question of community designation has not been resolved. Recommended management of this community is identical to that of hillside bogs (Platt et al., 1990). Rare plants associated with this natural community include most species found in the hillside bog community.

Sandy woodland — The sandy woodland natural community develops on extremely dry sites associated with deep, sandy soils. This variable natural community occurs in two topographic positions — low stream terraces and xeric hilltops and upper slopes. This community usually appears as a shrubby scrub oak woodland with small openings, sparse herbaceous understory, and much exposed sand. The extremely droughty sands allow rain water to percolate rapidly down below tree roots resulting in stunted trees. Most occurrences are limited in extent. Well-developed sandy woodlands are uncommon to rare on the Forest and throughout central, southwest, and northwest Louisiana. The Kisatchie and Winn Districts, and the Vernon Unit of the Calcasieu District each have several sandy woodland sites. The extent of these communities has not been well mapped in most cases. GIS mapping shows 68 sites with over 1,179 acres on the Forest. The floristics have been studied at one site on the Winn District (MacRoberts and MacRoberts, 1995b). Rare plants associated with sandy woodlands include:

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- Awl-shaped scurf pea
- Clammy weed
- Cupleaf beardtongue
- Drummond's nailwort
- Long-leaved wild buckwheat
- Louisiana squarehead
- Many-flowered wild buckwheat
- Mohlenbrock's umbrella sedge
- October jointweed
- Phacelia
- Riddell's spikemoss
- Southern jointweed
- Strong sedge
- Viperina
- Wedge-leaved Whitlow grass

Sandstone glades and barrens — These communities develop on sandstone outcrops in longleaf pine forests. They appear as an open complex of sandstone boulders, flats, and ledges. Vegetation consists of grassy herbaceous patches, scattered trees and shrubs, and a variety of mosses and lichens on stable sandstone surfaces. Due to the presence of highly erodible soils, much of the area exists as unvegetated gullies, bluffs, and miniature gorges and buttes. Individual occurrences are limited in extent and generally range from less than an acre to several acres. Known only from the Catahoula Formation, this community has always been very limited within Louisiana. On the Forest, sandstone glades and barrens occur only on the Kisatchie District where several quality examples exist. These communities have been extensively studied (**MacRoberts and MacRoberts, 1992a, 1993a, 1993c, 1995c**). Whether they should be considered one or two communities has yet to be determined (**MacRoberts and MacRoberts, 1993c**). Rare plants associated with this natural community include:

- Mead's sedge
- Riddell's spikemoss
- Small-flowered flame flower
- Texas sunnybell

Calcareous prairies — These communities develop where highly calcareous soils lie at the surface in uplands. They appear as small, open "pocket" grasslands in a mosaic with calcareous forest. These communities have a floristically diverse herbaceous understory similar to tallgrass prairies found elsewhere in the Midwestern and southeastern U.S. Warm-season perennial grasses, composites and legumes dominate the flora. Individual prairie openings range in size from less than one acre to about 40 acres. Periodic fire events once maintained these prairies, by preventing woody plant encroachment. This community is very rare in Louisiana. Estimates suggest less than 1,000 acres of relatively intact calcareous prairies exist within the state. On the Forest, the prairies can be broken down into three groups, the Keiffer Prairies (currently identified as 25 prairies, mixed with non-prairie, areas totaling 769.6 acres), the historic Tancock Prairies (8 current prairies totaling 45.1 acres, plus two historic prairies totaling about 740 acres), and the historic Bartrum Prairie totaling about 1,190 acres. Use of GPS technology is currently refining the locations and acreages. The Keiffer Prairies are in relatively good condition; aerial photos do show their extent has decreased about 50 percent in the last 50 years. The Tancock and Bartrum prairies, with acreages found on 1836 survey records, have mostly reverted to forest with the exclusion of fire and modern land management practices. Several of these prairies occur on the Winn (Keiffer and Tancock prairies) and Kisatchie Districts (**MacRoberts and MacRoberts, 1995a, 1996b, 1996c**). Currently, management guidelines are being prepared and restoration is in progress on the Keiffer and Tancock prairies. Rare plants associated with calcareous prairies include:

- Great Plains ladies'-tresses
- Ground-plum
- June grass
- Mead's sedge
- Narrow-leaved milkweed
- Ozark dropseed
- Purple bluet
- Purple coneflower
- Slender heliotrope
- Small-toothed sedge
- Wiry witch grass

Calcareous forests — These forests occur on surface outcroppings of calcareous soils. These communities often display an open-canopied mixed pine-hardwood forest with a fair amount of grassy ground cover in the understory. Shortleaf and loblolly pine and a variety of oaks, hickories and other hardwoods make up the overstory. Canopy composition varies based on topographic position, with the hardwood and loblolly pine component increasing downslope. Recurrent fire once maintained the open-cano-

TABLE 3–8, PLANT MANAGEMENT INDICATORS FOR LONGLEAF PINE LANDSCAPES

- **The major landscape community in these areas is longleaf pine forest. Unique or under-represented inclusional communities include hillside bogs, sandy woodlands, Fleming glades, longleaf pine flatwoods savannah, and sandstone glades and barrens. These landscapes are most closely associated with landtype associations 1, 2, 5, and 6.**

- **The management indicators are:**

Landscape-wide plants
Longleaf pine
Noseburn
Pinehill bluestem
Pale purple coneflower

TABLE 3–9, PLANT MANAGEMENT INDICATORS FOR SHORTLEAF PINE / OAK-HICKORY LANDSCAPES

- **The major landscape community in these areas is shortleaf pine / oak-hickory forest. Unique or under-represented inclusional communities include calcareous priaires, and calcareous forests. These landscapes are most closely associated with landtype associations 3, 8, and 9.**

- **The management indicators are:**

Landscape-wide plants
Black hickory
Flowering dogwood
Mockernut hickory
Partridge pea
Shortleaf pine
White oak
Wild bergamot

pied structure and unusual plant community composition. Examples of this natural community are rare in Louisiana and decreasing. While calcareous forests occur uncommonly to rarely on the Forest, the Winn District provides several good examples of this community. Rare plants associated with calcareous forests include:

- American pinesap
- Mead's sedge
- Wild hyacinth
- Yellow pimpernel

Fleming glades — These glades seem to arise on soils underlain by a siltstone rock layer occurring near the surface. These very open areas support scattered longleaf pine as well as some scattered blackjack oak. The herbaceous understory layer contains a highly unusual combination of species known from a variety of other natural communities. A thick, continuous swath of grasses and sedges intermixes with areas lacking herbs but supporting fruticose lichens. The combination of regular fires and other edaphic characteristics maintained the open condition of this natural community. Fleming glades are very rare in Louisiana and known only from the Dough Hills area of northwestern Rapides Parish. These glades have not been intensively studied but do support plant species of glades, barrens, and prairies. A very limited amount (less than 200 acres) of this community occurs in a relatively natural condition on the Evangeline Unit of the Calcasieu District. Rare plants associated with Fleming glades include:

- Mead's sedge

Limestone outcrops — Four ferns are listed as historic species from limestone outcrops. These four plants once grew on what is now a limestone quarry on private lands within the administrative boundary of the Forest. No other Louisiana sites are known, but these four plants could occur undetected on the Forest. If the quarry is ever abandoned, purchase and restoration could be considered.

- Alabama lip-fern
- Black-stemmed spleenwort
- Maidenhair spleenwort
- Purple cliff-brake fern

Other habitats — Descriptions of all habitats and communities on the Forest is beyond the scope of this discussion. However, a few other noteworthy habitats include a variety of wetland, swamp, or seep areas such as bayhead swamps, riparian forest, wooded seeps, and cypress-tupelo swamps. Some habitats are not wetlands, including hardwood slope forest, upland pine forest, and other upland forest areas.

These habitats, as a group, have not been as intensively studied as the bogs, prairies, sandy woodlands, glades, barrens and other habitats detailed above. They can and do support rare plant species in many cases. Further study and descriptions of the plant communites in these habitats would add to our knowledge base, and some of this information would be needed to develop conservation stategies and assessments of specific species and their habitats. Rare plants found in these areas include those mentioned in other habitats as well as species found in bogs, prairies, sandy woodlands, and others as listed above, that range into these other habitats.

The number of populations or plants known to exist for each species varies. Ongoing botanical surveys throughout the Forest determine the abundance, distribution, and habitat requirements of sensitive and conservation plant species and, to a lesser extent, for all plants in general. These surveys added several sites for the Louisiana bluestar, which was once thought to be endemic to the State. Several previously unknown populations have been recently discovered. Other species such as the hairy-lip fern and false Solomon's seal are common elsewhere, but known from only one location in Louisiana. These two species deserve conservation plant status because this designation protects the fringes of their range. Such isolated populations can gain sufficient variation from the parent species through geological time that they themselves can develop into new species.

Understanding of some rare plants' habitat requirements remains inconclusive. Several factors are considered when choosing species for listing as sensitive or conservation species. For example, such factors as the limited range of the Louisiana bluestar, or the wide range but low numbers of the Kentucky lady's slipper. These rare plant species' lists also cover species such as those of prairie environments, in decline because

TABLE 3–10, PLANT MANAGEMENT INDICATORS FOR MIXED HARDWOOD-LOBLOLLY PINE LANDSCAPES

- **The major landscape community in these areas is mixed hardwood-loblolly pine forest. Unique or under-represented inclusional communities include sandy woodlands. These landscapes are most closely associated with landtype association 4.**
- **The management indicators are:**

Landscape-wide plants
Bigleaf snowbell
Black snake-root
Christmas fern
Loblolly pine
Partridge berry
Southern red oak
Virginia Dutchman's pipe

TABLE 3–11, PLANT MANAGEMENT INDICATORS FOR RIPARIAN LANDSCAPES

- **The major landscape community in these areas is riparian forest. This includes cypress swamp, bottomland hardwood forest, and small-stream riparian forest. No unique or under-represented inclusional communities are noted. These areas are embedded within all landtype associations.**
- **The management indicators are:**

Small-stream riparian plants

American beech	Ironwood
Basswood	Mayapple
Cherrybark oak	Wild azalea
Inland sea-oats	

Large-stream riparian plants

Green hawthorn	Louisiana sedge
Inland sea-oats	Southern magnolia
Lizard's tail	Swamp chestnut oak

of habitat disturbance from human activities such as fire suppression.

The Forest exchanges data with the (Louisiana) Natural Heritage Program, and enters rare plant locations into the Forest geographic information system. The Natural Heritage Program also provided the Forest with historic data on sensitive species, and periodically furnishes updates on new rare plant locations reported to them by other individuals and agencies. Additional historic records may be obtained as time permits the review of specimens housed at various herbaria. Field surveys and research of cooperators have uncovered the majority of known rare plant sites to the Forest.

Activities that might threaten the continued existence of any plant species may be deferred or modified to provide adequate protection for the plants. Depending on the species, this may not require the protection of every individual plant or population.

Exotic pest plants

In 1996, the Forest Service began nationwide funding efforts to identify and control exotic pest plants. Several exotic pest plants have been identified on the Forest: Chinese tallow tree, Japanese climbing fern, Japanese honeysuckle, kudzu, a few privet species (none of several species are native), tropical soda apple, and vetiver grass. These seven plants comprise the current exotic pest plant list.

Tropical soda apple recently turned up in Natchitoches Parish on non-Forest Service lands. The single site was eradicated. Nevertheless, its rapid spread in the southeastern United States since its introduction justifies its listing here. This species is expected to invade Louisiana and cause problems in grazing areas. The pest appeared in Florida pastures in 1988 where it infests more than 100,000 acres now. It arrived in two Mississippi counties in 1993, and spread to more than ten Mississippi counties by 1998. Cattle will not graze through dense areas of tropical soda apple infested pastures; large prickles cover the plants (**Byrd and Bryson, 1995,**). The plant is an aggressive shrubby perennial that forms dense mats of shrubs which shade out pasture grasses.

Chinese tallow tree and privet both invade disturbed areas in forested lands. They can form dense single-species stands and shade out competing vegetation. In some cases, few other plant species can find a foothold in areas infested with these species. Japanese climbing fern, Japanese honeysuckle, and kudzu all vine over existing vegetation, shading out other native plants and displacing them. Areas of intense infestation support few if any other species. Vetiver grass is an invasive perennial grass that thrives under periodic burning conditions; it has been introduced on the Vernon Unit of the Calcasieu and Kisatchie Districts. Vetiver grass displaces native grasses, is not grazed by wildlife, and forms dense mats. Like kudzu, it has been used for erosion control on the Forest, but also like kudzu, it should not be used for erosion control because of its invasive nature.

Plant management indicators

Plant management indicators (MI) were selected to represent each of the four major landscape forest communities of the Kisatchie National Forest. The four major landscape communities — longleaf pine forests, shortleaf pine / oak-hickory forests, mixed hardwood-loblolly pine forests, and riparian forests — were described in detail in the *background* portion of this section. Tables 3–8 to 3–11 list plant MI.

In order to protect all plant species, plant MI were selected to represent the issues, concerns, and opportunities relating to the diverse plant resources and habitats on the Forest. The selection of plant MI species is designed to result in the monitoring of a series of plants in each community. For example, in the longleaf pine forest, selected species include a tree (longleaf pine), a fire dependant grass (pinehill bluestem), a forb that is susceptable to human collection for medicinal purposes (smooth coneflower), and an herb (noseburn). These four plant species occupy different niches (they serve different ecological functions) in the community. Monitoring of these species is designed to reflect the status of other non-management indicator species. That is, MI listed plant species designated for broad landscape-scale communities help the Forest track the health of those communities and the maintenance of their biodiversity.

The list of MI species resulted from a review of all species likely to occur on the Forest. Emphasis for selection was focused at the landscape scale. The selected MI plants represent roughly 2,000 kinds of plants growing on the Forest. While no comprehensive survey of plant species for the Kisatchie National Forest exists, parish surveys, surveys in research natural areas and other localized studies, and herbarium records provide baseline data. MacRoberts (1988) produced parish distribution maps for 2,990 Louisiana plant taxa. A review of this publication indicates 2,326 taxa occur from Vernon, Rapides, and Avoyelles Parishes, north. Many of these species probably do not exist on Forest lands, leaving probably 1,800 to 2,000 plant taxa which do occur on the Forest.

Future trends

General vegetation

Past use, management activities, and natural events have shaped the forests of today. The Kisatchie National Forest would continue to provide for viable populations of all native plants — including threatened, endangered, sensitive, and conservation species — and for quality representation of all natural plant communities occurring within the Forest. Ecosystem restoration and management focused on forest composition, structure, and natural processes at the landscape scale would facilitate this goal. This approach would also provide for long-term sustainability of the Forest's values, products, and amenities.

On surrounding lands a variety of state, federal, and industry programs are also addressing long-term sustainability of forests in the state. These include the Louisiana Forestry Initiative (state forestry community), Sustainable Forestry Initiative (American Forest and Paper Association), Forestry Incentives Program (USDA-Natural Resources Conservation Service [NRCS]), Stewardship Incentives Program (USDA-Farm Services Agency), Forest Stewardship Program (Louisiana Office of Forestry), Wetland Reserve Program (NRCS), Environmental Quality Incentives Program (USDA-Farm Services Agency), Conservation Reserve Program (USDA-Farm Services Agency), Louisiana Best Management Practices program (Louisiana Office of Forestry and the Louisiana Forestry Association), Forest Productivity Program (Louisiana Department of Agriculture), and the Wildlife Habitat Incentives Program (NRCS). Other programs or incentives available to landowners include Partners for Wildlife (U.S. Department of the Interior-U.S. Fish and Wildlife Service [USFWS]), Safe Harbor Program (USFWS), Conservation easements (The Nature Conservancy), Pineywoods Conservation Initiative (The Nature Conservancy and the Louisiana Department of Wildlife and Fisheries-Natural Heritage Program [LNHP]), and the Louisiana Natural Areas Registry (The Nature Conservancy and LNHP).

Rare plants

The Forest recently began the development of a *conservation strategy* for two rare plants. A conservation strategy provides basic, range-wide information about a species. It includes a plant's description as well as its habitat, frequency, distribution, a discussion of threats or reasons for its rarity, and management guidelines. Conservation strategies are planned for all plant species or habitats. Management guidelines for several rare species can be addressed in a single document when a conservation strategy covers more than one species growing in the same habitat and needing similar management.

The Forest would continue to undertake enhancement or rehabilitation projects for rare plant habitat when a species' needs can be determined and appearances indicate that its natural habitat can be successfully restored.

Habitat enhancement efforts would vary depending on the species, but include:

- Signing areas in an attempt to prevent recreational off-road vehicle activity in fragile habitats.
- Burning habitats to eliminate woody competition and expose bare ground for seedling germination.
- Fencing to protect plants from grazing or other disturbance.
- Mechanical soil disturbance to eliminate competition temporarily and encourage seed germination.
- Seed collection and dispersal into suitable habitat.
- Limited use of herbicides which specifically target competing woody plants.

Published scientific information on rare plants is often limited to detailed descriptions of these plants and general statements of their habitats and frequencies. The knowledge of rare plant species' responses to various management techniques — includ-

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ing fire or fire exclusion, mowing or grazing, and various timber harvest techniques — is often unavailable. This increases the difficulty of prescribing enhancement measures for all species.

As knowledge about the flora increases, some plant species would probably be added and others removed from designation. Some species would be found to be more rare or threatened than previously thought, new populations of rare species not previously known on the Forest would be found, and other species would be determined to be less rare or threatened. Even the discovery of undescribed species new to science would be possible.

Exotic pest plants

Only seven plants have been listed above as exotic pest plants; other invasive non-native plants are likely to be added to this newly created list as they are identified as a threat to native plant species on the Forest. The control of exotic pest plants requires the identification of infested areas followed by control and monitoring to see if control methods have been effective. Control methods will vary by species, but may include prescribed burning, herbicide use, manual removal, mowing, and other means. A method that works well on one species may encourage the spread of another. For example, burning may control some species, but vetiver grass reportedly thrives in areas that have been burned. Exotic pest plant infestations will continue to be found and treated.

TABLE 3–12, CURRENT FOREST HABITAT CONDITIONS, IN ACRES

	Successional Classes			
Forest Type	Early 0–10 Years	Early-Mid 11–30 Years	Mid-Late 31–80 Years	Late 81+ Years
Pine Types				
Longleaf	13,614	10,179	95,690	4,162
Slash	618	7,392	31,273	11
Loblolly	38,880	81,214	147,014	15,382
Shortleaf	938	927	8,000	4,799
Sub-total	54,050	99,712	281,977	24,354
Percent	12	22	61	5
Mixed Types				
Pine-Hardwood	1,200	4,593	15,024	4,438
Hardwood-Pine	371	2,958	25,071	8,229
Sub-total	1,571	7,551	40,095	12,667
Percent	3	12	65	20
Hardwood Types				
Upland	522	2,752	24,809	5,480
Bottomland	311	2,664	29,917	12,045
Sub-total	833	5,416	54,726	17,525
Percent	1	7	70	22
Forestwide Totals	**56,454**	**112,679**	**376,768**	**54,546**
Percent	**9**	**19**	**63**	**9**

WILDLIFE

Background

The central Louisiana area provides a variety of wildlife habitats typical of the West Gulf Coastal Plain. The location, extent, and condition of various habitats are the primary determinants of wildlife diversity and abundance in a given area. Suitable habitat conditions for individual wildlife species vary, depending on a species' requirements for specific structural or compositional components within its home range. Availability and spatial arrangement of such components in sufficient quantity provide the species with nesting, roosting, resting, and feeding sites — and the biological requirements necessary to complete life processes.

The climate, geology, topography and disturbance factors associated with this area has created a variety of landscape settings. Each landscape provides a unique habitat situation composed of a set of related habitats, habitat attributes and microhabitats. Some habitat features such as rock outcrops, streams, and wetlands remain relatively permanent components of the landscape. Others, such as the amount and arrangement of early successional vegetation, old-growth forest, snags, and den trees, as well as the structure and composition of forest stands, tend to be more transient. They are readily affected by succession, disturbance factors, land use, and resource management practices.

The mosaic of wildlife habitats on the area that is today the Kisatchie National Forest has been continuously shifting and changing over time in response to natural and human-induced disturbance factors occurring at a variety of scales. Prior to European settlement, a large majority of the Forest's habitat mosaics were primarily a product of recurrent landscape-sweeping fires ignited by lightning and by Native Americans. Windstorms, floods, and insect and disease outbreaks are natural disturbances which also influenced habitat conditions.

Many wildlife species existing within the Forest evolved in habitat conditions associated with periodic fire. The vegetation patterns and associated wildlife communities that developed on various landscapes across the Forest are largely the result of the frequency and intensity of major wildfire events. The effect of variations in soil moisture, topography, and landscape position on fire frequency and intensity resulted in the development of a wide variety of habitat situations on the Kisatchie's landscapes. Landscape-scale forest communities included open, parklike longleaf pine forests on drier uplands, stands composed of mixtures of pines and hardwoods on moist uplands and sideslopes, and riparian forests along many perennial and intermittent streams.

A more complete discussion of the vegetation, habitat situations and associated wildlife communities for individual landscapes on the Forest can be found in the *landtype association* (LTA) discussions of this chapter.

At more localized scales windstorms, insects, disease, and areas of high wildfire intensity occurred frequently and removed the forest canopy or portions of it. This allowed the development of early successional vegetation and habitats important to a variety of wildlife species such as white-tailed deer, Prairie Warbler, and American Kestrel. Openings in the forest canopy ranged from a fraction of an acre to hundreds of acres. Catastrophic stand replacement events such as those caused by hurricanes, tended to occur more frequently near the coast. However, these occurrences were relatively infrequent this far inland.

Because of the relatively small frequency and scale of stand replacement events occurring within a given year, a considerable portion of the forests occurring in central Louisiana were in a mature or old-growth condition. Components common to old-growth stands, such as large old trees and numerous snags, den trees, and decaying downed logs provided important habitats for many wildlife species, including Pileated Woodpecker, Louisiana slimy salamander, gray squirrel and fox squirrel.

Dead trees, whether standing snags or down logs, are critically important ecological components in any forest stand. Snags resulting from lightning strikes, insects, disease, fire or severe competition produced a continual supply of potential cavity sites and down logs. Cavity initiation and completion by primary cavity excavators such as the Red-headed Woodpecker yield numerous benefits for secondary cavity users, including the Eastern Bluebird and southern flying squirrel. At least 25 species of birds and 10 mammals known to inhabit the Kisatchie use cavities in standing snags for roosting or nesting. Many others use them to forage on or as places from which to hunt. Down logs furnish nesting, foraging, hiding, and hunting habitats for many of the Forest's small mammals, birds, reptiles and amphibians. Both snags and down logs in various stages of decay create a diversity of habitats for numerous insects, arachnids, other invertebrates, as well as fungi and other plant life.

Riparian and streamside habitats occurring adjacent to or immediately upslope from perennial and intermittent stream channels also contribute extremely important habitats or habitat attributes to many species of wildlife. These areas supply a variety of wildlife foods, including hard and soft mast. They often contain unique habitat features such as den trees, snags, down logs and leaf litter. They serve as a temporary or permanent source for water and aquatic habitats. They also afford travel corridors between habitat components for terrestrial wildlife as well as important stopover habitat for nongame birds during migration.

The production of mast, both hard and soft, is important to many wildlife species. Those preferring hard mast probably found abundant mast production from older dominant or codominant oaks, hickories and beech trees on moist sites in the uplands and along stream courses. Soft mast was available in the forest midstory and understory on sites receiving sufficient sunlight. White-tailed deer and Eastern Wild Turkey consume acorns during the fall to build up sufficient fat reserves for winter. Pine mast is utilized by gray and fox squirrels, doves, quail, and numerous other seed-eating birds and small mammals. Virginia opossum and tree squirrels select many soft mast species such as persimmon and wild grape. Although most species consume mast seasonally, the availability or lack of mast influences reproductive rates and general health.

Some wildlife species have sharply defined habitat requirements or are dependent on a specific habitat feature. Examples of these are the Red-cockaded Woodpecker's reliance on old pine trees, usually infected with redheart, for cavity excavation; and the southern red-backed salamander's association with sandstone outcroppings. Other wildlife species are considered to be generalists, able to find suitable habitat conditions in a variety of situations. Examples include white-tailed deer, Wild Turkey and the Eastern Wood-pewee. The shifting mosaic of habitats that developed across the Forest offered native wildlife species the specific or general habitats they required.

Current conditions

General wildlife

The Kisatchie National Forest continues to offer a variety of wildlife habitats. These habitats support more than 280 species of wildlife, including 155 breeding or wintering birds, 48 mammals, 56 reptiles, 30 amphibians and countless invertebrates. In general, the species that inhabited the central Louisiana area prior to European settlement are still present on the Forest today. Notable exceptions include the bison, elk, red wolf, and Ivory-billed Woodpecker. Some species, such as the House Sparrow, European Starling, and nutria have been introduced, while others such as the coyote and armadillo have expanded their ranges and are now common inhabitants here.

Current habitat conditions across the Forest are largely a product of past use and management activities. Most of the native overstory was removed during the extensive logging that occurred in the early 1900s. A large portion of the area harvested during this period was succeeded by off-site tree species which had not historically occupied these landforms.

The fire regime that shaped the wildlife habitats of the earlier forests was significantly altered as well. Conversion of the historical landscape vegetation, alteration of the natural fire regime, and past resource management practices have changed the character and pattern of forest vegetation on much of the Forest. These changes have altered the distribution, extent, and quality of wildlife habitats from those that existed prior to European settlement of this area. Wildlife populations have since been influenced by these changes in habitat conditions; some species' populations have increased while others have declined. Current Forest habitat conditions by successional classes are displayed in table 3–12.

The most apparent landscape-level changes in wildlife habitat conditions have occurred as a result of the reduction in longleaf pine forests. The area providing the open, parklike habitat conditions of these forests, which once dominated approximately two-thirds of the Kisatchie's land base, has been reduced by nearly 70 percent. Additionally, a large portion of the remaining longleaf pine exists as smaller fragments isolated from other longleaf tracts by stands of off-site pine species with dramatically different habitat conditions. Unlike longleaf pine forests, these stands generally have a relatively closed canopy, a dense midstory, and a less-diverse, more sparse and shade-tolerant understory. Wildlife species that are better adapted to these conditions find more suitable habitat and their populations have generally increased. Conversely, those requiring open forest conditions find less favorable habitat and their population levels have generally declined.

The areas within the Forest once forested by mixed pine-hardwood and hardwood-pine habitats have also been substantially reduced. This reduction is a result of direction to manage any particular stand toward either a pine or a hardwood type. The exception to this is in the two national wildlife management preserves, where mixed forest types are acceptable. Even with recent emphasis to increase the acreage of mixed types in these areas, it still remains well below that which occurred prior to European settlement.

Very little old-growth forest occurs on the Kisatchie today. Some old-growth stands can be found in the bottomlands and in areas which were inaccessible to the early loggers; but nearly all of the original forests were removed from the uplands at the turn of the century. Consequently, the presence of old-growth habitat attributes such as: large-diameter old trees, accumulations of large standing snags and down logs, multiple-canopy layers, and canopy gaps with understory patches are rarely in evidence. On upland sites, a large majority of the oldest stands are approximately 50 to 70 years old. Fewer relict trees exist within these upland stands.

Early successional habitats currently occupy a greater amount of the forested landscapes than they did within the original forests. These areas are generally larger in size and are fairly uniformly distributed across the Forest. This condition has increased forest fragmentation and reduced the average size of forest interior patches. It has also increased the amount and distribution of edge habitats.

Cumulatively, these changes have resulted in a reduction of suitable habitat for many native species, although some species have benefitted from the changes. In general, species with a wide range of habitat preference have increased while those with a narrow range of preference have decreased.

Wildlife population levels have changed tremendously over time. For instance, many current game species have increased through careful management and habitat manipulation. Deer and turkey populations, formerly low due to unregulated hunting, have increased through reintroduction, management, and increased protection. Other species, like the Red-cockaded Woodpecker, Northern Bobwhite Quail (bobwhite), and Bachman's Sparrow have declined due to past timber harvest methods and the infrequency of large-scale wildfires.

Hunting is a popular pastime, and game species populations are high enough to support this activity. Major game on the Forest include white-tailed -deer, Wild Turkey, fox and gray squirrel, bobwhite, woodcock, waterfowl, and Mourning Dove. Nonconsumptive activities such as wildlife viewing and nature photography are becoming increasingly popular.

Wildlife management of the Kisatchie National Forest is based principally upon direction contained within its current Forest Plan as amended, and guidance presented in the Forest Service *Wildlife Habitat Management Handbook*, **FSH 2609.23R**. Habitat requirements for specific wildlife species, general wildlife population objectives, and guidelines for habitat management by forest type are discussed in this handbook's multiple-use approach to land management. Additional guidance to management of the Forest's wildlife and fisheries resources is provided through cooperative working relationships with the Louisiana Department of Wildlife and Fisheries and the U.S. Fish & Wildlife Service.

Wildlife management activities on the Forest include — but are not limited to — prescribed burning, habitat assessments, species surveys, wildlife stand improvements, food plot construction, waterhole construction, hardwood plantings, silvicultural treatments, aquatic vegetation control, and access limitation.

Numerous federal, state, local, and private partners cooperatively participate in

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General wildlife

Threatened, endangered, sensitive, and other rare wildlife

wildlife and fisheries management activities on the Forest through challenge cost-share agreements. Additionally, special emphasis programs such as *Making Tracks*, *Answer the Call*, *Rise to the Future*, *Taking Wing*, and *Animal Inn* are pursued. The Kisatchie National Forest is identified as a Taking Wing priority forest. The primary mission of Taking Wing is the management of wetland ecosystems for waterfowl and wetland wildlife, while providing a variety of compatible recreational opportunities on National Forest System lands (USDA, 1996). The Forest is located within the Lower Mississippi Valley Joint Venture Area of the North American Waterfowl Management Plan and is a part of the Louisiana Waterfowl Action Plan.

The Kisatchie contains 2 national wildlife management preserves (NWMP). They are the 36,000-acre Catahoula NWMP on the Catahoula and Winn Districts, and the 38,500-acre Red Dirt NWMP on the Kisatchie District. These two areas were established by President Franklin D. Roosevelt in 1941 for the purposes of protecting and reestablishing native wildlife populations. The emphasis in the preserves continues to be focused on wildlife management and recreational opportunities. They are favored hunting areas for many hunters from all over Louisiana.

In addition, portions of the Forest are included in two state-designated wildlife management areas (WMAs): 44,700-acres of the Vernon Unit of the Calcasieu District are included in the Fort Polk WMA, and 480 acres of the Kisatchie District are included in the Peason Ridge WMA. Game habitat and populations in these areas are managed cooperatively with the Louisiana Department of Wildlife and Fisheries.

Red-cockaded woodpecker

Threatened, endangered, sensitive, and other rare wildlife

Due to existing habitat conditions, special habitat requirements, species vulnerability, and past or current species abundance and distribution, some species are more at risk of becoming extinct or being eliminated from the Forest.

A viability assessment was conducted on the long list of species known to occur or likely to occur on the Forest. This was to determine the current list of species for which there is a viability concern. The assessment identified those species for whose continued existence is a current concern — either throughout their natural range or within the Forest planning area.

Table 3–13 displays the terrestrial wildlife species listed as a threatened, endangered, sensitive, or conservation species on the Kisatchie National Forest.

Bald Eagle, Louisiana black bear, American alligator — The Bald Eagle (*Haliaeetus leucocephalus*), Louisiana black bear (*Ursus americanus luteolus*), and American alligator (*Alligator mississippiensis*) are federally listed as threatened species. Although the American alligator is considered biologically secure it remains on the list due to similarity in appearance to the American crocodile, a federally listed species that occurs in other locations. Suitable alligator habitat includes

TABLE 3–13, THREATENED, ENDANGERED, SENSITIVE, AND CONSERVATION WILDLIFE SPECIES

Common Name	Designation	Habitat	Forest Occurrence
Birds			
Bald Eagle	Threatened	Near large bodies of water	Limited habitat available on Forest. Scattered sightings have been reported in the past 10 years.
Red-cockaded Woodpecker	Endangered	Mature southern pine forests with old trees	Active cluster sites occur on all districts except the Caney.
Bachman's Sparrow	S	Open pine woods, old brushy fields, cutover areas	Common permanent resident where suitable habitat conditions exist.
Cooper's Hawk	C	Mature open coniferous, mixed, or deciduous forest	Uncommon permanent resident.
Worm-eating Warbler	C	Wooded hillsides; damp, rich woods	Uncommon summer resident.
Louisiana Waterthrush	C	Deciduous and mixed woods near flowing streams; favors rocky streams	Uncommon summer resident.
White-breasted Nuthatch	C	Open mature deciduous and mixed forests	Uncommon permanent resident on the Caney District.
Warbling Vireo	C	Open mature hardwoods along rivers and large streams	Uncommon summer resident.
Mammals			
Louisiana black bear	Threatened	Forests and swamps	Limited habitat on Forest. No recently confirmed sightings. Bear tracks on at least two sites have been confirmed.
Rafinesque's big-eared bat	C	Limestone caves; forested areas	Habitat exists on Forest. Distribution and abundance unknown. Five roost sites on Vernon Unit.
Big brown bat	C	Varied; cities to wilderness	Habitat exists on Forest. Distribution and abundance unknown. Documented occurrence on the Vernon Unit.
Long-tailed weasel	C	Farmlands, prairies woodlands, swamps	Rare, local resident.
Hispid pocket mouse	C	Grassy areas with sandy soil	Rare, permanent resident.
Reptiles			
American alligator	Threatened (SA)	Usually near water, ponds, swamps and rivers	Documented occurrences from several locations on the Forest. *Listed as threatened due to its similarity in appearance to another federally listed species, the American crocodile.*
Louisiana pine snake	S	Dry, sandy pinewoods	Uncommon permanent resident.
Amphibians			
Louisiana slimy salamander	S	Riparian areas	Uncommon permanent resident.
Southern red-backed salamander	C	Under logs and stones in forests and fields; associated with sandstone outcroppings	Rare permanent resident. Known only on the Kisatchie District.

FIGURE 3–4, KISATCHIE NATIONAL FOREST HMAs

RCW Habitat Management Areas Displayed by District

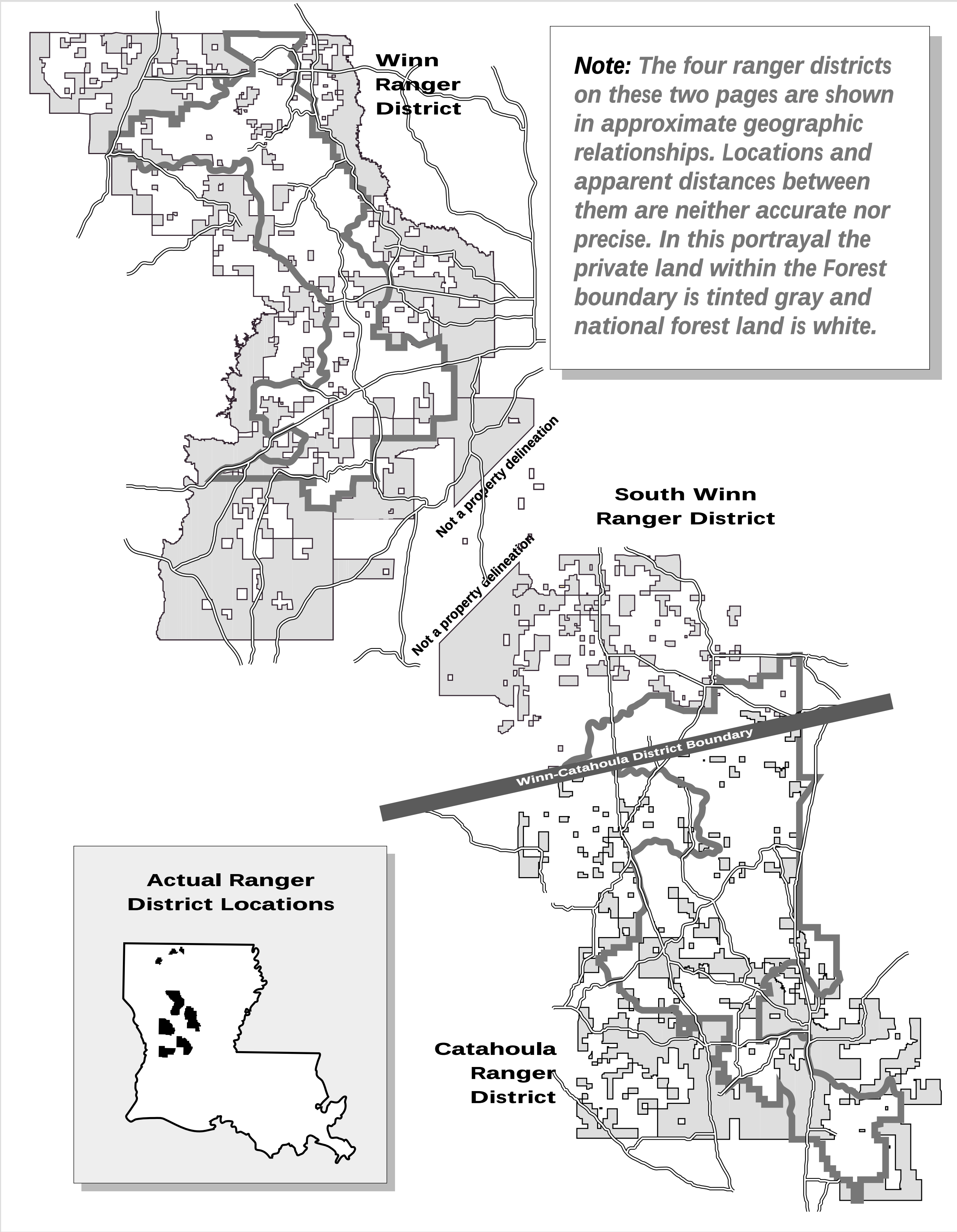
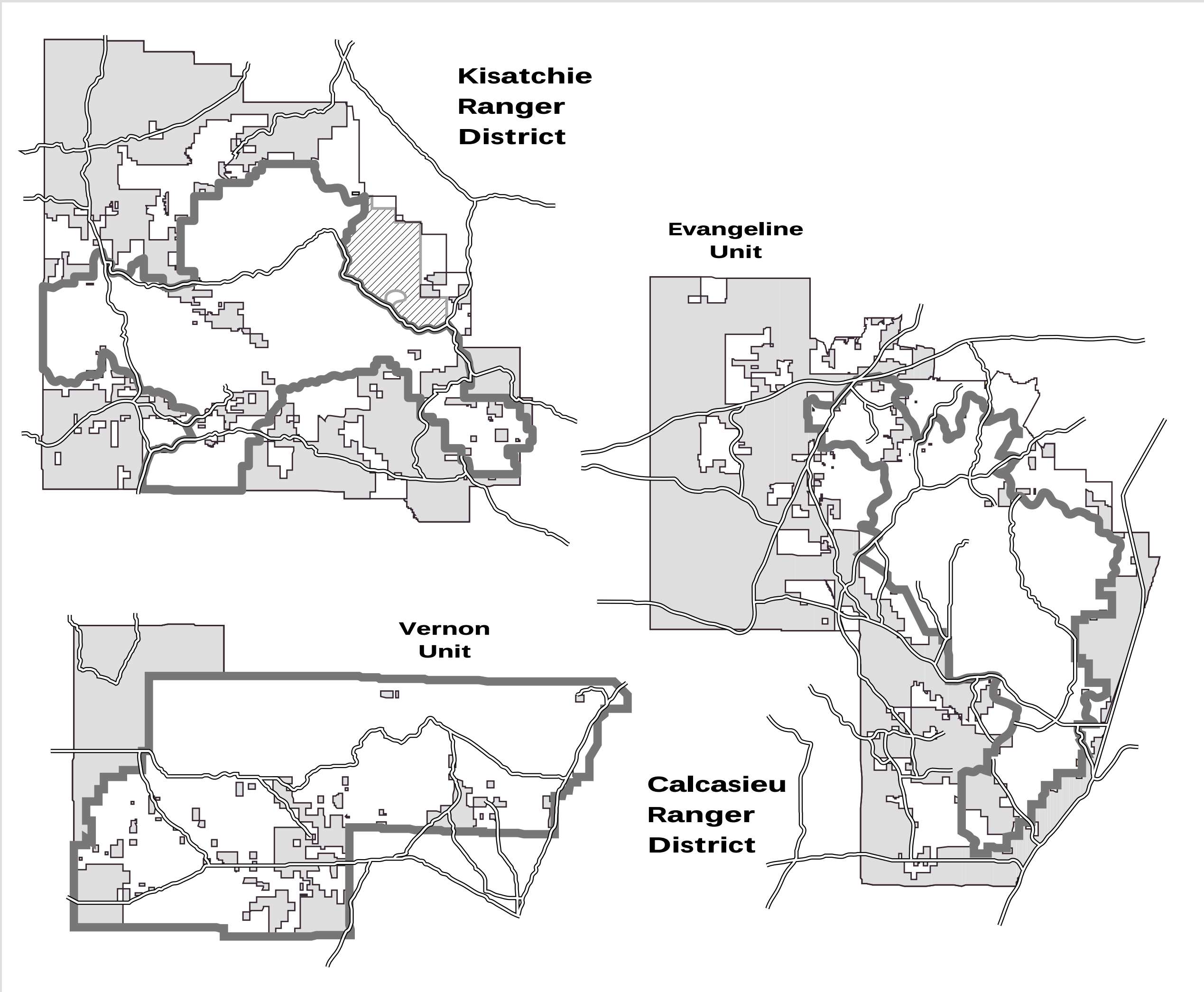


FIGURE 3–4, KISATCHIE NATIONAL FOREST HMAs

RCW Habitat Management Areas Displayed by District



river systems, lakes, swamps, bayous, and coastal marshes. It is known to occur in several locations on the Forest.

The Bald Eagle is an accidental, irregular, or occasional visitor to the Forest. It generally requires large trees near lakes, large rivers, or along seacoasts. Potential habitat may occur near large reservoirs on or adjacent to the Forest, such as Kincaid, Iatt, Saline, Caney, and Corney Lakes. Successful reintroductions of this species have occurred in the central Louisiana area. Currently no breeding territories or critical habitat is recognized on the Forest.

Although all of Louisiana is within the historical range of the Louisiana black bear, it has largely been extirpated from the Forest. Bear tracks have been found on or near the Forest in the recent past. Several unconfirmed sightings have also occurred. Black bears generally require large, heavily wooded areas with mature hardwoods for den sites. In Louisiana, the best remaining bear habitat is associated with large expanses of bottomland hardwood, especially along the Mississippi, Tensas, and Atchafalaya Rivers. Potentially suitable habitat may occur on the Forest.

Red-cockaded Woodpecker — Currently the Red-cockaded Woodpecker (*Picoides borealis*) is the only federally listed threatened or endangered terrestrial wildlife species with specific recovery plan objectives for the Kisatchie National Forest. The Red-cockaded Woodpecker (RCW) was once a common

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TABLE 3–14, RCW HABITAT MANAGEMENT AREAS

Population Statistics Display by HMA

HMA Name	Total Pine and Pine-Hardwood (acres)	Estimated RCW Population Objective (active clusters)	Current RCW Population[2] (active clusters)
Catahoula[1]	73,000	317	29
Evangeline	46,400	231	68
Kisatchie	60,200	292	56
Winn	59,400	263	14
Vernon	63,800	302	198
KNF Totals	**302,800**	**1,405**	**363**

1 / The Catahoula HMA includes approximately 10,000 acres of pine and pine-hardwood on the Winn RD.

2 / Current RCW population numbers are based upon 1998 RCW cluster survey results.

inhabitant of the mature pine and pine-hardwood forests of central Louisiana.

Open, parklike pine woodlands provide suitable habitat conditions for this woodpecker species. Historically, longleaf pine forests were the primary habitat for the RCW, although over much of its range shortleaf and loblolly pine forests also supported RCW populations. Frequently burned mature longleaf pine forests provide high quality habitat for nesting, roosting and foraging RCW groups. The natural fire regime associated with longleaf landscapes was critical in maintaining open stands, lacking substantial hardwood understory or midstory, essential to providing suitable nesting and efficient foraging habitat conditions.

Red-cockaded Woodpeckers excavate nesting and roosting cavities in living pine trees that have adequate heartwood to contain the roosting chamber. Trees selected for cavity excavation are usually infected with a heart rot fungus called *red heart*. Depending on the tree species involved, this generally occurs in pines aged 80–120 years or older. Extensive pine and pine-hardwood forests are required to meet RCW group foraging requirements. Depending on habitat conditions, an RCW group may forage on anywhere from 100 acres to several hundred acres to meet its needs.

The RCW feeds mainly on beetles, ants, roaches, caterpillars, wood-boring insects and spiders that it gleans from the loose bark of trees. It will occasionally eat fruits and berries. It prefers to forage for invertebrates on pine trees greater than 10 inches in diameter.

The RCW was declared an endangered species in 1970. The major reasons for its rangewide decline include fragmentation and loss of suitable habitat, a shortage of suitable cavity trees, hardwood midstory encroachment, and demographic isolation of existing populations and groups.

Locally, nearly all upland pine stands on what is now the Kisatchie National Forest were cut during the extensive logging that occurred in the early 1900's. A large majority of onetime longleaf pine forests were subsequently converted to other pine species, mostly loblolly and slash. Additionally, the fire regime that had created and maintained RCW habitat conditions was eliminated or greatly altered over most of the Forest. These two events along with later forest management practices contributed significantly to the overall decline in RCW population numbers on the Forest. For example, it is estimated that less than 12 RCW groups existed on the Vernon Unit of the Calcasieu District prior to its acquisition by the Forest Service (**Hooper and Stevens, in draft, 1995**).

Although its population numbers are considerably smaller than those that once existed, Kisatchie habitats currently support a significant number of the remaining RCW groups. In accordance with direction provided in the *Final Environmental Impact State-*

ment for the Management of the Red-cockaded Woodpecker and its Habitat on National Forests in the Southern Region (RCW EIS), 5 separate RCW populations are recognized on the Forest and habitat management areas (HMAs) are delineated around each. The 5 HMAs are displayed in figure 3–4.

The Vernon population is identified by the U.S. Fish & Wildlife Service as 1 of 15 RCW populations scattered throughout the bird's historic range which must meet long-term viability requirements before the species can be considered recovered and removed from the endangered species list. The other 4 populations (Catahoula, Evangeline, Kisatchie, and Winn) are considered support populations. In 1986 the Caney population was declared extirpated. The estimated population objective for each HMA is based on the amount of potentially suitable pine and pine-hardwood habitat it contains and the capability of individual landscapes to produce suitable RCW habitat conditions. While the Forest's RCW populations have fluctuated somewhat over the past 6 years, they are considered to be stable to slightly increasing. However, small populations such as those on the Winn and Catahoula may be at greater risk of extirpation due to chance events and demographic isolation of existing groups.

Table 3–14 provides important RCW information for each HMA. The total acres of pine and pine-hardwood and the RCW population objective differ slightly from the tentative figures given in Table 2-E1 of the RCW EIS. This difference in pine and pine-hardwood acres occurs as a result of more thorough GIS analysis of suitable and potentially suitable habitat within the HMAs. The population objective is slightly lower because of differences in population density objectives associated with the landtype associations (LTAS) within HMAS. The RCW EIS estimated 200 acres per RCW group. The proposed final HMA objectives are based upon 200 acres per group within LTAS 1, 2, 5, and 6 (historically longleaf dominated forests), 250 acres per group within Fort Polk Military Intensive Use Area (limited access for burning), 300 acres per group within LTA 3 (historically shortleaf pine/oak-hickory forests), and 400 acres per group within LTA 4 (historically mixed hardwood-loblolly pine forests). The population density objective of 300 acres per group in LTA 3 was determined by estimating this habitat stocking to contain approximately 67% of the pine stocking in LTAS 1, 2, 5, and 6 (0.67/200=300). The population density objective of 400 acres per group in LTA 4 was determined by estimating this habitat stocking to contain approximately 50% of the pine stocking in LTAS 1, 2, 5, and 6 (0.50/200=400). The population density objective of 250 per group inside the Vernon Intensive Use Area (IUA) was based on the ratio of existing (1997) clusters per acre of existing pine and pine-hardwood acres on the Vernon Unit (63,339/254). The lower density objective for the IUA was needed because of the limited access to the area for stand manipulation and prescribed burning.

Wildlife management indicators

Management indicators (MI) were selected to represent the issues, concerns, and opportunities relating to wildlife resources on the Kisatchie. The Forest's approach to the final selection of its MI is closely tied to its development and incorporation of a set of desired future condition statements (DFC) as described in chapter 2 of this EIS. An individual DFC is focused on a particular landscape, generally 10,000 acres or larger in size. For wildlife, the DFC includes a description of the broad habitat situation in terms of the forest composition, structure, and vegetation patterns that will persist when the DFC is attained. It also includes information on important habitat features — such as the presence of temporary ponds, early successional habitats, hard mast producers, snags, den trees, and down logs — within a particular forested landscape.

A group of bird species has been selected as MI to represent the wildlife communities

Wild Turkey

TABLE 3–15, WILDLIFE MANAGEMENT INDICATORS FOR LONGLEAF PINE LANDSCAPES

- **The major landscape community in these areas is longleaf pine forest. These landscapes are most closely associated with landtype associations 1, 2, 5, and 6.**

- **General habitat characteristics / attributes (compositional, structural and functional components) featured:** These areas are dominated by pine communities. The forest canopy for those stands at or approaching maturity is primarily single-layered and open, with a limited amount of within-canopy hardwoods (generally < 30 percent). The midstory is sparse. The herbaceous ground cover is a thick, continuous swath of grasses, composites, legumes, and other forbs. Snags and down logs are common. Prescribed fire is used frequently and is the principal influence in creating and maintaining open, parklike forest conditions. Generally, 10 percent or less of the landscape is in stand-size (10–40 acres) openings ≤ 10 years old. Additional small canopy gaps occur due to natural mortality or as a result of fire, insects, disease, or wind throw.

- **Suitability for demand species:**

Species	Habitat suitability	Species	Habitat suitability
White-tailed deer	suitable	Wild Turkey	suitable
Northern Bobwhite Quail	suitable – optimal	Eastern fox squirrel	suitable
Gray squirrel	unsuitable – marginal		

- **The management indicators are:**

Landscape-wide habitats*

Bachman's Sparrow
Northern Bobwhite Quail
Prairie Warbler
Red-headed Woodpecker
Red-cockaded Woodpecker (in HMA)

Current acreage: 134,000

* Due to open-canopied conditions and thick grass-forb understory, wildlife species usually associated with early successional habitats generally find favorable habitat throughout these areas.

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Wildlife management indicators

associated with each of the four major landscape communities found on the Forest. The MI habitat descriptions and current acreages are shown in tables 3-15 to 3-18. These species, as well as those they represent, are expected to find their most extensive optimal habitat conditions once the corresponding DFC is reached on a particular landscape. Although individual species may occur in several landscapes at lower population densities or as small isolated populations, a MI is expected to occur at its highest population densities within the landscapes for which they were chosen. Habitat quality and quantity are expected to have a primary influence on wildlife populations. Other factors beyond the control of forest management, however, may have a profound effect on wildlife populations as well. Such factors include weather patterns, habitat conditions on wintering grounds and migration routes, individual species demographics, and other unpredictable events.

Birds were selected as MI for several reasons. Many issues raised during public scoping for the Plan revision dealt with habitat conditions for a variety of birds or groups of birds, such as Red-cockaded Woodpecker, Northern Bobwhite Quail, neotropical migratory birds, cavity nesters, and forest interior-dependent birds. There is growing concern at local, regional, and national levels about the population trends of migratory and resident birds. On the Kisatchie, birds represent one-half of the wildlife listed as threatened, endangered, sensitive, or conservation species. Many birds tend to be more specific and demanding in their optimal habitat requirements. On the whole,

TABLE 3–16, WILDLIFE MANAGEMENT INDICATORS FOR SHORTLEAF PINE / OAK-HICKORY LANDSCAPES

- **The major landscape community in these areas is shortleaf pine/oak-hickory forest. These landscapes are most closely associated with landtype associations 3, 8, and 9.**

- **General habitat characteristics / attributes (compositional, structural and functional components) featured:** These areas are dominated by mixed pine-hardwood communities. The forest canopy for those stands at or approaching maturity is multilayered and relatively open with considerable amounts of within-canopy hardwoods (generally 30–50 percent). The midstory is diverse, multilayered, and relatively open, but may be thick in some areas. The herbaceous ground cover ranges from sparse to thick. Snags, down logs, and den trees are common. Prescribed fire is employed at regular intervals and is an important factor in controlling plant community composition and in maintaining open midstory conditions. Generally 10 percent or less of the landscape is in stand-sized openings ≤10 years old. Additional small canopy gaps occur due to natural mortality or as a result of insects, disease, fire, or wind throw.

- **Suitability for demand species:**

Species	Habitat suitability	Species	Habitat suitability
White-tailed deer	suitable – optimal	Wild Turkey	suitable – optimal
Northern Bobwhite Quail	suitable – optimal	Eastern fox squirrel	suitable – optimal
Gray squirrel	unsuitable – marginal		

- **The management indicators are:**

Early successional habitats*	Mid-to-late successional habitats**	
Prairie Warbler	Cooper's Hawk	Summer Tanager
	Eastern Wood-pewee	Red-cockaded Woodpecker (in HMA)
	Pileated Woodpecker	
Current acreage: 1,000	**Current acreage: 17,000**	

* Early successional habitats are considered to be sizable areas where the vegetation is in the grass-forb or shrub-seedling stages (the trees are generally less than 10 years old).
** Mid-to-late successional habitats are considered to be those where the trees have reached sawtimber size (greater than 9 inches DBH).

more is known about the habits and habitat needs of birds than many other classes of wildlife. Finally, birds may be easier to monitor, especially in spring when males sing from an occupied breeding territory.

Wildlife demand species

Commonly hunted wildlife species are valuable resources on the Kisatchie. Hunting is one of the most common recreational experiences on the Forest. Many of the game species here — for example, white-tailed deer, Wild Turkey, or fox squirrel, tend to be habitat generalists and can find suitable habitat conditions in a wide variety of forested landscape situations. Others such as Northern Bobwhite Quail, and gray squirrel may be somewhat more restricted in their habitat requirements and find some habitat conditions unsuitable. Each demand species has been given a general habitat suitability rating within the four major landscape communities.

Future trends

Wildlife management activities on the Forest would be concentrated in several important areas. The recovery of threatened and endangered species, especially the Red-cockaded Woodpecker, as well as the conservation of rare species would continue to be a very high priority. Forest management strategies designed to maintain or improve habitat conditions for migratory and resident

TABLE 3–17, WILDLIFE MANAGEMENT INDICATORS FOR MIXED HARDWOOD-LOBLOLLY PINE LANDSCAPES

- **The major landscape community in these areas is mixed hardwood-loblolly pine forest. These landscapes are most closely associated with landtype association 4.**

- **General habitat characteristics / attributes (compositional, structural and functional components) featured:** These areas are generally moist, rich woods dominated by mixed hardwood-pine and hardwood communities. They may include many temporary ponds. The forest canopy for those stands at or approaching maturity is multilayered and relatively closed with high amounts of within-canopy hardwoods (generally >50 percent). The midstory is also multilayered and contains a variety of trees, shrubs, vines, and overstory saplings. The herbaceous understory is sparse and the ground is generally covered with leaf litter. Snags, down logs, and den trees are common to abundant. Prescribed fire is employed infrequently, thus minimally influencing the alteration or maintenance of vegetation patterns. Generally, 10 percent or less of the landscape is in stand-sized (10–40 acres) openings ≤10 years old. Additional small canopy gaps occur due to natural mortality or as a result of insects, disease, or wind throw.

- **Suitability for demand species:**

Species	Habitat suitability	Species	Habitat suitability
White-tailed deer	suitable – optimal	Wild Turkey	suitable – optimal
Northern Bobwhite Quail	suitable – marginal	Eastern fox squirrel	suitable
Gray squirrel	suitable – marginal		

- **The management indicators are:**

Early successional habitats*
White-eyed Vireo

Current acreage: 56,000

Mid-to-late successional habitats**
Yellow-billed Cuckoo
Hooded Warbler
Pileated Woodpecker
Red-cockaded Woodpecker (in HMA)
Wood Thrush

Current acreage: 320,000

* Early successional habitats are considered to be sizable areas where the vegetation is in the grass-forb or shrub-seedling stages (the trees are generally less than 10 years old).
** Mid-to-late successional habitats are considered to be those where the trees have reached sawtimber size (greater than 9 inches DBH).

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land birds would receive increased attention. Managing habitats for quality recreational hunting and improved hunter success remains an important consideration.

Habitat of native and desired nonnative wildlife species would be maintained at levels expected to maintain viable populations. Ecosystem restoration and management aimed at the landscape scale would provide habitat conditions throughout the Forest capable of maintaining all represented species in viable numbers.

Alterations to current Forest management can benefit a wide range of species and restore historical patterns. Restoring historical habitats would produce a habitat mosaic more similar to those prior to European settlement. Although not all structural or compositional habitats may occur on all acreages, over time they would be present at a landscape scale. This would allow for the development of suitable habitat conditions for a lot of wildlife currently listed as threatened, endangered, sensitive, or conservation species. It would also provide landscapes capable of supporting huntable populations of all demand species.

On surrounding lands a variety of state, federal, and industry programs are addressing long-term sustainability of forests and wildlife habitat conditions in the State. These include the Louisiana Forestry Initiative (state forestry community), Sustainable Forestry Initiative (American Forest and Paper Association), Forestry Incentives Program (USDA-

TABLE 3–18, WILDLIFE MANAGEMENT INDICATORS FOR RIPARIAN LANDSCAPES

- **The major landscape community in these areas is riparian forest. This includes cypress swamp, bottomland hardwood forest, and small-stream riparian forest. These areas are all embedded within all other landtype associations.**

- **General habitat characteristics / attributes (compositional, structural and functional components) featured:** These areas are moist, rich woods associated with water and dominated by hardwood and hardwood-pine communities. The forest canopy for those stands at or approaching maturity is generally closed and is composed of a variety of oaks, hickories, and other hardwoods. Some pines may be present on small-stream communities within the uplands. The midstory is multilayered and diverse. The herbaceous understory is sparse but may contain a variety of ferns, mosses, sedges, and flowering plants. Snags, down logs, and den trees range from common to abundant. Fire frequency ranges from infrequent to rare. Plant community composition and structure is largely influenced by the frequency, extent, and duration of annual flooding events. Generally, stand-sized (10–40 acres) openings ≤10 years old are frequent or rare. Small canopy gaps occur due to natural mortality or as a result of insects, disease, or wind throw.

- **Suitability for demand species:**

Species	Habitat suitability	Species	Habitat suitability
White-tailed deer	suitable – optimal	Wild Turkey	suitable – optimal
Northern Bobwhite Quail	unsuitable – marginal	Eastern fox squirrel	suitable
Gray squirrel	suitable – optimal		

- **The management indicators are:**

Small-stream riparian habitats*
Acadian Flycatcher
Louisiana Waterthrush
White-eyed Vireo (canopy gaps)
Yellow-billed Cuckoo

Current acreage: 39,000

Large-stream riparian habitats**
Kentucky Warbler
Northern Parula
Pileated Woodpecker
Warbling Vireo
White-breastedNuthatch
Worm-eating Warbler

Current acreage: 40,000

* Small stream riparian habitats are generally associated with intermittent and smaller perennial streams with relatively narrow floodplains and include the associated mesic sideslope habitats.
** Large stream riparian habitats are generally associated with large perennial streams with broad floodplains and may include bottomland hardwood forest and cypress swamps.

Natural Resources Conservation Service [NRCS]), Stewardship Incentives Program (USDA-Farm Services Agency), Forest Stewardship Program (Louisiana Office of Forestry), Wetland Reserve Program (NRCS), Environmental Quality Incentives Program (USDA-Farm Services Agency), Conservation Reserve Program (USDA-Farm Services Agency), Louisiana Best Management Practices program (Louisiana Office of Forestry and the Louisiana Forestry Association), Forest Productivity Program (Louisiana Department of Agriculture), and the Wildlife Habitat Incentives Program (NRCS). Other programs or incentives available to landowners include Partners for Wildlife (U.S. Department of the Interior-U.S. Fish and Wildlife Service [USFWS]), Safe Harbor Program (USFWS), Conservation easements (The Nature Conservancy), Pineywoods Conservation Initiative (The Nature Conservancy and the Louisiana Department of Wildlife and Fisheries-Natural Heritage Program [LNHP]), and the Louisiana Natural Areas Registry (The Nature Conservancy and LNHP).

GENERAL FOREST SETTING

BIOLOGICAL ENVIRONMENT

FISH AND AQUATIC ORGANISMS

Streams

Impoundments

FISH AND AQUATIC ORGANISMS

Background

The presence of at least 92 species of fish has been documented on the Kisatchie National Forest. These species occur in a variety of habitats — reservoirs, lakes, ponds, and streams. Perennial, intermittent, and ephemeral streams occur within 35 watersheds. Stream conditions on the Forest are typical of the lower Gulf Coastal Plain and range from clear, swift-flowing streams with rapids and falls to sluggish, murky bayous. Natural lakes and sloughs provide additional aquatic habitats.

A wide array of invertebrates, including benthic macroinvertebrates, freshwater mussels, gastropods and crustaceans occur on the Forest. Vidrine (**1993**) lists at least 35 freshwater mussel species (*unionids*) that range within the watersheds of the Forest. The occurrence of benthic macroinvertebrates on the Forest has been fairly well documented in several studies (**Bryan, et al, 1995; Sloey, 1992; Carver, 1975; DeWalt, personal communication**). Although some analysis and stream sampling continues to occur, not much is known about invertebrates such as snails, crayfish, and others. Additional information on stream quality, habitat conditions, and associated fish and aquatic communities for individual landscapes on the Forest can be found in the landtype association discussions of this chapter.

Current conditions

Streams

Streams provide the dominant aquatic habitat on the Kisatchie National Forest. Streams on the Forest can generally be differentiated into two categories — fast- to moderate-flowing streams with sand or gravel bottoms and slow-flowing, sluggish streams with silt or clay bottoms. A study on the Forest by Ebert (**1983**) found fish biomass and numbers of individuals were correlated with soils, gradient, habitat, pool volume, and flow. He determined that, as stream order increased, fish biomass, numbers of individuals, and species richness also increased. Increases were largely associated with the addition of new fish species rather than species replacement. The majority of added species were pool and large-river fish.

Pools and flats were the only habitat types found in Ebert's study. Pool volume was important to high fish biomass and number. Pools created by woody debris and channel bends dominated stream reaches and contained the majority of fish. Flats occurred in straight channels where shallow water flows over fine substrates. Shiners typically inhabited flats.

Streams on the Forest vary from 2.62 to 16.00 percent in gradient, 3.0 to 51.3 centimeters in mean depth, with currents between 1.18 and 30.00 centimeters per second. Canopy cover ranges from 25 to 65 percent.

McLean (**1992**) used a combination of 4 stream descriptors to characterize Kisatchie National Forest streams:

- Large stream, high current, large watershed, high turbidity, little cover.
- Small stream, leaf litter, canopy cover, undercut banks, branches, low current, low turbidity.
- Shallow, high dissolved oxygen, high stream gradient.
- Deep, logs, low dissolved oxygen, low stream gradient.

Large shallow streams with high currents and gradients are likely to contain mosquitofish, striped shiners, redfin and bluntnose darters. Large deep streams with high currents and low gradients are typified by bluegill, green sunfish, spotted bass, and dusky and speckled darters. Blackspot shiners, creek chubs, brown madtoms, and yellow bullheads are the species to expect in small shallow streams with high gradients. Redfin pickerel, creek chubsuckers, warmouth, spotted sunfish, longear sunfish, pirate perch, blackspotted topminnows, and blacktail redhorses should be apparent in small deep streams with low gradients.

Impoundments

Artificial impoundments that are managed for recreational fishing range from 2 to 2,300 surface acres. These lakes are typically neutral to slightly acidic in pH, with values that vary anywhere from 6.8 to 8.6. They are low in conductivity (fertility), with conductivity parameters ranging from 28 to 83 microhms. Alkalinity is also low and rarely exceeds 20 parts per million (**PPM**) as calcium carbonate in natural situations. These collective values

TABLE 3–19, THREATENED, ENDANGERED, SENSITIVE, AND CONSERVATION AQUATIC SPECIES

Common Name	Desig.	Habitat	Forest Occurrence
Fish			
Western sand darter	S	Large streams, slight-to-moderate current over sandy bottom, also gravel or silt. May coexist with scaly sand darter, Ouachita darter, speckled chub, or Sabine shiner.	No Forest record. Known from Red River in Red River Parish and Bayou Toro in Vernon Parish.
Blue sucker	C	Large rivers and impoundments.	No Forest record. Known from Red River in Red River Parish and Sabine River in Vernon Parish.
Bluehead shiner	S	Quiet backwater areas of small-to-medium sluggish streams and oxbow lakes over mud or sand bottom.	No Forest record. Known record from Bayou Boeuf south of Evangeline Unit.
Sabine shiner	C	Closely restricted to substrate of fine, silt-free sand in smaller streams and rivers with slight to moderate current.	Known from Kisatchie Bayou drainage on the Kisatchie District; Big Creek drainage on the Catahoula District; Six Mile Creek and Whiskey Chitto drainages on the Vernon Unit.
Paddlefish	C	Large silty rivers, oxbow, and floodplain lakes.	No Forest record. Known from Red River in Avoyelles Parish.
Bigscale logperch	C	Streams with moderate to swift current and with gravel race-ways.	No Forest record. Known from the Sabine River watershed.
Mussels			
Louisiana pearlshell mussel	Threatened	Small, clear, shallow streams with moderate current.	Approximately 15 to 20 streams on the Catahoula and Evange-line Units.
Southern hickorynut	S	Large rivers with sand or gravel bottoms.	Known from Corney Bayou on the Caney District; Dugdemona River on the Winn District; Kisatchie Bayou on the Kisatchie District; Calcasieu River on the Evangeline Unit; and numerous streams on the Vernon Unit.
Southern creekmussel	S	Small-to-large streams with mud or gravel-mud bottoms in flowing water.	Some question as to species taxonomy. Possibly known from the Vernon Unit.
Squawfoot	C	Small-to-large streams with mud or gravel-mud bottoms in flowing water.	Known from Corney Bayou on the Caney District.
Insects			
Yellow brachycercus Mayfly	S	Stable streambanks.	No Forest record.
Caddisfly	C	Streams.	Unknown.
Schoolhouse Springs stonefly	S	Small, clear, shallow streams with moderate current.	Known from Loving Creek on the Evangeline Unit; Swafford Creek, Beaver Creek, and Jordan Creek drainages on the Catahoula District.
Crustaceans			
Teche painted crawfish (*Orconectes hathawayi*)	C	Streams.	Rapides Parish, throughout Spring Creek and Bayou Boeuf drainages, LTA1.
Kisatchie painted crawfish (*Orconectes maletae*)	C	Streams.	Natchitoches Parish, throughout Kisatchie Bayou drainage; LTAs 3& 4.

GENERAL FOREST SETTING

BIOLOGICAL ENVIRONMENT

FISH AND AQUATIC ORGANISMS

Impoundments

Natural lakes

Threatened, endangered, sensitive, and other rare aquatic species

generally indicate a need for supplemental fertilization, which can bring fertility and fish productivity to levels sufficient to support recreational harvest, provided aquatic plants do not proliferate to undesirable levels. Most lakes under 100 acres are being limed and / or fertilized routinely.

Lake populations are typical bass and sunfish predator-prey assemblages. Channel catfish, which are generalist-scavengers, are present in most, but not always reproductive due to limited spawning habitat. Bass populations are usually limited in catchable size classes due to fishing pressures that exceed recruitment capabilities. This trend is quite typical of most small recreation lakes on national forests. Catfish have been supplementally stocked in past years, but the recent lack of available federal fish has limited catfish stockings to donations from private hatcheries. In some lakes nongame fish prevail to the point of representing the majority of fish biomass. These situations typically involve lake chubsuckers and gizzard shad. The Winn District's bombing range pond and Upper Caney Lake on the Caney District have unique pickerel-warmouth assemblages more typical of swampy lakes.

Although some recreational fishing occurs in streams with deep pools or in larger rivers, most opportunities exist in impoundments. A variety of bass and sunfish are present with the primary demand species being largemouth bass, bluegill, redear sunfish, and channel catfish. The Forest participates in *Rise to The Future* activities such as youth fishing derbies.

Natural lakes

Although there are backwater sloughs associated with several of the bayou systems on the Forest, Kidd Lake on the Caney District is the only true, basin-type natural lake. Originally an oxbow of Corney Bayou, this 3-acre lake receives Corney Lake overflows during wet periods. Recent problems with the upstream Corney Lake dam spillway have resulted in the siltation of one-third of Kidd Lake, and cypress tree mortality.

Cowan, et al (1995) noted 41 different macroinvertebrate taxa over 4 seasons of sampling in Kidd Lake. Twenty-six different fish species were concurrently collected. The pH levels ranged from 5.4 to 7.1, while alkalinities varied from 6 to 40 PPM. Conductivities ranged between 89 and 190 microhms, with dissolved oxygen fluctuating from 0.8 to 13.6 PPM.

Threatened, endangered, sensitive, and other rare aquatic species

As a result of land use practices on private and public land, habitat changes have impacted the viability of some local populations and restricted the range fringes of others. The primary factors contributing to these trends are the construction of large impoundments and the proliferation of roads and crossings.

All aquatic species likely to occur on the Forest were examined to identify those deserving viability concern. Table 3–19 summarizes habitat requirements and known Forest occurrences of threatened, endangered, sensitive, and conservation aquatic species.

In 1988 the Louisiana pearlshell mussel (*Margaritifera hembeli*) was federally listed as endangered. Reasons given for its decline include inundation by beaver ponds and other impoundments, as well as sedimentation associated with timber harvesting, road construction and maintenance, and minerals activities. This mussel was reclassified to threatened in 1993 largely due to the discovery of additional mussel beds on and off the Forest.

These mussels are found in small streams with fine sand substrates and healthy zooplankton populations (Darden, 1988). While it appears that this species is very sensitive to changes in aquatic habitat conditions, recent studies indicate that the long-term viability of this mussel may be equally dependent upon the habitat conditions, life history, and movements of the host fish. The brown madtom is suspected to be the host fish for the Louisiana pearlshell mussel *glochidia* , although this is not certain. The Kisatchie National Forest is particularly important for this mussel. The Louisiana pearlshell mussel occurs only in Louisiana and the majority of the known mussel beds are located within the Forest. Currently, 15 to 20 streams on the Catahoula District and the Evangeline Unit of the Calcasieu District are known to contain populations of this rare mussel. A recent survey documented 16,500 Louisiana pearlshell mussels occurring in streams on the Evangeline Unit (S. Shively, Zoologist, Louisiana Natural Heritage Program, Louisiana Department of Wildlife and Fisheries, personal communication)

TABLE 3–20, AQUATIC MANAGEMENT INDICATORS

- **Aquatic management indicators apply forestwide. The group used depends on the aquatic habitat category involved.**
- **The management indicators are:**

Swift-flowing — sand / gravel bottom
Brown madtom
Redfin darter
Louisiana pearlshell mussel

Slow-flowing — silt / clay bottom
Pirate perch
Blackspotted topminnow

Impoundments and ponds
Largemouth bass
Sunfish

GENERAL FOREST SETTING

BIOLOGICAL ENVIRONMENT

FISH AND AQUATIC ORGANISMS

Aquatic management indicators

Aquatic management indicators

Aquatic management indicators (MI) were selected to represent the issues, concerns, and opportunities relating to aquatic resources on the Forest. In measuring the biological integrity of an aquatic ecosystem, it is preferable to use a combination of species to represent aquatic habitats and communities. Fish are indicators reflecting the ability of aquatic organisms to move within and among stream reaches. Fish occurrence can be affected by factors other than water quality. A stream reach with high water quality may contain no fish because of culvert impediments downstream, structural voids, seasonal flow changes, range limitations, or migration. A mussel is included as a management indicator because there may be environmental factors that impact filter feeders, such as mussels, that may not impact fish. Table 3–20 displays aquatic management indicators.

Future trends

Activities in the fish and aquatic resource area would be concentrated on stream inventory and sampling to collect more information on life histories, movement, and habitat requirements for fish and aquatic invertebrates on the Forest. This information could be used to provide baseline data, refine monitoring techniques, and eventually establish population trends.

The Forest would continue to provide for viable populations of fish and aquatic species. Recreational fishing opportunities on the Forest would continue to be provided where possible.

Issues that continue to impact fish and aquatic ecosystems would include:

- Localized water quality problems — fecal coliform, low pH, total dissolved solids, and turbidity — that could potentially impact stream fisheries.
- Short-term and long-term impacts of sedimentation, siltation, and hydrocarbon pollution resulting from military activities, timber harvest, road construction and maintenance, and minerals extraction.
- Fish stocking and release.
- Lack of a full understanding of the occurrence and / or vulnerabilities of many mussels, crayfish, gastropods, and other aquatic species which may lead to their imperilment.
- Placement of road culverts which may become impediments to the movements of many stream fishes, shrinking their ranges and limiting their function as mussel *glochidia* hosts.

GENERAL FOREST SETTING

BIOLOGICAL ENVIRONMENT

FOREST HEALTH

Insect pests

Diseases

FOREST HEALTH

Background

Insects and diseases play important roles in any forest ecosystem. Insects pollinate plants, thus assisting in the production of food for other insects, animals and fish. Many insects and diseases in the forest contribute directly to the carbon and nutrient recycling processes of dead plant residue and to the development of the soil organic layers. Insects and diseases may also cause negative impacts on stands of trees.

Forest health is described as a condition wherein a forest has the capacity across the landscape for renewal, for recovery from a wide range of disturbances, and for retention of its ecological resiliency while meeting current and future needs of people for desired levels of values, uses, products, and services. This means balancing the detrimental effects of endemic insects, pathogens, and other agents on resource values over the short term, against their beneficial ecological functions over the long term. Even when forests appear healthy, their condition may be far from ideal for sustaining their productivity and for maintaining features in the landscape important for conserving biodiversity.

A forest's health is influenced by such factors as:

- Current and past management practices.
- Forest type / site relationships.
- Management intensity.
- Age class distribution.
- Rotation ages.

Pests within the Forest are generally well known. The influences and extent of their impacts, however, are not as easily determined.

Current conditions

The mosaic representing the Kisatchie National Forest's current condition developed from the early reforestation efforts to reclaim cutover and often burned-over lands. Watershed protection was then the primary goal of this effort. Thousands of acres were planted with loblolly and slash pine. Today the Kisatchie is predominately a pine forest.

Insect pests

Influences of insect and disease interactions are more significant within the pine management types of the Forest. Predominant insect pests are the southern pine beetle (SPB) and other associated bark beetles. During endemic population levels, the SPB attacks primarily overstocked or overmature pine stands and trees with low vigor, drought-induced stress, or other factors such as root disease. Red-cockaded woodpecker (RCW) cavity trees and lightning-struck trees are also vulnerable.

The SPB is most destructive during periodic epidemic outbreaks. During the 1985–86 epidemic, the Kisatchie lost an estimated 490 million board feet of growing stock. The loss equaled approximately 8 percent of the Forest's total growing stock.

Management to reduce losses caused by SPB include thinning of overstocked stands, maintaining aerial surveillance for early detection, and removal of infested trees prior to spot expansion.

Incidental attacks by *Ips* beetles and black turpentine beetles also indicate stress conditions within host stands. Primary hosts are loblolly, slash, shortleaf, and occasionally longleaf pines.

Diseases

The most prevalent pathological interactions within a southern pine forest include fusiform rust, annosus root disease, brown-spot needle blight, and red heart decay. Loblolly and slash pines are the predominant hosts for fusiform rust. Disease initiation usually occurs during the seedling-sapling stage. Galls and cankers are formed, which cause mortality or persist through the life of the host, resulting in weakened or deformed trees. Fusiform rust incidence is scattered within the Forest. The most damage has occurred in plantations established from the 1930's through the 1950's.

Annosus root disease is associated with well-drained sandy-to-loamy soils, the number of susceptible host trees, and the frequency and intensity of thinnings of host stands — primarily plantations. The most susceptible hosts on these sites are loblolly and slash pines. The reproductive sporophores of the annosus fungus have been found in thinned pine stands on all of the ranger districts. Although mortality and visible symptoms have been slight, growth loss and increased susceptibility to bark beetle attacks are likely consequences.

The only significant disease of longleaf pine is brown-spot needle blight. Longleaf is a preferred management species on sandy and sandy-loam sites. Needle blight affects the grass stage of longleaf regeneration. This disease is usually controlled fairly easily through prescribed burning or other silvicultural methods that reduce the duration of the blight-susceptible grass stage.

The amount of red heart decay within the maturing pine component of forest stands was once measured as the degree of cull or defect caused by this heart-rotting fungus at the time of harvest. With current emphasis on Red-cockaded Woodpecker management, red heart is now considered a vital component of RCW habitat which provides suitable nesting cavity trees. The decay fungus enters the heartwood column of host trees through branch stubs. The number of potential red heart trees available for RCW cavity excavations is dependent upon site / species, age, and spacing, which all influence heartwood development. Decay incidence is more likely to occur on poor sites in pine species with large limbs, such as loblolly, but tree survival and the longevity of RCW cavities is greater in longer-lived species such as longleaf.

Insect and disease problems in the Forest's hardwood component are relatively minor, with some damage caused by insect borers and decay fungi. Decay fungi enter the host through fire scars, mechanical injury, dead branch stubs, insect wounds, and storm damage. Reducing injury-causing agents and promptly salvaging storm damage lessens the impact of decay fungi and hardwood borers.

Future trends

Forest health issues are multi-scaled, and landscape approaches may be especially useful in identifying management strategies and practices for improving the overall forest condition (**Kaufmann & Regan, 1995**). Promoting and maintaining a healthy forest ecosystem is a desired outcome of management strategies. Key strategic elements are proper species / site selection, promoting stand vigor, and maintaining age class distribution and rotation ages not exceeding species / site capabilities.

Endemic populations of SPB and other bark beetles that expand into periodic epidemics are expected on areas where pine management predominates. However, the damage and impact to these forest stands should diminish as management strategies are implemented to reduce the number of high-risk acres — for example, thinning overstocked stands, converting off-site species to appropriate species, and maintaining vigor. Damage from SPB and other bark beetles can be expected to increase in areas where management practices are restrained by other resource objectives, such as wilderness or RCW management.

The risk of annosus root disease may increase as the Kisatchie National Forest initiates more first-time thinnings in loblolly and slash pine plantations. This is especially true on high-risk sites that have predominately sandy and sandy-loam soils. Risk on these sites can be mitigated through stump treatments and other silvicultural methods, and by the eventual conversion of these high-risk stands to longleaf pine.

Brown-spot needle blight and fusiform rust would continue to be evident in the pine ecosystem. Both diseases should be minor impacts to forest health. The incidence and impact of fusiform rust have been greatly reduced through development of genetically resistant clones and improved planting technology. Stems with existing canker damage should be removed through planned harvest and thinnings. Conversion of high-risk loblolly and slash pine stands to longleaf pine should also reduce the impacts of fusiform rust. Although the Kisatchie's future may include increased longleaf pine acreage, the effects of brown-spot needle blight should diminish with improved regeneration technologies and integrated forest pest management.

As rotation ages for hardwoods are extended, some increases in heartwood and butt rot decay can be expected. A possible threat to the Forest's hardwood stands is the potential of gypsy moth infestation. This is an exotic pest that defoliates oaks, sweetgum, and other hardwoods. The pest has not yet been found in Louisiana, but the Forest's hardwood stands are suitable hosts. Gypsy moth infests much of the forest in the northeastern U.S. Isolated gypsy moth infestations outside of the generally infested area have been reported in Arkansas, Georgia, North Carolina, Tennessee, and Virginia.

Transport from one area to another is by egg masses attached to vehicles, campers, and other household goods. Surveillance and monitoring for gypsy moth infestations are ongoing efforts of integrated pest management. Although not yet documented on the Forest, additional pest concerns may include dogwood anthracnose, oak wilt, fruittree leafroller, and forest tent caterpillar.

SCENERY

Background

Most of the land that is now Kisatchie National Forest had been cleared by timber harvest or for agriculture prior to acquisition by the Federal Government in the 1930's. Today most of Forest is perceived visually as a natural, heavily forested, gently rolling landscape supporting dominant overstories of loblolly, shortleaf and longleaf pine with scattered hardwoods. Areas of hardwood overstory occur primarily along river and stream drainages.

Over much of the landscape, mid- and unerstory vegetation is sparse. This allows viewing depths up to 1/4 mile, but the relatively flat terrain makes distant landscape views or panoramas rare. An exception to this is the Kisathie District; its hilly topography contains numerous vistas.

The sparse mid- and understory depends on frequent prescribed burning, so the visual character of infrequently burned or unburned areas is much different. Riparian areas and transitional zones not normally exposed to fire often support a dense understory of shrubs and small trees, contributing to the overall visual variety of the landscape.

Because of the Forest's dominant evergreen pine overstory, fall color displays are not a major scenic attribute, although areas with a heavier deciduous hardwood component sometimes exhibit moderate levels of color. Flowering trees and shrubs — such as dogwood and wild azalea — growing primarily on moister sideslopes consistently produce impressive spring flower displays.

Within the overall matrix of this landscape, some small areas or inclusions such as bogs, rock outcroppings, and cypress swamps possess unique visual characteristics. This contributes to the variety and attractiveness of the landscape.

Current conditions

The scenic resources of the Kisatchie National Forest are currently managed in accordance with the 1985 Forest Plan. The scenic resource direction of that plan is in compliance with the Forest Service's *Visual Management System*.

Visual management involves mapping relative levels of inherent scenic quality or variety of the existing landscape; defining and mapping the foreground, middleground, and background zones along roads and other travelways in the Forest; determining the relative sensitivity of the majority of visitors on the travelways; and then compiling this information and assigning 1 of 5 possible visual quality objectives (**VQOs**) to all lands in the Forest. **VQOs** define different levels of alteration affecting the scenic resource that are acceptable.

The definitions of each **VQO** and the total acreage currently assigned to each one, are shown in table 3–21, opposite.

The vast majority of the Forest supports a forest canopy; however, some temporary openings have been created by timber harvests or natural events such as tornadoes or southern pine beetle infestations. These openings can appear visually out of place in a heavily forested setting, particularly in the first year following their creation. They do, on the other hand, contribute spatial diversity and opportunities for viewing a progression of successional vegetation stages.

The existing scenic condition of the Forest has been analyzed by assessing compliance with visual management standards and guidelines as defined in the 1985 Forest Plan. The analysis revealed that more than 80 percent of the Forest meets the requirements for the *retention* **VQO**, which indicates the overall scenic resources of the Forest are in excellent condition. Approximately 40,000 acres exceeded the opening size limitations of the standards and guidelines. These openings resulted from natural occurrences such as tornadoes and southern pine beetle infestations, not planned management activities.

TABLE 3–21, VISUAL QUALITY OBJECTIVES

Descriptions and Acreages

Preservation	Allows ecological changes only	**9,628**
Retention	Human activities are not evident to the casual visitor	**28,941**
Partial Retention	Human activities may be evident but will be subordinate to the characteristic landscape	**19,413**
Modification	Human activities may dominate but will appear natural when viewed as foreground or middleground	**68,933**
Maximum Modification	Human activities may dominate the landscape but will appear natural when viewed as background	**470,846**

Future trends

Management activities and projects with potential to cause visual deviations from a natural-appearing landscape would continue to occur, but may vary in size and frequency. Areas with large or frequent alterations would be difficult to mitigate, while areas with small or infrequent alterations would be more easily mitigated. Areas where historic vegetation is restored would in the long run be beneficial to scenic conditions, and the overall perceived attractiveness of the landscape, even though initial regeneration activities would produce visual contrasts.

The Forest Service has developed and adopted a new system for the management of visual or scenic resources: the Scenery Management System, or SMS. The SMS provides an overall framework for the orderly inventory, analysis, and management of scenery. The system applies to every acre of land administrated by the agency and to all management activities, including timber harvesting, road building, stream improvements, special-use developments, utility line construction, recreation developments, and fire management. The Forest has adopted and is implementing the new SMS as a component of the revised Forest Plan. Appendix F details the process and the results of scenery analysis on the Forest.

GENERAL FOREST SETTING

LAND USE AND IMPROVEMENTS

DEVELOPED AND DISPERSED RECREATION

LAND USE AND IMPROVEMENTS

DEVELOPED AND DISPERSED RECREATION

Background

Since its establishment in 1930 the Kisatchie National Forest has provided opportunities and settings for a wide range of recreation activities. During the early years most recreation use was dispersed, the kind of use which occurs where no developed facilities such as campgrounds and picnic sites exist. The first developed recreation sites on the Forest were constructed by the Civilian Conservation Corps (CCC) in the 1930's. Three of those recreation sites remain in use today: Gum Springs, Valentine Lake, and Stuart Lake. As the years passed and more developed recreation areas were constructed, developed site use became increasingly popular. With few exceptions, most major recreation facilities on the Forest were constructed in the 1950's and 1960's.

The Kisatchie National Forest records recreational visitor day (RVD) use data for 47 individual outdoor recreation activities that occur in either developed or dispersed settings. An RVD is defined as 12 visit-hours, which may be aggregated continuously, intermittently, or simultaneously by 1 or more persons. Outdoor recreation opportunities on the Kisatchie include but are not limited to hunting, camping, driving for pleasure, swimming, fishing, viewing scenery, picnicking, off-road vehicle (ORV) riding, gathering forest products, attending talks, horseback riding, nature study, bicycling, and motor boating.

These activities are provided in a variety of recreation opportunity settings that the Forest Service calls the *recreation opportunity spectrum* (ROS). The ROS provides a framework for defining classes of outdoor recreation opportunities, environments, activities, and experiences. The settings, activities, and opportunities for obtaining experiences have been divided into five classes; primitive, semi-primitive, roaded natural, rural, and urban (see Appendix G for a complete discussion of each Kisatchie National Forest ROS class).

Kincaid swimming beach

Current conditions

The Kisatchie National Forest is the second-largest supplier of public recreation lands in Louisiana. The Forest encompasses approximately 603,769 acres. Slightly more than 561,000 acres are open for dispersed recreation activities. The Forest's theoretical maximum annual outdoor recreation capacities for dispersed recreation activities is determined by the amount of acreage within each ROS class. Under the current Forest Plan 527,897 acres are classified as roaded natural, 33,096 acres are classified as semi-primitive, and 2,615 acres are classified as rural.

The theoretical maximum annual capacity is based on the assumption that the Forest is used consistently throughout the year by the maximum possible number of people. This condition is unlikely to occur, since most use is grouped into specific time periods, not spread over an entire year. For forest planning purposes, reasonable outdoor recreation capacity provides a more accurate account of dispersed recreation capacity. The Forest's total reasonable dispersed recreation capacity is approximately 2.16 million RVDs.

The Kisatchie currently maintains 117 recreation sites featuring 274 improved camping sites, 25 horse camping sites, 332 primitive camping sites, 14 boat launches, 5 swim sites, 10 group picnic shelters, 218 family picnic units, 11 overlooks, 4 interpretive sites, and more than 342 miles of trails — displayed in tables 3–22, 3-24, and 3-25.

Capacities for developed sites are based upon the number of people at one time (PAOT) the site can support. The PAOT capacities for developed recreation sites are summarized by district in table 3–23. The maximum yearly capacity of a recreation area is based on the site's PAOT and the number of days the area is open (the use season). The maximum PAOT yearly capacity of all developed recreation areas on the Forest is approximately 3.76 million RVDS. Maximum yearly capacity values usually represent theoretical upper limits which seldom occur on the ground. Reasonable developed recreation capacity is more accurate for forest

TABLE 3–22, DEVELOPED RECREATION SITES

A Summary of Sites by District

Ranger District	Recreation Sites	Improved Camping	Primitive Camping	Boat Launch	Swimming Sites	Picnic Shelters	Picnic Tables	Vistas / Overlooks	Interpretive Sites
	UNITS								
Calcasieu,Evangeline Unit	24	81	70	2	2	2	80	0	0
Calcasieu, Vernon Unit	18	9	60	2	0	4	12	0	2
Caney	24	101	54	5	2	2	74	0	0
Catahoula	12	8	90	0	1	1	18	0	2
Kisatchie	23	42	50	0	0	0	18	11	0
Winn	16	33	8	5	0	1	16	0	0
Total	**117**	**274**	**332**	**14**	**5**	**10**	**218**	**11**	**4**

TABLE 3–23, DISTRICT RECREATION SITE CAPACITY

A Summary of People-At-One-Time Capability

Ranger District	Improved Camping	Primitive Camping	Boat Launch	Swimming Sites	Picnic Shelters	Picnic Tables	Vistas / Overlooks	Interpretive Sites
	PAOT	PAOT	PAOT	PAOT	PAOT	PAOT	PAOT	PAOT
Calcasieu, Evangeline Unit	405	350	465	560	130	400	0	0
Calcasieu, Vernon Unit	45	300	45	0	260	100	0	110
Caney	505	270	370	980	230	370	0	0
Catahoula	40	575	0	110	100	90	0	230
Kisatchie	210	250	0	0	0	90	195	0
Winn	165	40	150	0	30	80	0	0
Total	**1,370**	**1,785**	**1,030**	**1,650**	**750**	**1,130**	**195**	**340**

TABLE 3–24, TRAILS OF KISATCHIE NATIONAL FOREST

A Summary of Trails by Use Type

District	Trail Name	Length (MILES)	Hiking	Horse	ATV / Motorcycle	Bike	Canoe
			Permitted Uses				
Calcasieu, Evangeline Unit	Claiborne North Loop	30.0	Y	Y	Y	Y	N
	Claiborne Woodworth Loop	28.0	Y	Y	Y	Y	N
	Claiborne Boy Scout Loop	31.0	Y	Y	Y	Y	N
	Indian Ridge	0.5	Y	N	N	Y	N
	Kincaid	9.0	Y	N	N	Y	N
	Lakeshore	7.0	Y	N	N	Y	N
	Lamotte Creek	2.6	Y	N	N	Y	N
	Magnolia Walk	0.5	Y	N	N	Y	N
	Valentine	3.0	Y	N	N	Y	N
	Wild Azalea	27.0	Y	N	N	Y	N
	Wild Azalea Spur	2.0	Y	N	N	Y	N
DISTRICT MILES		140.6					
Calcasieu, Vernon Unit	Big Branch	10.0	Y	Y	N	Y	N
	Enduro	30.0	Y	Y	Y	Y	N
	Fullerton	1.6	Y	N	N	Y	N
	Hogback Ridge	2.5	Y	N	N	N	N
	Ol' Sarge	0.5	Y	N	N	N	N
	Whiskey Chitto	10.0	Y	N	N	Y	N
	Wild Turkey	2.2	Y	Y	N	N	N
DISTRICT MILES		56.8					
Caney	Sugar Cane	6.3	Y	N	N	Y	N
	Lost Man Loop	3.5	Y	N	N	Y	N
	Beech Bottom	3.5	Y	N	N	Y	N
DISTRICT MILES		13.3					
Catahoula	Glenn Emery	2.2	Y	N	N	Y	N
	Livingston-Hickman Loop	14.0	Y	Y	Y	Y	N
	Livingston-South Loop	7.0	Y	Y	Y	Y	N
	Socia Branch	0.5	Y	N	N	N	N
	Stuart Lake	1.2	Y	N	N	N	N
DISTRICT MILES		24.9					
Kisatchie	Backbone	7.0	Y	Y	N	N	N
	Caroline Dormon	13.0	Y	Y	N	Y	N
	Explorer	0.5	Y	Y	N	N	N
	High Ridge	1.5	Y	Y	N	N	N
	Longleaf Vista	1.5	Y	N	N	N	N
	Turpentine Hill	1.5	Y	Y	N	N	N
	Sandstone	36.0	Y	Y	Y	Y	N
DISTRICT MILES		61.0					
Winn	Gum Springs	22.0	Y	Y	N	Y	N
	Bayou	3.2	Y	N	N	Y	N
	Dogwood	1.5	Y	N	N	N	N
	Saline Bayou	19.0	N	N	N	N	Y
DISTRICT MILES		45.7					
Forest Total Miles		**342.3**					

TABLE 3–25, PRIMARY RECREATION SITES

As of February 1999

District	Complex	Use	Site
Caney	Caney Lake	boating	Paint Road Launch
			Beaver Dam Launch
			Ski Beach Launch
		camping	Turtle Slide Campground
			Beaver Dam Campground
		picnicking	Caney Ski Beach Picnic Area
			Caney Mountain Picnic Area
			Caney Lake Picnic Area
		swimming	Caney Lake Swim Site
		group picnicking	Caney View Group Shelter
		group swimming	Caney View Group Swim Site
	Corney Lake	boating	Corney Launch
			North Corney Launch
		camping	South Corney Campground
		picnicking	Corney Picnic Area
			Corney Dam Picnic Area
		group picnicking	South Corney Shelter
	Bucktail Camp	camping	Bucktail Campground
Catahoula	Stuart Lake	camping	Stuart Lake Campground
		picnicking	Stuart Lake Picnic Area
		group picnicking	Stuart Lake Shelter
		swimming	Stuart Lake Swim Site
Calcasieu, Evangeline Unit	Kincaid Lake	boating	East Kincaid Launch
			West Kincaid Launch
		camping	Kincaid Campground
		picnicking	Kincaid Picnic Area
		group picnicking	Kincaid Shelter
		swimming	Kincaid Swim Site
	Valentine Lake	fishing	Valentine Lake Fishing
		camping	South Valentine Campground
			North Valentine Campground
		picnicking	Valentine Picnic Area
		group picnicking	Valentine Shelter
		swimming	Valentine Swim Site

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DEVELOPED AND DISPERSED RECREATION

TABLE 3–25, PRIMARY RECREATION SITES

As of February 1999

District	Complex	Use	Site
Kisatchie	Longleaf Vista	picnic	Longleaf Vista Picnic Area
	Dogwood Camp	camping	Dogwood Campground
	Lotus Camp	camping	Lotus Campground
	Kisatchie Bayou	camping	Kisatchie Bayou Campground
		picnicking	Kisatchie Bayou Picnic Area
	Cane Camp	horse camping	Cane Horse Camp
Calcasieu, Vernon Unit	Fullerton Lake	boating	Fullerton Lake Launch
		camping	Fullerton Lake Campground
		picnicking	Fullerton Lake Picnic Area
		group picnicking	Fullerton Lake Shelter
	Government Pond	fishing	Government Pond
	Little Cypress Pond	picnicking	Little Cypress Picnic Area
		group picnicking	Little Cypress Shelter
	Blue Hole	wildlife viewing	Blue Hole Wildlife Viewing Area
		picnicking	Blue Hole Picnic Area
		group picnicking	Blue Hole Shelter
	Enduro Camp	group picnicking	Enduro Camp Shelter
Winn	Cloud Crossing	boating	Cloud Crossing Launch
		camping	Cloud Crossing Campground
		picnicking	Cloud Crossing Picnic Area
		group picnicking	Cloud Crossing Shelter
	Gum Springs	camping	Gum Springs Campground
		horse camping	Gum Springs Horse Camp
		picnicking	Gum Springs Picnic Area
	Goldonna Boat Ramp	boating	Goldonna Launch
	Sand Point Boat Ramp	boating	Sand Point Launch

planning, recognizing that weekday use is generally less than weekend use, thereby providing a more accurate capacity estimate. The Kisatchie National Forest's reasonable developed recreation capacity is about 1.62 million RVDS.

The database used by the Forest Service to record recreation use by activity is known as the Recreation Information Management System (RIM). It is the Forest's most comprehensive and representative source of past and current recreation use. Reported recreation use on the Forest has remained relatively constant over the last 15 years, with totals averaging more than 500,000 RVDs annually. According to the Forest's RIM reports, dispersed recreation is more popular than developed recreation.

The Forest's 1997 RIM reported more RVDs for hunting, driving for pleasure, motorcycle and ATV riding, and fishing than for any other type of dispersed recreation. Hunting accounted for 115,901 RVDs; driving for pleasure, 73,900 RVDs; OHV riding, 47,460 RVDs; and fishing, 29,847 RVDs. Camping has historically been the most popular activity at developed sites. Total dispersed and developed camping accounted for 137,436 RVDs. Other popular developed recreation included swimming, 41,600 RVDs; and picnicking, 36,100 RVDs. In 1997 the total reported RVDs for all recreation activities on the Forest was 621,845. These and other activities are displayed in table 3–26.

Future trends

It is estimated that during the next 50 years demand should increase for mountain biking, fishing, hiking or walking, sailing, non-

TABLE 3–26, 1997 RECREATION USE

Recreation Information Management Summary for Kisatchie National Forest

Rank	Activity	Reported RVDs	Percent Total
1	Camping	137,436.	22.1
2	Hunting	115,901	18.6
3	Driving for pleasure	73,900	11.9
4	OHV Use	47,460	7.6
5	Viewing activities	45,200	7.3
6	Swimming and waterplay	41,600	6.7
7	Picnicking	36,100	5.8
8	Fishing	29,847	4.8
9	Horseback riding	14,800	2.4
10	Motorboating	14,700	2.4
11	Nature Study	13,100	2.1
12	Hiking and walking	12,200	2.0
13	Recreational cabin use	10,501	1.7
14	Bicyling	9,200	1.5
15	Gathering forest products	5,500	0.9
16	Receiving Information	4,400	0.7
17	Waterskiing and water sports	4,000	0.6
18	Canoeing	3,200	0.6
19	Sports, games and play	2,800	0.5
Forest Total		**621,845**	**100.00**

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DEVELOPED AND DISPERSED RECREATION

consumptive wildlife uses, horseback riding, developed camping, and driving for pleasure. The Forest can provide for these recreational activities by improving existing facilities and developing new ones.

Regional demands for big and small game hunting are expected to remain relatively constant or to increase slightly. The overall hunting pressure on public lands in Louisiana, however, is expected to increase significantly. This can be attributed to the increase in leasing large private land tracts to a relatively small number of hunters.

Demand for ORV riding opportunities is another activity projected to increase slightly during the next 50 years. Similar to hunting, however, as more private lands are leased public lands should be among the few remaining areas where ORV enthusiasts can pursue their sport. In fact almost all dispersed recreation activities would be affected to some extent by the increased leasing of private land to hunting clubs. Because of these factors the importance of public lands for all types of recreation opportunities could increase.


Enduro competition

NATIONAL FOREST SCENIC BYWAYS

Background

The Forest Service designates *scenic byways* to maintain and enhance adjacent scenic, cultural, and historic resources. They also promote public appreciation of such resources and help induce rural economic development through increased tourism.

Current conditions

The 17-mile *Longleaf Trail* was designated as a scenic byway in 1989. One of the finest scenic drives in the State, this route was nominated in partnership with the Louisiana Department of Culture, Recreation and Tourism. Passing through the Forest's most unique scenery, the byway traverses terrain exceptionally rugged for Louisiana, ranging from 120 to 400 feet in elevation. The route offers vistas of mesas, buttes, and sandstone outcrops — each with a backdrop of beautiful longleaf pine forest.

Future trends

The management of the Longleaf Trail Scenic Byway to promote and enhance its unique values would continue. No additional scenic byway designations on the Forest are anticipated. If other routes possessing characteristics comparable to those of Longleaf Trail are identified they would be considered for nomination.

SPECIAL INTEREST AREAS

Background

Special interest areas are designated by the Forest Service to protect and, where appropriate, foster public use and enjoyment of areas with scenic, historical, geological, botanical, zoological, paleontological, or other special characteristics.

Current conditions

The Forest now has two special interest areas:

- *Castor Creek Scenic Area* on the Evangeline Unit of the Calcasieu District is a bottomland hardwood area supporting many large beech, gum, ash, oak, magnolia, baldcypress and loblolly pine. It is accessible by the Wild Azalea National Recreation Trail.
- *Longleaf Scenic Area* on the Vernon Unit of the Calcasieu District showcases a tract of older longleaf pine surrounded by younger forest. In addition to its large old trees, this unique area is home to the endangered Red-cockaded Woodpecker.

Future trends

The Longleaf and Castor Creek Scenic Areas would be managed to protect their unique values while allowing appropriate public use and enjoyment. The following are being evaluated for designation as *special interest areas*:

- *Bayou Luce* on the Kisatchie District covers 1,499 acres. The area falls from deep sandy soils on its southern ridge through old-growth oak forest on north facing slopes. Lower slope hardwood forest yield to the flat river floodplain and bayous.
- *Castor Creek Scenic Area expansion* on the Evangeline Unit is 90 acres. The area supports a mature bottomland hardwood forest.
- *Cooter's Bog* on the Vernon Unit is 447 acres in size, with 367 acres listed as a *Louisiana registry natural area*. It supports longleaf pine, hillside bog, and bayhead swamp communities.
- *Drake's Creek Area* on the Vernon Unit is 146 acres in size, and is a *Louisiana registry natural area*. It supports upland longleaf pine forest and hillside bog communities.
- *Fleming Glade* on the Evangeline Unit is 105 acres. It supports a sparse overstory of longleaf pine and a diverse plant understory adapted to open glade habitat.
- *Kieffer Prairie* on the Winn District. This 654-acre area contains calcareous prairies with 10 listed rare plant species. Such plants and prairies represent communities similar to the Great Plains, but today exist as grassy islands surrounded and somewhat encroached upon by forest.

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SPECIAL INTEREST AREAS

NATIONAL WILD AND SCENIC RIVERS

- *Malaudos Glen* on the Winn District is 38 acres. It supports an old-growth pine-hardwood stand. Several of the pines in the area are of near-record size.

- *Whiskey Chitto Area* on the Vernon Unit is 924 acres, 143 acres of which is listed as a *Louisiana registry natural area*. It supports old-growth longleaf pine, mixed hardwood-loblolly pine, riparian forest, and hillside bog communities.

- *Wild Azalea Seep* on the Evangeline Unit is 123 acres, and is a *Louisiana registry natural area*. It supports unique species adapted to a seep habitat.

- *Tancock Prairie* on the Winn District connects prairie patches over 729 acres. A historic land survey in 1836 laid out a 740 acre area in two patches. Today, only remnants of this prairie exist as prairie.

NATIONAL WILD AND SCENIC RIVERS

Background

The Wild & Scenic Rivers Act (**PUBLIC LAW 90-542**: ***16 USC 1271-1287***, **OCTOBER 2, 1968**) and its amendments provide for the protection of selected rivers and their immediate environments. To be eligible for designation rivers must possess one or more outstandingly remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values. Designation preserves rivers in free-flowing condition, and protects their immediate environments for the benefit and enjoyment of present and future generations.

In October 1986, Congress designated Saline Bayou as part of the National Wild & Scenic River System, from the Bienville Parish boundary to Saline Lake. The following January an amendment of the Forest Plan indicated that designation. It included protection of the river corridor to the 140-foot contour interval or to 1/4 mile, whichever was greater, until a decision could be made on the river classification and its corridor width.


Saline Bayou
National Scenic River

TABLE 3–27, SUMMARY OF STUDY RIVERS

Eligibility Determinations and Potential Classification

River	Parish	Total Length	Private Own	FS Own	Potential Class
Big Creek	Grant	13.3	8.4	4.9	ineligible
Castor Creek	Rapides	3.8	1.1	2.7	scenic
Corney Bayou					
Segment A	Claiborne	2.8	0.7	2.1	ineligible
Segment B	Claiborne	0.7	0.0	0.7	ineligible
Drakes Creek	Vernon	11.5	2.6	8.9	scenic
Fish Creek	Grant	11.4	2.6	8.8	ineligible
Kisatchie Bayou	Natchitoches	32.2	18.3	13.9	scenic
Middle Fork Bayou					
D'Arbonne	Claiborne	7.5	1.5	6.0	ineligible
Six Mile Creek					
Segment A	Vernon	4.6	1.4	3.2	scenic
Segment B	Vernon	5.7	1.5	4.2	scenic
Spring Creek	Rapides	20.2	18.5	1.7	ineligible
Whisky Chitto	Vernon	8.0	3.8	4.2	recreation

In December 1987 the river was classified as "scenic." A boundary of varying width, generally 1/4 mile beyond the bayou's ordinary high water marks, was established. The boundary encompassed about 6,000 acres of land. In November 1989 another Forest Plan amendment included management practices and activities, general direction, and standards and guidelines for the management of Saline Bayou National Scenic River and its corridor.

Current conditions

The forest planning process identified and evaluated 10 rivers in or near the Forest to determine their eligibility for wild & scenic river (WSR) status. The evaluation and potential classifications report for eligible rivers is documented in Appendix D. Rivers identified for eligibility study were listed by the National Park Service on the Nationwide River Inventory, designated by Louisiana as a State Natural and Scenic Stream, or identified by other interests, as shown in table 3–27.

Of the 10 rivers evaluated, 6 were determined eligible for further study: Castor Creek on the Evangeline Unit of the Calcasieu District; Kisatchie Bayou on the Kisatchie District; Drakes Creek, East and West Fork Six Mile Creek, and Whiskey Chitto Creek on the Vernon Unit of the Calcasieu District.

The suitability study in Appendix E contains the evaluation of the study rivers' abilities to meet suitability criteria. It also details the determinations for recommendation to Congress for WSR status.

Future trends

Demand for WSR designation is expressed primarily through public comment and responses to agency proposals. The degree to which public input favors designation indicates the demand for a wide range of uses, activities, and resource qualities associated with WSR management. Although demand is closely related to the current population and the projected growth of the local area, WSR designation would likely produce increased levels of recreation use in designated and potential WSR corridors. In the event of designation, most forest management principles would apply only to federal lands.

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LOUISIANA NATURAL AND SCENIC RIVERS

LOUISIANA NATURAL AND SCENIC RIVERS

Background

Louisiana's Natural and Scenic Rivers System is one of the Nation's largest, protecting more than 1,500 miles of streams or stream segments. Proposed in the late 1960's, the system was brought into existence in the early 1970's with the Louisiana Natural and Scenic Rivers Act. In 1987 the Louisiana Legislature created a scenic river task force mandated to update the Act, set policy, establish regulations for the act's full implementation, and oversee the planning process for management of the system by the Department of Wildlife and Fisheries.

Stream channelization, channel realignment, clearing and snagging, impoundment, and commercial timber clearcutting within 100 feet of low-water marks are prohibited under the Louisiana Natural and Scenic Rivers Act. Other activities that may directly or significantly impact stream ecology must be permitted by the Louisiana Department of Wildlife and Fisheries (LDWF).

The Forest manages its portion of State natural and scenic rivers and their corridors under the *retention* visual quality objective (VQO). A primary goal of the retention VQO is managing visually sensitive areas to promote natural appearing diverse landscapes. The Forest coordinates all recreational and structural improvements along natural and scenic rivers with the LDWF.

Current conditions

Table 3–28 below shows nine streams, bayous, or rivers located wholly or partially within national forest lands in Louisiana. They include: Corney Bayou, Middle Fork Bayou D'Arbonne, Saline Bayou, Big Creek, Fish Creek, Spring Creek, Kisatchie Bayou, Whisky Chitto Creek, and Six Mile Creek.

Future trends

The Forest would continue to coordinate with the Department of Wildlife and Fisheries on management activities along State natural and scenic rivers. We would also assist in the development of scenic river management plans for those rivers flowing through the Forest.

TABLE 3–28, LOUISIANA NATURAL & SCENIC RIVERS

Located Either Wholly or Partially On the Kisatchie National Forest

River	District	Parish	Length[1] (MILES)
Big Creek	Catahoula	Grant	20.7
Corney Bayou	Caney	Claiborne	3.5
Fish Creek	Catahoula	Grant	13.9
Kisatchie Bayou	Kisatchie	Natchitoches	40.5
Middle Fork Bayou			
D'Arbonne	Caney	Claiborne	8.6
Saline Bayou[2]	Winn	Winn	19.0
Six Mile Creek			
East Fork	Calcasieu, Vernon Unit	Vernon	4.8
West Fork	Calcasieu, Vernon Unit	Vernon	6.2
Spring Creek	Calcasieu, Evangeline Unit	Rapides	27.4
Whisky Chitto	Calcasieu, Vernon Unit	Vernon	11.3

[1] *Length within KNF proclamation boundary only*

[2] *Saline Bayou was designated as a National Wild and Scenic River in 1986*

WILDERNESS

Background

In December 1980, the Kisatchie Hills Wilderness was established by Presidential approval of the Colorado Wilderness Act (Public Law 95-560). Kisatchie Hills became the third designated wilderness in Louisiana. Please see table 3–29 for a list of wilderness areas within the State.

As in other longleaf pine-dominated landscapes, Kisatchie hills Wilderness ecosystems evolved under a frequent fire regime. However, for more than 30 years resource management activities such as scheduled timber harvests and prescribed burning have not been practiced in what is now Kisatchie Hills Wilderness. Records indicate the last prescribed fire was conducted in 1961. These records also indicate that about half of the area was prescribed burned in 1954 and 1955, with a few small burns conducted between 1955 and 1961.

During the period 1984–1986 the worst southern pine beetle epidemic in history struck Louisiana, severely impacting the Kisatchie Hills Wilderness. Pines on a total of 4,360 acres in the Wilderness were killed. Southern pine beetle control was implemented in the Wilderness to reduce impacts on Red-cockaded Woodpecker habitat and adjacent private land. In efforts to stop the beetles' advance, more than 3,320 acres of pine were cut and left.

In April 1987 a high-intensity wildfire occurred in Kisatchie Hills, and in 10 days burned 7,500 acres. Although the exact cause remains undetermined, circumstantial evidence pointed to lightning as the most likely cause. A heavy accumulation of highly flammable yaupon brush draped with dry pine needles fed the fire. As a result of fire exclusion for at least 26 years preceding the Wilderness Fire, loblolly pine and hardwood species had expanded into areas once dominated by longleaf pine.

Prior to the southern pine beetle epidemic and the Wilderness Fire, the predominant community was longleaf pine, occurring on about 80 percent of the Wilderness. Shortleaf pine / oak-hickory, mixed hardwood loblolly pine, and riparian plant communities occurred on 9, 7, and 4 percent of the Wilderness, respectively.

Current conditions

All 4 broad vegetation communities common throughout the Forest — longleaf pine, shortleaf pine / oak-hickory, mixed hardwood-loblolly pine, and riparian — are also found within the Kisatchie Hills Wilderness.

The Wilderness contains the entire spectrum of stand conditions and age classes of forest. However, the plant communities were greatly impacted by the southern pine beetle epidemic of 1984–1986 and by the 1987 Wilderness Fire. In places where the southern pine beetle or the fire killed nearly pure stands of pine, there are now new stands of regeneration.

An administrative research study established in 1985 through the Southern Forest Experiment Station (now the Southern Research Station) documented natural plant succession and ground cover changes in the Wilderness following the pine beetle epidemic and the subsequent fire. Before the study was closed out in 1991 early results indicated that by 1989 loblolly pine was increasing on the beetle-killed area, but none had yet been found on the area burned by the wildfire. Other woody plants such as yaupon and huckleberry had increased on both areas, and hardwood tree growth had also increased on both areas (**Pearson, Martin, and Peterson, 1991**).

In the fall of 1995, Wilderness stands were reclassified. Now longleaf pine comprises approximately 53 percent of the Kisatchie Hills Wilderness.

Within the Wilderness are now 10 active and 11 inactive Red-cockaded Woodpecker (RCW) *clusters*. The RCW is the only endangered

TABLE 3–29, EXISTING WILDERNESS

Designated Wilderness Areas
In the State of Louisiana

Area Name	Agency	Location	Year Estab.	Acres
Breton NWR	USFWS*	Breton	1975	5,000
Kisatchie NF	USFS	Kisatchie Hills	1980	8,679
Lacassine NWR	USFWS	Lacassine	1976	3,346
Statewide total				**17,025**

* *USFWS is the U.S. Fish & Wildlife Service*

species known to occur in the Wilderness.

Highly erodible *Kisatchie soils* cover approximately 55 percent of the Wilderness. Numerous rock outcrops are evident here. Plant nutrients and plant-available water are low. These soils are moderately deep, with a sandstone or siltstone layer, and are intermingled with deep clays. The associated subsoils are slowly permeable, which creates high runoff potential and serious surface erosion hazard.

For this reason 11 percent of the soils are severely eroded — mostly in the southern portion of the Wilderness, southeast of the Longleaf Vista Recreation Area. Historic erosion on these soils has caused widespread loss of surface soil, extensive washouts, and still-active gullies. Despite low fertility and plant-available water, this soil does support sparse vegetative cover. Deep sands comprise about 17 percent of these soils, which presents a severe erosion hazard on side slopes. Fertile alluvial floodplain soils comprise about 7 percent of the area. The remaining 10 percent is a variety of soil types on small acreages.

Because of its special designation and its unique landscape, the Kisatchie Hills Wilderness offers opportunities for primitive and unconfined recreation, solitude and physical challenge.

In 1994 an estimated 6,000 recreational visitor days (RVDs) were recorded for the Wilderness. Use has slowly increased over the last few years. While the area is popular for camping, hunting, and nature study, hiking and horseback riding are the predominant uses.

A portion of Red Dirt National Wildlife Preserve is located within the Kisatchie Hills Wilderness. Hunting pressure is lower there because the area is closed to motor vehicles.

There are currently 4 wilderness trails — Backbone, Explorer, High Ridge, and Turpentine Hill — totaling approximately 10.5 miles. For details please see table 3–24 in the recreation section of this chapter.

The Recreation Opportunity Spectrum (ROS) classification for the Wilderness is *semi-primitive non-motorized*. The Wilderness has, however, been managed as *primitive*. Please see Appendix G for a complete discussion of Forest ROS classes.

There are no developed sites or open roads in the Wilderness. It nevertheless enhances the quality of recreation experience at Longleaf Vista Recreation Area, Bayou Cypre Overlook and Longleaf Trail Scenic Byway because it serves as a unique viewshed for numerous viewpoints and vistas.

The uniqueness and visual quality of the Kisatchie Hills landscape are the primary attributes that contributed to wilderness designation. The area's overall visual character is defined primarily by existing vegetation — or in some places the lack of it — the rugged topography, and the outcrops of sandstone, so rare for Louisiana.

The barren ridgetops and mesas within the area result in numerous locations with large viewsheds that extend across the Wilderness to private and adjacent national forest land. Opportunities for distant background views are very uncommon on the Forest and those available in the Kisatchie Hills are one of its primary attractions.

The Kisatchie Hills Wilderness has been assigned a visual quality objective (VQO) of *preservation*. The preservation VQO allows only for natural change. Fire management has the greatest potential to affect the visual characteristics of the Wilderness. Either wildfire or prescribed fire could alter the visual elements of form, line, color and texture, as well as the visual variety and viewing depth of the existing landscape.

Future trends

Page 19 of the June 1995 *record of decision* (ROD) for the *Management of the Red-cockaded Woodpecker and its Habitat on National Forests in the Southern Region* established that RCW groups or family units in wilderness are considered nonessential to recovery of the species. It also established that wilderness RCW groups should be managed, not because they are essential to recovery or needed to maintain viability, but because of obligations under the Endangered Species Act; and that, if a forest chooses not to manage its wilderness groups, that forest must go through formal consultation with the U.S. Fish & Wildlife Service and must obtain an *incidental take statement* (reference: RCW EIS, page 318). Measures necessary to minimize and mitigate the potential loss of wilderness clusters would be determined at that time. Managing or not managing RCW groups in the Kisatchie Hills Wilderness varies by alternative. The effects of this are discussed in Chapter 4.

Forest officials have been working on a process for establishing acceptable levels of wilderness use. This system is called *limits of*

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acceptable change (LAC). The concept does not propose to eliminate all human-caused changes to wildernesses, but recognizes that impacts can be the result of specific kinds of use, user behaviors, and seasons and distribution of use. The LAC system calls for inventories of existing conditions in Kisatchie Hills, and comparisons of existing conditions to the standards and guidelines for each opportunity class.

The primary issues currently concerning the public with regard to the Kisatchie Hills Wilderness are the impacts of human recreation and the use of fire. Briefly, the public is interested in societal and resource impacts, trails and access, group size, and the role fire played in the natural processes of the wilderness ecosystem.

Future wilderness use would likely be affected by changes in a variety of socioeconomic indicators — such as population growth, disposable income, and leisure time. Reported wilderness use in Louisiana has slowly increased over the last few years and this growth trend is expected to continue as the public becomes ever more aware of wilderness values. The Wilderness Implementation Schedule outlines site-specific direction for managing the Wilderness. The LAC planning system would be used to update schedules as needed.

ROADLESS AREAS

Background

Initiation of the Roadless Area Review and Evaluation (RARE) program came soon after passage of the Wilderness Act of 1964. It was an effort to identify areas best suited as candidates for inclusion in the National Wilderness System. The evaluation criteria used in RARE were designed essentially for national forest lands in the western states. Conditions on national forests and grasslands in the eastern states — generally defined as east of the 100th meridian — received little attention. As a result of various problems associated with the RARE program, the Forest Service undertook yet another inventory and evaluation of roadless and undeveloped areas in the national forests and grasslands nationwide. This inventory became known as RARE II.

The Kisatchie National Forest had 3 areas listed on the final RARE II inventory in 1979: Kisatchie Hills at 9,120 acres; Cunningham Brake at 2,100 acres (GIS-computed size is 2,222 acres); and Saline Bayou at 6,479 acres. As a result of further court action, all RARE II recommendations had to be reevaluated for each national forest as part of the forest planning process.

Approximately 8,679 acres of the Kisatchie Hills RARE II area became designated wilderness in December 1980. The difference in RARE II acres and the designated wilderness was the result of the actual boundary establishment of the wilderness, the declassification of part of a former Scenic Area when the wilderness was established, and the location of the wilderness boundary along the scenic Longleaf Trail, a paved 2-lane highway which eventually became a designated *national scenic byway*. The 2 remaining RARE II areas, Cunningham Brake and Saline Bayou, were not recommended for wilderness designation in the 1985 Forest Plan.

Current conditions

In October 1986 Saline Bayou was designated by Congress as part of the National Wild & Scenic River System. The corridor boundary encompasses approximately 6,030 acres of land, of which 5,150 acres are national forest land; the remaining 880 acres are in private ownership. The difference in size between the RARE II acres and the designated scenic river and corridor is a result of the 1987 boundary established generally 1/4 mile on either side of the river's ordinary high water mark.

In 1990, 1,797 acres were designated as the Cunningham Brake Research Natural Area (RNA), 1,646 acres of which lies within the 2,222-acre RARE II area. Research natural areas provide for non-manipulative research, observation, and study of undisturbed ecosystems typifying important forest types. The management emphasis in Cunningham Brake is to maintain the area in a natural condition by allowing physical and biological processes to operate without human intervention.

To identify potential roadless areas for the Forest Plan revision, the Forest used its geographic information system (GIS) to analyze and develop screening criteria based upon road densities, nonnative vegetation, and past harvest patterns. Areas contiguous to the Kisatchie Hills, and Cunningham Brake and Saline Bayou RARE II areas were analyzed for roadless charac-

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teristics based upon these criteria.

Cunningham Brake and Saline Bayou RARE II areas were reevaluated based on criteria for roadless areas east of the 100th meridian, as outlined in *Forest Service Handbook* (FSH) *1909.12*. These evaluations are in Appendix C — *roadless areas inventory and evaluations*.

Evaluation of roadless areas east of the 100th meridian as part of the forest planning process yields one of the two following decisions: 1) manage the area for multiple uses other than wilderness or 2) recommend the area to Congress as a wilderness study area. If a roadless area no longer meets inventory criteria the area then becomes available for other management activities and its roadless status is removed.

Cunningham Brake RARE II area met the inventory criteria for potential wilderness areas east of the 100th meridian. The area was then evaluated for its ability to meet the test of capability, availability, and need. Based on a lack of demonstrated demand or need for wilderness designation of Cunningham Brake RNA, the potential limitations on research opportunities associated with wilderness designation, and the fact that management under RNA designation would insure all roadless characteristics are protected, Cunningham Brake is not recommended for inclusion into the wilderness system.

Saline Bayou RARE II area is determined to be ineligible for potential wilderness because the perpetuation of wilderness values cannot be ensured, due to excessive acreage that is encumbered with outstanding mineral rights, and the number of improved roads within the area. As the Saline Bayou RARE II area no longer satisfies the inventory criteria for wilderness areas east of the 100th meridian (*FSH 1909.12, Chapter 7.11b*), this area will be dropped from the roadless area inventory. The portion of the Saline Bayou RARE II area that is within the designated Saline Bayou National Scenic River corridor would continue to be managed and protected in accordance with the scenic river management plan.

In addition to the remaining RARE II areas, each district on the Forest was evaluated for potential roadless areas using the same screening criteria. These evaluations indicated that the Forest has no additional areas that satisfy the inventory criteria (outlined in *FSH 1909.12, Chapter 7.112b*). For more information on roadless area evaluations, please see Appendix C.

Future trends

The extent of development or preservation of roadless land would be dependent upon the type of use to which areas are allocated in the Forest Plan. This would also depend on applicable management direction.

RESEARCH NATURAL AREAS

Background

The Forest Service designates *research natural areas* (RNAs) for research and education and / or to maintain biological diversity on national forest lands. The RNAs are for nonmanipulative research, observation, and study. They also may assist in implementing provisions of laws such as the Endangered Species Act, or carrying out the monitoring provisions of the National Forest Management Act.

Current conditions

Currently the Forest manages two RNAs — 702 acres of Bayou Beouf on the Evangeline Unit of the Calcasieu District and 1,797 acres of Cunningham Brake on the Kisatchie District. The Forest established these areas in 1975 and 1990, respectively. Both are bottomland hardwood forests in the Red River floodplain and feature cypress-tupelo swamps. While Bayou Beouf has seen only limited timber harvesting in the last 70 years, the Forest Service purchased Cunningham Brake in 1935 after timber had been removed from the area. Botanists intensively surveyed both of these RNAs during recent years.

Future trends

The RNA national network of ecological areas is designed to include representative areas of each type of ecosystem found on national forest lands. Within the Southern Region of the Forest Service, several discernible ecosystems are presently unrepresented in the RNA network. The need may exist for the designation of additional RNAs, pursuant to a review of how potential new RNAs would include segments of habitats not currently represented in the RNA network or would set aside habitats for species protected by the Endangered Species Act or the monitoring provisions of the National Forest Management Act. The areas described below are being evaluated for RNA designation:

- *Cooter's Bog* on the Vernon Unit of the Calcasieu District is 447 acres in size, with 367 acres listed as a *Louisiana registry natural area*. It supports longleaf pine, hillside bog, and bayhead swamp communities.

- *Drake's Creek Area* on the Vernon Unit of the Calcasieu District is 146 acres, and is a *Louisiana registry natural area*. It supports upland longleaf pine forest and hillside bog communities.

- *Fleming Glade* on the Evangeline Unit of the Calcasieu District is 105 acres. It supports a sparse overstory of longleaf pine and a diverse plant understory adapted to open glade habitat.

- *Kieffer Prairie* on the Winn District. This 654-acre area contains calcareous prairies with 10 listed rare plant species. Such plants and prairies represent communities similar to the Great Plains, but today exist as grassy islands surrounded and somewhat encroached upon by forest.

- *Whiskey Chitto Area* on the Vernon Unit of the Calcasieu District is 924 acres, with 143 acres listed as a *Louisiana registry natural area* (Leo's Bog). It supports old-growth longleaf pine, mixed hardwood-loblolly pine, riparian forest, and hillside bog communities.

REGISTRY NATURAL AREAS

Background

The Louisiana Nature Conservancy and the Louisiana Department of Wildlife and Fisheries jointly administer the Louisiana Natural Areas Registry program. This program identifies and preserves examples of the State's natural heritage — special plants, animals, and natural communities. During the past five years, the Forest Service, the Louisiana Nature Conservancy, and the Louisiana Department of Wildlife and Fisheries entered into agreements to conserve specific biologically unique lands on the Forest.

TABLE 3–30, REGISTRY NATURAL AREAS

Area Name	District	Acres	Habitat
Cooter's Bog	Calcasieu	367	Hillside bogs, upland longleaf pine forests, and bayhead swamps.
Drake's Creek Bog	Calcasieu	146	Hillside bogs and upland longleaf pine forests.
Wild Azalea Seep	Calcasieu	115	Wooded seep, bayhead swamp, riparian and upland forests.
Leo's Bog	Calcasieu	143	Hillside bogs and upland longleaf pine forests.
Middle Branch Bog	Kisatchie	66	Hillside bogs and upland longleaf pine forests.
Bayou L'Ivrogne Bog	Kisatchie	85	Hillside bogs and upland longleaf pine forests.
Steep Hill Bog	Kisatchie	33	Hillside bogs and upland longleaf pine forests.
Sheard's Branch Boulders	Kisatchie	40	Hardwood forest ravine with large boulder outcrops
Sheard's Branch Sandstone Barrens	Kisatchie	30	Sandstone glades and barrens with thin, fragile soils
Saline Bayou Sandy Woodlands	Winn	104	Mature forest sandy woodlands, bottom-land hardwoods, and cypress forests

Current conditions

Table 3–30 displays a summary of the Forest's existing registry natural areas.

Future trends

As more exemplary natural communities are identified the potential would exist for designation of additional registry natural areas on the Forest. Four new Registry Natural Areas are being evaluated for referal to the Louisiana Natural Heritage Program for designation:

- *Black Creek* , a 147-acre area on the Catahoula District which supports an older area of shortleaf pine/oak-hickory forest.

- *Brushy Creek and Magnolia Ridge* on the Evangeline Unit of the Calcasieu District covers 232 acres. It supports mesic riparian forest and a unique ridge with very large magnolia trees.

- *Bynogne Branch* on the Kisatchie District consists of 134 acres of hardwood slope forest. Shortleaf pine of uplands yields to a mixture of hardwoods downslope.

- *Fleming Glade* on the Evangeline Unit of the Calcasieu District is 105 acres. It supports a sparse overstory of longleaf pine and a diverse plant understory adapted to open glade habitat.

STRUCTURES

Background

The Forest maintains approximately 165 structures consisting of the Alexandria Forestry Center — containing 13 structures, 6 ranger district offices, 7 work centers, 5 lookout towers, 11 dams, and numerous recreation sites. Recreation developments range from complete water, sewer, and bathing facilities to vault toilets in primitive areas.

Current conditions

For 4 of the ranger district offices, privately owned structures are leased. The Catahoula District office and Alexandria Forestry Center are owned by the Forest Service. There are 7 work centers on the Forest whose average service life is considered to be 40 years. Replacement of these individual facilities should be anticipated at roughly 6-year intervals. The most recent replacement was the Winn Work Center in 1985. The Vernon Work Center, constructed in the 1940's, has been removed and a small facility is being provided on Fort Polk. Replacement of remaining work centers would be considered in this order: Kisatchie, Caney (near Minden), Evangeline, Catahoula, and Caney (at Homer).

Continued retention and use of the Forest's 4 residences would be determined on a case-by-case basis. Of the 5 lookout towers on the Forest, 1 is being operated by the Louisiana Office of Forestry. The other 4 towers have been declared surplus and are planned for disposal. Structural facilities on recreation sites would be considered for reconstruction on a case-by-case basis. New and replacement facilities would be dependent upon the projected recreation use and demand. The 11 dams are routinely inspected for safety and maintenance purposes. All are classified as low-hazard facilities.

The Kisatchie has three EPA-permitted sewage treatment facilities located at Kincaid, Valentine, and Caney Recreation Areas. They are routinely sampled and tested to ensure compliance with respective permits. Quarterly reports are sent to the EPA and the State of Louisiana.

The water supplied to national forest facilities is drawn from public or municipal water systems except at 7 sites. These systems are supplied from Forest Service wells, which are sampled and tested quarterly at minimum — a State of Louisiana requirement, and up to once monthly — by Forest Service direction, to assure that safe drinking water regulations are met.

All building structures are annually inspected to determine their general condition and safety. Deficiencies are documented and corrective actions are undertaken as necessary or planned for funding.

All buildings have been surveyed with respect to accessibility for persons with disabilities and gender-separated facilities. Planned modification, reconstruction or replacement of any building addresses current regulations for accessibility and gender-separated facilities. As permitted by availability of funds, the Forest has been modifying some buildings to provide accessible parking, toilet facilities, water fountains, and other items of this nature where not already provided.

Future trends

Funds available for replacement of administrative sites should remain constant or decrease. Maintenance of these structures would increase as needed to extend the service life. Annual inspections of all facilities would continue with safety, general condition, and accessibility as primary elements. Deficiencies would continue to be abated and accessibility would be provided based on funding availability. The safety of our employees and accessibility of structures to all persons shall remain a priority.

TRANSPORTATION

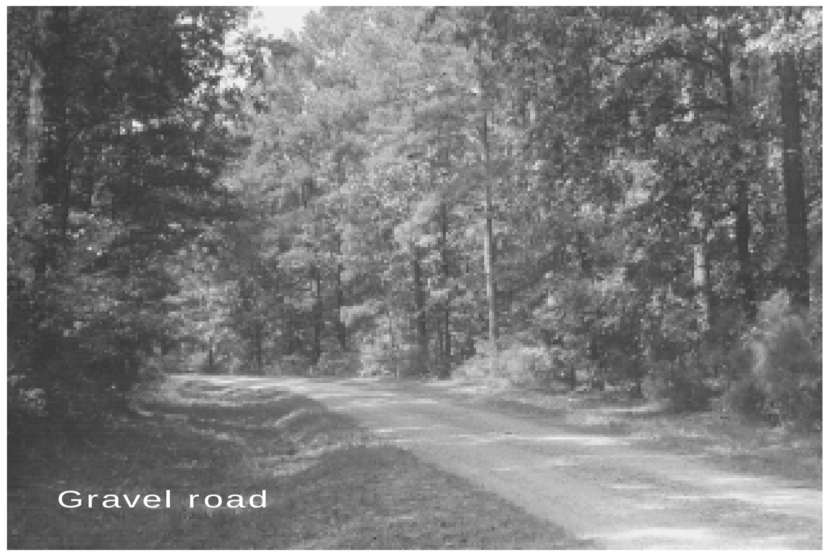
Background

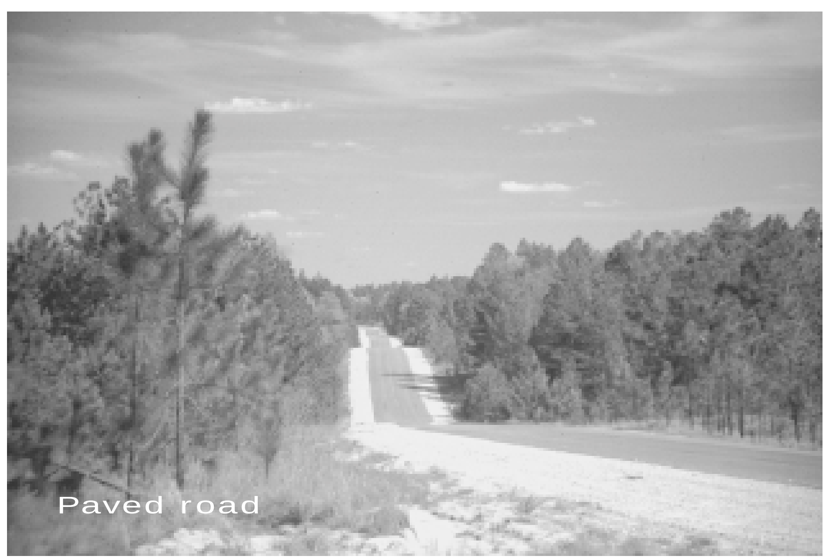
Travel within the Kisatchie National Forest requires a transportation network suited to the needs of the user. This network includes U.S. and State highways (including federal aid primary, secondary, and farm-to-market roads); parish roads serving farm-to-market and private land access; and Forest Service roads. The total network contains 4,132 miles of road of which 2,761 miles are under Forest Service jurisdiction. The transportation system also includes 204 bridges under Forest Service jurisdiction. While federal, state and parish roads provide primary access into the national forest, Forest Service roads provide the intermediate and final avenues needed to administer, manage and protect public lands and resources.

At the time it became a national forest, the Kisatchie, like many others in the South, had a system of roads already in place — ranging from U.S. highways to two-track trails. Many of the roads now serving management and public needs lie within corridors that have existed for many years. Over the last six decades, the Kisatchie's road system has expanded and improved, responding to the needs of a growing nation and the increasing demands of society to utilize and enjoy the opportunities offered by a maturing national forest. Although Forest Service road development has primarily been in response to timber management access needs, the resulting system provides a broad spectrum of facility types and levels of service to all users and visitors of the Forest.

Today's roads provide convenient and safe access to developed recreation sites, trail heads, scenic areas, wilderness, lakes and streams, wildlife management areas and general driving for pleasure. They also continue to provide the basic access requirements necessary to manage and protect the national forest.


Primitive road


Gravel road


Paved road

Current conditions

Transportation management objectives are to plan, develop, and operate a network of roads that provide user safety, convenience, and the efficiency to accomplish the Forest's land and resource management objectives.

Roads included in the Forest's transportation network are classified as *arterial*, *collector* or *local roads*. Arterial roads are U.S. and state highways serving large land areas and providing primary travel routes for business, commerce and for national defense. Collector roads serve smaller land areas, collect traffic from local roads, and usually connect to an arterial road. Local roads serve limited areas or sites and generally connect terminal

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TABLE 3–31, TRANSPORTATION JURISDICTION

By Forest Road System Composition

Jurisdiction	Functional Classification Arterial	Collector	Local	Total Miles	%
State	0	376	0	376	9
Parish	0	233	333	566	14
Other Federal (including Army)	86	83	236	405	10
Private	0	0	24	24	1
Forest Service	0	233	2,528	2,761	67
Total miles	**86**	**925**	**3,121**	**4,132**	**100**
% BY FUNCTIONAL CLASS	2%	22%	76%	100%	

Sources*: the Louisiana Department of Transportation and Development, and the Forest Service Transportation Information System*

facilities with collector or arterial roads.

Table 3–31 displays existing components of the transportation network by jurisdiction and functional class. As shown, about two-thirds of the total mileage is under Forest Service jurisdiction. While road densities vary from area to area, on average there are approximately 3.5 miles of road per square mile. Of this, the Forest Service has authority to control access on about 2.4 miles of road per square mile. These *Forest Service roads* or *forest development roads* are the roads for which the agency has authority to improve, maintain, and control use.

Forest Service roads vary widely in construction standards, ranging from paved surface to primitive wheel tracks. These roads are constructed and maintained to standards appropriate to their planned uses — considering safety, cost of transportation, and impacts on land and resources. Table 3–32 shows the composition of the Forest Service road system by surface type.

Traffic service levels have been defined for each road, characterizing the degree of service a given road is expected to offer and designating the appropriate vehicle for use. Table 3–33 displays traffic service levels for all Forest Service roads.

Roads in the national forests are maintained as required to assure that planned service levels and user safety are preserved and that impacts to soil and water resources are minimized. Utilizing the annual road maintenance and prescription process, road maintenance needs are identified and cost estimates are prepared. Through the road maintenance planning process, including district interdisciplinary team meetings, priorities are determined and negotiated based upon available funding levels. Each road is assigned a *maintenance level* (1–5) based on road use objectives.

Roads in maintenance level 1 are closed to vehicular traffic and receive custodial maintenance only, primarily for resource protection. Maintenance level 2 roads receive minimum maintenance for limited passage of traffic; for example, high-clearance vehicles such as pickups. These roads are normally unsuited for passenger cars. Based on established priorities, roads in maintenance levels 3, 4 and 5 receive routine work to assure safety and travel efficiency. All types of vehicles use these roads, including those with low clearance, such as passenger cars.

The transportation system on the Kisatchie National Forest is maintained primarily through service / construction contracts with local contractors. The Forest began this contracting-out of road maintenance in 1987. Table 3–32 also displays the miles of Forest Service roads by maintenance level.

The Kisatchie maintains close working relationships with the seven parishes containing national forest land, for development, maintenance, and operation of selected roads of mutual need. This is accomplished through a forest development road cooperative agreement. Cooperation with

TABLE 3–32, ROADS

By Surface Type and Operational Maintenance Level

Surface Type Miles

Paved	Gravel	Native	Total
96	1,079	1,586	2,761

Levels in Miles

Level	Miles
1	188
2	1,855
3	442
4	217
5	59
Total	2,761

the Louisiana Department of Transportation and Development is set forth in a memorandum of understanding.

Certain public roads under state or parish jurisdiction which serve the mutual transportation needs of the public and the Forest Service may be designated as forest highways. Once designated, these roads become eligible for Federal Highway Administration rehabilitation and reconstruction funds, including bridge replacement. Formal concurrence by the Louisiana Department of Transportation and Development, the Federal Highway Administration, and the Forest Service is required to designate any potential public road as a forest highway. Currently 16 public roads with a total length of 141 miles have been designated.

Commercial use of forest development roads is prohibited without a permit or authorization. Commercial users are responsible for making deposits or performing maintenance commensurate with their use.

Future trends

As long as the Kisatchie remains a managed forest, an effective system of roads would be required to meet public demand and permit agency managers to care for the land. For any road, regardless of type, that is determined to be needed as a permanent facility, periodic improvements would be made as required and road maintenance activities would continue. The development, management and operation of the Forest Service Road System would continue as needed to respond to resource management objectives.

The Forest's collector road component is in place. There are no plans to construct additional roads in this functional class. To assure that the continuing need for transport and mobility is met, collector roads would require a high degree of reconstruction and maintenance attention in the future. Existing local roads would continue to be developed, improved, maintained and managed as required to meet the demand for limited or intermittent access. In areas where no suitable access exists, minimum design-standard roads would be constructed as required and planned. Where existing permanent roads are causing ad-

TABLE 3–33, ROADS

By Traffic Service Level

Service Levels and Miles

A	B	C	D	Total
58	32	620	2,051	2,761

Traffic service levels are defined as follows:

A Free-flowing two-way traffic with stable, smooth all-weather surface.

B Free-flowing two-way traffic except during peak activity use. Surface is stable for normal use season and smoothness is commensurate with maintenance frequency and use.

C Two-way traffic impaired by limited passing facilities or slowed by road condition. Surface may not be stable under all traffic or weather conditions during the normal use season.

D Flow is slow or may be blocked by an activity. Two-way traffic is difficult and may require backing to pass. Rough, irregular surface is stable only during dry conditions.

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verse impacts to the adjacent environment, efforts to relocate or stabilize them would be undertaken.

Over the past 5-year period the Kisatchie's appropriated road maintenance funding has shown an average 4.5 percent decrease while costs of contract road maintenance and administration have increased. Current funding is insufficient to maintain all roads to 100 percent of operation and maintenance objectives. Over this time period the Forest has fully maintained approximately 50 percent of its maintenance level 3, 4, and 5 roads, and 75 percent of level 2 roads. Long-term funding trends may require that appropriated funds from benefitting resources be used to maintain a greater share of the road system. Greater portions of the road system may be placed in lower maintenance levels with more roads closed to vehicular traffic.

Bridges and large drainage structures would be inspected on a routine basis and, depending upon the availability of funds, would be rehabilitated, replaced, or closed as required to assure user safety.

All roads would continue to be inventoried and decisions made about their intended uses. Road management objectives would be developed for each individual road.

Based on the desired future condition, certain roads may be:

- Obliterated, allowing the land to be reclaimed for natural resource uses.
- Closed for long periods of time.
- Restricted to use during certain periods or to certain vehicle types.
- Managed as open to all users.

Traffic management methods, such as road closure devices, orders issued restricting or prohibiting use, signing, and law enforcement efforts, would be applied to roads according to their intended use and the safety of users.

Through cooperative agreements, the Forest Service would continue to participate with other agencies or local governments to accomplish work on roads of mutual benefit.

LAND ADJUSTMENT

Background

The lands program area includes acquiring, exchanging, and transferring forest land; acquiring, granting and exchanging rights-of-way; locating and maintaining property boundaries, resolving land claims and trespasses; and processing and administering special-use applications and authorizations. The lands program also determines the suitability of available lands for satisfying the national forest mission.

Almost all of Kisatchie National Forest was acquired under authority of the Weeks Law of 1911 and related acts. Consequently, the Forest has all the problems normally associated with acquired land, particularly outstanding and reserved mineral rights. These are discussed more fully in the *minerals* section of this chapter.

The Kisatchie National Forest boundary encompasses 1,024,659 acres, 603,769 acres of which are national forest land. Intermixed private and national forest lands results in a patchwork-quilt pattern of ownership. This makes landline maintenance, rights-of-way problems, administration of boundary encroachments and claims, and forest management in general, more difficult and relatively expensive. Many landowners of large private tracts within the Forest boundary are timber companies and others who, like the Forest Service, are interested in exchanging land to consolidate holdings and alleviating the problems that accompany mixed ownership.

During the past 20 years more than 7,000 acres have been added to the Forest. This increase resulted from land exchanges, purchases, interagency transfers, and donations.

Current conditions

Several proposed land-for-land exchanges are currently pending. Four recently completed purchase cases contained more than 1,400 acres, of which 52 percent were jurisdictional wetlands. Two tracts added acreage within Saline Bayou Scenic River corridor.

Consolidation of land is a big benefit of acquisitions, purchases and exchanges. However, additional benefits accrue from reduced landline maintenance, addition of lands that lie within or adjacent to scenic stream corridors, the protection of floodplains / wetlands and sensitive plant communities, and increased habitat for wildlife, including endangered species. Recent acquisitions have provided lakeshore frontage on Iatt Lake, an important recreation resource.

Future trends

The Forest would continue its program of landownership adjustments through consolidation of lands in order to improve management effectiveness and enhance public benefits.

Future acquisitions would be analyzed for suitability and inclusion into surrounding management practices.

Mineral status would continue to be an important factor in land exchange and purchase negotiations. In many instances it is the determining factor in a successful acquisition. Every effort would be made to keep surface and mineral estates together, to provide for their unification in the future.

TABLE 3–34, LAND USE

Listing of Authorizations

Use	Number	Acres
Utility ROWs	48	1,909
Pipeline ROWs	27	1,021
Road ROWs private & public	181	1,819
DOT[1] and FRTA[2] easements	55	764
Recreation-related permits	50	147
Churches and cemeteries	12	18
Agriculture and residence	21	25
Watershed, reservoir, & supply	1	1,000
Mineral materials & occupancy	36	191
Military	7	111,832
Communication sites	5	18
Other miscellaneous	12	(Forestwide)
Total	**455**	**118,744[3]**

[1] *DOT = Department of Transportation*

[2] *FRTA = Forest Road and Trail Act (previously known as USDA easements)*

[3] *Forestwide authorizations not included in the total acre figure*

CLAIMS AND TRESPASSES

Background

Because the 2,054-mile Kisatchie National Forest boundary is irregular and difficult to patrol, the Forest has problems with occupancy trespass. Following completion of the landline location program in 1984, the Forest Service increased efforts to resolve occupancy trespasses. In the past 10 years 65 cases have been resolved, leaving approximately 85 known trespasses still pending. Emphasis has been placed on the disposal of qualifying church and cemetery sites through the claims process. These facilities are currently considered incompatible with national forest management and no longer qualify for free use.

Current conditions

Claims and trespass cases are being resolved through the use of land exchanges, quit claim deeds — where legitimate and appropriate, and negotiations with landowners to remove improvements from federal land. Each district is responsible for resolving at least one case annually.

Resolution of occupancy trespasses and land claims should be pursued diligently as time and funds allow. The vast majority of these trespass and claims cases have been enduring problems — some 20 years standing or longer. Future cases can be kept to a minimum by maintaining a schedule of refurbishing all established property lines on a 7- to 8-year schedule — with more frequent attention at the urban-wildland interface — and by aggressive enforcement of occupancy trespass laws and regulations.

To expedite resolution of trespasses, emphasis is being given to obtaining information about encountered trespasses from landline location and maintenance contractors.

LAND USE AUTHORIZATIONS

Background

For the past 10 years, 400 to 500 special-use permits have been administered annually on the Kisatchie National Forest. Permits of a temporary nature, authorized for 1 year or less, are issued by district rangers and are included in the above numbers.

Substantially varying requests are received

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for the occupancy and use of national forest lands, but the largest number are for access and utility rights-of-way.

In recent years, recreation use requiring authorizations has increased. In the past, recreational permits on the Forest included recreation residence sites, marinas, organization camps, and isolated cabins. In addition to these, during the past 10 years numerous motorized and non-motorized recreation events and 3 outfitter and guide permits have been authorized.

Permits covering the largest number of acres are those issued for military use. Military activity has historically been conducted on all 5 ranger districts. For further information on military use and activity, see Chapter 3, *military lands*.

Current conditions

Currently, the Forest administers about 500 permits annually, 50 of which are of a recreational nature. Use fees are waived on nearly half of all authorizations. A breakdown of uses is shown in table 3–34.

Motorcycle enduros are held annually or semiannually on some districts. Horse riding activities are popular on all districts. The Forest has issued 3 outfitter-guide permits; all are for canoe rentals. One operates on Saline Bayou in Winn Parish and the other on Kisatchie Bayou in Natchitoches Parish. Canoe rental services are offered on two other State-designated streams, Big Creek in Grant Parish and Whiskey Chitto in Vernon Parish. Although there have been outfitter-guide permits issued for backpacking and hiking trails, none are currently active.

Two districts have recreation residence sites, surveyed and approved for a specific purpose: two separate areas on the Winn District and one on the Evangeline Unit of the Calcasieu District. The permittees have almost exclusive use of the sites, but a public strip is available along the shoreline to protect and ensure the public's right to occupy that part of national forest lands. Use fees are based on appraised values with an annual adjustment influenced by the Implicit Price Deflator-Gross Domestic Product (IPD / GDP) Index. Appraisals are to be conducted at 20-year intervals. The Kisatchie's next appraisal is due in 1999.

Communication by definition could include a variety of communication use categories — typically occurring on designated sites and including buildings, towers, and other support improvements. Factors affecting the suitability of sites for communication-use facilities include: topographic requirements, soil or geologic factors, power sources, and access. In analyzing whether or not to designate a communication site on national forest system lands, the following factors are considered:

- Potential demand for the site.
- Alternate locations.
- Availability of suitable non-federal land.
- Compatibility of the use(s) that might be authorized.
- Interference from other users and from other sites.
- Areas of coverage.
- Signal paths.
- Relationship to other sites.
- Management guidelines for the area, including visual quality objectives.
- Site suitability for the intended use.

Presently the Forest administers 5 single-user communication site permits, one each on the Caney, Kisatchie, and Winn Districts and two on the Calcasieu District, discussed respectively below.

The Caney communication site, previously occupied by the Corney Fire Tower in T23N, R4W, section 34, SW, is occupied by a 180-foot tower on a 2-acre site. It is currently used by the Claiborne Parish 911 System, the Louisiana Office of Forestry, and the Forest Service.

The Kisatchie site permittee is terminating the use. All improvements except a powerline have been removed from the 1.7-acre site, known as "Bolton Hill," in Natchitoches Parish at T5N, R6W, section 15, NW, SW. The elevation and location of this site make it appropriate for future communication use, and its designation for such purpose will continue.

The Gum Springs Tower site on the Winn District is located in Winn Parish at T11N, R4W, section 33, NW. Designated in August 1990 through the NEPA process, it was classified for use by multiple users. A site plan was prepared and approved. The first authorized user is to serve as site or facility manager and the Forest Service reserves the final approval authority for all new tenants. This designation remains in force even though the one private user vacated the site in 1992.

The two Calcasieu site permittees are

government agencies that use a fenced-in site of about 1 acre to accommodate a storage building and a 260-foot steel radio tower with a microwave dish. Known as the "Government Site," it is in Rapides Parish at T2N, R2W, section 3, NE, NE. This should be designated as a communication site with potential for multiple users if additional use would not conflict with the current permittee's operations. The other site on the Calcasieu is the Sunset Fire Tower. This fire tower site is located in Rapides Parish at T1N, R3W, section 27, NE. It is used only by the State of Louisiana, but the site would be suitable for multiple users — provided the uses do not conflict. It has been expanded to 6.5 acres and a 300-foot tower to accomodate the 911 system.

Most other existing communications sites are used exclusively by the Forest Service. One site on the Winn District, however, has been designated as a communication site through the National Environmental Policy Act (NEPA) process. Three other sites on the Forest would be suitable for designation as communication sites:

- Kisatchie Fire Tower — This site, located about 3 miles north of the Kisatchie Community, is an old Kisatchie District fire tower site, located in Natchitoches Parish at T6N, R8W, section 34, SW. The site accommodates the tower and a 10-foot by 12-foot cinder block equipment storage building, and would be suitable for multiple users — provided the uses do not conflict.

- Old Germantown Tower Site — Previously occupied by the Germantown Fire Tower, this site is located in Webster Parish at T20N, R9W, section 25, NE. The availability of utilities and the elevation and location at this site make it suitable for future communication use and development. The Forest Service has received numerous inquiries about the availability of the site for an AM / FM radio tower and for other communication uses.

- Gardner Tower — This is an old fire tower located on a site in Rapides Parish at T3N, R3W, section 17, SE. It is used only by the Forest Service, but the site would be suitable for multiple users — provided that they do not conflict, and if private land is not reasonably available.

Although eight other sites are occupied by metal antennas or old fire towers, none are suitably located to allow private use.

Special use authorizations are currently issued to the U.S. Army at Fort Polk, the U.S. Air Force Reserve at Barksdale AFB, and the Louisiana Army National Guard.

Future trends

The public is concerned about the aesthetic and resource impacts of existing and potential future authorizations for the occupancy of national forest lands. Any requested occupancy causing an unnatural disturbance of the environment should be rarely authorized. Those authorized should be the most desirable locations, from a standpoint of being as compatible as possible with the integrity of the ecosystem that is being managed.

The approved recreation residence sites should continue to be permitted unless a project analysis determines that one or more sites are needed for higher or alternative public uses. Should that occur, a permittee would be given a 10-year prior written notice before conversion to alternate public use could be implemented. All three areas on the Winn District should qualify for disposal under the land exchange program. The isolated cabins should be phased out as opportunities allow.

Outfitter and guide use is compatible with other forest management activities, as long as the use is restricted to stream corridors or areas designated for recreation use — such as hiking trails. Any other areas would require site-specific analysis. Permitted uses should continue, and new uses should be authorized, in areas specified above.

Future requests for communication site uses should first be considered for incorporation into existing sites suited for multiple users. If no existing site meets an applicant's needs, a site-specific analysis for the requested site should be performed using factors outlined under *current conditions*. A site plan would have to be prepared and approved on any site prior to authorizing use of the site under a special use permit.

Military use of national forest lands could change or increase in the future, especially in the Fort Polk vicinity.

Little can be done about existing uses, except that those incompatible with current

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ecosystem management policies should be phased out as provisions allow.

RIGHTS-OF-WAY

Background

During the past 10 years, the Forest has acquired 60 road right-of-way easements across private lands. Most of these were acquired more than 5 years ago. The decreased need for rights-of-way is the result of declines in timber sale harvesting and the suitability of roads already in place.

Current conditions

Emphasis has shifted away from acquiring road easements for timber sales, and toward acquiring permanent easements on existing roads. Permanent easements are needed to protect and manage public lands for recreation and other public benefits in addition to timber harvesting. Currently an average of 6 road rights-of-way are acquired annually by easement purchases, donations, exchanges, or by fee-simple title.

Future trends

The goal of the right-of-way acquisition program is to ensure that public lands are sufficiently accessible. However, the reluctance to grant unrestricted easements for road rights-of-way across private lands is growing. This could complicate the completion of future acquisitions needed to furnish the legal access desired by the public.

PALUSTRIS EXPERIMENTAL FOREST

Background

The Palustris Experimental Forest is an area of the Kisatchie National Forest designated by Congress July 19, 1935, to conduct forestry research. The experimental forest is named Palustris in recognition of the species longleaf pine (*Pinus palustris* Mill.) that was prevalent in the region prior to the harvesting of virgin pine forests in the early 1900's. It consists of 7,209 acres in two separate tracts that are located in southern Rapides Parish, on the Evangeline Unit of the Calcasieu District. It was used by pioneer Southern Forest Experiment Station researchers to develop early reforestation techniques for the four major southern pines. Studies established in the 1930's with the help of the Civilian Conservation Corps continue to provide research data for today's forest managers. Activities are under the supervision of the Forest Management Research Unit of the Southern Research Station.

The J.K. Johnson Tract, 18 miles southwest of Alexandria on highway LA-488, is named in honor of one of the first industrial foresters to reforest harvested lands in the southern United States. It is the site of numerous long-term studies such as longleaf pine planting, spacing, prescribed burning, pruning, and a thinning study of more than 60 years duration. Research was expanded to include direct seeding and planting techniques, overstory tree and understory herbage browse relationships, prescribed burning, native plant taxonomy, and economics. It also serves the area for the planting of shorter-term studies evaluating seedling physiology. At this tract, studies were developed to evaluate the effects of silvicultural practices on conditions that might result from global climate change. These studies should allow forest managers to devise management strategies to reduce the potential detrimental effects of climate change. Such studies require intensive measurements of tree and stand morphology and physiology and involve cooperative efforts withorganizations and agencies outside the Forest Service.

The Longleaf Tract, about 35 miles south of Alexandria, off highway US-165 near Glenmora, has been the site of some of the most intensive multiresource research in the South. Since the mid-1940's, the interactions of cattle grazing, wildlife management, and timber production have been studied. This effort has provided the information necessary to allow integration of grazing, wildlife habitat, and forest productivity. Recent research emphases include evaluations of effect of timber harvesting, site preparation, and pine straw utilization. Evaluations of these practices must account for long-term effects on soil structure, nutrition, and chemistry; ecology of soil microorganisms; soil plant moisture relationships; and plant productivity.

Current conditions

Activities concentrate on research and technology transfer. Studies focus on maintaining a healthy environment through ecosystem management, understanding sustainable forest ecosystems, and recognizing people's needs through commodity production.

Study plots are five acres or less in size and are located on the Johnson and Longleaf tracts. The following research studies are ongoing:

- Ecophysiology of seedling establishment and stand development.
- Fungicidal control of fusiform rust in intensely cultured slash pine plantations.
- A continuous function approach to measuring response of young pine plantations to rates of application of nitrogen and phosphorous fertilizers.
- Effect of phosphorus fertilizer and direct seeded inter-row pine on the growth of loblolly pine seedlings.
- Fertilizers, litter, and herbicide effects on soil moisture and temperature, loblolly pine height, diameter growth, and competing vegetation.
- Physiology and development of loblolly pine under 2-stand density and fertility rates.
- Effects of seasonal burning on herbaceous and woody vegetation of a longleaf pine-bluestem sites.
- Soil seed bank survival in southern forests.
- Vegetation responses to burning frequency and season in longleaf pine community.
- Group selection and prescribe fire to restore old-growth attributes and sustain native plant communities.
- Continuous-rate fertilizer trial.
- Influence of lifting and storage on the physiology and growth of loblolly seedlings.
- Nursery survey of root storage pathogens.
- Impact of root storage pathogens on absorptive capacity of longleaf pine seedlings.
- Fungicide rate study for root storage pathogens: II.
- Effects of nitrogen fertilization and undercutting on seedling characteristics, and field performance of bareroot longleaf pine.
- Placing mats around planted longleaf pine seedlings to initiate early height growth.
- Choice of species for planting sites.
- Screening for fusiform rust resistance in intensively cultured slash pine plantations.
- Alexandria phase, Southwide Pine Seed Source Study, Longleaf series 4 and 6.
- Burning, pruning, and thinning in longleaf spacing plantations.
- Effect of spacing in row seeding of longleaf, loblolly, and slash pine.
- Precommercial thinning direct-seeded longleaf pine on a medium site.
- Spacing in row-seeding loblolly pine on 1) a medium site; and 2) on a good site.
- Yields of unthinned longleaf pine plantations on cutover sites.
- Thinning planted slash and loblolly pine at l0-year intervals.
- Growth and yield of planted longleaf pine at Sunset Tower.
- Precommercial thinning demonstration area for direct-seeded loblolly, longleaf, and slash pine on a good site.
- Effects of site preparation and fertilization on second-rotation slash pine.
- Effects of site amelioration on next-rotation slash and loblolly pine.
- The management of longleaf pine for straw harvesting, and its influence on forest and soil.
- Effect of soil compaction and organic residue on long-term soil productivity: LA location 1.

Future trends

Future research studies are expected to focus on subject areas relating to sustaining forest ecosystems while emphasizing improved technology transfer.

MILITARY USE LANDS

Background

On January 7, 1941 the Secretary of Agriculture signed a letter to the Secretary of War authorizing the Army to use 27, 615 acres of the old Vernon District to establish Camp Polk (**Burns, 1994**). This official action initiated the military use of the Kisatchie National Forest. During World War II, the U.S. Army was authorized to use many other areas of the Forest, ranging from water supply to gravel pits. The primary use, however, was military training; five separate primary locations were authorized — Camp Polk, in Vernon Parish; Camp Claiborne and associated bombing and munition impact areas, in Rapides Parish; and Camp Livingston, Breezy Hill Artillery Range, and the Pollock Air Support Command Base, primarily located in Grant Parish.

After the war ended, Camp Claiborne and Camp Livingston were deactivated and closed, and movable materials and equipment were sold as surplus. Streets, roads,

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parking lots, building foundations, drainage structures and surface and subsurface infrastructure systems remained in place. Surplus Army-acquired lands within Camp Claiborne were transferred to the Forest Service. All surplus Army-acquired lands within Camp Livingston were transferred to the Louisiana National Guard and are currently used as Camp Beauregard. Administration of national forest lands under permit to the Army for military purposes was returned to the Forest Service. Most of the Breezy Hill Artillery Range was administered by the Forest Service prior to the war; the balance was small privately owned tracts purchased by the Army to consolidate the range. After the war, the previous owners were given an opportunity to acquire their land by purchase. Tracts not disposed of in this manner were given national forest status.

The Pollock Airbase area was a site for processing and initial training. It was never contaminated with dangerous ordnance or structures that could be safety hazards. After the war most of the land was transferred to the town of Pollock. Only land previously administered by the Forest Service was returned to national forest status.

Current conditions

Fort Polk

Of those military areas listed above, only Camp Polk — now known as Fort Polk — currently occupies national forest lands under a special use permit.

The U.S. Army at Fort Polk makes *intensive use* of 40,026 acres and *limited use* of 44,799 acres on the Vernon Unit of the Calcasieu District. It also makes special limited use of 12,820 acres and intensive use of 480 acres on the Kisatchie District.

In 1993 the 5th Infantry Division began relocating from Fort Polk, to Fort Hood, Texas. The Joint Readiness Training Command (JRTC) moved to Fort Polk about the same time. The primary mission of Fort Polk is to support the JRTC which provides joint training for Army, Air Force, Army National Guard, Navy, and Marine units. Training simulates conditions of low and mid-intensity conflicts and focuses on Army light forces including airborne, air assault, ranger and light infantry battalions, and special operation forces, and their associated combat, combat support, and combat service units. Ten JRTC training rotations occur each year. This move changed the role of the *intensive use area* (IUA) on national forest land. It was anticipated that tank and small arms range-use days would decrease by 66 percent. This would have allowed the areas to heal over if properly restored and seeded after each use period. Only the type of use in these areas has changed, however, and rehabilitation has been slower than expected. The IUA is used for maneuver and live-fire training exercises.

The Army has indicated the need for additional use of lands currently under permit. Fort Polk is preparing an environmental analysis of a proposal to conduct increased military training in the southern portion of the Vernon Unit, known as the Limited Use Area (LUA). A final document is expected during 1999.

The Army has conducted a variety of low intensity, minimal environmental impact training events since 1988 on the LUA. Twenty-nine training events have historically been conducted recurrently under permit on the LUA. They are: mounted and/or dismounted land navigation (up to 100 personnel, 20 to 50 vehicles); helicopter landing and refueling (30 to 100 personnel, 10 to 15 helicopters); airborne operations, no live ordnance (up to 30 personnel, 3 to 4 vehicles); helicopter landing and removal of personnel and equipment (up to 100 personnel, some vehicles, and 10 to 15 helicopters); dismounted patrolling (up to 100 personnel, 20 to 50 vehicles); mounted patrolling (up to 100 personnel, up to 40 vehicles); mounted and dismounted road marching (up to 100 personnel, up to 60 vehicles); assembly area bivouac training (100 or more personnel, up to 60 vehicles); simulated chemical training (70 to 80 personnel, up to 15 vehicles); escape and evasion (up to 100 personnel, 5 to 10 vehicles); mass casualty evacuation (up to 100 personnel, a combination of helicopters and 20 to 30 vehicles); helicopter sling loading operations; field training exercises (up to 100 personnel, 30 vehicles); military intelligence field training operations (80 personnel, 30 to 40 vehicles); command post field exercise (up to 60 personnel, 10 to 40 vehicles); communication field training exercise (up to 100 personnel, 60 vehicles); special operation forces training operations and recovery missions (30 personnel, 3 to 4 vehicles); survivial training (100 or more personnel, 10 to 20 vehicles);

tracked command vehicles positioned at stationary locations (up to 100 personnel, up to 50 vehicles); first aid and litter carrying exercise (100 personnel, 10 to 30 vehicles); tactical exercises (100 or more personnel, 20 to 30 vehicles); leader stakes (100 or more personnel, 10 to 30 vehicles); squad raid exercises (up to 100 personnel, 10 to 30 vehicles); combat search and rescue (up to 100 personnel, 10 to 30 vehicles); helicopter aeroscout testing-air recon simulated threat training (up to 100 personnel, 10 to 30 vehicles); external evaluation training (up to 100 personnel, 30 to 40 vehicles); aviation tasks (100 or more personnel, 10 to 30 vehicles); scout stakes (100 or more personnel, 30 to 50 vehicles); and convoy support training (up to 100 personnel, 30 to 40 vehicles).

In August of 1996, the Secretary of the Army and the Secretary of Agriculture signed a supplemental Memorandum of Agreement (MOA) whereby the Army, in cooperation with the Forest Service, should prepare environmental analyses to: (a) assess the impacts of issuing a special use permit to continue the recurrent use of the LUA by Fort Polk for those activities mentioned above, and, (b) assess the impacts of more intensive military use of the LUA. In May 1997, an amendment to the existing Special Use Permit Agreement (SUPA) between Fort Polk and the Kisatchie National Forest was issued that authorized the above-mentioned 29 routine military exercises within the LUA.

Currently, the Army is in the process of evaluating the second proposal called for in the MOA , along with several alternatives. In addition to the recurrent activities, the Army is requesting a permit to allow the following 6 additional activities within the LUA:

- Cross-country vehicle maneuvers
- Blackout driving
- Use of pyrotechnics and artillery simulation devices
- Construction of hasty/limited defensive positions
- Emplacement of obstacles
- Establishment of forward/rear support areas and/or field hospitals

The public scoping and environmental analysis process is underway, and potential impacts to the environment will be disclosed in a separate environmental document. That document will consider the effects to the Revised Plan's management direction and changes to the environmental effects expected in this FEIS along with site-specific environmental effects to the areas being affected. That decision is not expected to occur until the latter part of 1999, after issuance of the Record of Decision for this FEIS.

Air Force

The U.S. Air Force Reserve unit at Barksdale Air Force Base (AFB), located in Bossier City, LA, operates a bombing and gunnery practice range on the Evangeline Unit of the Calcasieu District in Rapides Parish. This involves 3,207 acres of intensive-use land, including a 672-acre impact area and a 2,535-acre safety fan. The range and a separate site in old Camp Claiborne were authorized to England AFB from 1953 until the Base closed in 1992, whereupon Barksdale AFB took over the responsibility.

To address Air Force safety concerns relative to B-52 bomber training, the U.S. Air Force Reserve has proposed an expansion of the current weapons safety area buffer zone at the Claiborne Bombing and Gunnery Range, a permitted site. A draft environmental document for public comment may be completed in 1999.

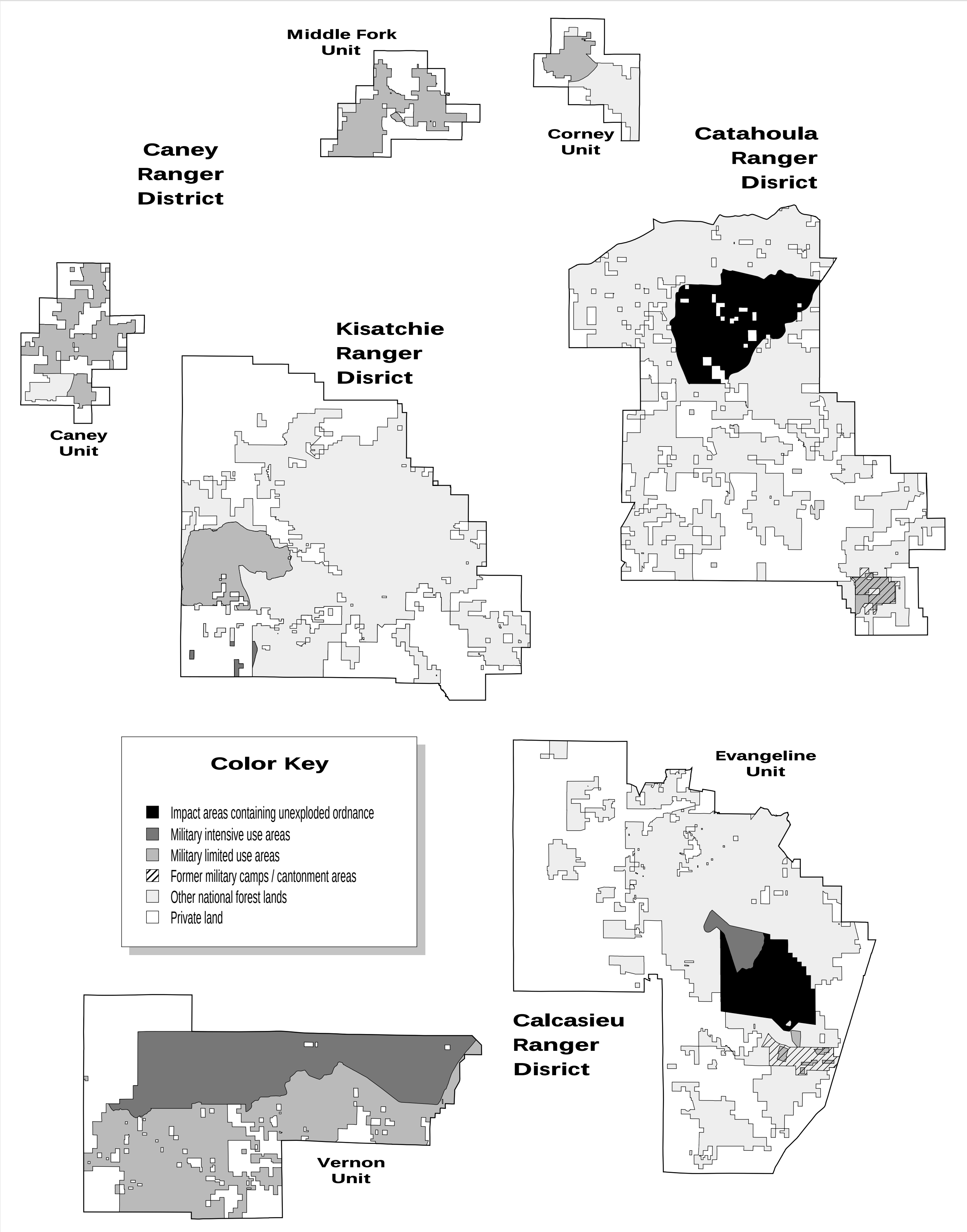
National Guard

The Louisiana Army National Guard (LANG) is currently authorized the use of some lands on the Caney and Catahoula Districts and the Evangeline Unit of the Calcasieu District. This required the issuance of 2 separate permits. The first authorizes 27,106 acres on the 3 districts for bivouac and other military training activities, such as the use of existing roads for driver training and reconnaissance exercises. Although this gross acreage is authorized, only a few acres — usually 10 or less, are used at a given time. Each training exercise must be scheduled — and its location approved — before actual occupancy occurs. During the past seven years, only 2 training exercises have been scheduled on the Calcasieu District. No exercises have occurred on the Caney District during that period. The second permit authorizes the use of 11.48 acres on the Catahoula District, specifically for training in rapid runway repair.

In a letter to the Forest Supervisor dated September 3, 1996 the Adjutant General of

FIGURE 3–5, CURRENT MILITARY USE / IMPACTS

Displayed by Affected Ranger District



the LANG expressed a desire to acquire approximately 10,230 acres in the Catahoula District for expanded military training activities. The lands specified adjoin LANG's Camp Beauregard and include the cantonment and surrounding areas of old Camp Livingston. Forest Service offers to consider expansion of military training under special use — and suggested alternatives for possible land exchange or interchange — were rejected, at that time. While the LANG actively solicited public, community, business, and political support for legislative action to transfer ownership of the lands from the United States of America to the State of Louisiana, no formal proposal was presented.

Inactive military use areas

Closed military areas are available for general forest management — excepting specific delineated areas not yet determined to be clear of all unexploded ordnance. These areas require specific guidelines and use restrictions. One such area is the old Breezy Hill Artillery Range. About 856 acres of the impact area have a high potential for unexploded shells on or below the surface. The acreage is not contiguous, but each hazard area is marked with a pair of 6-inch orange bands painted on trees at about 50-foot intervals. Warning signs are posted at about 250-foot intervals. These areas have been designated *no entry*, and currently no management activities are permitted.

The other portion of the Breezy Hill artillery range contains approximately 17,265 acres. It is considered to present some potential for buried, unexploded shells, and is designated a *no ground penetration* area. The boundary is marked by a single 6-inch orange band painted on trees at 50-foot intervals. Warning signs are posted at about 250-foot intervals. Management practices requiring ground penetration are prohibited except when mitigated by specific guidelines.

During August and September 1993 the U.S. Army Corps of Engineers (St. Louis District) and U.S. Army Engineering and Support Center-Huntsville (USAESCH) performed a combined archives search and site survey of former Camp Claiborne. The objective was to determine the types, quantities, and probable locations of ordnance and explosives (OE) remaining on the site. As a result, two areas — the Conventional Munitions Impact Area and the Claiborne USAF Bombing and Gunnery Range — were reported as having high potential for the presence of OE. The two areas are adjacent to each other and lie north of the old Camp Claiborne cantonment area. Together the two areas contain approximately 14,300 acres. Based on this cursory survey, sufficient evidence of OE contamination was found to prompt a more intensive and detailed assessment.

In July, 1994 USAESCH contracted with Environmental Science & Engineering, Inc. of Gainesville, Florida to conduct an engineering evaluation / cost analysis (EE/CA) to serve as a basis for selecting the corrective action alternative to reduce public safety risks associated with OE at the former Camp Claiborne. Primary attention was given to the areas previously determined to contain OE. Field work was performed in 1995 and the EE/CA was finalized in 1996. The report identifies four separate areas comprising the former Camp Claiborne site, evaluates ordnance contamination, and proposes risk reduction alternatives ranging from "no further action" to "clearance to depth."

In all areas except the cantonment area, for which a "no further action" alternative is recommended, risk reduction involves *institutional controls* such as signing, boundary marking, public education and information dissemination, fencing highly contaminated areas, and / or imposing rules, regulations, or orders restricting or prohibiting access or use. For the Claiborne USAF Bombing and Gunnery Range and the Conventional Munitions Impact Area, more intensive alternatives of "surface clearance" and "clearance to depth" may be appropriate.

Further site evaluation is required to identify possible high-risk areas embedded within the overall site. This would focus on hazards other than OE, such as open wells, areas of exposed reenforcing rods (rebar), weakened concrete structures or hazardous materials. This would be to determine the need for restricting use or prohibiting access and to prioritize these areas for possible future clearance.

Under contract to USAESCH, UXB International, Inc. performed time-critical removal action (TCRA) activities within a portion of the Conventional Munitions Impact Area and the Claiborne USAF Bombing and Gunnery Range. The work was performed during the period of April 3, 1995 through August 31, 1995. The objective was to locate and remove surface and subsurface OE to a depth of two feet along

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roads and trails, within campsites, and in selected sampling sites in the general area. The following areas were included:

- 11.5 miles of trail , 10 feet wide — 5 feet each side of centerline.
- 2.77 miles of unimproved roads, 10 feet each side of the road but excluding the road prism.
- 4.2 miles of unimproved roads, including the width of the road plus 10 feet on each side.
- 23.76 acres of campsites.
- 2.3 acres of 10 selected sampling sites.

The TCRA has effectively minimized the risk in areas where the majority of forest visitors and users would most likely encounter OE, such as roads, trails, and campgrounds. The remainder of the area still poses potential risks associated with surface and subsurface OE contamination.

In a continuing effort of cleanup, USAESCH awarded a contract to EOD Technology, Inc. (EODT) on December 13, 1996 to conduct ordnance and explosive removal on 1,300 acres within the old Claiborne USAF Bombing and Gunnery Range Impact Area. In the designated 1,300 acres, EODT is to safely locate, identify, and dispose of surface and subsurface ordnance and explosives to a depth of 4 feet. The project was planned for initiation in 1997 and may require 2–3 years for completion.

Implementation of institutional controls are currently needed. The Forest Service and Corps of Engineers (CORPS) will coordinate efforts to define the extent of controls needed and develop an implementation action plan. Figure 3–5 displays Forestwide military use.

Future trends

It is anticipated that military use of national forest lands may increase in the future, especially by Fort Polk. The Army has requested additional use of the LUA. Based on the findings of the environmental analysis currently in progress, additional intensive use for military training may be allowed.

Change may occur in the management of the Claiborne Range authorized to the U.S. Air Force Reserve. Based on the findings of the environmental analysis additional acres may be added by amendment to the existing use permit, expanding the current weapons safety area buffer zone. The Army at Fort Polk has indicated it may request use of some of this permit area for training, although such use would have to be coordinated with the Air Force Reserve. The Army has also expressed an interest in using additional area for higher-elevation training by B-52 bomber pilots. Nothing, however, has been proposed.

The Army has also considered requesting use of a portion of the Pollock Airport and adjacent national forest lands for training. It is anticipated that the Army's primary need would be for the use of forest roads. No formal request has been received.

Management of lands defined as having high potential for unexploded ordnance within the Claiborne USAF Bombing and Gunnery Range and Conventional Munitions Impact Area may change. In cooperation with the CORPS, a strategic implementation plan will be developed to identify, prioritize, and initialize the appropriate level of institutional controls. Signing, public information and education, and contacts with user groups, contractors, and permittees are anticipated initial action items. The CORPS will be requested to perform a more detailed evaluation, delineating and prioritizing the more highly contaminated sites and to schedule appropriate decontamination action. Based on the results of a more detailed survey and evaluation, consideration may be given to imposing restrictions and prohibitions on use and access until clearance is performed. No change in current management within the cantonment area at Camp Claiborne is anticipated. There have been many requests for various types of uses in both areas, including a national veterans cemetery at Camp Claiborne. More such requests are expected. They would be considered and analyzed for environmental impacts on an individual, site-specific basis. In 1995 an 80-acre portion of Camp Claiborne cantonment area was selected for the development of the proposed Camp Claiborne Job Corps Center. At this writing that proposal reposes at the U.S. Department of Labor, awaiting the selection process and possible funding.

In November of 1997 a new Adjutant General for LANG was appointed. There has been no proposal from LANG for additional use or acquisition of national forest land for Camp Beauregard. If LANG proposes additional use or acquisition of lands in the former Camp Livingston area, for limited or intensive use, a decision would be made based on the findings of an environmental analysis with full public participation.

Safety hazards have been identified within the cantonment areas of Camp Claiborne and Camp Livingston, including streets and roads, abandoned wells, and partially demolished concrete structures. The CORPS has the responsibility for cleanup of any hazardous materials. All other safety-related responsibilities in these areas appear to rest with the Forest Service as landowners. In 1998 the Forest received funds to begin preliminary hazard abatement on deteriorated road surfaces, bridge removal and barricades, and filling open sewage treatment tanks. The Forest expects to receive additional funds in 2001 to do more cleanup, and will continue to seek further funding. However, removal or correction of all safety hazards will be an extremely costly project spread over many years.

Declassification of all or part of the Breezy Hill Artillery Range is desired. The Forest Service continues to enlist the cooperation of the CORPS to cleanup unexploded ordnance in *no entry* and *no ground penetration* areas. The goal is decontamination and declassification of the entire impact area. The CORPS indicates that cleanup of the area is on their schedule, but the exact time frame is unknown. Management practices would continue to be restrictive until the area is decontaminated. However, waivers or modifications of restrictions on specific portions of the impact areas may be approved on the basis of need, type of activity, and availability of mitigating measures. Specific uses of these areas would continue to be covered by standards and / or guidelines.

HERITAGE RESOURCES

Background

Heritage resources (formerly called *cultural resources*) are the physical remnants of past human behavior which can reveal patterns of human adaptation to, and use of, the environment. These resources can include, but are not limited to artifacts, ruins, structures, historic roads, Civilian Conservation Corps constructions, oral traditions, written historic records, or human-modified landscapes.

The Forest Heritage Resources Program manages these resources to:

- Prevent their damage or loss of information until they are evaluated using criteria for eligibility to the National Register of Historic Places (NRHP).
- Permit opportunities for scientific study about past human use of, and interaction with, the surrounding environment.
- Provide public interpretive and participatory opportunities to foster understanding of the rich cultural heritage of Louisiana and the Forest.

Current archeological data indicate that humans first entered what is now the state of Louisiana about 12,000 years ago. Scientific studies show more-or-less continual occupation for at least 10,000 years in the area that is now national forest.

The earliest inhabitants entered a landscape somewhat drier and cooler than today's. Predominant modern pine communities were yet to develop. Archeological sites on the Forest contain valuable information regarding human behavior, adaptation to the environment, and modification of the surrounding environment. Some archeological sites may contain the only avenue for revealing often-subtle data regarding the interplay of humans and the environment through time. The Forest's heritage resources represent fragile and nonrenewable fragments of local, regional, and even national cultural heritage.

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HERITAGE RESOURCES

Current conditions

To date, approximately 46 percent of the Forest has been inventoried or surveyed for the presence of heritage resources. Slightly more than 3,300 sites have been recorded, 2,600 of which belong to the *prehistoric* period and 735 of which are of the *historic* period. Almost 426 sites are in protective status, pending evaluation for NRHP eligibility. Most of the inventory has been conducted in support of various timber activities, land exchanges, road construction, and recreation development.

Prehistoric sites represent all time periods — *Paleo-Indian*, about 12,000–8,000 years ago; *Meso-Indian* or *Archaic*, 8,000–4,000 years ago, and *Neo-Indian*, from 4,000 years ago to about AD 1550. Site types range from small areas to large base camps. Smaller areas were probably single-use lithic reduction, or stone toolworking, areas often less than 50 square yards in size. Large base camps of 10–12 acres were probably used almost year-round for a number of years. Many sites cannot be assigned to a specific time period because they lack temporally diagnostic artifacts. All known prehistoric sites are utilitarian or domestic. While sacred or ceremonial sites such as burial places no doubt exist on the Forest, they have not yet been encountered during inventory efforts.

Louisiana's historic period begins in the late 16th century. The first evidence of Euro-American presence in central Louisiana was in 1690, with the establishment of a French mission in the locale of present-day Pineville. One site of this French colonial period has been tentatively identified on the Forest. Since most Euro-American activity of this time period was focused on the Red River itself, however, additional sites are likely to be rare.

During the first half of the 19th century, settlement was sparse in the pine uplands. That population increased during the latter half as small landholders were gradually pushed out of the fertile alluvial valleys into the surrounding pine hills. Some evidence of Civil War actions may be present on the Kisatchie District. During the latter decades of the 19th century, the booming timber industry accounted for the majority of historic sites. This includes both large industrial communities and complexes, such as the Fullerton Mill and Town, which is on the National Register of Historic Places, and small homesteads in associated communities.

Important vestiges of the early to mid-20th century are best typified by sites relating to the 8 Civilian Conservation Corps camps on the Forest. These include several recreation areas still in use today. The Forest also hosted 2 large World War II military camps, Livingston and Claiborne, which are also designated as historic sites.

As is the case elsewhere, sites on the Forest are not distributed randomly across the landscape. They were selected for use or occupation by past inhabitants because of certain environmental variables, particularly during prehistoric times. The Kisatchie site predictive model which is derived from studies by the Forest Service, private contract archeologists, and the National Park Service, notes 2 primary variables as distance to permanent water sources, and the relative degree of topographic relief. The model breaks the landscape down into 3 "geographic zones," these being *zone 1* — floodplains and bottoms; *zone 2* — areas of low relief; and *zone 3* — areas of high relief.

Inventory shows variable site frequencies per 100 acres in each zone, with zone 3 having the highest site frequency at roughly 2 sites per 100 acres, and zone 2 having the least at 0.25 sites per 100 acres. These figures apply only to prehistoric period sites because historic sites follow a slightly different pattern. For the most part, historic homesites and associated features most commonly occur near historic transportation routes often located in higher elevations along ridge lines.

Recent modeling efforts using the Forest's geographic information system (GIS) suggests that soil series may influence site predictability. This line of modeling investigation is being field tested now.

Future trends

Inventory is ongoing, as are refinements to the site predictive model. As field inventory progresses into more areas of higher predicted probability—often beyond the boundaries of project actions — site frequencies per acre, particularly of areas in or adjacent to riparian zones, can be expected to change.

The Forest is moving toward full integration of survey data and predictive modeling with the forestwide GIS database. Inventoried areas and new site recordings are updated on a regular basis, to enhance both on-the-ground management and predictive models.

The Southern Region of the Forest Service, which includes the Kisatchie National Forest, has enacted a *programmatic agreement* with the Advisory Council on Historic Preservation, and the State Historic Preservation Officers in the Southern Region. One aspect of this agreement streamlines the reporting process for compliance with Section 106 of the National Historic Preservation Act. Under provisions of the programmatic agreement some projects or project types can be *categorically excluded* from full review procedures. This means that the Forest is able to schedule its heritage resource work force to better concentrate accomplishments on higher-impact projects in higher-probability areas. This would be important in future efforts to fill in data gaps, especially in non-project related portions of the Forest.

The Kisatchie also has a partnership with Northwestern State University in Natchitoches to mutually administer from one to three graduate-level internships in the masters-level cultural resource management curriculum. These interns obtain real-life work experience on Forest Service projects, for which they receive graded course credits.

There is growing public recognition that facilities or experiences with a historical focus are an increasingly popular recreational activity. To satisfy this public need, in 1989 the Forest Service created the Passport in Time (PIT) program. The program encourages and solicits volunteers to assist in projects such as site excavation, rehabilitating historic buildings, conducting oral interviews, or historic records research. The Kisatchie has offered several PIT projects in the recent past. Because of their success, PIT would continue as an integral part of the Forest's heritage and recreation programs.

GENERAL FOREST SETTING

SOCIAL AND ECONOMIC ENVIRONMENT

Demographics

SOCIAL AND ECONOMIC ENVIRONMENT

Background

Social and economic environment describes the social and economic setting in which a national forest functions. The Forest's operating area presented here is influenced by Forest Service management actions and the social characteristics of the community. Some Forest issues and resource-related activities are localized and may involve only a small area of the Forest; whereas others may take on a state or national perspective. Unless otherwise specified, all statistics are derived from U.S. Census data.

As shown in figures 3–6 and 3–7, the Kisatchie National Forest directly affects, and is predominantly influenced by, citizens of 7 north and central Louisiana parishes containing national forest land — Claiborne, Grant, Natchitoches, Rapides, Vernon, Webster, and Winn. The Forest occupies 23.6 percent of Grant Parish, more than any of the others. The larger national forest hosts are Natchitoches Parish at 21.5 percent, Winn Parish at 18.5 percent, and Rapides Parish at 16.9 percent.

Lying between the Caney and Winn Districts, 4 more parishes are also part of the functional rural economy in which the Forest operates — Bienville, Jackson, Lincoln, and Red River. These parishes collectively form a contiguous area in north central Louisiana reflecting a rural economy generally thought of as being heavily dependent on natural resources.

Current conditions

Demographics

An essentially rural 11-parish region is designated as the Forest's impact area. In Rapides Parish at the southern end of this region, the Alexandria metropolitan statistical area (MSA) contains 131,556 people — 32 percent of the total population. Although the overall area's predominantly rural setting reflects rural lifestyles with the expected traditional values, its character is influenced by the more transient population from nearby Fort Polk.

The area has four 4-year institutions of higher learning: Louisiana College, in Rapides Parish; Northwestern State University of Louisiana, in Natchitoches Parish; and in Lincoln Parish, Louisiana Tech University and Grambling State University. Louisiana State University at Alexandria is a 2-year institution. Also located in the central Louisiana area are 3 vocational schools.

Public education enrollment in area primary and secondary schools increased from 70,350 in 1983 to 74,000 in 1990, as measured by average daily attendance. This is a 0.7 percent average annual increase in public school enrollment. This compares with a general declining trend of children less than 18 years of age. From 1980 to 1990, the number of children in this age category decreased by 1 percent annually. The slow growth in school attendance and the decrease in school-age children are consistent with the small reduction in the population of this area during that period.

Public and private school enrollment in the area during 1991 totaled 84,700 pupils — 9 percent of the state's total. High school graduates totaled 3,800 of the state's graduating seniors — also about 9 percent.

While the population of the United States grew by a moderate 9.8 percent and Louisiana grew slightly at 0.3 percent, the population of the 11-parish area went almost unchanged from 1980 to 1990, with a loss of only 0.2 percent.

At 30.3 years, the median age of the population within the Forest's impact area is generally less than that of Louisiana, at 31.0, or the United States, at 32.9. The local area has a greater percentage of youths — less than 24 years old, and a smaller percentage of the elderly — greater than 65 years old, than do the two larger areas.

The area's black minority population component is about the same as the state's at 31 percent, but is more than twice the rate for the United States. The percentage of other racial and ethnic minorities are slightly less than the rate for Louisiana as a whole. The percentage of males is slightly higher in the local area population than that of the state or the United States, which may be explained by military influence.

The area has a slightly stronger traditional family tendency than either the state or the nation. As a percentage of total households, there is a greater number of married couples. However, there are more female heads-of-households in Louisiana and in the local area than in the United States — which may in part contribute to lower family incomes.

Nontraditional family households are a smaller percentage of all households in the area than in either the state or the nation.

Population density in the 11-parish area is significantly less than that of the United States and the state at 44.7 persons per square mile. Such a density reflects the area's rural nature.

Relatively low housing expenses, an important item in a family's budget, indicate the cost of living is dramatically less in this area than in the rest of the state, and significantly less than is found nationally.

The 11-parish area has a greater percentage of its labor force in agriculture, manufacturing, and government than does the rest of the state. Government accounts for the largest share of employment, about 32 percent. Fort Polk in Vernon Parish contributes substantially to this employment characteristic, alone employing approximately 14,950 persons (**source: Central Louisiana Chamber of Commerce**).

The closing of England Air Force Base has reduced military employment by approximately 3,200 jobs within the Alexandria MSA. However, simultaneous increases in state and local government as well as quick local response to reestablish use of base facilities, has held overall loss in jobs to approximately 1–2 percent (**source: Jay Ellington, Alexandria Chamber of Commerce**). Central Louisiana in particular continues to significantly diversify its economy.

Income from all sectors in the study area is approximately 7.5 percent of the state total. This income is produced by 9.6 percent of the state's population, suggesting that average wages are lower than the state as a whole.

The government (public) sector — which earns more than 40 percent of the area's income — is by far the most important sector of the economy for this area. This area depends substantially upon the public sector, and it is not considered a growth portion of the economy. The 11 parishes containing national forest therefore represent a relatively concentrated, isolated economic sector providing little hope of future income and employment growth.

Manufacturing is the second most important sector of this regional economy, one that is sensitive to national economic recessions. The wood products industry is a significant part of the local area's manufacturing industry. Approximately 38 percent of the state's wood products industry employment comes from the 11-parish area. Respectively, logging and contractors, sawmills and planing, and veneer and plywood industries in this area represent 37, 54, and 40 percent of the state employment for this industry.

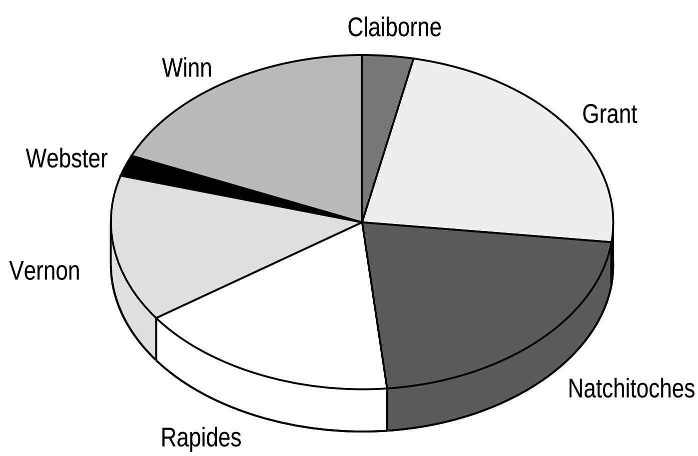
The paper products industry in the impact area comprises approximately 25 percent of all employment and income in the state. About one-third of the state total for employment and income in this industry is represented by the manufacturing of bags, paperboard, containers, and boxes.

Total employment in the 11-parish area was approximately 158,000 persons in 1991, a growth of 20,000 people since 1981 — 14 percent or 1.4 percent per year. Unemployment, on the other hand, decreased from the severe oil-induced recession of 1981, when the unemployment rate peaked at 11.1 percent. By 1991 the rate in the 11-parish area dropped to 7.7 percent. Meanwhile, statewide employment growth was 5.7 percent over the decade of the 1980s. In 1994 the unemployment rate for the Alexandria MSA was 7.5 percent (**source: Louisiana Chamber of Commerce**).

Household median income in the area was significantly less in 1990 than for the United States. Income in this area was only about 60 percent of the national average median house-

FIGURE 3–6, KISATCHIE NATIONAL FOREST STATEWIDE ACREAGE BY PARISH

Although the Kisatchie National Forest is hosted by only 7 Louisiana parishes, it influences the industry and commerce of 11 parishes, as displayed in figure 3–7.



GENERAL FOREST SETTING

SOCIAL AND ECONOMIC ENVIRONMENT

Demographics

Rural community assistance

hold income. When compared with the state, however, local area income was only about $3,000 per family, 14 percent less per household than the state average.

At 25 percent, poverty of households in the 11-parish area was only slightly higher than the statewide level, which stood at 23.6 percent. Overall, only 13.1 percent of U.S. households are at the poverty level.

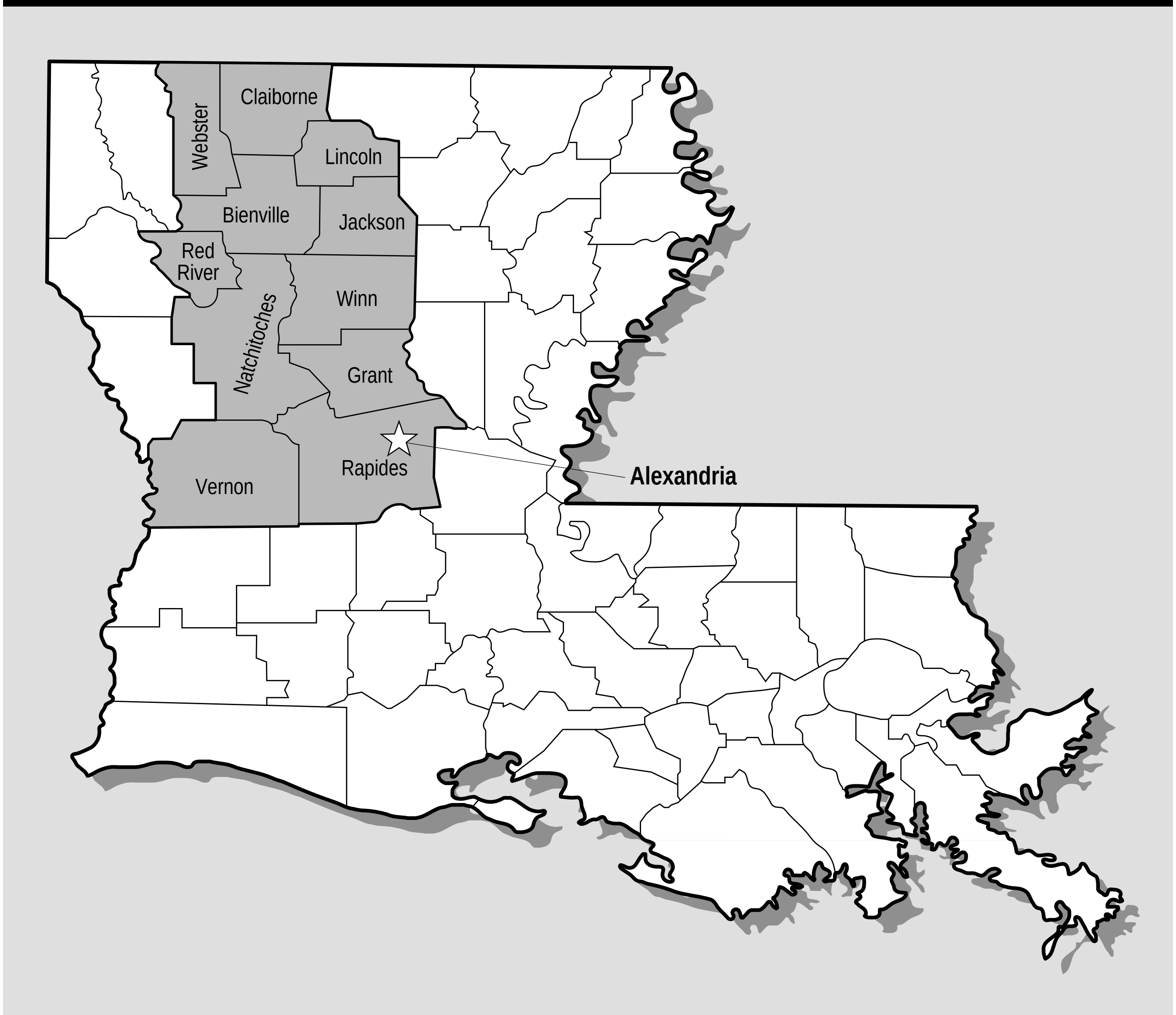
In summary, the area's economy is relatively slow growing and predominantly rural, relying heavily on government employment for employment and income. Poverty is almost twice the national rate, with one-quarter of area households in this condition. While timber-related employment and income are not large proportions of the area's total employment and income picture, they do constitute a significant portion of the area's manufacturing activity in Louisiana's wood and paper products industries.

Both the state and the 11-parish area have had difficulty recovering from the oil-induced recessions of the early 1980's. An early 1990 recession set this recovery back even more.

Rural community assistance

The Forest Service has long been a vital part of local and state communities. In addition to timber receipt returns to parishes, our employees and their families constitute an often important part of local economies and

FIGURE 3–7, KISATCHIE NATIONAL FOREST INFLUENCE AREA



civic interactions.

A new avenue of Forest Service / community involvement came about with the passage of the Food, Agriculture, Conservation, and Trade Act of 1990. This is Public Law 101-624, usually referred to as the 1990 Farm Bill.

A primary focus of this bill was assistance to diversify the economies of economically disadvantaged rural communities in or near national forests. It allows for federal grants, channeled through state foresters' offices or directly through the National Forest System, to upgrade existing industries or to diversify economies and eliminate dependency on forest resources. Grants are available to communities through competition based on eligibility criteria. Grant information is routinely distributed to state and federally recognized Native American tribes, minority and non-minority rural communities, and nonprofit organizations. This law initiated the Rural Community Assistance (RCA) program in the State & Private Forestry arm of the Forest Service.

Since 1990 the Kisatchie National Forest and Louisiana Office of Forestry have administered 36 grants — derived from rural development, economic recovery, economic diversification studies, or Americorps grants — to more than 18 rural communities in 13 Louisiana parishes. These federal RCA grant monies are intended as "seed money" to initiate worthy projects rather than to provide outright full federal funding for the work. The total amount of federal grants distributed to date is nearly $462,000. Communities receiving these funds have contributed almost $380,000 worth of matching funds or services.

The range of approved grant assistance includes such direct forestry-related projects, such as starting a containerized longleaf pine nursery, planning for a forest heritage museum, and growing shiitake mushrooms on hardwood logs otherwise left from timber harvest. Projects also include outreach programs for at-risk minority children, tutoring to help displaced timber workers achieve their GED (high school diploma equivalency), eco-tourism development, and economic diversification studies.

Community response has been universally favorable, with measurable results such as increased employment opportunities in disadvantaged communities, initiation of new businesses, and at-risk students receiving GED certification. Other less tangible but nevertheless real outcomes are enhanced community pride, cohesion, and stability.

Native American tribes

Louisiana has four federally recognized tribes: Chitimacha, Tunica-Biloxi, Coushatta, and Jena Choctaw. In addition, the state of Louisiana has granted state-level recognition to five tribes: Caddo Adai, Choctaw Apache, Clifton Choctaw, Louisiana Band of Choctaw, and United Houma Nation. State level recognition does not convey the "sovereign government" status that federal recognition does, however. The Forest has recently initiated government-to-government relations with federally recognized tribes within and outside Louisiana having an interest in the Forest's landbase and resources.

Two federal tribes and one state tribe are located within the 25 miles of the Kisatchie National Forest's administrative boundaries. No lands administered by the Kisatchie are involved with formal treaties or rights granted by such treaties. No tribal lands are commingled or immediately adjacent to national forest.

In 1995 the Forest Service's Washington (DC) office developed a draft resource book: *American Indian and Alaska Native Relations*. Forests were requested to solicit input from federally recognized tribes in their states. Louisiana tribes expressed great interest in increasing communication with the Forest, especially regarding technical assistance or technology transfer, such as fire protection and infrastructure — for example, the Wood In Transportation program. One federal tribe and one state tribe have applied for and received RCA grants.

GENERAL FOREST SETTING

SOCIAL AND ECONOMIC ENVIRONMENT

Environmental justice

Environmental justice

Presidential Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations" was issued in February 1994. This directed federal agencies to consider, as part of the NEPA analysis process, how their proposed actions or projects might affect human health and environmental conditions on minority and/or low-income communities. Each agency is also required to develop an environmental justice strategy by "identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations..."

Some primary factors to consider are:

- *Demographic factors*, such as race, ethnicity, age, or low-income status.
- *Geographic factors*, such as climate, hydrology, or surface topography.
- *Economic factors*, including economic situations of community members, and the community as a whole.
- *Human health and risk factors*, such as pollutants, source of emissions, exposures to toxic pollutants, and numbers and locations of pollutants.
- *Cultural and ethnic factors*, such as minority and/or Native American populations, literacy rates, or non-English speaking populations.

Two fundamental screening questions are posed by the Council on Environmental Quality (CEQ) to help agencies address these and related factors: 1) "Does the potentially affected community include minority and/or low-income populations?" and, 2) "Are the environmental impacts likely to fall disproportionately on minority and/or low-income members of the communty and/or tribal resources?"

The 1990 census data at state, regional, and local levels were used in considering the above factors and screening questions. Census data for towns, villages, and Census Designated Places (CDP) show that no communities within the administrative boundaries of the Forest have minorities as the major population component. However, Homer, Minden, Natchitoches, Alexandria, and Winnfied have Black populations exceeding 45% within each community. Vernon Parish contains the greatest persentage of those claiming Native American ancestry (1%), with all other Forest parishes reporting 0.8% or less.

The Kisatchie and Caney Districts have the highest proportion of minorities. Total minority population in Natchitoches Parish is 39%, with 32.1% in Webster Parish, and 46.5% in Claiborne Parish.

Within the seven parishes containing national forest land, 1990 census data show no pockets of elderly populations, averaging 13.2% throughout forest communities. There are no retirement or elder-care facilities within the Forest's administrative boundaries.

Unemployment averages 10% across the seven parishes, with Webster (Caney District), and Grant (Catahoula District) parishes being the highest at 12.9% and 12.7% respectively. The percentage of families below the poverty level is highest in Natchitoches Parish (28%) (Kisatchie District), and Claiborne Parish (25.7%)(Caney District).

Future trends

The Kisatchie National Forest influences activities of people in roughly an 11-parish area of north-central Louisiana. Various demands are placed upon the national forest so that interests of various publics may be served.

Issues such as management of the Red-cockaded Woodpecker and its habitat, biological diversity, streamside zone management, and recreation opportunities directly affect timber harvest levels and, in turn, the supply of logs to mills. While timber supplies may be supplemented or even supplanted by private sources, the quality of sawlogs and the operation of certain individual mills may be negatively impacted if changes in national forest management direction emphasize less extraction.

Range, minerals, and recreation have been relatively small revenue producers for the Forest; however, they could become much more important in the future. The primary recreation activities on the Forest are hunting and camping. Recreationists are drawn predominantly from the immediate area; however, many hunters and ORV users come from the southern part of the state.

The area's characteristics suggest that it would be expected to have relatively high economic stability and a relatively slow growth rate. The concentration in public sector employment has been a stabilizing factor in the past. However, future cutbacks could hurt the economy.

The RCA program on the Forest is an established and viable component of our relationships with communities in or near the Forest. We expect it to continue at current or slightly higher levels in the future.

In the immediate future the Forest would continue to work with Native American tribes to increase the number and quality of grant proposals from both federal- and state-recognized tribes.

GENERAL FOREST SETTING

COMMODITY PRODUCTION

TIMBER

COMMODITY PRODUCTION

TIMBER

Background

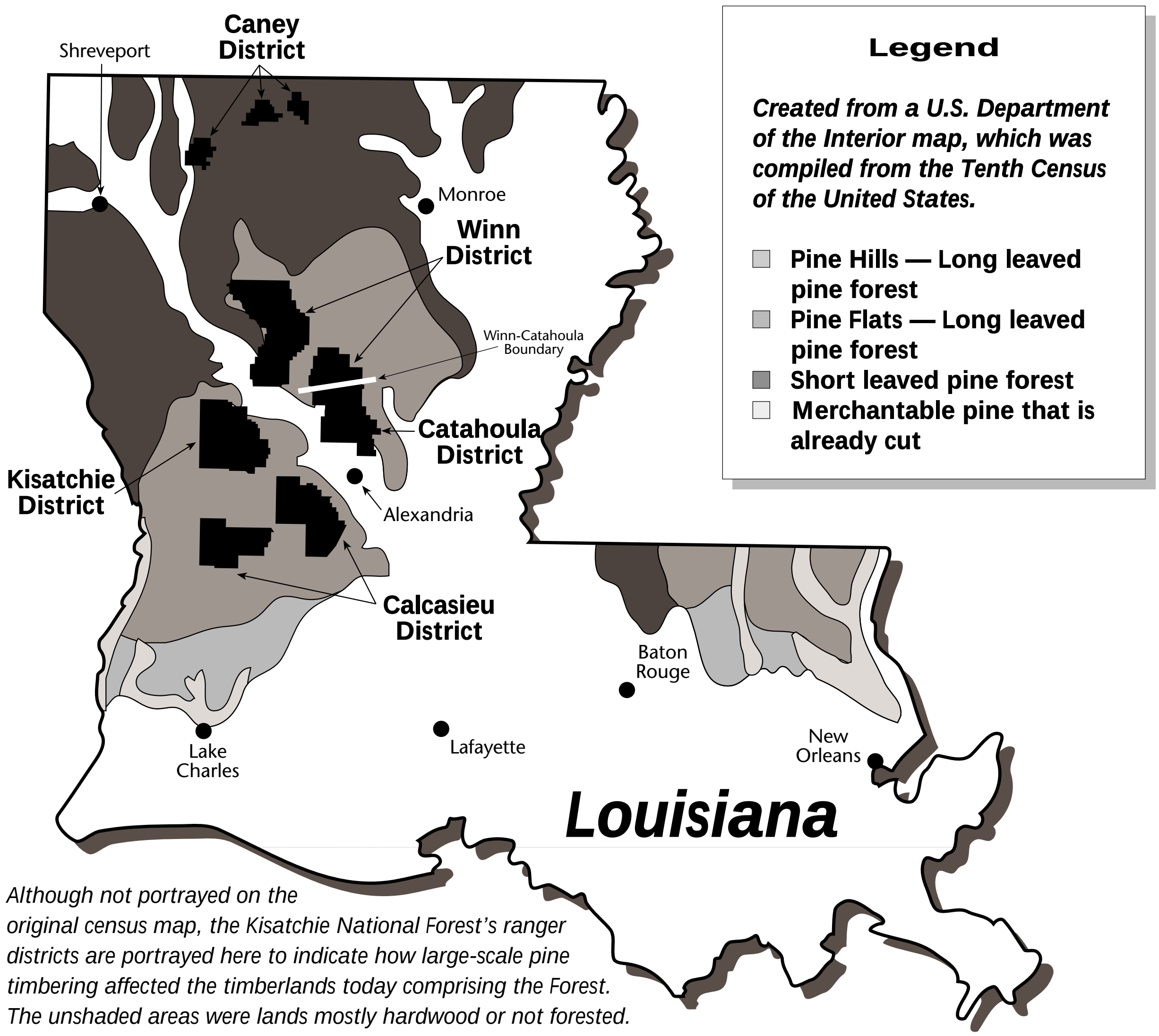
Trees used for commercial harvest make up only one component of vegetation. Timber is discussed separately in this chapter because of its importance as an economic resource and the effects of timber harvests on other components of the environment.

The land base for what is now the Kisatchie National Forest began with the February 1928 Congressional authorization of 3 purchase units in Vernon, Natchitoches, and Grant Parishes. Another unit in Rapides Parish was authorized in May 1930. A month later the 4 purchase units were designated by the Secretary of Agriculture as the Kisatchie National Forest.

Congress had authorized purchase of up to 175,000 acres. In early 1928 acquisition teams and foresters began the full-time task of assembling title information and timber data on the purchases. Large timber companies such as Gulf Lumber, Long-Bell, Bodcaw,

FIGURE 3–8, PINE FOREST DISTRIBUTION IN 1881

Census Map Showing Distribution of Pine Forests and the Lumber Industry in 1881



Although not portrayed on the original census map, the Kisatchie National Forest's ranger districts are portrayed here to indicate how large-scale pine timbering affected the timberlands today comprising the Forest. The unshaded areas were lands mostly hardwood or not forested.

Louisiana Long Leaf Lumber, and others owned the bulk of this land. The Forest often acquired blocks exceeding 10,000–15,000 acres. The overwhelming majority of these tracts were "cut over," meaning very little merchantable timber was left on them. No provisions had been made for replanting the next generation of timber. Acquisition foresters identified a great percentage of these cutover lands that had previously supported longleaf pine. Figure 3–8 depicts the distribution of pine forests as of 1881.

Consequently, reforestation was the early thrust of the timber program on the Kisatchie. The first timber sale occurred in 1932, a sale of 198,000 board feet with a total receipt of $445. By 1942 timber harvests exceeded 11 million board feet annually, with $60,000 in revenues.

Large scale reforestation, or replanting of pine species in clear-cut areas, began almost immediately. In 1934 this program was accelerated when 8 Civilian Conservation Corps (CCC) camps were created on national forest land in Louisiana. Historic planting records show that by 1935 almost 5,000 acres were being reforested each year, with an average of more than 13,000 acres annually for the period 1934–1942. By the end of the 1942 winter planting season, the CCC had replanted in excess of 105,000 acres. See table 3-35.

At this point, the Nation's entry into World War II significantly affected reforestation efforts in Louisiana and across the country. With the exit of CCC enrollees into full-time military service, the Kisatchie's replanting efforts fell to 300 acres in 1943 and remained near that level for the rest of the war years. Reforestation accomplishments began increasing in 1946, but tree-planting efforts never again reached the scale seen during the depression years.

For the most part, CCC crews planted longleaf and slash pine seedlings. Seedlings were locally grown at the Stuart Nursery on the Catahoula District. See table 3–35. The overall species distribution for the planting period 1934–1943 was 61 percent longleaf at 64,242 acres, 37 percent slash at 39,881 acres, 1.3 percent shortleaf at 1,370 acres, and less than 0.3 percent loblolly at 295 acres.

It is interesting to consider the dramatic contrast in the species planted, compared to the mix of species now comprising the Forest. Loblolly stands today occupy 47 percent of the land managed for timber production.

A possible reason for this contrast is that during the CCC planting period, third-year seedling survival rates frequently fell to less than 25 percent. The survival among planted longleaf pines was especially low. A 1947 record states:

> ***"After eight years we have, for a number of reasons, failed to bring through a satisfactory stand of longleaf pine. These are: 1. Hog damage, 2. Brown spot, 3. Competing vegetation."***

Vast acreages remained essentially bare during the 1930's and 1940's. Loblolly is commonly known to regenerate well naturally at distances of up to 1/10 mile, and under optimum conditions, as far as 2.5 miles from the seed source (USDA, 1965). Given these facts, it seems reasonable that understocked longleaf or slash pine plantations could have been restocked by loblolly seed from nearby drainages, thus becoming loblolly stands rather than longleaf or slash.

The planting of loblolly dramatically increased beginning in the mid-1950s. Current age class distributions reveal the abundance of loblolly compared to the fewer acres of longleaf or slash pine. This trend followed CCC era observations that longleaf had proven to be an extremely difficult species to manage and maintain, whereas loblolly survival and maintenance was relatively easy to achieve.

Today, using modern technology and proven silvicultural techniques, foresters are able to effectively establish and maintain longleaf plantations. This emerging aspect of ecosystem management would enable the Forest to work towards restoring longleaf pine to a greater percentage of its natural range.

Current conditions

This section presents information on the ownership and land use, growth, removals, and productivity of timberland in the Kisatchie's market area. It has been derived principally from the 1991 Forest Inventory and Analysis (FIA) Survey in Louisiana, the most recent survey in the state. Some information from the 1984 FIA survey is included.

The Kisatchie provides timber products within a 30-parish market area of central and northern Louisiana. Within the market area national forest timber supply competes with timber from other ownerships.

GENERAL FOREST SETTING

COMMODITY PRODUCTION

TIMBER

Ownership and land use

Ownership and land use

Land classed as forest occupies 9.6 million acres, or 62 percent, of the 30-parish market area's 15.3 million-acre total land base. The remaining 38 percent of the 30-parish market area total land base is comprised of urban and rural communities, major industrial areas (wood products such as plywood, lumber, particle board, pulpwood; rice milling; garment manufacturing; metal works; oil and gas production; cotton gins), and various farming areas (rice, corn, wheat, hay, cotton, oats, soybeans, sweet potatoes, peas, sugarcane, potatoes, peaches, watermelons, pecans, dairy, poultry, livestock, cattle, catfish, and crawfish)(***The Louisiana Almanac, 1995***).

Private landowners hold 88.5 percent of all the timberland in the Kisatchie's market area. Nonindustrial private timberland owners hold the largest share — 51 percent, or 4.9 million acres. Public ownership accounts for 11 percent of all timberland. Slightly more than one-half of all publicly owned acreage is represented by the Kisatchie, which accounts for roughly 6 percent of the total timber acreage in the market area.

Recreational opportunities on other ownerships surrounding the national forest are provided by a wide variety of public agencies and private organizations. Federal, state, parish, and local governments provide recreation facilities, as do commercial and nonprofit organizations. Excluding the Kisatchie National Forest, there are 5,097 developed camp units, 365 boat launches, 62 swim sites, 16 group picnic shelters, 3,959 family picnic tables, 59.7 miles of hiking trails, 6 miles of horse trails, 10.2 miles of all terrain vehicle trails, and 29.75 miles of bike trails within the market area of the Forest. There are also 42 major lakes or reservoirs, with a total surface area of 647 square miles within the Forest's market area, not including impoundments on the Forest. In addition, there are numerous smaller lakes, ponds, streams, rivers, and bayous which provide fishing, canoeing and boating opportunities.

There are 5 National Wildlife Refuges (59,453 acres), 7 State Parks (11,299 acres), and 24 State Wildlife Management Areas (608,539 acres) within the market area of the Forest. Twelve of the Wildlife Management Areas (WMAS) are owned by the State Department of Wildlife and Fisheries which manages the lands using primarily uneven-aged management (single-tree and group selection) with very limited even-aged management. Six WMAS are owned by other state, federal, or local governments which manage the lands using a mixture of even- and uneven-aged management. Six WMAS are owned by forest industries which manage the lands primarily using even-aged man-

TABLE 3–35, PLANTINGS BY SPECIES, 1934–1943

Year Planted	Longleaf ACRES	Longleaf (%)	Slash ACRES	Slash (%)	Loblolly ACRES	Loblolly (%)	Shortleaf ACRES	Shortleaf (%)	Total Acres
1934	109	(23)	302	(64)	62	(13)	0	0	473
1935	3,054	(65)	1,645	(36)	0	0	0	0	4,699
1936	4,423	(19)	17,691	(76)	233	(1)	931	(4)	23,278
1937	16,917	(77)	4,614	(21)	439	(2)	0	0	21,970
1938	8,639	(63)	5,074	(37)	0	0	0	0	13,713
1939	8,587	(73)	3,176	(27)	0	0	0	0	11,763
1940	8,960	(64)	5,040	(36)	0	0	0	0	14,000
1941	9,778	(85)	1,726	(15)	0	0	0	0	11,504
1942*	3,475	(85)	613	(15)	0	0	0	0	4,088
1943	300	(100)	0	0	0	0	0	0	300
Total	**64,242**	**(61)**	**39,881**	**(37)**	**295**	**(0.3)**	**1,370**	**(1.3)**	**105,788**

* *Last year of CCC planting*

GENERAL FOREST SETTING

COMMODITY PRODUCTION

TIMBER

Ownership and land use

agement. WMAS vary in the amount and types of recreation opportunities are available; however, hunting, fishing, hiking, camping in designated areas, canoeing, boating, picnicking, horseback riding, berry picking, and wildlife observation are common activities.

The 5 National Wildlife Refuges manage their lands for bottomland hardwood wildlife habitat and wetland restoration. The refuges provide wildlife observation, nature trail, hiking, hunting, fishing, canoeing, and boating opportunities for the public.

The 7 State Parks generally allow for natural succession to maintain natural landscapes. Only salvage harvests are allowed. Camping, hiking, picnicking, nature trails, birding, boating, and fishing are the principal opportunities available in State Parks.

Management on nonindustrial private lands varies, based on landowner objectives, from natural succession to selective harvest to even-aged harvest. Industrial ownerships also vary harvest methods, but generally utilize even-aged management. Recreational opportunities vary on these ownerships; however, industrial lands are typically leased to hunt clubs.

From 1984 to 1991 the total timberland acreage within the Kisatchie's market area changed less than 1 percent. In 1991 approximately 45 percent of all timberland was softwood — essentially unchanged from 1984. Approximately 56 percent of the total pine acreage was natural pine — down from 69 percent in 1984. In 1991, oak-gum-cypress was the primary hardwood type, followed by oak-pine and oak-hickory. From 1984 to 1991 acreage in oak-hickory forest type declined while oak-gum-cypress and oak-pine increased. Please see table 3–36. Within the total timberland acreage of the Forest's market area, 30% is seedling/sapling, 16% poletimber, and 55% sawtimber; 20% of the acres are planted and 80% are from natural origin (Vissage, et. al., 1992).

In 1991 the Kisatchie National Forest accounted for 5.9 percent of all timberland acreage, 7.6 percent of all softwood acreage, and 4.6 percent of all hardwood acreage in the market area. In 1984 the Forest accounted for 8.4 percent of all softwood acreage and 5 percent of all hardwood acreage. In 1991 the composition of softwood forest types on the Forest was 33.1 percent longleaf-slash and 66.8 percent loblolly-shortleaf type — little change from 1984.

The majority of softwood forest types in 1991 were on forest industry lands, accounting for 47 percent of all softwood acreage in the market area, or about 2 million acres, up from 1.75 million acres in 1984. The Forest accounted for 4.6 percent of all hardwood acreage in the market area; the hardwood component was 40.2 percent oak-pine, 37.3 percent oak-hickory, and 22.5 percent oak-gum-cypress. Nonindustrial private lands held roughly 59 percent, or 3.1 million acres, of all hardwood acreage in 1991 and forest industry lands accounted for 29 percent, or 1.5 million acres, of all hardwoods.

TABLE 3–36, KISATCHIE MARKET AREA

Timberland Acreage 1984 & 1991

Forest Type	1984	1991
Longleaf-slash		
Plantations	500.2	526.8
Natural	301.4	218.9
Loblolly-shortleaf		
Plantations	806.5	1,390.7
Natural	2,661.9	2,183.7
Oak-pine	1,625.0	1,676.8
Oak-hickory	1,740.2	1,637.3
Oak-gum-cypress	1,803.7	1,867.2
Elm-ash-cottonwood	86.3	63.2
Non-typed	10.8	4.5
Total (M acres)	**9,536.0**	**9,569.1**

Growing stock

Growing stock includes live sawtimber trees, poletimber trees, and sapling and seedlings meeting specified standards of quality and vigor. In 1991 the volume of growing stock in the market area was 12,327.3 million cubic feet (MMCF). Softwoods represented 61.2 percent of this total, hardwoods 38.8 percent. The Forest accounted for 8.3 percent of all growing stock and 9.7 percent of softwoods. Other public lands accounted for 5.8 percent of all growing stock. Forest industry lands accounted for 32.3 percent of all growing stock and 35.9 percent of all softwoods; while nonindustrial private forest land accounted for 53.5 percent of all growing stock and 50.9 percent of all softwoods.

Softwood growing stock volume in all ownership categories decreased 11.2 percent from 1984 to reach 7.5 billion cubic feet in 1991. In 1991 about 71 percent of the softwood volume in the market area was loblolly pine, followed by shortleaf pine at about 11 percent, slash pine at approximately 9 percent, and longleaf pine at roughly 5 percent. Softwood removals in the market area increased 36 percent from 1984 to 1991. Net annual growth of softwood growing stock did not exceed net annual removals in 1991 as it did in 1984. Please see table 3–37.

Hardwood growing stock rose by 3 percent from 1984 to 1991. Red oak and sweetgum dominated the hardwood growing stock inventory. Hardwood removals over that same period increased 35 percent. In 1991 net annual growth of hardwood growing stock in the market area did not exceed net annual removals.

Natural events such as SPB infestations, tornados, or fires affect the softwood resource; these forces combined with natural aging and increased mortality can impact net growth. Growing stock mortality and sawtimber mortality increased from 1984 to 1991.

Many existing natural pine stands established during the 1940's and 1950's are maturing. The SPB was a major cause of mortality in the last FIA survey. The 1984-1986 epidemic resulted in 490 MMBF of timber killed on the Kisatchie National Forest (390 MMBF from suitable land or 8 percent of the total Forest growing stock). During the epidemic 28,047 acres were infested or 4.7 percent of the Forest total.

Productivity

Forest site productivity class refers to classification of forest land based on potential cubic foot volume of wood growth per acre, at the culmination of mean annual increment, in fully stocked stands. Timberlands in the market area have high productive potential. More than three-fourths of timberland acreage consists of land with good-to-excellent site productivity (site class 85–120 or better). See table 3–38.

TABLE 3–37, SOFTWOOD & HARDWOOD 1984 & 1991

Volume of Growing Stock and Sawtimber on Timberlands, by Ownership Classes and by Softwood & Hardwood in the Kisatchie Market Area

	GROWING STOCK Million Cubic Feet						SAWTIMBER Million Board Feet					
	All Species		Softwood		Hardwood		All Species		Softwood		Hardwood	
Ownership / Year	**1984**	**1991**	**1984**	**1991**	**1984**	**1991**	**1984**	**1991**	**1984**	**1991**	**1984**	**1991**
National forest	1,082.4	1,024.2	793.1	731.6	289.4	292.6	4,865.5	5,191.0	4,024.9	4,030.6	840.6	1,160.4
Other public	600.6	717.8	205.3	269.7	395.3	448.1	2,473.9	3,137.6	1,010.8	1,338.7	1,463.1	1,798.8
Forest industry	4,375.8	3,985.3	3,086.8	2,706.2	1,288.9	1,279.1	16,155.8	15,398.2	12,361.2	11,025.2	3,794.6	4,373.1
Farmer	570.9	480.3	302.2	218.8	268.8	261.5	1,866.6	1,894.9	1,268.4	1,027.2	598.2	867.7
Misc. private	6,500.6	6,119.7	4,109.4	3,618.4	2,391.2	2,501.3	23,550.3	24,845.4	17,047.4	16,753.9	6,502.9	8,091.6
All owners	**13,130.4**	**12,237.3**	**8,496.8**	**7,544.7**	**4,633.6**	**4,782.7**	**48,912.1**	**50,467.2**	**35,712.7**	**34,175.6**	**13,199.3**	**16,291.6**

Source: *FIA 1984,1991*

In 1991, 53 percent of nonindustrial timberlands, 51 percent of the Kisatchie, and 49 percent of industry lands were in site class 120 or better.

Timber production

Timber produces significant economic impacts in Louisiana. Forestry is a leading industry in the State and supports the economy with more than 24 thousand manufacturing jobs. This payroll and income derived from money generated by the wood products industry amounted to an estimated $5 billion in 1990 (***Louisiana's Fourth Forest; The Louisiana Almanac, 92–93***).

In 1982 forest products sectors were ranked fourth among all manufacturing industries in employment, payroll, and value added in Louisiana. In 1990 the value of timber products was ranked first among major agricultural crops (**USDA Forest Service, *Forest Resource Report No. 24, 1988*; and *The Louisiana Almanac, 92–93***). In the same year the forest industry ranked second among the major Louisiana industries, ahead of oil and slightly behind chemicals (***Louisiana's Fourth Forest; The Louisiana Almanac, 92–93***).

Since 1978 softwoods have played a steady role in market area sawtimber removals. In 1992 softwoods accounted for 92 percent of all sawtimber removals in the market area. Hardwoods have played an important role in pulpwood removals and accounted for as much as 31 percent of pulpwood removals (in 1989). In 1992 pine accounted for 80 percent of removals. In recent years pine has played a steady role in total removals, accounting for 78–80 percent of all timber removals.

The most significant difference between the mix for sawtimber and pulpwood removals in the Forest and in the market area is the continued importance of pine sawtimber and pulpwood removals on the national forest. Within the Kisatchie's pine component, 70.4 percent of the timberland acres are in sawtimber size classes. Sawtimber size classes make up 54.2 percent of the market area's pine timberlands. The national forest contains a greater proportion of larger size classes and produces large-diameter quality sawtimber, veneer, poles, and pilings. While hardwood has become an increasingly important component of pulpwood removals within the market area, this has not been the case on the Kisatchie National Forest.

TABLE 3–38, 1991 AREA OF TIMBERLAND

By Site Class and Ownership in the Kisatchie Market Area

	Thousand Acres			
Site Class	National Forest	Other Public	Forest Industry	Other Private
> 165	101.0	61.9	447.4	743.7
120–165	186.6	94.2	1,303.0	1,839.6
85–120	203.0	207.6	1,310.9	1,601.1
50-85	73.9	137.6	480.7	652.2
< 50	3.9	16.6	33.8	70.4

The Forest has provided a total of 3,442,004 MBF during the period of 1970 through 1997 with a yearly average of approximately 122,929 MBF. The majority of this volume was pine, with a nearly even mix of sawtimber and pulpwood (50.9 percent pine sawtimber and 49.1 percent pine pulpwood).

As illustrated by table 3–39 on the next page, the Kisatchie National Forest contributes a small percentage to the total supply of timber produced in the market area. Because of the small amount of timber supplied by the Kisatchie National Forest, an increase or decrease in timber harvested from the Forest would not be expected to substantially affect prices in the market area. In 1982, a low harvest year, timber from the Forest accounted for 3 percent of total timber production in the market area. In 1986, when total timber harvest from the Forest was at an all-time high (230,771 MBF), this represented 6.76 percent of the total market area production. From 1978 to 1997 the Forest averaged 5 percent of all sawtimber in the market area.

The role of the Kisatchie as a producer of softwood sawtimber was slightly more significant; from 1978 to 1997 the Forest supplied an average of 5.6 percent of all softwood sawtimber in the market area. In 1985, when the Forest cut 124,276 MBF of softwood sawtimber, this amounted to just 12 percent of all softwood sawtimber cut in the market area. In the pulpwood market from 1978 to 1997 the Kisatchie accounted for 3.2 percent of all pulpwood cut in the market area. Please see tables 3–40 and 3–41.

The Forest's market role is illustrated in figure 3–9. In 1990 it accounted for 4 percent of the total timber cut in the market area, 5

GENERAL FOREST SETTING

COMMODITY PRODUCTION

TIMBER

Productivity

Timber production

GENERAL FOREST SETTING

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TIMBER

Timber production

TABLE 3–39, MARKET AREA VOLUME 1970–1997

Percentage of Total Volume Cut in the Kisatchie National Forest's Market Area

Year	National Forest Total Timber Production (MBF)	Market Area Total Timber Production (MBF)	National Forest Production as a Percentage of the Market Area Total (%)
1970	84,501	2,327,813	3.63
1971	87,156	2,234,002	3.90
1972	107,028	2,418,362	4.43
1973	110,880	2,441,718	4.54
1974	134,523	2,516,261	5.35
1975	127,106	2,070,165	6.14
1976	162,892	2,484,850	6.55
1977	137,564	2,527,669	5.44
1978	161,414	2,670,947	6.04
1979	147,570	2,675,476	5.52
1980	144,328	2,486,343	5.80
1981	101,008	2,444,443	4.13
1982	73,744	2,460,801	3.00
1983	112,981	2,850,866	3.96
1984	106,737	2,296,911	3.65
1985	216,967	2,894,621	7.50
1986	230,771	3,411,709	6.76
1987	166,624	3,518,902	4.75
1988	164,237	3,656,425	4.50
1989	108,444	3,615,183	3.00
1990	155,977	3,519,077	4.44
1991	121,471	3,336,090	3.64
1992	142,681	3,519,118	4.05
1993	81,688	3,764,546	2.17
1994	81,474	3,953,227	2.06
1995	64,283	3,681,272	1.75
1996	72,378	3,409,660	2.12
1997	56,608	3,440,234	1.65

MBF = thousand board feet, Scribner Scale

Source: *Forest Totals, 1970–1997 Kisatchie National Forest. Market Area Totals: Louisiana Dept. of Agriculture & Forestry, Office of Forestry, 1970–1997 Timber and Plywood Production*

percent of all softwood cut, and 6 percent of total timberland acreage. In 1991 the Forest accounted for 8 percent of all growing stock volume, 9.7 percent of all softwood growing stock volume, and 11.8 percent of all standing softwood sawtimber volume.

A percentage of national forest timber volume is set aside for bidding by small businesses. In connection with the sale of government-owned timber, the Small Business Administration defines a small business as 1) primarily engaged in the logging or forest products industry, 2) is independently owned and operated, 3) is not dominant in its field of operation, and 4) together with its affiliates, its number of employees does not exceed 500 persons. The small business share percentage is recalculated every 5 years to determine what percentage of timber volume would be set aside for preferential consideration of bids by small businesses. Table 3–42 displays the Forest's small business shares.

The Forest Service annually pays 25 percent of collected revenues from timber sales and other activities — such as grazing, recreation, minerals, and land uses — to states containing national forest lands. Law requires using these funds for schools and roads. Louisiana parishes receive varying amounts for all receipts, totaling millions of dollars. See table 3–43.

TABLE 3–40, VOLUME CUT BY PRODUCT 1981–1997

Kisatchie National Forest Volumes and Percents of Totals

Fiscal Year	PINE Sawtimber (MBF) VOLUME	(%)	PINE Pulpwood (MBF) VOLUME	(%)	PINE Total (MBF)	HARDWOOD Sawtimber (MBF) VOLUME	(%)	HARDWOOD Pulpwood (MBF) VOLUME	(%)	HARDWOOD Total (MBF)
1981	39,880	(42)	54,305	(58)	94,185	1,950	(31)	4,296	(69)	6,246
1982	24,698	(35)	46,202	(65)	70,900	597	(21)	2,247	(79)	2,844
1983	64,045	(63)	37,963	(37)	102,008	3,634	(33)	7,333	(67)	10,967
1984	37,368	(36)	64,974	(64)	102,342	667	(15)	3,718	(85)	4,385
1985	124,276	(59)	85,541	(41)	209,817	1,223	(20)	4,714	(80)	5,937
1986	111,426	(51)	106,223	(49)	217,649	1,323	(11)	10,775	(89)	12,098
1987	86,225	(56)	66,694	(44)	152,919	1,856	(15)	10,744	(85)	12,600
1988	90,425	(55)	59,175	(35)	164,237	1,433	(10)	12,654	(90)	14,087
1989	61,330	(56)	38,330	(34)	108,444	1,395	(16)	7,040	(84)	8,435
1990	78,920	(54)	67,958	(46)	146,878	815	(10)	7,671	(90)	8,486
1991	61,577	(54)	52,743	(46)	114,320	902	(13)	6,249	(87)	7,151
1992	71,607	(53)	62,928	(47)	134,535	1,031	(13)	7,115	(87)	8,146
1993	41,570	(52)	37,809	(48)	79,379	350	(15)	1,960	(85)	2,310
1994	34,961	(46)	40,951	(54)	75,912	782	(16)	4,227	(84)	5,009
1995	27,672	(43)	34,739	(57)	61,411	125	(4)	2,748	(96)	2,873
1996	27,895	(40)	41,282	(60)	69,177	202	(6)	2,999	(94)	3,201
1997	29,970	(55)	24,930	(45)	54,900	200	(13)	1,300	(87)	1,500

Source: *Timber cut and sold, Kisatchie National Forest*

TABLE 3–41, KISATCHIE'S MARKET ROLE 1978–1997

National Forest Role in Market Area by Product Percentage

Year	SAWTIMBER Pine	SAWTIMBER Hardwood	SAWTIMBER Total	PULPWOOD Pine	PULPWOOD Hardwood	PULPWOOD Total
1978	7.75	1.10	6.82	5.29	2.79	3.99
1979	6.07	1.11	5.42	5.91	1.86	4.22
1980	7.27	1.03	6.20	5.85	2.09	5.09
1981	5.46	1.28	4.74	4.41	1.30	3.75
1882	3.28	0.66	3.00	3.55	0.65	2.94
1983	5.90	2.81	5.57	3.05	1.88	2.77
1984	3.78	0.40	3.30	4.91	0.80	3.85
1985	11.90	1.00	10.77	6.84	0.99	5.22
1986	8.95	1.05	8.23	6.97	2.08	5.73
1987	7.26	1.05	6.40	4.19	1.90	3.59
1988	7.23	0.90	6.54	3.54	2.17	3.19
1989	5.38	1.03	4.92	2.37	0.97	1.94
1990	6.50	0.44	5.70	4.48	1.28	3.57
1991	5.51	0.97	5.17	3.34	1.14	2.77
1992	5.71	0.90	5.32	4.04	1.20	3.25
1993	4.70	0.40	4.42	2.47	0.29	1.82
1994	2.60	0.50	2.37	2.49	0.53	1.85
1995	2.03	0.20	1.95	1.88	0.30	1.50
1996	2.44	0.20	2.20	1.50	0.20	1.41
1997	2.67	0.22	2.30	1.50	0.20	1.46

GENERAL FOREST SETTING

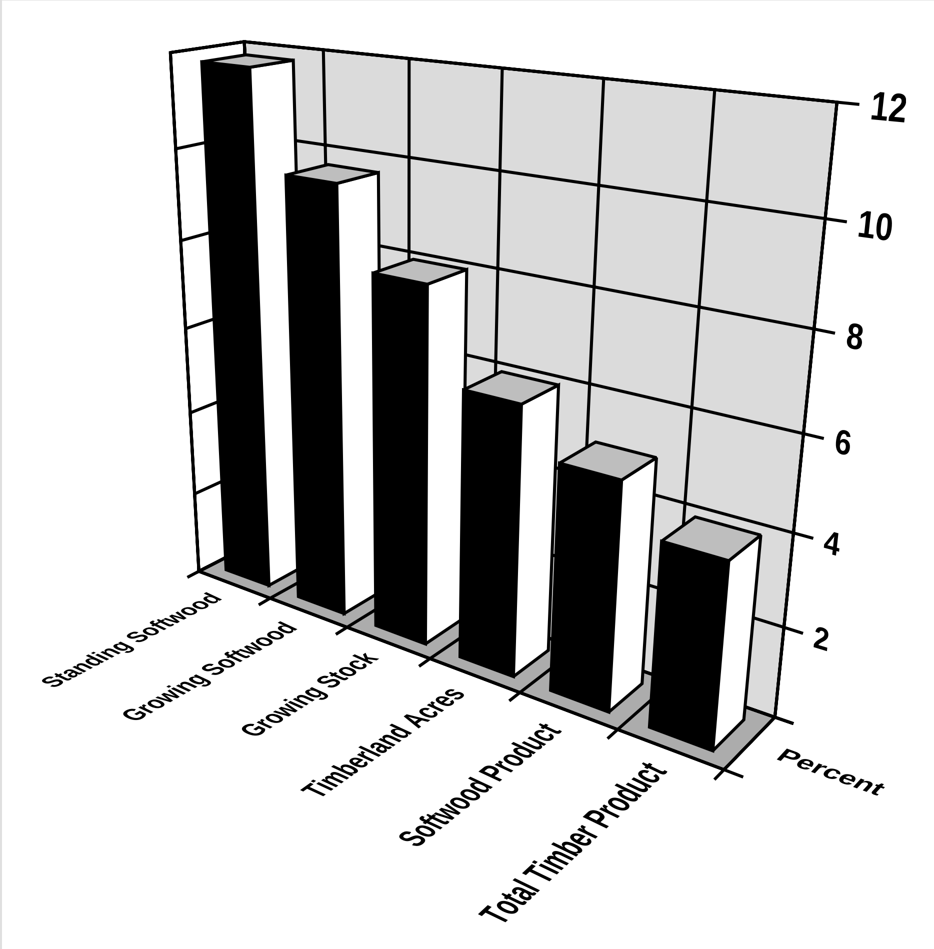
COMMODITY PRODUCTION

TIMBER

Land suitability for timber production

FIGURE 3–9, NATIONAL FOREST MARKET ROLE

Kisatchie National Forest as a Percent of Market Area Totals 1990-1991



Land suitability for timber production

The most current records show approximately 83 percent (505,260 acres) of the Kisatchie is identified as suitable for timber production. Table 3–44 displays a breakdown of the acres currently identified as unsuitable for timber production on the Forest. These acres would remain constant for all alternatives except in the *not appropriate* category. These are expected to vary as RCW cluster sites and recruitment stands are expanded; as additional replacement stands are designated; and as land is allocated differently to meet the Forestwide desired future conditions in the different alternatives.

Additional acres may be identified as unsuitable for timber production due to other resource objectives such as old-growth forest allocations; streamside and riparian habitat protection zones; or additional research natu-

TABLE 3–42, SMALL BUSINESS SHARES

5-Year Period	Small Business Share
1971–1975	52%
1975–1980	49%
1980–1985	48%
1985–1990	49%
1990–1995	48%
1996–2000	46%

TABLE 3–43, PAYMENTS TO LOUISIANA, 1932–1997

Fiscal Year	Forest Acres	Total $ Receipts	Payment to State	$ per Acre
1932	75,598	445.88	111.47	0.0015
1933	78,237	123.76	30.94	0.0004
1934	78,395	–310.56	77.64	0.0010
1935	88,455	1,229.76	307.44	0.0035
1936	413,020	1,521.36	380.34	0.0009
1937	481,837	7,368.05	1,842.01	0.0038
1938	485,204	21,013.57	5,253.39	0.0103
1939	490,549	31,466.88	7,866.72	0.0161
1940	499,157	33,514.34	8,378.58	0.0168
1941	505,044	45,512.77	11,378.19	0.0225
1942	531,738	59,227.19	14,806.80	0.0278
1943	535,305	204,538.87	51,134.72	0.0953
1944	538,658	200,138.96	50,034.74	0.0929
1945	538,658	199,725.82	49,931.46	0.0927
1946	538,690	157,081.46	39,270.36	0.0729
1947	540,089	173,031.35	42,788.71	0.0792
1948	547,464	311,278.65	77,819.66	0.1421
1949	547,464	405,386.83	101,346.71	0.1851
1950	559,829	450,693.28	112,673.32	0.2013
1951	560,565	409,613.84	102,403.46	0.1827
1952	560,512	620,660.24	155,165.06	0.2768
1953	560,512	606,940.26	151,735.07	0.2707
1954	560,512	615,083.80	153,770.95	0.2743
1955	560,543	799,800.99	199,950.25	0.3567
1956	560,543	937,773.80	234,443.45	0.4182
1957	560,543	755,634.50	188,906.13	0.3370
1958	560,571	906,141.40	226,535.35	0.4040
1959	560,571	1,192,118.38	298,029.59	0.5317
1960	591,566	1,111,420.49	277,855.12	0.4696
1961	591,409	1,483,337.64	370,834.41	0.6270
1962	591,409	831,495.54	207,873.89	0.3515
1963	591,564	959,460.34	239,865.09	0.4055
1964	591,637	984,660.22	246,165.06	0.4161
1965	591,571	1,032,541.73	258,135.43	0.4364
1966	591,530	1,313,822.69	328,455.67	0.5553
1967	593,291	1,853,094.38	463,273.60	0.7809
1968	593,117	2,560,923.00	640,130.91	1.0794
1969	593,447	2,947,891.31	736,947.831	0.2418
1970	593,789	2,300,357.66	575,089.42	0.9685
1971	594,759	2,530,686.36	632,671.59	1.0637
1972	594,849	5,146,473.14	1,286,618.28	2.1629
1973	595,216	5,742,846.78	1,435,711.69	2.4121
1974	595,361	8,408,397.83	2,102,099.46	3.5308
1975	595,589	4,794,432.25	1,198,608.05	2.012
1976	595,562	6,494,626.00	1,623,656.50	2.726
1976TQ[1]	595,562	2,180,898.89	545,224.75	1.000
1977[2]	596,869	10,100,574.24	2,525,143.56	4.230
1978	597,039	11,037,234.00	2,759,308.00	4.6217
1979	597,637	12,741,284.76	3,185,321.19	5.329
1980	597,663	9,314,048.10	2,328,512.03	3.90
1981	597,672	7,994,018.92	1,998,504.74	3.34
1982	597,769	8,845,406.23	2,211,351.56	3.70
1983	597,839	15,494,281.58	3,873,570.39	6.48
1984	597,933	18,685,788.59	4,671,447.15	7.81
1985	599,017	9,625,571.68	2,406,392.93	4.02
1986	600,102	12,708,943.82	3,177,235.97	5.29
1987	600,231	13,693,251.22	3,423,312.82	5.70
1988	600,574	11,214,790.75	2,803,697.70	4.67
1989	600,619	10,599,883.11	2,649,970.79	4.41
1990	600,764	13,914,772.43	3,478,693.12	5.79
1991	600,764	11,249,988.31	2,812,497.08	4.68
1992	601,398	15,554,753.03	3,888,688.27	6.47
1993[3]	602,090	9,669,394.28	2,417,348.58	4.01
1994	603,288	10,308,089.22	2,577,223.55	4.27
1995	603,757	8,699,053.25	2,174,763.33	3.60
1996	603,786	10,942,189.01	2,735,547.25	4.53
1997	604,138	11,795,262.98	2,948,815.75	4.88

[1] ***TQ (Transition Quarter) –*** *A 3-month interim, as Federal fiscal years were changed.* [2] ***Returns of revenues –*** *Prior to fiscal year 1977, returns to parishes were based on 25 percent of net receipts. The National Forest Management Act of 1976 changed this to 25 percent of the gross receipts.* ***Note:*** *Parishes containing national forest land receive 25 percent of annual Forest receipts. The amount is based on national forest acres in a parish.* [3] ***Mineral receipts –*** *Beginning with FY 93 revenues, the Minerals Management Service (MMS) assumed oil and gas minerals activities. National forest receipts reflect only the sale of mineral materials such as sand and gravel. Consequently, 25% payments are distributed to states from two sources: the USFS and the MMS.*

TABLE 3–44, ACRES UNSUITABLE FOR TIMBER PRODUCTION

Water — reservoirs, lakes	3,435
Non-forest — permanent openings, rights-of-way, special uses	8,042
Special — scenic, historic, natural areas, wilderness	11,428
Not appropriate — RCW cluster sites and recruitment stands, experimental forest, wetlands, recreation sites, military intensive use areas, administration sites, seed orchard, etc	71,900
Non-productive — prairies, bogs, savannahs, poor sites	6,680

GENERAL FOREST SETTING

COMMODITY PRODUCTION

TIMBER

Land suitability for timber production

Milling capacity

ral areas, scenic areas, and other special interest areas. Amounts would vary by alternative.

Future trends

Since World War II demand for wood products in central Louisiana and the South has risen steadily. Current demand for wood substantially exceeds supplies, as indicated by stumpage prices and the number of bidders for most timber sales. Second-growth pine stands provided sufficient supply until the 1990's. At this writing, the majority of second-growth is on the Kisatchie National Forest, while private holdings are primarily plantation wood.

Milling capacity

The Forest's immediate market area major wood-processing facilities are as follows:

- 4 sawmills, with estimated capacity of 500 MMBF each
- 8 plywood / veneer mills
- 6 pulp / paper mills
- 4 pole treatment mills
- 13 chip mills

There are 16 chipmills in Louisiana (**M. Buchart, Director, Forest Product Marketing, Utilization and Industrial Development, Louisiana Department of Agriculture and Forestry, Office of Forestry; and, T. Johnson, Forest Inventory and Analysis, Southern Research Station, personal communication**). Four mills had start-up dates between 1994 to 1998. For the remaining mills, 1 came on line in the 1960's, 1 in the 1970's, 6 in the 1980's, and 3 in the early 1990's. One mill, in Ouachita Parish, is scheduled to start up in 1999 (**Timber Processing, July/August 1998**). Ten of the 16 chipmills predominately produce hardwood chips, six predominately produce softwood chips.

Thirteen of the sixteen chipmills are within the 30-parish market area of the Forest; six are within the seven parishes containing national forest lands. Three mills in the 7 parishes containing national forest lands had start-up dates from 1994 to 1998. Two mills came on line in the 1970's, and 1 in the 1980's. Three are predominately hardwood chipmills, and 3 are softwood chipmills.

A combination of milling facilities, relatively low logging costs, fiber growth capacity, and access to growing Texas and southeastern markets have produced strong, consistent demand for all wood products from the Forest.

Nationwide timber supply and demand projections indicate an increasing role for nonindustrial timberlands as supplies from national forests decrease. The 1989 RPA Assessment (**USDA Forest Service, 1990**) stated, "Opportunities to increase productivity exist on all ownerships, but the greatest potential is on private ownerships, decisions on future management of private timberlands tend to be less constrained by institutional factors and freer to respond to economic opportunities than management choices for public lands."

Concerns over a continuous timber supply and the long-term health and productivity of forest lands have prompted state, federal, and industry programs and initiatives to ensure sustainable forest management and conservation of all forest values. These programs and their coordinating group(s) include the Louisiana Forestry Initiative (state forestry community), Sustainable Forestry Initiative (American Forest and Paper Association), Forestry Incentives Program (USDA-Natural Resources Conservation Service [NRCS]), Stewardship Incentives Program (USDA-Farm Services Agency), Forest Stewardship Program (Louisiana Office of Forestry), Wetland Reserve Program (NRCS), Environmental Quality Incentives Program (USDA-Farm Services Agency), Conservation Reserve Program (USDA-Farm Services Agency), Louisiana Best Management Practices program (Louisiana Office of Forestry and the Louisiana Forestry Association), Forest Productivity Program (Louisiana Department of Agriculture), and the Wildlife Habitat Incentives Program (NRCS). Other programs or incentives available to landowners include Partners for Wildlife (U.S. Department of the Interior-U.S. Fish and Wildlife Service [USFWS]), Safe Harbor Program (USFWS), Conservation easements (The Nature Conservancy), Pineywoods Conservation Initiative (The Nature Conservancy and the Louisiana Department of Wildlife and Fisheries-Natural Heritage Program [LNHP]), and the Louisiana Natural Areas Registry (The Nature Conservancy and LNHP).

LOCATABLE AND LEASABLE MINERALS — REASONABLY FORESEEABLE DEVELOPMENT SCENARIO

Background

While providing for the conservation and protection of surface resources, the Forest encourages, facilitates, and administers the exploration, development, and production of mineral resources. Mineral activities on the Forest are encouraged in accordance with various mining and leasing acts, and applicable federal and state statutes governing protection of the environment. This includes air and water quality standards applicable to these activities. Statutory and regulatory direction separate mineral resources in publicly owned lands of the United States into three categories: locatable, leasable, and salable.

Locatable minerals may be acquired through compliance with the *U.S. Mining Laws of 1872*, as amended. Locatable minerals include gold, silver, platinum, copper, and other minerals having unique and special values. There are no known deposits of locatable minerals on the Forest.

Leasable minerals include fossil fuels — primarily coal, oil, natural gas, oil shale — and geothermal resources. All of these are subject to exploration and development under leases, permits, or licenses granted by the Secretary of the Interior with consent of the Secretary of Agriculture. The Secretary of Interior's authority is administered by the Bureau of Land Management (BLM). Current controlling statutes are the *Mineral Lands Leasing Act of 1920* and amendments, the *Mineral Leasing Act for Acquired Lands of 1947*, and the *Federal Onshore Oil and Gas Leasing Reform Act of 1987*.

Because most of the national forest land was acquired, the United States has varying degrees of ownership of mineral rights and control of surface operations related to mineral extraction. The United States claims ownership of all mineral rights on approximately 469,500 acres of the Forest, of which 9,166 acres are reported as unavailable to lease. This includes the legislatively withdrawn acreage in the wilderness area.

In 1996 the United States owned a partial interest in the minerals on about 440 acres within the Forest and 100 percent of the minerals on 1,284 acres of private land. Over time these figures are subject to change because of the prescriptive rights contained in the Louisiana mineral statutes.

According to 1996 records about 113,800 acres of mineral rights were outstanding in third party under USA-owned surface. Also, there were about 20,000 acres where the grantor reserved a mineral servitude when the land was conveyed to the USA.

The majority of the forest land was acquired subject to a variety of encumbrances involving mineral rights. Louisiana law does not allow for the creation of a mineral estate separate from the surface estate. Instead, a sale or reservation of minerals creates a mineral servitude granting the holder the right of enjoyment of the land belonging to another for the purpose of exploring for and

TABLE 3–45, 1990-1994 DRILLING HISTORY

	Winn District	Caney District
1990	7 wells drilled	1 well drilled
	6 dry holes	1 dry hole
	1 producer	
	0 USA minerals	1 USA minerals
	7 outstanding	
1991	2 wells drilled	1 well drilled
	1 dry hole	
	1 producer	1 producer
	0 USA minerals	1 USA minerals
	2 outstanding	
1992	1 well drilled	1 well drilled
	1 producer	1 producer
	1 USA minerals	1 USA minerals
1993	1 well drilled	0 wells drilled
	1 producer	
	1 private minerals	
1994	2 wells drilled	1 well drilled
	1 producer	
	1 dry hole	1 dry hole
	0 USA minerals	
	2 private minerals	

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producing those minerals. The servitude must be exercised by the holder within 10 years or the mineral servitude is extinguished.

The Forest is currently reviewing mineral title records on all its lands to verify ownership. It is anticipated that this project will be completed within the next 18 to 24 months. This is the result of recent legal opinions issued by the USDA, Office of General Counsel, and a realization that the Forest mineral ownership records were in error as prescription, based on non-use as allowed for under state law, was not considered when earlier ownership determinations were made.

Until such time as this review is complete, the Forest is unable to provide accurate figures as to the number of acres of Forest lands subject to mineral rights outstanding in third parties or reserved.

Litigation involving ownership of certain mineral rights and the U.S.'s interpretation of the Louisiana statutes governing mineral prescription is on-going. A final mineral ownership determination for the Forest's 603,700 acres is unlikely until that litigation is complete. If the court ruling(s) result in an interpretation of state law that differs from that used in the on-going mineral title verification, the Forest will initiate a second review based upon the court ruling(s).

Fee ownership offers the greatest control because exploration is carried out under a lease with stipulations developed by the Forest Service.

Under the terms of a lease, the lessee has a right to use the leased lands as necessary to explore for, drill for, mine, extract, remove, and dispose of all the leased resources in a leasehold. Federal oil and gas leases contain *standard lease terms* (SLTs) which provide that the operations must be conducted in a manner that minimizes adverse impacts to the land, air, water, cultural, biological, and visual elements of the environment, as well as other land uses and users. Federal environmental protection laws such as the Clean Water Act, Endangered Species Act, and Historic Preservation Act are applied to all lands. In addition a stipulation may be applied that modifies the standard lease rights and is attached to and made a part of the lease. Conditions or restrictions in the stipulations are considered consistent with the lease rights granted, provided that they do not require relocation of proposed operations by more than 200 meters, require that the operations be sited off the leasehold, or prohibit new surface disturbing operations for a period in excess of 60 days in any lease year. There are three stipulation forms available for attaching to leases. They are:

- *No surface occupancy* (NSO) — Used when surface occupancy of certain lands is prohibited during development.

- *Timing / season* — Used to prohibit surface occupancy of certain lands during specific times, such as for protection during nesting season.

- *Controlled surface use* (CSU) — Used when certain restrictions will apply to occupancy, such as potential conflicting uses that exist or used to meet visual quality objectives.

A *lease notice* (LN) may also be used. This does not contain any new restrictions. It puts the lessee on "notice" that his operations could be affected by special on-the-ground conditions existing when the lease was granted.

Two nationally approved stipulations are currently used on the Kisatchie National Forest as conditions of consent to lease on an as-needed basis. These are the NSO and CSU. Also, two LNs are used consistently by the Kisatchie:

- **LN #3**, which indicates all or part of the leased lands may contain animal or plant species classified under the Endangered Species Act, is included in all consents to lease Forest lands.

- **LN #4**, which indicates all or part of the leased lands may be classified as wetlands, floodplain, or riparian areas that will require special protection, is required when those areas are present.

Issued leases are reviewed on the Forest to ensure inclusion of two basic stipulations. One *Notice to Lessee* **(NTL)** from the BLM, Department of the Interior, states that any entity holding a coal lease cannot qualify for an oil and gas lease unless the coal lease is operating properly. The other stipulation applies to all national forest lands under the jurisdiction of the Department of Agriculture and ensures general compliance with rules and regulations of the Secretary of Agriculture when not inconsistent with the rights granted in the lease.

A lessee may request a modification, waiver, or one-time exception of an NSO stipulation, or any other stipulation. The Forest Service may authorize the BLM to grant the change if: 1) the change is consistent with Federal law and the Forest Plan, 2) management objectives which led to the stipulation can be met following the change, and 3) the environmental impact of the change is acceptable. If the change substantially modifies the terms of the lease, public notice must be given at least 30 days before the results of an environmental analysis are approved (Federal Onshore Oil and Gas Leasing Reform Act of 1987).

In all cases where the minerals are privately owned, the Forest Service must obtain the best surface protection possible using terms of the deed severing the subsurface from the surface, applicable state and federal laws, and cooperation and negotiations with the operator.

The Kisatchie has a long history of oil and gas exploration, development, and production. In recent years the acreage leased for oil and gas development has increased steadily. Income from this commodity has increased concurrently. In FY 95 revenues from oil and gas leases and production totalled approximately $726,500 for the Forest. Receipts for FY 98 were about $1,612,000.

The Energy Policy Act of 1992, PL102-486, legislated new accounting procedures for leasable minerals receipts on National Forest System lands. These collections are processed by the Minerals Management Service (MMS) of the Interior Department. Beginning with fiscal year 1993 revenues, MMS assumed accounting responsibility along with control of the 25 percent payment to states distribution for oil and gas mineral activities. Therefore, from 1993 to the present, the figures in table 3–43 do not include the sale of oil and gas leases, but reflect only the sale of mineral materials such as sand and gravel.

The Austin Chalk formation extends into central Louisiana, underlying the Vernon and Evangeline Units of the Calcasieu District, and the southern part of the Kisatchie District. Horizontal drilling is preferred in the Austin Chalk because of the formation's characteristics. Louisiana's Austin Chalk lies at 12,000 to 15,500 feet below the surface, and past drilling on private land had been considered less than successful until recently. In 1995 Oxy USA drilled a successful well on the Evangeline Unit (federal minerals, private surface), with initial production of 7,271 MCF of gas and 1,924 barrels of oil daily.

Two wells, one in Avoyelles Parish and one in Rapides Parish, have indicated a strong production initially but the Avoyelles Parish well soon decreased significantly. The well in Rapides Parish has been producing only since November 1994, so it is too early to predict long-term success.

The Austin Chalk formation in Texas has resulted in commercial production along "sweet spots" where the chalk reservoir fracture density is greatest (Maloy, 1997). In a geological review of the Louisiana Austin chalk, Maloy (Maloy, 1997) concluded that the results should be the same in Lousiana and only selected "sweet spots" will yield commercial production.

Between 1990 and 1995, most of the drilling activity on the Kisatchie National Forest was on the Winn and Caney Districts. The Winn District has had the most activity

TABLE 3–46, LEASABLE ENERGY MINERALS

Acres Available for Oil & Gas Leases
As of September 1996

District /Unit	Acres Potentially Available for Lease [6]	Acres With LN #4	Acres With CSU Stipulation	Acres With NSO Stipulation	Unavailable Due to Congressional Action
Catahoula	91,457	89,734	124	20,888	0
Evangeline Unit	82,901 [1]	66,997	2,628	9,404	0
Kisatchie	91,721	87,504	513	1,858	9,166 [5]
Winn	77,513 [2]	72,599	0	1,833	0
Vernon Unit	84,854 [3]	83,427	39,839	520	0
Caney	31,873 [4]	28,554	0	3,509	0
Totals	460,319	428,815	43,104	38,012	9,166

Note: all acreages have been rounded to the nearest whole acre.
[1] 236.99 acres have public domain (pd) status
[2] 402.57 acres have pd status
[3] 39.79 acres have pd status
[4] 34.65 acres have pd status
[5] Acres withdrawn for Kisatchie Hills Wilderness (designated to contain 8,700 acres)
[6] Actual acres of federal mineral ownership will be unavailable until completion of the mineral title verification project and a final court ruling on the interpretation of Louisiana state statutes governing mineral prescription.

TABLE 3–47, 10-YEAR DRILLING FORECAST

District/Unit	Low	Moderate	High
Level of Industry Activity of O / G Drilling:			
Caney	2	9	16
Catahoula	1	3	6
Evangeline Unit	5	10	20
Kisatchie	1	6	10
Vernon Unit	5	15	26
Winn	9	17	59
Total	**23**	**60**	**137**
Total Number of Dry Holes:			
Caney	1	2	3
Catahoula	1	1	2
Evangeline Unit	1	4	16
Kisatchie	1	2	3
Vernon Unit	3	6	12
Winn	8	13	18
Total	**15**	**28**	**54**
Total Number of Producers:			
Caney	1	7	13
Catahoula	0	2	4
Evangeline Unit	2	3	4
Kisatchie	0	4	7
Vernon Unit	2	9	14
Winn	3	7	41
Total	**8**	**32**	**83**

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with the overwhelming majority of the drilling on reserved or outstanding (private) mineral rights. Table 3–45 provides the drilling history of the Kisatchie National Forest from 1990 through 1994.

Current conditions

In 1998 approximately 341,000 Forest acres were under lease for oil and gas exploration and development. This is approximately 74 percent of the total acres available for lease on the Forest in 1996. Table 3–46 lists the number of acres that were available for lease by district. It also shows the number of acres that were affected by the two standard stipulations (NSO and CSU) and LN #4 (floodplain and wetlands). Since LN #3 is included in all leases, it is not included in the table. The "no surface occupancy" stipulation is currently required for all lands located within the following designated areas: developed recreation areas, special interest and scenic areas, registry natural areas, research natural areas, Stuart Seed Orchard, seed production areas, Breezy Hill "no entry" area, Claiborne Bombing & Gunnery Range impact area, administrative sites, state natural and scenic river corridors, Saline Bayou National Scenic River corridor, portions of the Palustris Experimental Forest's Longleaf and Johnson Tracts, where ongoing research projects require no surface occupancy, and other areas designated sensitive because they contain aesthetic importance or where certain specified vegetation management practices have been implemented to maintain or improve the quality of the visual resource. A specific listing of designated areas along with their inclusive acres are contained in the *Mineral Supply and Demand Analysis* — located in the Forest Plan revision process records.

Within the Forest are 42 producing wells — 7 on the Caney District, 15 on the Winn District, and 20 on the Vernon Unit of the Calcasieu District. In addition to the producing wells on the Winn, there is also one saltwater disposal well. Drilling activity on the Winn District, from March 1999 to June 1999, resulted in two dry holes and 1 producer. The Vernon Unit has received one application for permit to drill (APD), and drilling is scheduled for December 1999.

The Forest has been divided into areas of unknown, low, moderate, and high potential for oil and gas development. This is illustrated in table 3–47. Based on analysis of the geologic data, trends, and other available information, the 10-year mineral demand prediction is also shown in that table.

- **High potential** — Geologic environments that are highly favorable for the occurrence of undiscovered oil and / or gas resources. This includes areas previously classified as *known geologic structures* (KGS). A KGS is defined as "…a trap, either structural or stratigraphic, in which an accumulation of oil or gas has been found to be productive, the limits of which include all acreage that is presumptively productive." The area is on or near a producing trend and evidence exists that the geologic controls of reservoir, source, and trap necessary for the accumulation of oil and / or gas are present.

- **Moderate potential** — Indicates the geologic environment is favorable for the occurrence of undiscovered oil and / or gas resources; however, one of the geologic controls necessary for the accumulation of oil and / or gas may be absent.

- **Low potential** — The geologic, geochemical, and geophysical characteristics do not indicate a favorable environment for the accumulation of oil and / or gas resources. Evidence exists that one or more of the geologic controls necessary for the accumulation of oil and / or gas is present.

- **Unknown potential** — A region where the geologic information is insufficient to otherwise categorize potential.

Existing on all districts is the possibility of hydrogen sulfide gas (H_2S), a highly toxic, transparent, and colorless gas that can paralyze a person's respiratory system and can cause death in minutes. Safety precautions are required when the potential for H_2S is evident. Currently, H_2S is known to occur only on the Winn District.

The Caney District contains three geographic areas. The entire district has high potential for the occurrence of oil and gas reserves because of the many fields (Colquitt, Bayou Middle Fork, Northwest Antioch, and Mount Sinai) on or adjacent to the district. Presently there is no drilling activity on the district. Approximately 78 percent of available acreage is currently leased.

The Catahoula District has moderate-to-high potential for the occurrence of oil and gas reserves. Approximately 64 percent of available leasable acres on the district are presently leased. During the past four years (1995-1998), 3 wells were drilled on the district; all were nonproducers. High interest has been expressed in continuing exploration or drilling operations, so future requests are anticipated. There is gas production on private land within and adjacent to the district.

Production has been limited to shallow wells in the School House Creek field, targeting the Wilcox formation. The School House wells were gas wells with some associated oil. The drilling depths range from 3,000 to 4,000 feet.

The Evangeline Unit of the Calcasieu District has moderate-to-high potential for the occurrence of oil and gas reserves. All leasable acres are presently leased.

One producing well on the unit is located on private land adjacent to USA property. Two directional holes were drilled; one directed toward privately owned minerals and the other directed to USA-owned minerals. The Austin Chalk formation (see figure 3–10) which underlies this unit was the target of both holes. Two wells were targeted for the Tuscaloosa formation with Austin Chalk being a second objective. Drilling was completed in December 1996. Both holes failed to produce for either objective.

There was considerable interest in drilling for the Austin Chalk in Texas prior to extending interest into Louisiana. Horizontal drilling has been successful for recovering the oil and gas from the formation. Drilling at greater depths — 12,000 feet or more — in Louisiana would be required to reach this formation. Horizontal drilling and the increase in drilling depths increase exploration and production costs. Six APDS were filed but no wells were drilled. All permits have been withdrawn as of February 1999.

The Kisatchie District has moderate-to-high potential for the occurrence of oil and gas reserves. During the past four years (1995-1998), 3 wells were drilled on the District; all were nonproducers. There are currently no exploration or drilling operations. One well, however, that was a producer has recently been closed down. The APDs for two other wells have been approved by BLM. One well was drilled but was dry. About 90 percent of the district's leasable minerals are presently leased. The Austin Chalk formation may underlie the southern portion of the district.

The Vernon Unit of the Calcasieu District is also classified as having high potential. No exploration or drilling is presently underway on the unit. However, 21 wells were drilled since 1997 with 20 wells producing and 1 dry hole. About 90 percent of the unit's available acreage is leased. The unit has historically seen little drilling activity. Recent interest, however, has been substantial because of other successful production from the Austin Chalk. It is anticipated that as many as 10 to 20 APDs could be filed during the coming 5 to 10 years.

The Winn District has high potential for occurrence of oil and gas. During the past four years (1995-1998), 3 wells were drilled on the district; 2 of the 3 were producers. Currently there are 15 active oil and gas

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wells on the district and many private wells adjacent to it. Approximately 19 percent of leasable acres are presently under lease. The district's currently producing area is the Calvin Field.

A more in-depth analysis of leasing exploration and predicted future impacts is included in the *Mineral Supply and Demand Analysis* — located in the Forest Plan revision process records.

Future trends

Table 3–47 indicates the projected level of drilling by the oil and gas industry. This considers the potential for producers, the economic situation, and other factors that affect exploration. It is anticipated that leasing interest on the Forest will continue, especially for areas with potential for developing the Austin Chalk formation. Successful producers from this formation are primarily due to new technology allowing horizontal drilling, for optimum recovery of hydrocarbon reserves.

There has been recent interest in leasing on the Winn and Catahoula Districts in addition to the Calcasieu District. The total anticipated number of wells to be drilled within the next twelve months on the Forest is 7; 5 on the Winn District and 2 on the Vernon Unit of the Calcasieu District. However, with the rising interest in leasing, the Catahoula District may anticipate 3 wells or more, and there may also be an increase on drilling on the Calcasieu and Winn Districts. There has been no recent drilling or leasing interest in the Kisatchie or Caney Districts.

In addition to well sites and roads, impacts would include connecting uses such as pipeline rights-of-way, storage facilities, processing or transfer stations. Table 3–48 shows leases scheduled to expire by the year 2003. Some of these will be extended because of drilling activity while others may terminate earlier than the expiration date by either request or nonpayment.

As crude oil prices rise because of increased demands for petroleum-based products development may again increase. However, oil production in the United States should decline as oil imports increase. These developments are attributed to higher-profit nondomestic sources. The decline of domestic development is also a result of diminishing acreage available for exploration; many areas are being withdrawn from availability. Also, environmental laws make development more costly.

The production outlook for domestic natural gas is much better than that of domestic crude oil. Gas production and prices should increase gradually for the decade as electric utilities prefer gas to generate electric power.

Another factor influencing future oil and gas development is economic growth. Using the reference case presented in the *1992 Annual Energy Outlook* as a mid-level growth rate, total energy demand increases at a 2.2 percent annual rate. Measured by changes in gross national product, increases in the growth rate reflect rising energy demand.

SALABLE MINERALS

Background

Salable minerals — also called *mineral materials* — are common varieties of stone, gravel, sand, and clay as defined by the Minerals Act of 1947 and Public Law 167 of July 23, 1955. In general these minerals are widespread, present relatively low unit values, and are predominantly used for road construction and maintenance.

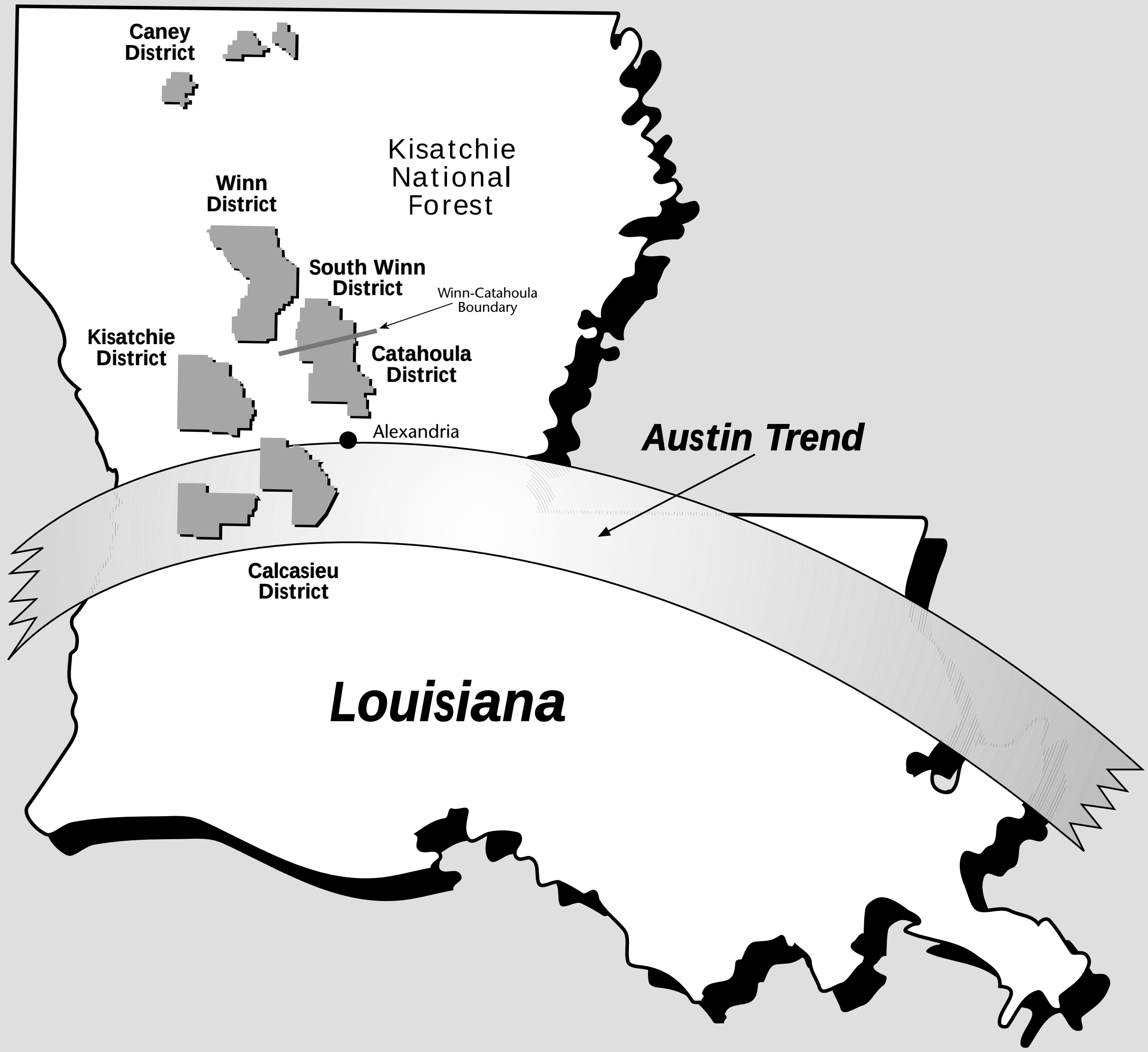
Common-variety minerals known to exist on the Forest are sand, gravel, low-grade iron ore, clay, and salt. Although known sand and gravel deposits are located on the Catahoula District, and the Evangeline and Vernon Units of the Calcasieu District, gravel reserves across the Forest are limited.

In Louisiana, the surface owner is also the owner of common variety minerals regardless of reserved or outstanding mineral rights.

TABLE 3–48, SCHEDULE OF EXPIRING LEASES

	Forest Acres Leased 1998	Year 1999	2000	2001	2002	2003
Acres	341,132	49,686	15,304	16,049	28,320	38,873

FIGURE 3–10, LOCATION OF AUSTIN CHALK FORMATION



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The only exception would be in the event that a deed specifically reserved certain commodities. Historically, most accessible sand and gravel deposits have been used by local governments or by commercial operators for road surfacing material. The Forest Service has retained the right to utilize pit-run gravel for its own needs, to be taken from pits that are under permit to other government agencies. However, this is not applicable on permitted commercial operations.

Extensive iron ore deposits exist in Webster and Claiborne Parishes. Some smaller scattered deposits are located on the Caney District. Because of its high phosphorus content, iron ore in the larger deposits has not been historically competitive with other iron ore sources. High phosphorus content in iron ore produces brittle steel. Although technology is available to remove phosphorus, this is not considered cost-effective.

Clay and salt deposits are also located within the Forest boundary. These deposits have historically not been commercially operable because abundant reserves exist outside the Forest.

Current conditions

In 1998 the Forest administered a total of 20 permits for the removal of common-variety minerals. Approximately 99,293 cubic yards of pit-run material was removed. Local governments, mainly parish police juries, removed 98,749 cubic yards of pit-run material for local parish road maintenance. The Forest Service removed 37,875 cubic yards of pit-run for road maintenance and construction projects. Commercial operators and temporary special-use contracts accounted for the removal of approximately 542 cubic yards of pit-run material.

Areas of the Forest thought to have potential for development as gravel reserves have been partially inventoried. In some areas the Forest has used seismic drill logs, in conjunction with geologic structure maps, to determine potential areas in which to conduct future testing operations.

Future trends

The demand for gravel continues to grow. Basic gravel and haul costs are rising. This has produced an increasing awareness that mineral materials are a resource that must be managed in coordination with renewable resources.

RANGE

Background

Regulated grazing allotments were established on the Forest in 1967. Prior to that time domestic livestock were grazed over open range on all districts except the Caney. Between 1967 and 1981 dozens of allotments became vacant and were eventually closed to grazing. Since open range laws remained in effect long after 1967 on lands surrounding national forest land, trespass livestock including cattle, horses, and hogs have intermittently occurred on the Forest.

The large decrease in permitted use and number of active allotments generally resulted from stock reductions on overgrazed allotments, institution of local livestock ordinances, and strict permit requirements. By 1981, 54 allotments totaling about 240,000 acres were established across the Forest — excluding the Caney District — to provide forage for livestock grazing. There had been no grazing on many of these allotments for several years. Consequently structural improvements such as fences, stock watering facilities, and corrals had fallen into a state of disrepair. As the number of permittees continued to elect to waive their permits and permittee fence maintenance ceased, control of trespass livestock, especially in areas where open range laws were in effect on private lands adjoining the Forest, has been an intermittent but ongoing problem. The total number of permitted livestock grazing on the Forest has declined to 10 percent of that in 1967, the year that regulated grazing allotments were established. Please see figure 3–11.

Current conditions

The Kisatchie's livestock forage is produced primarily in a forested setting, most often under relatively open, periodically burned pine canopies. Sometimes it is in large regeneration area openings or other breaks in the canopy. Cattle grazing has been and continues to be confined primarily to longleaf and slash pine stands which are thinned and prescribed burned on a regular basis. Native bluestem grasses are the dominant livestock forage species.

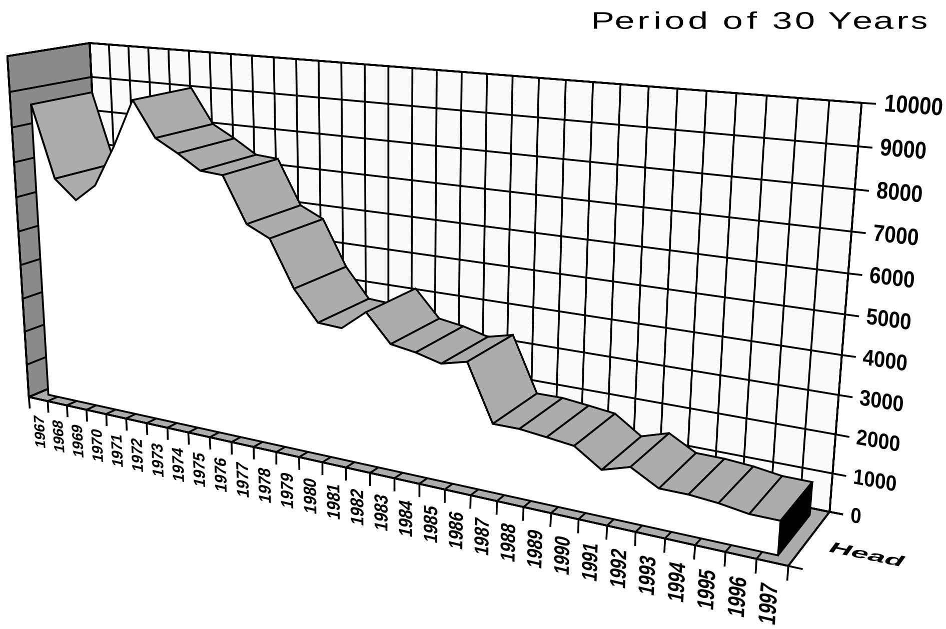
Range allotment plans have been implemented on all active allotments. Plan objectives are to obtain proper forage utilization without damage to other forest resources. Options for improving livestock distribution and resource protection controls include fencing and rotational grazing, seasonal grazing, supplemental feeding, salting, and water hole placement. Periodic overstory thinning and prescribed fire are the primary management tools used to increase forage production.

At this writing, 16 livestock owners hold term grazing permits, allowing 853 cattle to graze on 14 allotments covering about 78,000 acres. Currently, the Catahoula District has 1 permittee grazing livestock on 1 allotment; the Calcasieu District, 14 on 12; and the Kisatchie District, 1 on 1. Current livestock use on the Forest is well below capacity. Although the Forest could supply considerable amounts of livestock forage, less than 2 percent of livestock producers within the Forest's 5-parish market area utilize Forest forage. Consequently the Forest's supply of beef cattle within the market area is also less than 2 percent.

Trespass livestock are known to continue to occur intermittently on the Forest. Appropriate actions are decided and taken on a case-by-case basis following established policies and procedures.

FIGURE 3–11, FOREST GRAZING TREND, 1967–1997

Year	Permits	Head
1967	314	8,622
1968	544	6,566
1969	536	6,030
1970	485	6,526
1971	366	7,686
1972	326	9,028
1973	292	8,055
1974	295	7,709
1975	254	7,315
1976	239	7,267
1977	307	6,030
1978	195	5,731
1979	148	4,469
1980	141	3,658
1981	126	3,622
1982	122	4,157
1983	79	3,423
1984	80	3,314
1985	74	3,141
1986	60	3,310
1987	58	1,817
1988	56	1,824
1989	52	1,744
1990	44	1,658
1991	43	1,189
1992	28	1,413
1993	25	1,181
1994	24	1,161
1995	20	967
1996	18	856
1997	16	853



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In March 1990 the Southern Region established a new grazing fee system, basing fees upon fair market forage values. Fees collected for the Forest grazing program have since risen steadily. Increased costs of national forest grazing, and the preference of livestock owners to graze their stock on improved pastures — especially within the Red River floodplain, result in little demand for Kisatchie National Forest forage. These factors and others should result in a continuation of a steady decline in domestic grazing on the Forest.

LANDSCAPE SETTING

The first portion of Chapter 3, *general forest setting*, described the Kisatchie National Forest within the subregional scale of the national hierarchy of ecological units, called *sections* and *subsections*. This portion of the chapter focuses lower, at the landscape level of this hierarchy.

The landscape level is composed of ecological units, each called a *landtype association* (LTA). These LTAs are more finite subdivisions of their respective subsections. They are recurring areas of land ranging from about 25,000 to about 500,000 acres. Each LTA is fairly uniform in land-surface form, subsurface geological materials / features, patterns of soils, and historical landscape vegetation. Each LTA is composed of a unique pattern of smaller ecological units: *ecological landtypes*, *landtype phases*, and *sites*.

Three major criteria differentiate individual LTAs: *geology*, *historical landscape vegetation*, and *land-surface form*. For each of these criteria, their predominance over a relatively broad area is considered in the differentiation process.

The first of the three criteria is geology. Geologic history in terms of surface formation and time of deposition were used to delineate LTAs (**Groat and Roland, 1984**). They reveal soil parent materials and the length of time these materials have undergone physical, biological, and / or chemical weathering. Surface geology is an important criteria at this level because it closely corresponds to major soil associations, the recharge potential of major underground aquifers (**Boniol et al, 1989**), and a high correlation to the presence of historical plant communities (**Martin and Smith, 1991**). Please see table 3–49 for a display of geologic history in the area that is now Louisiana.

Historical landscape vegetation is the second of the three criteria for defining the Forest's LTAs. For delineating LTAs, the term *historical landscape vegetation* is used instead of potential natural vegetation. Interpretations using potential natural vegetation tend to disregard the influence of recurrent large-scale fires on plant communities (**Kuchler, 1964**).

The frequency and intensity of these landscape-level fires fundamentally influenced the composition and extent of broad forest patterns of the Kisatchie National Forest. The longleaf pine forests of the Southeast are considered a *pyroclimax* because they evolved under a frequent-fire regime. Fire developed the longleaf community and stabilized its historic distribution. In the absence of fire, less fire-adapted species — primarily hardwoods — would eventually replace most pines.

Historical landscape vegetation patterns were produced by an integration of climate, landform, geology (soil associations), and large-scale stabilizing disturbance regimes (fire). A fairly accurate representation of the major overstory vegetation patterns existing prior to 1900 on the area that is now the Kisatchie National Forest has been created. It relies on information from soil surveys, purchase unit records, and planting records dating back to the Civilian Conservation Corps, ca. 1933–1942. It is supplemented by Louisiana Natural Heritage Program documentation of pre-European natural communities on all ranger districts (**Grace & Smith, 1995; Williams & Smith, 1995; Martin & Smith, 1991 and 1993**). All of this information is further corroborated by existing vegetation patterns, as depicted by the Forest's continuous inventory of stand conditions database and old photographs of the Forest.

The Kisatchie recognizes four major historical landscape communities: *longleaf pine forests*, *shortleaf pine / oak-hickory forests*, *mixed hardwood-loblolly pine forests*, and *riparian forests*. For a detailed description of these communities and their makeup, please see the section on vegetation in Chapter 3, *general forest setting*. Each of these four communities are found in one or more LTAs. Likewise, as noted above, LTAs are broken down into smaller ecological units. Small units characteristic of one LTA may be found in adjoining LTAs. This happens because LTAs are broad landscape-scale units and are not intended to accurately map every anomoly in the edges of LTA units.

The last of the three criteria for defining the Forest's LTAs is land-surface form. It is used to identify relatively large areas — hundreds of square miles. These areas have predominantly uniform slope ranges, local relief, topography and drainage densities. On the Forest, four types of land-surface forms are recognized: *nearly level*, *undulating*, *rolling*, and *hilly*. See table 3–50.

The major differentiating criteria used to identify the Kisatchie National Forest's nine LTAs are displayed in table 3–51. To provide a more comprehensive and understand-

LANDSCAPE SETTING

TABLE 3–49, GEOLOGIC HISTORY

Composite Cenozoic Era Columnar Section of Louisiana

PERIOD	EPOCH	YEARS AGE	GROUP	FORMATION	REMARKS
QUATERNARY PERIOD	HOLOCENE	10,000		Recent alluvium	
	PLEISTOCENE	1,000,000		Loess	Forms a veneer on terraces locally.
				Prairie Intermediate terrace High terrace	Fluviatile and coastwise terraces at the surface; subsurface marine equivalents downdip zoned on paleontology.
TERTIARY PERIOD	PLIOCENE	13,000,000			Not recognized at surface except for Citronelle, possibly, in part; zoned in marine subsurface on paleo.
	MIOCENE	25,000,000		Fleming Catahoula	Subsurface marine beds zoned on paleo—arbitrarily into upper, middle, and lower.
	OLIGOCENE	36,000,000		Anahuac	Recognized in subsurface only.
				Frio	Mid. Frio (Hackberry) is a subsurface wedge.
			Vicksburg	Nash Creek (W) = Rosefield (E)	These are surface units, and are not subdivided in the subsurface.
				Sandel	
	EOCENE	58,000,000	Jackson	Mosely Hill Danville Landing Yazoo Moody's Branch	Most of these have both surface and subsurface expression.
			Claiborne	Cockfield Cook Mountain Sparta Cane River	
	PALEOCENE	63,000,000	Wilcox	Carrizo Sabinetown Pendleton Marthaville Hall Summit Lime Hill Converse Cow Bayou Dolet Hills Naborton	These are surface units; and are undifferentiated in the subsurface.
			Midway	Porters Creek Kincaid	These units are present only very locally at the surface.

Modified from: *Louisiana Geological Survey – 1980, Compiled by David E. Pope.*

LANDSCAPE SETTING

TABLE 3–50, CRITERIA OF LAND-SURFACE FORMS

Land-Surface Form	Description	Slope	Local Relief
Nearly level	Large floodplains and their associated stream terraces	0–3%	0–20 ft / sq mi
Undulating	Extensive areas of broad ridgetops with gently sloping side slopes	1–8%	40-60 ft / sq mi
Rolling	Well-defined ridgetops and side slopes	1–12%	60–100 ft / sq mi
Hilly	Narrow ridgetops and steep side slopes	5–25%	80–100 ft / sq mi

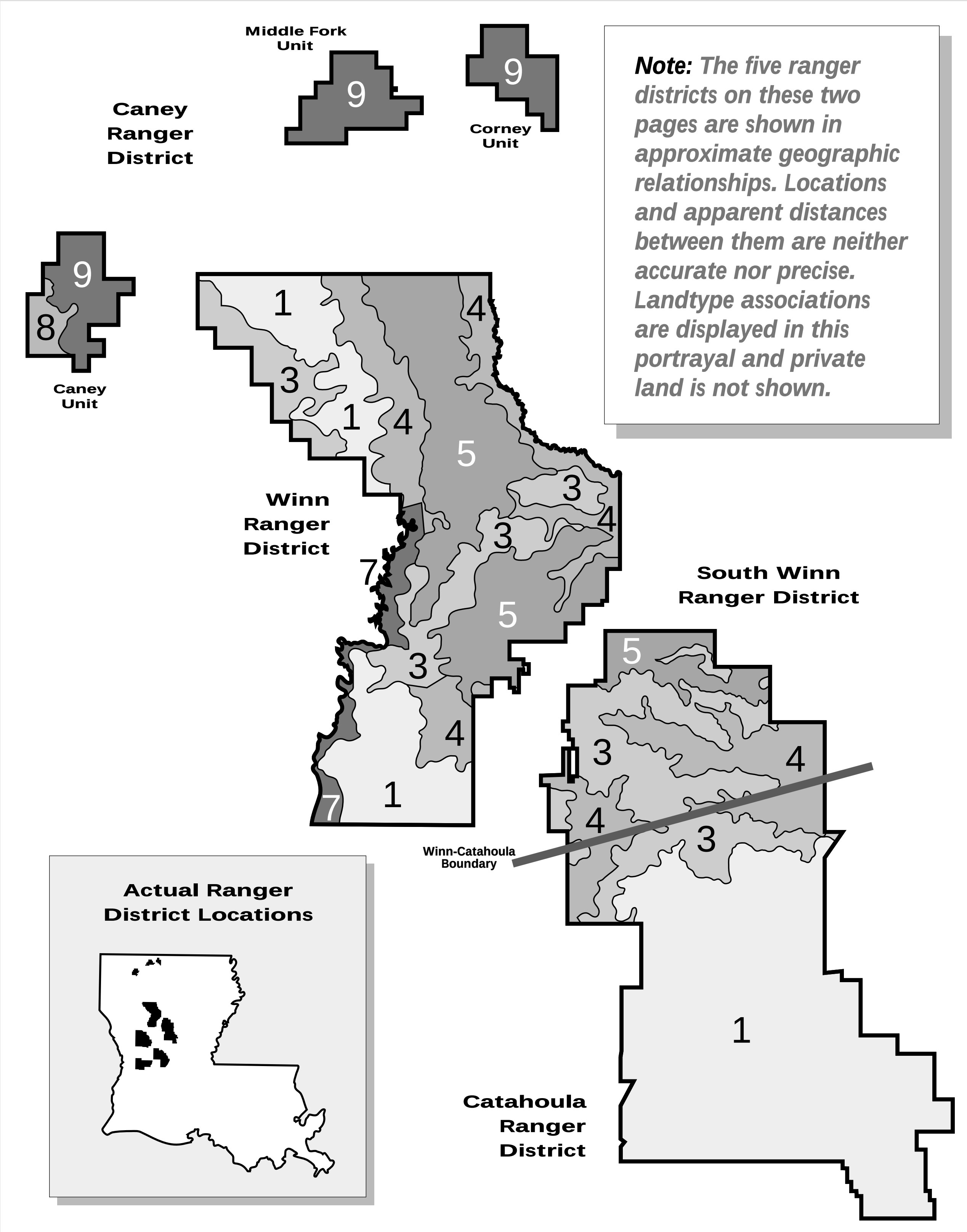
TABLE 3–51, KISATCHIE NF's LTA CRITERIA MATRIX

LTAs:	1 High Terrace Rolling Uplands	2 Kisatchie Sandstone Hills	3 Undulating Clayey Uplands	4 Alluvial Floodplains and Stream Terraces	5 Winn Rolling Uplands	6 Fort Polk Rolling Uplands	7 Red River Alluvial Plain	8 Caney Lakes Loamy Uplands	9 North Louisiana Clayey Hills
Land Surface Form									
Predominant slope range	1–10%	5–25%	1–8%	0–3%	5–12%	1–12%	0–1%	0–10%	1–10%
Predominant topography	Rolling	Hilly	Undulating	Nearly level	Rolling	Rolling	Flat	Rolling	Rolling
Drainage density (mi/mi^2)	3.04	3.74	3.32	4.09	3.71	3.49	High`	3.04	Moderate
Geology									
Time period	Pleistocene	Miocene	Oligocene / Eocene	Holocene / Early Pleistocene	Eocene	Miocene	Holocene	Pleistocene	Eocene
Surface geologic formation	High terrace	Catahoula	Cane River Cook Mountain Jackson Vicksburg	Recent alluvium Prairie terrace	Cockfield	Fleming	Recent alluvium & natural levees	High terrace	Cook Mountain Cockfield
Parent material	Loamy fluvial sediments	Clayey marine sediments, bedrock	Clayey marine sediments	Fluvial sediments	Marine sediments	Marine sediments	Fluvial sediments and flooding of the Red River	Braided river sediments	Marine & nonmarine sediments
Historic Landscape Vegetation	Longleaf pine	Longleaf pine	Shortleaf pine / oak-hickory	Mixed hardwood - loblolly pine and riparian	Longleaf pine	Longleaf pine	Riparian and cypress-tupelo swamp	Shortleaf pine / oak-hickory	Shortleaf pine / oak-hickory

able picture of the landtype associations within the Forest, the LTAs have been broadly delineated within the Forest proclamation boundary. The nine LTAs are displayed in figure 3–12. The following pages contain descriptions of the nine LTAs.

FIGURE 3–12, KISATCHIE NATIONAL FOREST LTAs

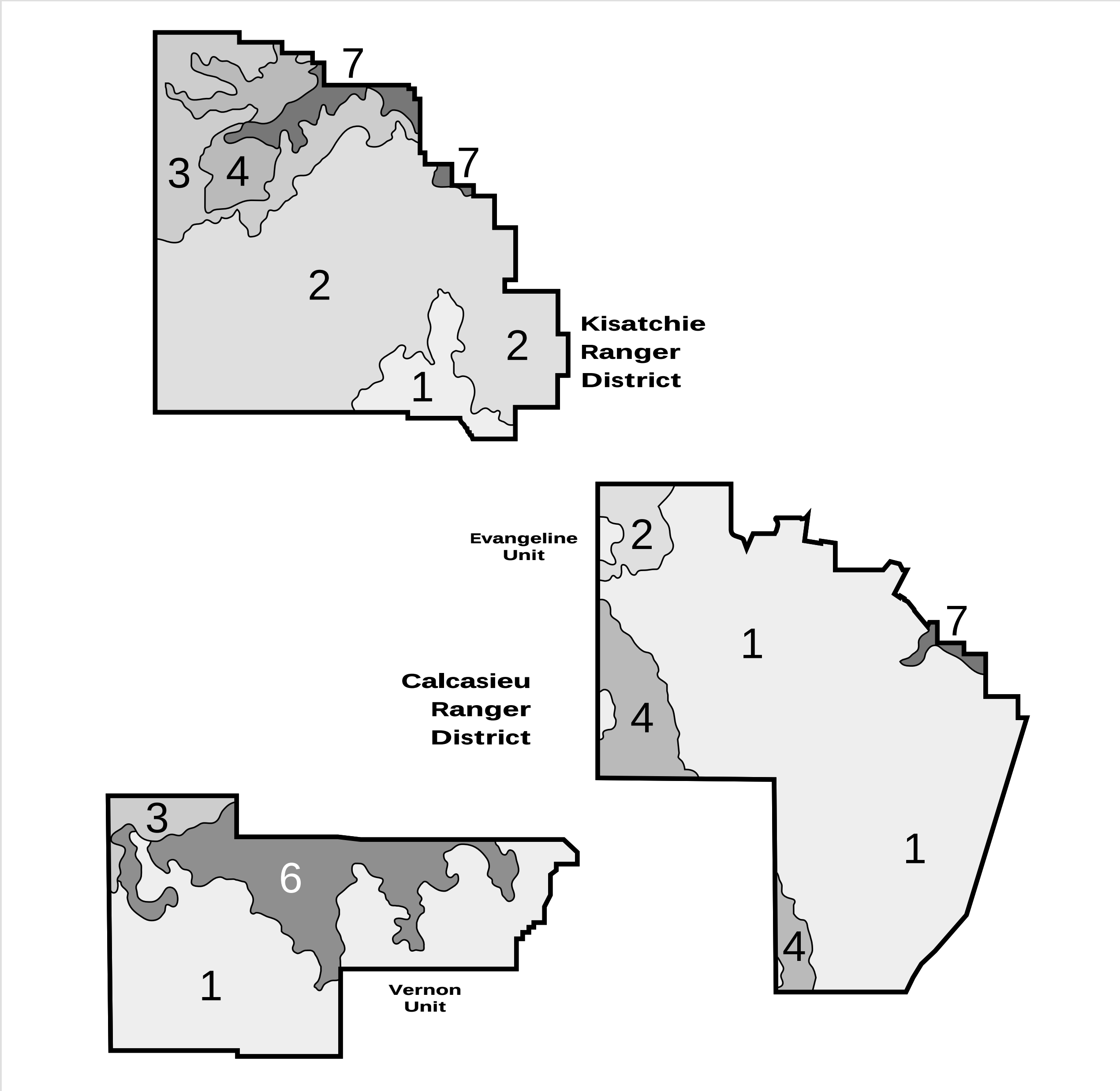
Land Type Associations Displayed by Ranger District



Note: *The five ranger districts on these two pages are shown in approximate geographic relationships. Locations and apparent distances between them are neither accurate nor precise. Landtype associations are displayed in this portrayal and private land is not shown.*

FIGURE 3–12, KISATCHIE NATIONAL FOREST LTAs

Land Type Associations Displayed by Ranger District



LANDSCAPE SETTING

LANDSCAPE SETTING

LTA 1 — HIGH TERRACE ROLLING UPLANDS

LOCATION

PHYSICAL ENVIRONMENT

Soils

LTA 1 — HIGH TERRACE ROLLING UPLANDS

LOCATION

Acreages shown here include only national forest lands. Occupying roughly 264,000 acres, LTA 1 is the Forest's largest. It covers:

- The southern half of the Vernon Unit of the Calcasieu District at 57,000 acres.
- Nearly all of the Evangeline Unit of the Calcasieu District at 95,000 acres.
- The southern four-fifths of the Catahoula District at 91,000 acres.
- Small portions in the northwestern and southwestern corners of the Winn District at 18,000 acres.
- An area in the south-central Kisatchie District at 3,000 acres.

PHYSICAL ENVIRONMENT

Soils

Background

Consisting mostly of Pleistocene age formations, LTA 1 lies primarily on *quaternary high terrace* deposits — tan-to-orange clays, silts, and sands containing large amounts of gravel. They were most likely deposited by braided river complexes, in this case the Red River complex. The LTA contains numerous drainages and associated Holocene alluvium.

The land-surface form is mostly rolling upland ridges with moderate-to-steep side-slopes with gradient averages of 1–10 percent. Lower in elevation than adjacent rolling uplands, gently undulating areas and upland flats are located in the south Vernon Unit, the southwestern Evangeline Unit, and south Catahoula District. Slope gradient on these areas averages 1–5 percent. Numerous small streams with associated narrow, level floodplains and small stream terraces dissect the LTA. Elevations range from 100 feet above sea level near floodplains to 350 feet in the north Winn District. Most of the LTA is less than 250 feet above sea level.


Typical of LTA 1

Current Conditions

Soils in LTA 1 formed mostly in loamy sediments. The *Ruston* and *Smithdale soils* on ridge tops and sideslopes of the rolling areas typically have fine sandy loam surfaces overlaying sandy clay loam or clay loam subsoils. These soils are well-drained with moderately low runoff potential. They have moderate plant-available water. Moderately well-drained *Malbis soils* with similar textures are located on broad ridgetops and interfluves. The *Glenmora and Beauregard soils* on the undulating areas and flats typically have silt loam surfaces over silty clay loam subsoils. These soils are moderately well-drained with moderately high runoff potential, and they have moderate to high plant-available water. Subsoils are characterized as moderately permeable. Although the soils in this LTA are low in plant nutrients and organic matter, the soils on the flat and undulating areas are among the Forest's most productive soils for growing pine.

About 10 percent of this LTA contains frequently flooded *Guyton* alluvial floodplain soils, which occur on the narrow floodplains of small perennial and intermittent streams. The nutrients and plant-available water of these loamy soils are relatively high, and drainage is typically poor to somewhat poor.

Future trends

Most upland soils in this LTA appear to favor longleaf establishment. Perhaps this is because longleaf is able to thrive in less fertile conditions than other species. Somewhat conversely, however, longleaf cannot easily establish itself in the presence of substantial competition from other plants. Due to more nutrients and plant-available water, floodplain soils favor the establishment of riparian vegetation.

Compaction hazard is high on most of these soils. Erosion hazard is high-to-moderate on sideslopes. For these reasons, compaction and erosion would continue to be management concerns.

Water

Background

The following are streams with significant portions of their watersheds in LTA 1:

Typical of LTA 1

- *Evangeline Unit* — Bayou Beouf and Spring Creek.
- *Catahoula District* — Big Creek, Flagon Bayou, Bayou Rigolette, Iatt Creek, and Fish Creek.
- *Vernon Unit* — Bundick Creek, Drakes Creek, Whisky Chitto Creek, Six Mile Creek, Big Brushy Creek, and Ten Mile Creek.
- *State-designated scenic streams* — Spring Creek, Fish Creek, Whisky Chitto Creek, and the East and West Forks of Six Mile Creek. This also includes the Calcasieu River, which runs through the proclamation boundary of the Evangeline Unit, though not onto Forest property.

The soils and subsoils of LTA 1 are typically loamy. They are highly permeable, with high infiltration and low surface runoff, and experience significant groundwater storage with subsequent recharge to stream base flows. Perennial streams are characterized by well-sustained, relatively constant base flows in dry months. Flood peaks are low, and so are suspended sediment loads. This LTA generally provides high recharge potential to the *Chicot / terraces* aquifer system. The drainage density within this area is approximately 3.3 miles of stream per square mile, and less than 10 percent of the streams are perennial.

Current conditions

Characteristically, LTA 1 streams are shallow with frequent deep pools, clear water, and significant amounts of large woody debris.

LANDSCAPE SETTING

LTA 1 — HIGH TERRACE ROLLING UPLANDS

PHYSICAL ENVIRONMENT

Water

BIOLOGICAL ENVIRONMENT

Vegetation

Stream bottoms are generally sandy.

The Louisiana pearlshell mussel, a federally listed threatened species, inhabits some Catahoula District and Evangeline Unit LTA 1 streams that drain into the Red River. In the late 1980's a monitoring program was undertaken to determine water quality and trend in the Evangeline Unit's 6 known mussel streams. Annually a minimum of one sample per quarter has been collected from each stream and evaluated for several chemical and physical water quality parameters. All samples have shown water quality to be good, with no trend toward degradation.

Future trends

No change is expected in the designated uses of the Forest's streams and lakes through the next planning period.

BIOLOGICAL ENVIRONMENT

Vegetation

Background

Prior to European settlement, old-growth longleaf pine forest dominated LTA 1 landscapes (**Martin and Smith 1991, 1993; Grace and Smith 1995**). For centuries, fires swept frequently through the rolling uplands of this LTA. Natural selection within this ecosystem established species not only tolerant of fire, but requiring it—a longleaf pine-bluestem grass community in an upland burning regime. Longleaf pine forest covered approximately 230,000 acres of this LTA. This community dominated the landscape of mesic-to-xeric ridgetops, sideslopes and gently rolling hills, broken only by riparian bottoms and wet depressions. Hardwoods and pine species less tolerant of fire grew on the more moist landforms.

Establishment of longleaf pine communities was associated with sandy-to-loamy surface soil textures. The natural regeneration of longleaf pine and the propagation of its associated native ground cover plants depended essentially on the disturbance created by periodic wildfires. Prior to the turn of the century these communities most likely burned every one to five years. Longleaf pine communities are species-rich, and when frequently burned they attain a higher degree of floristic diversity than any other natural community found within the Forest.

Typical longleaf pine communities consisted of pure, rather patchy, older overstories. The open, parklike understories consisted of grasses, composites, legumes and forbs. Frequent seedling recruitment within canopy openings resulted in an uneven-aged structure. Old-growth areas included scattered standing snags and large, flat-topped, fire-scorched, longleaf pines with variable stem densities. Moisture regimes and soil types varied greatly within the landscape, influencing the associated ground cover plants. Smaller plant communities found embedded within the longleaf pine forests of LTA 1 included hillside bogs, sandy woodlands, bayhead swamps, riparian forest, and wooded seeps.

Current conditions

Existing plant communities reflect recent history—exclusion of wildfire and a wide variety of management activities. Surveys note an overall lower floristic diversity in areas where hardwoods dominate both canopy layers. Slash and loblolly pine have either invaded or been planted on historic longleaf pine sites. Today approximately 67,000 acres of longleaf pine forest exist in LTA 1.

The native old-growth longleaf pine ecosystem is rarely found. Densely stocked, even-aged pine stands with closed canopies have sparse, patchy understories when compared to a mature, open longleaf pine landscape. Grasses and forbs which dominated the longleaf pine understory decrease or disappear.

Past management practices across the southeastern United States have eliminated much of the habitat favored by some plant species found in longleaf pine communities. Unique or under-represented communities in LTA 1 include hillside bogs, sandy woodlands, and longleaf pine flatwood savannahs. Numerous high-quality hillside bogs occur within this LTA on the Vernon Unit. This community occurs rarely on other portions of this LTA. Sandy woodlands occur in this LTA only on the northern portion of the Winn District. Longleaf pine flatwood savannahs were most extensive on the southwestern and eastern portions of the Vernon Unit, with limited occurrences on other portions of this LTA.

Future trends

By mimicking the processes under which various longleaf plant communities evolved, many of these communities could be restored. Frequent prescribed burns, including growing season burns, would be essential to restoring these habitats. These efforts, applied at the landscape level, and focusing on the restoration of the habitat, would benefit many species and communities, including hillside bogs, sandy woodlands, longleaf pine flatwood savannahs, and their associated rare plants.

Wildlife

Background

The uplands of this LTA were occupied by open, parklike pine stands with thick grass and forb understories. Snags and down logs were common within these pine stands, though probably less abundant than on infrequently burned landscapes. Upland stands are dissected by many perennial and intermittent streams.

The forest canopy occupying the level floodplains adjacent to narrow and intermediate stream channels was generally a rich mixture of hardwoods and pines. Loamy-to-sandy soil conditions on gently rolling hills allowed some fires to burn down to — and often through — narrow riparian areas. This produced a relatively narrow *ecotone* of mixed pines and hardwoods between uplands and floodplains. Hardwood den trees, mast producers, and down logs were generally confined to ecotones, riparian areas, and upland sites isolated from recurrent fires. High stream densities provided for these and other streamside habitat features such as leaf litter, soft mast, water, and travel corridors within close proximity to all upland areas.

Larger streams and rivers occur infrequently within these landscapes. However, the bottomland hardwood forests and occasional cypress swamps along Whiskey Chitto Creek, Fish Creek, Castor Creek and other large LTA 1 streams provided additional unique wildlife habitats.

The forest mosaics on these landscapes provided suitable-to-optimal habitat conditions for a variety of wildlife communities. These communities evolved with and adapted to habitat conditions produced by recurring landscape fires. The American bison, red wolf, and panther probably once existed in these areas but they have been extirpated, or nearly so, for decades. Other characteristic wildlife inhabitants of these landscapes included: Louisiana pine snake, least shrew, fulvous harvest mouse, red bat, eastern fox squirrel, white-tailed deer, Red-headed Woodpecker, Red-cockaded Woodpecker, Bachman's Sparrow, Eastern Bluebird, Eastern Wood-pewee, Pine Warbler, Prairie Warbler, Wild Turkey, and many others.

Current conditions

On the Forest, the longleaf pine habitats formerly occupying these landscapes have been reduced by nearly 70 percent. Some relatively large, continuous blocks exist on the Vernon Unit. Much of what remains of this once-prominent landscape habitat condition, however, occurs as smaller isolated fragments of second-growth longleaf pine forest. These areas are often isolated from one another by infrequently burned, off-site pine stands with generally closed canopies. Stands which are burned and thinned on a regular basis are open and parklike, while those not receiving such treatments quickly develop midstories of sweetgum and other hardwood trees and shrubs. This alters the structure of the habitat considerably, changing its suitability for many wildlife species. Most of the Forest's stands today are considerably less than 90 years old. As a result, some wildlife habitat attributes which were more common in older forests — such as snags, down logs, relict trees, and small canopy gaps — are less common today. Hardwood den trees and mast producers continue to exist in stream bottoms, ecotones, and as individual trees or clumps scattered throughout some upland stands.

With the notable exceptions of the species listed above, most of the wildlife known to have occurred on these landscapes prior to European settlement exist here today. However, largely due to considerable habitat alteration, some species which tend to be more dependent upon open, frequently burned habitats have become increasingly rare. These include Red-cockaded Woodpecker, Bachman's Sparrow, Henslow's Sparrow, hispid pocket mouse, and Louisiana pine snake. Approximately 56 percent of the active RCW cluster sites known on the Forest occur within this LTA. A large majority of

LANDSCAPE SETTING

LTA 1 — HIGH TERRACE ROLLING UPLANDS

BIOLOGICAL ENVIRONMENT

Wildlife

Fish and aquatic organisms

these are on the Vernon Unit. Within the Kisatchie, 67 percent of the forested acres in LTA 1 are inside a tentative RCW habitat management area (HMA).

Future trends

In terms of wildlife, the physical and biological characteristics inherent in LTA 1 landscapes provide natural resource managers considerable opportunities for restoring and maintaining open longleaf pine ecosystems in an economically and ecologically efficient manner. The set of habitats, habitat conditions, and habitat attributes common to longleaf pine forests on this LTA are essential to maintaining viable populations of wildlife species associated with open, frequently burned pine communities. These landscapes also provide some of the highest potential for achieving long-term RCW population objectives, as well as meeting the habitat needs of other rare wildlife species occurring on the Forest — Bachman's Sparrow, Henslow's Sparrow, hispid pocket mouse, and Louisiana pine snake. Popular game species such as Northern Bobwhite, Wild Turkey, white-tailed deer, and fox squirrel would also find suitable habitat conditions within these areas.

Fish and aquatic organisms

Background

Perennial streams in this LTA are characterized by well-sustained, relatively constant base flows in dry months, low flood peaks, and low suspended sediment loads. Less than 10 percent of the streams are perennial. Stream gradients range from 1.91 to 16.00 percent. Mean depths vary from 8.6 to 51.3 centimeters (cm), while the flow rate spread is from 1.03 to 30.00 cm per second.

Current conditions

Clear water, shallows with frequent deep pools, and significant amounts of large woody debris characterize LTA 1 streams. Roots, branches and logs are nearly twice as plentiful as LTA 2 or LTA 3 streams (adapted from McLean, 1982). Leaf litter, however is less prevalent than in LTA 2. Stream bottoms are generally sandy, with substrate sizes double that of LTA 2. Information from two data sets indicate that LTA 1 streams are generally deeper than LTA 2 streams (Ebert 1985; McLean 1992). The canopy cover in LTA 1 averages 45 and 52 percent, respectively, in these studies. Bank angles are typically steeper than in LTA 2 (Ebert, 1985).

Brown madtoms, the known host fish for the threatened Louisiana pearlshell mussel larvae (*glochidia*), occur in most of these streams around woody material. The redfin shiner is also common to most of these streams. This fish is classified as an intolerant by Karr (1981), due to its sensitivity to siltation and low dissolved oxygen levels. The piscivorous green sunfish and warmouth also appear to be prevalent in this LTA, probably due to their preference for deep pools. Similarly, bluegills are also common in this LTA.

Fish diversity in this LTA averaged 15.3 species per stream, with the Catahoula District and Evangeline Unit registering 14.1 and 17.1 species, respectively (adapted from Mclean, 1992). Ebert found an average of 14.3 species per stream. Fish diversity differences are not significant when compared to other LTA streams. Five streams in this LTA were each found to contain four species of darters. Darters generally require higher quality habitats with good flows, high dissolved oxygen and low levels of siltation.

Streams within this LTA have been surveyed periodically, in part with larger studies. At least 38 streams have been sampled for fish and other concurrent biological and chemical parameters. More data is available for this LTA than all others combined. Repeat inventories of these areas are currently in progress, primarily to track the occurrence of rare species. The Louisiana pearlshell mussel, a federally-listed threatened species, is known to occur on the Forest only within this LTA. It is found within 15–20 LTA 1 streams that drain into the Red River.

The Sabine shiner is the main fish species of concern in LTA 1. This minnow has declined in much of its historic range, including this LTA. The only recent record is from an unnamed creek on the Catahoula District (McLean, 1992). The main impacts to this fish are thought to be from excessive siltation.

Future Trends

Aquatic habitat quality in LTA 1 should be maintained or improved through additional streamside habitat protection measures and watershed improvement practices. These aquatic habitats are important to maintaining viable populations of all fish and aquatic organisms including Louisiana pearlshell mussel, schoolhouse stonefly, and Sabine shiner.

Substandard water quality conditions in Bayou Beouf, Spring Creek, and Little River, according to Louisiana Department of Transportation and Development (LADOTD), need to be addressed. Of particular concern are low dissolved oxygen (DO) levels in these streams, since these conditions are limiting to fish and other aquatic species. Dry Prong Creek on the Evangeline Unit has been reported as "appearing polluted," indicated by high turbidity and low DO readings. Socia Branch on the Catahoula District has DO levels below the 5.0 ppm requirement for fish (McLean, 1992).

Forest health

Background

Ruston and Smithdale soils predominate LTA 1. These generally well-drained sands and sandy-loams, low in plant nutrients and organic matter, are primarily managed for pine. This LTA was heavily impacted during the 1985–86 southern pine beetle (SPB) epidemic, especially on the Evangeline Unit and Catahoula District.

Current conditions

Annosus root disease and SPB are the pests representing the greatest destructive potential within LTA 1. Management strategies to reduce these insect and disease impacts include hazard-rating of pine stands for SPB and rating soil risk for annosus root disease. The number of high-hazard SPB sites can be substantially reduced by thinning overstocked stands, maintaining stand vigor, and reducing off-site planting. Rating of stands with high-risk soil types for annosus root disease prior to thinnings permits integrated pest management. Ruston and Smithdale soils are classified as high-risk for annosus development within loblolly and slash pine plantations. Malbis, Glenmora, and Beauregard soils are moderate-risk sites. Longleaf pine is the pine host most resistant to this root disease. It is the most suitable species for establishment on moderate- and high-risk sites.

Fusiform rust, brown-spot needle blight of longleaf pine, and red-heart decay of mature pine are other diseases within LTA 1. On this landform loblolly and slash pine are the predominant fusiform rust hosts. The disease begins during the seedling-sapling stage. Galls and cankers form, either persisting through the life of the host, resulting in weakened and deformed trees, or causing outright mortality.

Disease management consists of removing damaged trees during scheduled thinnings, culling diseased nursery stock during planting operations, and site / species selection that reduces risk of fusiform rust incidence. Slash pine is considered a high-risk species in Grant, Winn, Natchitoches, Rapides and Vernon Parishes. Winn and Natchitoches Parishes are moderate-risk areas for loblolly pine host.

Longleaf pine is a natural component of LTA 1. Brown-spot needle blight is its only significant disease, occurring during the susceptible grass stage. Winn, Natchitoches, Rapides, and Vernon Parishes are high-risk areas for the disease, but its impact is greatly reduced by prescribed burning techniques limiting the duration of the grass stage. See tables 3–52 and 3–53.

Future trends

Site-species management is key to forest health on high terrace rolling upland soils. Longleaf pine is the most suitable species for this LTA. The increase of longleaf pine management on these sites would reduce the impacts of SPB, annosus root disease, and fusiform rust. Longleaf pine is a desired species for RCW habitat. Extended rotation age would be conducive to red heart development, providing ideal nesting cavity trees.

TABLE 3–52, ACRES POTENTIALLY AFFECTED BY DISEASE IN LTA 1

Host Acres Relative to the Pathological Interactions of Host / Site and Age Classes

	1 Fusiform Rust		2 Annosus Root Disease		3 Brown-Spot		4 Red Heart	
Ranger District	Host Acres	% of LTA 1	Host Acres	% of LTA 1	Host Acres	% of LTA 1	Host Acres	% of LTA 1
Catahoula	12,598	14	18,072	20	2,097	2	9,656	10
Evangeline Unit	8,446	9	24,405	26	3,601	4	6,108	6
Kisatchie	235	9	704	27	50	2	126	5
Vernon Unit	1,176	2	6,897	12	3,071	5	2,304	4
Winn	2,404	14	4,512	25	334	4	1,561	9

1. Loblolly, slash, and pine acres in 0–10 age class
2. Loblolly and slash pine acres in age classes 11–40 years
3. Longleaf pine acres in 0–10 age class
4. Loblolly, slash, and shortleaf pine acres in age classes 71 and older; longleaf pine acres in age classes 81 and older; and pine-hardwood acres aged 71 and older.

LANDSCAPE SETTING

LTA 1 — HIGH TERRACE ROLLING UPLANDS

BIOLOGICAL ENVIRONMENT

Forest health

TABLE 3–53, ANNOSUS DISEASE RISK IN LTA 1

Host Acres and Soil Conditions with the Greatest Risk for Annosus Development

Ranger District	Acres of High Risk Soils	Percent of LTA 1	Acres of Moderate Risk Soils	Percent of LTA 1
Catahoula	54,903	60	19,639	21
Evangeline Unit	56,080	59	21,414	23
Kisatchie	0	0	936	36
Vernon Unit	15,410	27	32,438	57
Winn	9,726	55	5,292	30

LTA 2 — KISATCHIE SANDSTONE HILLS

LOCATION

The Kisatchie Sandstone Hills LTA occupies about 86,000 Forest acres. It includes the southern 2/3 of the Kisatchie District — 85,000 acres, and a small northwestern corner of the Evangeline Unit of the Calcasieu District — 1,000 acres.

PHYSICAL ENVIRONMENT

Soils

Background

The *Catahoula* formation dominates the geology of LTA 2. This formation is composed of sandstone with tuff- and ash-containing beds, along with sandy clay beds. Also in this LTA the Carnahan Bayou and Lena members of the *Fleming* formation are composed of sandstones and siltstones along with silty clays. All of these Miocene age formations were deposited during the Tertiary period. The LTA contains numerous drainages with associated Holocene alluvium.

The land surface form is characterized as hilly, having narrow ridgetops and steep sideslopes. The average slope gradient across the area ranges from 5 to 25 percent with local relief of 80–100 feet per square mile. This unique LTA is underlain by a sandstone-siltstone bedrock layer commonly visible in surface outcrops. Level floodplains — both narrow and wide — characterize the many intermittent and perennial stream channels dissecting the area.

Current conditions

The LTA contains mostly well-drained clayey soils, with slowly permeable subsoils and high runoff potential. It includes extensive hilly areas of *Kisatchie* soils — moderately deep to sandstone or siltstone and often complexed or intermingled with deep clay soil. The surface ranges from sandy loam to silt loam and is absent on eroded areas. These highly erosive soils occur on narrow ridge tops with steep sideslopes and numerous rock outcrops. Early road construction, timber cutting, burning, and other disturbances caused severe erosion. This created washouts and gullies which remain active. The low fertility and low plant-available water of this soil supports sparse vegetation; disturbed areas

LANDSCAPE SETTING

LTA 2 — KISATCHIE SANDSTONE HILLS

LOCATION

PHYSICAL ENVIRONMENT

Soils

Typical of LTA 2

LANDSCAPE SETTING

LTA 2 — KISATCHIE SANDSTONE HILLS

PHYSICAL ENVIRONMENT

Soils

Water

BIOLOGICAL ENVIRONMENT

Vegetation

recover slowly. If intensively managed for timber or range, Kisatchie soils could exceed tolerable soil loss rates, causing loss of soil productivity and sedimentation of streams.

This LTA includes extensive hilly areas of *Betis soils*: somewhat excessively drained deep sands low in runoff potential, plant nutrients, and plant-available water; with rapidly permeable subsoils. The LTA also contains large areas of somewhat poorly drained clayey soils and about 15 percent of it contains moderately well-to-poorly drained *Guyton and Lotus soils*, located on frequently flooded, narrow-to-wide alluvial floodplains.

Future trends

The infertility and droughtiness of most upland soils in this LTA appear to favor longleaf pine establishment.

The severe erosion hazard of Kisatchie soils would continue as an important management concern. Protecting and improving severely eroded gullied areas that comprise about eight percent of this LTA would require careful management and monitoring. The severe compaction hazard of most of these soils would also be a management concern.

Water

Background

Streams with significant watershed portions in LTA 2 are the Kisatchie District's Horse Head Creek, Bayou Cypre, and Kisatchie Bayou — a State-designated scenic stream. A significant portion of Cotile Lake's watershed lying within the Evangeline Unit is also in LTA 2.

Relatively steep, shallow, well-drained soils in LTA 2 have impermeable subsurfaces, causing much precipitation to reach streams as runoff, producing flashy storm flows with high peaks and low summer base flows. At 13 percent of the total, this LTA has more perennial stream miles than any other; its drainage density is about 4.1 stream miles per square mile. Upland areas vary from high to low potential to recharge the Miocene aquifer of central Louisiana.

Current conditions

Holocene floodplains are well developed on the larger channels within LTA 2. Stream gradients are high, relative to other LTAs. Consequently, stream velocities tend to be relatively high. Channel bottoms tend to be sandy, though the lower reaches grade from sand to clay. High velocities through sandy bottoms contribute to elevated sediment loads, especially in the highly erosive Kisatchie soil type. Local outcrops of the Catahoula formation form whitewater shoals in Little Bayou Pierre and Kisatchie Bayou.

Future trends

No change is anticipated in designated stream and lake use through the next planning period.

BIOLOGICAL ENVIRONMENT

Vegetation

Background

A pure, mostly older longleaf overstory of varying ages made up this community, creating uneven-aged structure. Frequent burning in the Kisatchie Sandstone Hills once allowed the longleaf pine plant community to dominate the landscape. Longleaf pine forest covered about 70,000 acres in this LTA. The LTA contains natural communities of upland and sandy woodlands-xeric phase longleaf pine forest. The open, parklike understory consisted of herbaceous ground cover, with grasses and forbs and few woody hardwood stems.

Stunted longleaf grew in Kisatchie soils where bedrock outcrops at the surface were covered with thin clay. Sites are more xeric than those of other longleaf pine landtypes. Relatively narrow intermittent and perennial drainages dissect upland landforms — ridgetops and sideslopes with sands to sandy loam soils.

Moisture regimes varied greatly by landform and aspect within the landscape, influencing the types of herbaceous species. Hillside bogs, sandy woodlands, bayhead swamps, sandstone glades and barrens, riparian forest, Fleming glades, and wooded seeps are smaller communities embedded within this landscape.

Current conditions

Late 19th- to early 20th-Century logging in most Louisiana uplands left small scattered patches of virgin longleaf pine. Today's forested landscape reflects its recent history: an altered fire regime accompanied by a variety of land management activities. In the absence of frequent wildfire, competing species displaced fire-adapted plants. Slash and loblolly pine and various hardwood species and shrubs invaded or were planted on upland sites historically occupied by longleaf pine. Longleaf once dominated natural plant communities over much of the Kisatchie Sandstone Hills LTA but now covers approximately 29,000 acres.

Unique or under-represented communities in LTA 2 include hillside bogs, sandstone glades and barrens, Fleming glades, and sandy woodlands. Numerous hillside bogs occur within this LTA on the Kisatchie District. Sandstone glades and barrens are limited in extent and occur only on the Kisatchie District. A very limited amount of Fleming glades occurs on this LTA in the northwest corner of the Evangeline Unit. Sandy woodlands cover extensive areas on the northern portion of this LTA on the Kisatchie District.

Future trends

Restoration of longleaf pine ecosystems on this landscape would provide for viable populations of many plant species and communities including hillside bogs, sandstone glades and barrens, Fleming glades, sandy woodlands, and their associated rare plants.

Wildlife

Background

Similar to LTA 1 landscapes, the dominant landscape habitat type was old-growth longleaf pine forest (**Martin and Smith, 1991**). The forest composition and open structure of these forests were similar to those described in LTA 1. Notably different from LTA 1, this LTA features lesser soil fertility, steeper topography, and frequent rock outcrops. All of these variations affect wildlife habitat characteristics, availability, and quality — and may have influenced some species' population densities. The occurrences of habitat features such as pine snags, down logs, hardwood den trees, mast producers, riparian areas, and ecotones were also comparable to those on LTA 1. The steep, hilly topography of this LTA influenced the spread and intensity of landscape fires and may have resulted in somewhat different vegetation patterns than those on LTA 1.

The sandstone outcrops contained within the geology of this LTA provide an additional unique habitat feature. The cracks, crevices, small caves, and microhabitats provided by rock outcrops and surface boulders serve as additional denning, roosting, foraging, or nesting sites for bats, small mammals, birds, reptiles, amphibians, and other animals. In Louisiana, the southern red-backed salamander is known only from a few localities, all of which contain sandstone outcroppings (**Dundee and Rossman, 1989**). Although the Louisiana waterthrush may be found in a variety of riparian habitats, it favors those adjacent to rocky stream courses (**Hamel, 1992**). The bottomland hardwood forests occurring along Kisatchie Bayou and other large streams in this LTA are additional wildlife habitat features within this landscape.

The wildlife communities associated with this LTA were probably similar to those which occurred on LTA 1.

Current conditions

The open longleaf pine forest characterizing this landscape prior to European settlement has been reduced on the Forest by about 60 percent. However, relatively large continuous blocks of second-growth longleaf exist on the Kisatchie District today. Frequently burned areas exhibit open, parklike conditions, while those remaining unburned tend to develop thick yaupon midstories. As on LTA 1, most forest stands today are considerably less than 90 years old. As a result, some of the more abundant wildlife habitat attributes of older forests, such as snags, down logs, relict trees, and small canopy gaps, are less common today. Hardwood den trees and mast producers continue to exist in stream bottoms, ecotones, and as individual trees or clumps scattered throughout some upland stands.

In general, the wildlife populations levels in this LTA are considered similar to populations on LTA 1. In addition to those species listed for LTA 1, the southern red-backed salamander would be an additional rare species for LTA 2. Approximately 20 percent of the known active RCW cluster sites on the Forest occur within LTA 2. Where this LTA lies inside the Kisatchie National Forest, 78 percent of its forested acres are within a tentative RCW HMA.

This LTA contains nearly 85 percent of the National Red Dirt Wildlife Management Preserve and more than 90 percent of Kisatchie Hills Wilderness. Large portions of the two areas are contiguous. Both have long been

LANDSCAPE SETTING

LTA 2 — KISATCHIE SANDSTONE HILLS

BIOLOGICAL ENVIRONMENT

Wildlife

Fish and aquatic organisms

Forest health

popular for wildlife hunting, viewing and photography.

Future trends

The physical and biological characteristics inherent in LTA 2 landscapes provide additional opportunities for restoring and maintaining open longleaf pine ecosystems in this unique geologic setting. The set of habitats, habitat conditions, and habitat attributes common to longleaf pine forests on LTA 2 are essential to maintaining viable populations of all native wildlife species associated with open, frequently burned pine communities. These landscapes also provide some of the best potential for achieving long-term population objectives for the Red-cockaded Woodpecker as well as meeting habitat needs of other rare wildlife species occurring on the Forest, such as southern red-backed salamander, Louisiana pine snake, hispid pocket mouse, Bachman's Sparrow, Henslow's Sparrow, and Louisiana Waterthrush. Popular game species such as Northern Bobwhite, Wild Turkey, white-tailed deer, and fox squirrel would also find suitable habitat conditions within this LTA.

Fish and aquatic organisms

The soils of LTA 2 are relatively steeply sloped, shallow with an impermeable subsurface, and are well drained. This LTA has the greatest percentage of perennial stream miles — 13 percent — than any other Kisatchie LTA. As mentioned previously, the stream substrates of LTA 2 are twice as fine as those in LTA 1.

Current conditions

Two studies indicated that canopy cover in this LTA is slightly higher than in LTA 1 (Ebert 1985, McLean 1992). Woody material in the streams appears to be less. However, leaf litter and in-stream cover — which includes plants, wood and organic debris — is more prevalent than in LTA 1. Stream widths of LTA 2 are generally greater and undercut banks less than in LTA 1.

Fish biomass in these streams is comparable to LTA 1. Species diversity is not significantly different than LTAs 1 and 3. DeWalt (1994) documented five darter species in one sample in Kisatchie Bayou, which is the highest record for darter diversity on the Forest since 1968.

Kisatchie Bayou is the center of the Sabine shiner species population, with more recent records and higher densities than anywhere else within its range. Elevated fecal coliform and turbidity levels noted in Kisatchie Bayou are cause for concern, since this fish is silt-sensitive and subject to dissolved oxygen limitations. The southern hickorynut, a rare mussel, is also known to occur here.

Intolerant redfin shiners are found in only about half of the streams in this LTA. The banded pygmy sunfish and goldstripe darter occurred only in LTA 2, in a study encompassing LTAs 1-3 (McLean, 1992). The goldstripe darter usually depends on spring-fed streams.

Future trends

Conditions in LTA 2 streams should improve with additional streamside habitat protection measures and watershed improvement practices. Such practices should aid in maintaining viable populations of all fish and aquatic organisms, including the Sabine shiner and southern hickorynut. Habitat degradations resulting from off-Forest practices need more attention.

Forest health

Background

This LTA's predominant soils are *Kisatchie*, *Oula*, *Anacoco* and *Betis*: mostly well-drained clayey soils formed from marine sediments. An exception is the *Betis-Briley* complex, with excessively drained deep sands, low nutrients, and available water. Pine is the predominant management type. This LTA was moderately impacted during the 1985–86 SPB epidemic — except for the heavily impacted Kisatchie Hills Wilderness.

Current conditions

The low nutrients and droughty soils of this LTA are key factors in risk from insects and diseases. Betis and Briley soils are especially susceptible to annosus root disease development in loblolly, shortleaf, and slash pine plantations. Longleaf pine is the most resistant pine host for this disease. Longleaf is most suitable for establishment on these low-nutrient sites. It is also somewhat resistant to SPB attack, but under stress conditions and during epidemic years of SPB out-

TABLE 3–54, ACRES POTENTIALLY AFFECTED BY DISEASE IN LTA 2

Host Acres Relative to the Pathological Interactions of Host / Site and Age Classes

Kisatchie NF Ranger District	1 Fusiform Rust Host Acres	1 Fusiform Rust % of LTA 2	2 Annosus Root Disease Host Acres	2 Annosus Root Disease % of LTA 2	3 Brown-Spot Host Acres	3 Brown-Spot % of LTA 2	4 Red Heart Host Acres	4 Red Heart % of LTA 2
Kisatchie	7,307	9	8,965	10%	5,122	6%	2,999	4%
Evangeline Unit	–	–	378	25%	90	6%	206	14%

1. Loblolly, slash pine, and pine / hardwood acres in 0–10 age class
2. Loblolly, slash, and shortleaf pine acres in age classes 11–40 yrs
3. Longleaf pine acres in 0–10 age class
4. Loblolly, slash, and shortleaf pine acres in age classes 71 and older; longleaf pine acres in age classes 81 and older; and pine-hardwood acres aged 71 and older

TABLE 3–55, ANNOSUS DISEASE RISK IN LTA 2

Host Acres and Soil Conditions with the Greatest Risk for Annosus Development

Ranger District	Acres of High Risk Soils	Percent of LTA 2	Acres of Moderate Risk Soils	Percent of LTA 2
Kisatchie	17,436	21%	529	<1%
Evangeline Unit	30	2%	17	1%
Total Risk Acres	17,466	20%	546	1%

LANDSCAPE SETTING

LTA 2 — KISATCHIE SANDSTONE HILLS

BIOLOGICAL ENVIRONMENT

Forest health

break mortality of all pines can be expected. Risk of fusiform rust is minimal in longleaf and shortleaf pine. The risk in Natchitoches Parish is considered moderate for loblolly pine and high for slash pine.

This LTA is a high risk area for brown-spot needle blight during the grass stage of longleaf pine. Management emphasizing limited duration of the grass stage and prescribe burning greatly reduces the impact of this disease.

About 4 percent of this LTA contains pine 70 years old or older. The development of red heart can be expected to increase on these sites. Please refer to tables 3–54 and 3–55.

Future trends

Species management with emphasis on longleaf pine is key to forest health on this LTA. Longleaf pine management on these sites would reduce the risks and impacts of forest insects and disease.

An extended rotation age for longleaf pine and emphasis for RCW habitat would favor increase in red heart and the potential for cavity tree development. During epidemic SPB years, increased losses of pine could be expected in the Wilderness.

LANDSCAPE SETTING

LTA 3 — UNDULATING CLAYEY UPLANDS

LOCATION

PHYSICAL ENVIRONMENT

Soils

LTA 3 — UNDULATING CLAYEY UPLANDS

LOCATION

This LTA occupies approximately 76,000 Forest acres. It occurs on 48,000 acres along the southeastern edge, in a central band, and on the northwestern edge of the Winn District; 8,000 acres on the northern one-third of the Kisatchie District; and 20,000 acres along the northern edge of the Catahoula District.

PHYSICAL ENVIRONMENT

Soils

Background

Several small geologic formations are a composite, forming LTA 3. The *Vicksburg* group, *Jackson* group, *Cane River*, and *Cook Mountain* are the primary surface formations; all deposited during the Tertiary period. Most are Eocene age formations and can be generally characterized as having lignitic, sideritic and / or glauconitic clays. This LTA contains numerous drainages with associated Holocene alluvium.

The landform character over the majority of this LTA is undulating uplands with broad ridges and gently sloping sideslopes with an average slope gradient of 1–8 percent. Some portions of this LTA are typified by narrow ridgetops and steeper sideslopes. Local relief generally ranges 40–60 feet per square mile. The area is generally dissected by intermittent and perennial stream channels, with associated narrow floodplains and small stream terraces.

Current conditions

This LTA generally contains moderately well-drained and somewhat poorly drained clayey soils, on gently to strongly sloping ridge tops and sideslopes. Runoff potential is high. The predominant soils within this LTA have relatively high plant nutrients and plant-available water. Their subsoils are very slowly permeable. Erosion hazard is severe on sideslopes. Included in this LTA are large areas of *Vaiden* and *Hollywood* soils with alkaline subsoils. Other major soils are *Bellwood*, *Cadeville* and *Metcalf*. Also included are small areas of *Kieffer* soils with calcareous subsoils, which comprise the Kieffer prairies. About 8 per-


Typical of LTA 3

Typical of LTA 3

cent of this LTA contains frequently flooded Guyton alluvial soils on narrow floodplains.

Future trends

A severe erosion hazard exists on most of the sideslope soils in this LTA. Compaction hazard is also severe on many of these soils. These would continue to be management concerns. Most of these soils appear to favor establishment of shortleaf pine and hardwood species. This may be due to their relatively high nutrient content.

Water

Background

The following are streams with significant portions of their upper watersheds in LTA 3:

- *Kisatchie District* — Upper Kisatchie Bayou and McKinny Creek.
- *Catahoula District* — Iatt Creek, Fish Creek, and Little River.
- *Winn District* — Antoine Creek, Saline Bayou, Upper Dugdemona River, Little River, Iatt Creek, and Lower Dugdemona.
- *State-designated scenic streams* — Fish Creek, Little River, and Saline Bayou.

The soils are clayey in this LTA — with poor subsoil permeability, high runoff potential, and high erosion hazard. Groundwater seepage or base flow is particularly lacking and adds no significant amount to the recharge potential of any major Louisiana aquifer. Drainage density within this area is about 3.1 miles of stream per square mile.

Current conditions

Streams within LTA 3 are generally slow-flowing and shallow, with silt-covered hard-clay bottoms frequently having deep holes. They are characteristically dry channels with scattered pools during the dryer months of July–October. Water is often turbid, and is moderate in pH and specific conductance.

Future trends

Designated uses of the streams and lakes are not expected to change through the next planning period.

BIOLOGICAL ENVIRONMENT

Vegetation

Background

The shortleaf pine / oak-hickory plant community dominated upland landforms found within LTA 3. Shortleaf pine / oak-hickory forest covered approximately 65,000 acres in this LTA.

Landscapes consisted of xeric to dry-mesic middle slopes and low ridges. These landforms typically support acidic clay soils with

LANDSCAPE SETTING

LTA 3 — UNDULATING CLAYEY UPLANDS

BIOLOGICAL ENVIRONMENT

Vegetation

Wildlife

uplands dissected by relatively narrow intermittent and perennial drainages. Slopes between uplands and stream bottoms provided a transitional zone composed of a mixture of shortleaf pine, loblolly pine, upland oaks and hickories. Upland areas within this association that were subjected to frequent wildfire supported longleaf pine or perhaps a mixture of longleaf, shortleaf, and hardwoods.

The virgin shortleaf pine / oak-hickory community developed an open-canopied, mostly uneven-aged, moderately to densely stocked overstory. Large-diameter shortleaf and loblolly pine dominated the canopy. Hardwoods — particularly white oak, southern red oak, mockernut hickory, and pignut hickory — were codominants. The midstory grew fairly thick with regenerating overstory species, shrubs, and vines. Grassy patches in canopy gaps enhanced the sparse herbaceous ground cover. Bayhead swamps, wooded seeps, riparian forest, calcareous forest, and calcareous prairies are smaller communities embedded within this association.

Current conditions

The existing forested landscape shows the effects of reduced wildfire frequency, dormant season burns, and varied management activities. Today, approximately 12,000 acres identified as similar in composition to shortleaf pine / oak-hickory forest exist in LTA 3. Loblolly pine, sweetgum, and red maple are common; canopy gaps are overgrown with numerous vines and shrubs.

Unique or under-represented communities in LTA 3 include calcareous forest and calcareous prairie. Both communities are limited in extent and occur on the Kisatchie and Winn Districts.

Future trends

The restoration of shortleaf pine / oak-hickory ecosystems to this LTA would aid in maintaining indigenous natural plant communities. This would include calcareous forest and calcareous prairies and their associated rare plants.

Introduction of landscape-level growing season prescribed burns would reduce the midstory and encourage the development of native ground cover.

Wildlife

Background

Old-growth shortleaf pine / oak-hickory forest was the primary major landscape vegetation on LTA 3 prior to European settlement (**Martin and Smith, 1991, 1993**). Mixtures of oaks, hickories and other hard mast producers were prominent throughout these landscapes. Snags, hardwood den trees and down logs were common.

Perennial and intermittent streams generally dissect upland stands. Due to the effects of soil moisture conditions and topography on fire frequency and intensity, the ecotones between the mixed pine-hardwood uplands and the riparian areas were wider and probably less distinct than such areas on LTAs 1 and 2.

The mixed pine-hardwood habitats of these landscapes were an important habitat contrast to the rest of the outer Coastal Plain, where longleaf pine dominated. These landscapes provided suitable-to-optimal habitat conditions for wildlife communities considerably different from those on open, longleaf pine landscapes. The Louisiana black bear, red wolf, and panther probably existed on these landscapes in years past. The spotted salamander, broad-headed skink, golden mouse, fox squirrel, gray fox, white-tailed deer, Cooper's Hawk, Summer Tanager, Black-and-white Warbler, Eastern Screech Owl, Red-bellied Woodpecker, and Wild Turkey among many others were common inhabitants of these landscapes. Mixed pine-hardwood habitats appear to be of particular importance to neotropical migratory birds utilizing Kisatchie National Forest habitats (**Barry, et. al., 1995**). Game and nongame species preferring hard mast undoubtedly occurred at increased population densities within this LTA.

Current conditions

Today on LTA 3, nearly 80 percent of the shortleaf pine / oak-hickory habitats within the area that is now the Kisatchie National Forest have been considerably altered from what they were prior to European settlement. The canopies of many LTA 3 stands are relatively closed, and do not contain prominent oak and hickory composition in their overstories, as did the preceding forest. These factors have reduced the understory component and mast production over much of the area, which has altered habitat suitability for many native species. As on other LTAs, most Forest stands today are second-growth forest and are considerably less than 90 years old. Therefore, some wildlife habitat attributes more abundant on older forests, such as snags, down logs, relict trees, and small canopy gaps are consequently less common today. Hardwood den trees and mast producers continue to exist in stream bottoms, ecotones, and as individual trees or clumps scattered throughout some upland stands.

With some exceptions, most of the wildlife known to have occurred on these landscapes prior to European settlement are still there. Rare wildlife species expected to find suitable habitat conditions on LTA 3 include: Red-cockaded Woodpecker, Bachman's Sparrow, Henslow's Sparrow, and Cooper's Hawk. Approximately 2 percent of the known active RCW cluster sites on the Forest occur within LTA 3. Within the Kisatchie, 36 percent of the forested acres comprising LTA 3 are inside a tentative RCW HMA.

Nearly 65 percent of the National Catahoula Wildlife Management Preserve occurs on this LTA. This preserve is a popular wildlife hunting, viewing and photography spot. It generally has more white-tailed deer than surrounding areas.

Future trends

The physical and biological characteristics inherent in LTA 3 landscapes provide natural resource managers the best opportunities for restoring and maintaining shortleaf pine / oak-hickory ecosystems in an economically and ecologically efficient manner. The set of habitats, habitat conditions, and habitat attributes common to shortleaf pine / oak-hickory forests on LTA 3 are essential to maintaining viable populations of all native wildlife species associated with mixed pine-hardwood communities. These landscapes also provide some of the best potential for conserving many of the Forest's neotropical migratory birds and meeting the habitat needs of rare wildlife species such as Red-cockaded Woodpecker, Bachman's Sparrow, Henslow's Sparrow, and Cooper's Hawk. Popular game species such as Wild Turkey, white-tailed deer, and fox and gray squirrel would find suitable habitat conditions within this LTA.

Fish and aquatic organisms

Background

Streams within LTA 3 are generally slow flowing and shallow, with silt-covered hard clay bottoms and frequent deep holes. Their channels are characteristically dry with scattered pools during the dryer months of July through October. McLean's limited data in LTA 3 (1992) denotes less canopy cover and woody structure, lower conductivity, and shallower depths than LTAs 1 or 2.

Current conditions

Recognizing that only seven samples are available from this LTA (McLean, 1992; Ebert, 1985), species diversity and fish biomass appear comparatively less than in LTAs 1 and 2. Fish and other aquatic organisms in this LTA are likely to be more silt-tolerant because of natural substrate composition. Bluntnose darters are common in this LTA because of their ability to thrive in sluggish streams with clay bottoms.

Future trends

Stream conditions in this LTA would be expected to improve with additional streamside habitat protection measures and watershed improvement practices. Such practices should aid in maintaining viable populations of fish and other aquatic organisms.

Forest health

Background

This LTA generally contains well-drained and somewhat poorly drained clayey soils with relatively high nutrients and plant-available water. Dominant forest vegetation includes shortleaf and loblolly pine, upland oaks, and hickories. This area was moderately affected during the 1985–86 SPB epidemic.

Current condition

Forest stands are generally healthy, with good growth potential and minimal insect and disease impacts. The clay soils are low-risk sites for annosus development. Shortleaf pine stands pose minimal risk for fusiform rust. Loblolly pine stands on these

TABLE 3–56, ACRES POTENTIALLY AFFECTED BY DISEASE IN LTA 3

Host Acres Relative to the Pathological Interactions of Host / Site and Age Classes

	1 Fusiform Rust		2 Annosus Root Disease		3 Brown-Spot		4 Red Heart	
Kisatchie NF Ranger District	Host Acres	% of LTA 3	Host Acres	% of LTA 3	Host Acres	% of LTA 3	Host Acres	% of LTA 3
Catahoula	3,990	20	3,141	16	15	<1	2,466	13
Kisatchie	1,610	19	1,899	22	34	<1	1,042	12
Winn	2,511	12	9,078	44	100	<1	2,767	13

1. Loblolly and slash pine, and pine / hardwood acres in 0–10 age class
2. Loblolly, slash, and shortleaf pine acres in age classes 11–40 years
3. Longleaf pine acres in 0–10 age class
4. Loblolly, slash, and shortleaf pine acres in age classes 71 and older; longleaf pine acres in age classes 81 and older; and pine-hardwood acres aged 71 and older

TABLE 3–57, ANNOSUS DISEASE RISK IN LTA 3

Host Acres and Soil Conditions with the Greatest Risk for Annosus Development

Ranger District	Acres of High Risk Soils	Percent of LTA 3	Acres of Moderate Risk Soils	Percent of LTA 3
Catahoula	680	3	1,116	6
Kisatchie	347	4	132	2
Winn	410	2	684	3

sites in Winn and Natchitoches Parishes are moderate risk in the 0–10 age class. The oak component in these stands is the alternate host for rust development. No slash pine is recommended for this LTA; it is high-risk for fusiform rust. Stand vigor, optimum stocking levels, and pine and pine-hardwood stand mixtures help keep SPB outbreaks at controllable levels during endemic years. See tables 3–56 and 3–57.

Future trends

Fusiform rust and SPB are likely to produce the most impact within this LTA, but can be managed with silvicultural techniques. Longer pine rotations would favor RCW habitat because of cavity tree development from red heart, but would increase SPB attack risk. More emphasis on hardwood and pine-hardwood management would reduce susceptible host acres.

LANDSCAPE SETTING

LTA 4 — ALLUVIAL FLOODPLAINS AND STREAM TERRACES

LOCATION

PHYSICAL ENVIRONMENT

Soils

LTA 4 — ALLUVIAL FLOODPLAINS AND STREAM TERRACES

LOCATION

This LTA occupies approximately 55,000 acres within the Forest. There are 40,000 acres of it on the Winn District along Bear Creek, Nantachie Creek, Saline Bayou, and the Dugdemona River; 3,000 acres along the northern reaches of Kisatchie Bayou on the Kisatchie District; and 12,000 acres on the Catahoula District surrounding Iatt and Indian Creeks.

PHYSICAL ENVIRONMENT

Soils

Background

Recent alluvium and *prairie terrace* make up the primary surface formations within LTA 4. They were deposited during the Quaternary period. The recent alluvium sediments found in the valley bottoms are of Holocene age. The prairie terraces were deposited during the late Pleistocene epoch. These formations can be generally characterized as having gray to brownish-gray clay with varying amounts of silt, sand and gravel.

Large, nearly level floodplains and associated wide stream terraces characterize this LTA. Floodplain slopes range from 0 to 1 percent. Slopes of stream terraces at slightly higher elevations range from 0 to 3 percent. The local relief generally ranges from 0 to 20 feet per square mile.

Current conditions

The soils of this LTA formed in loamy and silty alluvial stream deposits. Soils in the large, level floodplains are variable but generally contain poorly drained loams with plentiful plant-available water. These soils typically have silt-loam surfaces over silty clay-loam subsoils. The associated wide and nearly level stream terrace soils consist of moderately well to poorly drained silts and loams with high-to-moderate plant-available water. Floodplain and stream terrace soils are relatively high in plant nutrients.


Typical of LTA 4

LANDSCAPE SETTING

LTA 4 — ALLUVIAL FLOODPLAINS AND STREAM TERRACES

PHYSICAL ENVIRONMENT

Soils

Water

BIOLOGICAL ENVIRONMENT

Vegetation

Future trends

Because of their wetness and surface textures, most of these soils present high rutting and compaction hazards. This would be a management concern during the winter and spring or other lengthy wet periods. Due to relatively high nutrients and plant-available water, these floodplain soils favor establishment of riparian vegetation. Stream terrace soils appear to favor hardwoods and loblolly pine.

Water

Background

The major streams with significant portions of their watersheds in LTA 4 are:

- *Kisatchie District* — Kisatchie Bayou and McKinny Creek.
- *Catahoula District* — Iatt Creek and Little River.
- *Winn District* — Saline Bayou, Upper & Lower Dugdemona River, Nantachie Creek, and Little River.

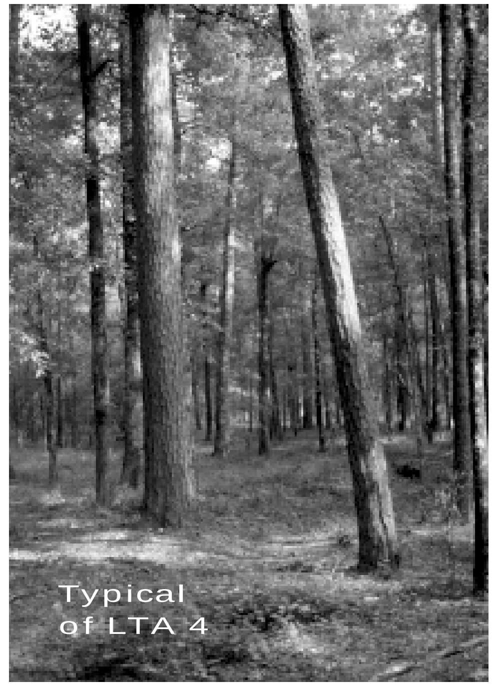
This LTA is principally broad stream terraces and their associated bottomland with silty, loamy soils, and a drainage density of 3.8 stream miles per square mile.

Current conditions

The incidence of LTA 4 perennial streams is high. Stream bottoms are generally silty. Water clarity varies — some stretches may resemble blackwater streams which are coffee-colored due to acidic swamp drainage. Water pH may be slightly lower in these streams than in other LTAs. Annual high winter-spring floods overflow much of the floodplain, producing numerous scattered temporary ponds. This LTA contains a large portion of the Forest's wetlands.

Future trends

Designated uses of the streams and lakes are not expected to change through the next planning period.


Typical of LTA 4

BIOLOGICAL ENVIRONMENT

Vegetation

Background

A mixed hardwood-loblolly pine plant community lies within this LTA. Historically it covered approximately 50,000 acres. This landscape community occurred on broad stream terraces. Hardwood and pine composition varied depending on topographic position or on floodplain width and the subsequent flooding regime.

The uneven-aged community structure was moderately to densely stocked. Closed canopy conditions coincided with an open, parklike appearance. Assorted hardwoods dominated the understory, forming a dense crown cover beneath larger pines. Finally, sparse ground cover grew through a thick carpet of leaf and needle litter.

Smaller plant communities embedded in this LTA include riparian forest, sandy woodlands, bayhead swamps, and wooded seeps.

Current conditions

The establishment of loblolly pine plantations have largely replaced the mixed hardwood-loblolly pine community acreage.

Today approximately 22,000 acres of mixed hardwood-loblolly pine forests exist in LTA 4. Much of this occurs as predominantly pine stands which are lacking a substantial hardwood component. The only unique or under-represented plant community in LTA 4 is sandy woodland. Stream terrace examples of sandy woodland are known to occur along Saline Bayou on the Winn District.

Future trends

The restoration of mixed hardwood-loblolly pine ecosystems to this LTA would aid in maintaining viable populations of natural plant communities, including sandy woodlands and their associated rare plants.

Wildlife

Background

Old growth mixed hardwood-loblolly pine forest was the major landscape vegetation type occupying LTA 4 (**Martin and Smith, 1991, 1993**). The forest canopy was multilayered and relatively closed, and had high amounts of within-canopy hardwoods. The midstory was also multilayered and diverse. Ground cover was sparse and generally covered with leaf litter. Snags, hardwood den trees and down logs were abundant. Soil moisture conditions and flat topography allowed fire into these landscapes on an infrequent basis. Thus, ecotones between the mixed hardwood-pine uplands and narrow riparian areas were not readily apparent. These landscapes were generally moist rich woods dominated by mixed hardwood-pine and hardwood habitats. Shallow ponds persisted on some of the area for portions of the year. Oaks, hickories and other hard mast producers were prevalent throughout these landscapes.

Within the Forest, LTA 4 occupies terraces adjacent to several large streams. These include Indian Creek, Bear Creek, Iatt Creek, Upper Kisatchie Bayou, and Saline Bayou. The bottomland hardwood forests and occasional cypress swamps along these streams provide additional unique wildlife habitats within these landscapes.

These hardwood-dominated habitats provided suitable-to-optimal habitat conditions for a variety of wildlife communities. The Louisiana black bear, red wolf, and panther likely existed on these landscapes. The marbled and small-mouthed salamander, spring peeper, eastern narrow-mouthed toad, cotton mouse, gray squirrel, white-tailed deer, Wood Thrush, Blue-gray Gnatcatcher, Yellow-throated Vireo, Barred Owl, Pileated Woodpecker, Hooded Warbler, Yellow-billed Cuckoo, White-eyed Vireo, and Wild Turkey, among many others, were common inhabitants.

Similar to LTA 3, the mixed hardwood-pine habitats of LTA 4 appear particularly important to neotropical migratory birds utilizing Kisatchie National Forest habitats (**Barry, et. al., 1995**). Wildlife species more dependent upon forest interior habitats may have found suitable conditions on these areas. Game and nongame species which have a preference for hard mast undoubtedly occurred at increased population densities in this LTA.

Current conditions

On LTA 4 approximately 60 percent of the mixed hardwood-loblolly pine habitats occurring on what is today the Kisatchie National Forest have been considerably altered from what they were prior to European settlement. Most older stands on LTA 4 are second-growth forests lacking the oak, hickory and other hardwood composition which dominated the preceding forest's overstories. This has considerably altered the composition of the Forest and reduced hard mast production over most of the area, changing the habitat suitability for many native species. As on other LTAs, most Forest stands today are considerably less than 90 years old. As a result, some wildlife habitat attributes more abundant on older forests, such as snags, down logs, relict trees, and small canopy gaps, are less common today. Hardwood den trees and mast producers continue to exist in stream bottoms, ecotones, and as individual trees or clumps scattered throughout most upland stands.

Most of the wildlife known to have occurred on these landscapes prior to European settlement are here today. The only rare wildlife species expected to find suitable habitat conditions and potentially occur on LTA 4 are the Cooper's Hawk and Louisiana slimy salamander. Only 1 percent of the known active RCW cluster sites on the Forest occur within LTA 4. Within the Forest 42 percent of the forested acres in LTA 4 are inside a tentative RCW HMA. However, habitat suitability for the RCW in this LTA is considered marginal.

LANDSCAPE SETTING

LTA 4 — ALLUVIAL FLOODPLAINS AND STREAM TERRACES

BIOLOGICAL ENVIRONMENT

Wildlife

Fish and aquatic organisms

Forest health

This LTA contains 35 percent of the National Catahoula Wildlife Management Preserve, a popular wildlife hunting, viewing and photography spot. It generally has more white-tailed deer than surrounding areas. The Saline Bayou National Scenic River and corridor are entirely within LTA 4.

Future Trends

The inherent capabilities of LTA 4 landscapes provide natural resource managers the best opportunities for restoring and maintaining mixed hardwood-loblolly pine ecosystems in an economically and ecologically efficient manner. The set of habitats, habitat conditions, and habitat attributes common to mixed hardwood-loblolly pine forests are essential to maintaining viable populations of all native wildlife species associated with mixed hardwood-pine and hardwood communities. These landscapes also provide some of the best potential for conserving many of the Forest's neotropical migratory birds, as well as meeting the habitat needs of forest interior and rare wildlife species occurring on the Kisatchie — such as Cooper's Hawk and the Louisiana slimy salamander. Popular game species such as Wild Turkey, woodcock, white-tailed deer, and fox and gray squirrel would also find suitable habitat conditions within this LTA.

Fish and aquatic organisms

Background

This LTA is principally broad stream terraces and associated bottomlands with silty, loamy soils and high rutting potential. Ebert (1985) found the streams here to be somewhat shallow and narrow when compared to LTAs 1 through 3.

Current conditions

The canopy cover is similar to LTA 3, while instream cover conditions resemble LTA 1. Fish biomass is higher than LTA 3 and species diversity is comparable to LTAs 1 and 2. These streams appear to be heavy with piscivores — green sunfish, warmouth, largemouth bass, redfin, and chain pickerel are common. Bluegill, dollar sunfish, and pirate perch also predominate. Darters are extremely rare, probably due to the sluggish nature and low dissolved oxygen levels of these streams.

Future trends

Additional streamside habitat protection measures and watershed improvement practices should improve stream habitat quality in this LTA.

Forest health

Background

The soils of this LTA were formed in loamy and silty alluvial stream deposits. The floodplains generally consist of poorly drained silty loams with high plant-available water and nutrients. Stream terrace soils are moderately well to poorly drained silty loams, with high-to-moderate plant available water, relatively high in plant nutrients. *Guyton*, *Frizzell*, and *Caddo* are the major soil types.

The historical landscape vegetation found on this LTA was predominantly mixed hardwood-loblolly pine forest on the stream terraces and riparian forest on the floodplains. This LTA was slightly affected by the 1985–86 SPB epidemic.

Current conditions

Forest stands within this LTA are predominately loblolly pine, pine-hardwood, bottomland hardwood and upland hardwood. Wet sites and poorly drained soils present low risk for annosus development. With the absence of longleaf pine, brown-spot needle blight is not a consideration. Loblolly stands and pine-hardwood stands are at risk for fusiform rust, especially in the 0–10 age class. Disease management may consist of removing damaged trees during scheduled thinnings, culling diseased nursery stock during planting operations, or site / species selection that would reduce the risk of fusiform rust incidence.

Southern pine beetle outbreaks are frequent in the pine and pine-hardwood stands, but rapid detection and suppression prevent buildup of large SPB infestations. Long-term management strategies consist of hazard-rating stands, reducing basal area in overstocked stands, and prompt removal of damaged stands.

Older pine and pine-hardwood age classes present increased potential for red heart development.

The bottomland and upland hardwood stands are at risk from decay fungi — causing root and butt decay of hardwood trees which have been damaged by periodic flooding, storms, fire, or logging. The most common hardwood rots are caused by species of *Armillaria* and *Ganoderma.* Insect borers can also serve as secondary pests. Please see table 3–58.

TABLE 3–58, ACRES POTENTIALLY AFFECTED BY DISEASE IN LTA 4

Host Acres Relative to the Pathological Interactions of Host / Site & Age Classes

	1 Fusiform Rust		2 Red Heart	
Kisatchie NF Ranger District	Host Acres	% of LTA 4	Host Acres of	% of LTA 4
Catahoula	1,570	13	1,080	9
Kisatchie	297	11	442	16
Winn	2,569	13	3,909	19
Totals for LTA 4	4,436	13	5,431	16

1. Loblolly and slash pine acres in 0–10 age classes
2. Loblolly, slash, and shortleaf pine acres, age classes 71 and older; longleaf pine acres, age classes 81 and older; and pine-hardwood acres aged 71 and older

Future trends

Increased emphasis in hardwood and pine-hardwood management could be expected. Outbreaks of SPB would continue as the most significant pest problem in this LTA. Management emphases include prompt detection and control of infestations, and, continuing to reduce the acreage of high-hazard stands through thinning.

LANDSCAPE SETTING

LTA 5 — WINN ROLLING UPLANDS

LOCATION

PHYSICAL ENVIRONMENT

Soils

LTA 5 — WINN ROLLING UPLANDS

LOCATION

This LTA occupies about 61,000 acres within the Forest. It lies entirely within the Winn District.

PHYSICAL ENVIRONMENT

Soils

Background

The primary surface geology within LTA 5 is believed to be the *Cockfield* formation. This formation is a member of the Eocene age *Claiborne* group, generally characterized as having brown lignitic clay, silts, and sands.

The land surface form over the majority of this LTA is characterized as rolling, with well-defined ridges and sideslopes. The predominant slope gradient ranges from 5–12 percent. Local relief generally ranges from 60–100 feet / square mile. The area is highly dissected by intermittent and perennial stream channels, with associated narrow, level floodplains and small stream terraces.

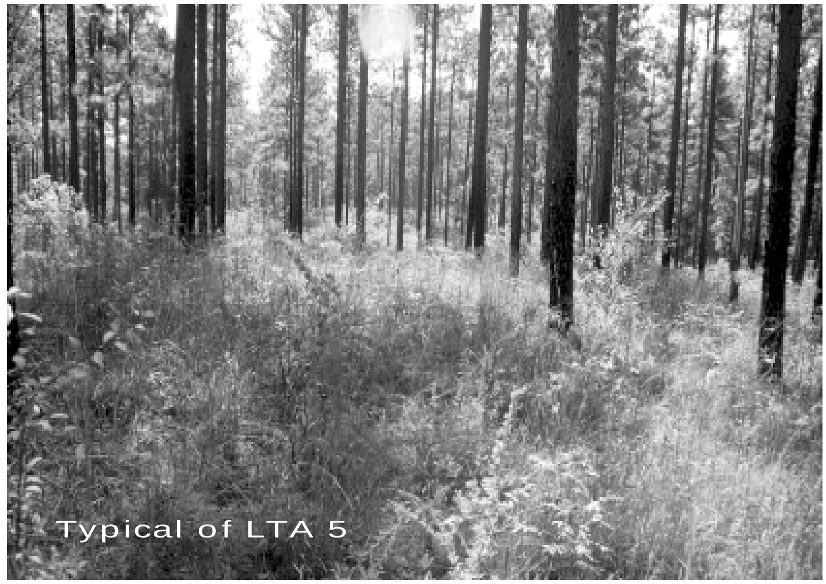
Current conditions

Soils in the Winn rolling uplands LTA formed in clayey and loamy sediments. These moderately well-drained clays and moderate- to well-drained loams have moderately permeable subsoils. Runoff potential is moderately high; plant nutrients are low. Clayey *Sacul* soils on ridgetops and sideslopes are high in plant-available water. Loamy *Savannah* soils on broad ridgetops and gentle sideslopes have moderate plant-available water. Fine, sandy-loam surfaces typify both soils. Also included are large areas of sandier *Boykin* soils. About 12 percent of this LTA contains frequently flooded, poorly drained alluvial soils on narrow floodplains.

Future trends

A continuing management concern on most of these soils would be severe erosion hazard on sideslopes and their high compaction hazard. Their relatively low fertility appears to favor longleaf establishment.

Typical of LTA 5



Typical of LTA 5

Water

Background

Streams with significant portions of their watersheds in LTA 5 are limited to the Winn District: Upper and Lower Dugdemona, Little River, and Saline Bayou.

This LTA generally provides high recharge potential to the *Sparta* and *Cockfield* aquifers. Drainage density in LTA 5 is relatively high, with 3.9 stream miles per square mile. Relatively few streams are perennial.

Current conditions

Low-order streams are flanked by coarse sands in upland ridges and terraces. Narrow ravines and gullies may be present. Sediments in these streams are generally coarser than those found along major streams. Channels in LTA 5 are generally dry in the summer months, with scattered pools.

Future trends

Designated uses of the streams and lakes are not expected to change through the next planning period.

BIOLOGICAL ENVIRONMENT

Vegetation

Background

An almost pure longleaf pine overstory dominated the community. The open, parklike understory consisted primarily of native bluestem species infrequently broken by embedded hardwood plant communities.

Frequent burning of uplands established and maintained a longleaf pine community in much of this LTA. Longleaf pine forest once covered about 47,000 acres here. The LTA may have contained more shortleaf pine / oak-hickory acreage on sideslope and low ridge landforms than did other longleaf pine-dominated LTAs.

Relatively narrow intermittent and perennial drainages dissected these uplands, which consist of mesic to xeric ridgetops and sideslopes with clayey to sandy-loam soils. Hardwood and less fire-tolerant pine species occupied these drainages and other moister areas within this association.

Moisture regimes varied greatly by landform and aspect within the landscape. This in turn influenced the associated plant species of the native ground cover. Smaller natural plant communities found embedded within this LTA included hillside bogs, bayhead swamps, wooded seeps, riparian forest, and sandy woodlands.

Current conditions

The existing landscape reflects its recent history — an altered fire regime and past land management activities. Loblolly pine, various hardwood species, and shrubs either invaded or were planted on upland sites historically occupied by longleaf pine. Past management limited the extent of the once-dominant natural plant community within this association. Today, less than 10,000 acres of longleaf pine forest exist in this LTA. Few high-quality examples of longleaf pine exist on Winn rolling uplands.

Hillside bogs and sandy woodlands are two unique or under-represented communities known to occur in LTA 5. They are extremely rare, with several recently discovered bogs and two more well known bog sites.

Future trends

Restoration could be the primary focus of management for the longleaf pine plant community. This would include emphases on returning to a more ecologically appropriate fire regime and establishing a longleaf pine overstory. Applied at the landscape level, these efforts would benefit many spe-

LANDSCAPE SETTING

LTA 5 — WINN ROLLING UPLANDS

BIOLOGICAL ENVIRONMENT

Vegetation

Wildlife

cies and communities including hillside bogs and their associated rare plants.

Wildlife

Background

Old-growth longleaf pine forest was the dominant landscape habitat type prior to European settlement (Martin and Smith, 1991). The forest composition and open structure of these forests were similar to those described in LTA 1. In contrast to the well-drained loamy soils of LTA 1, the soils on this LTA are more clayey in texture and less well-drained. This may have influenced the frequency and intensity of landscape fires, especially on relatively longer sideslopes where moister, clay soils are closer to the surface.

This appears to have resulted in somewhat wider mixed pine-hardwood ecotones between the frequently burned pine uplands and the riparian floodplains adjacent to the small and intermediate stream channels. This variation in vegetation patterns has an effect on wildlife habitat characteristics, availability, and quality and may have influenced some species' population densities. The occurrences of other habitat features such as pine snags, down logs, hardwood den trees, mast producers, and riparian areas were probably comparable to those on LTA 1.

The composition of wildlife communities on this LTA were probably comparable to those which occurred on LTA 1.

Current conditions

The longleaf pine habitats which once occupied these landscapes have been reduced by nearly 80 percent on the Kisatchie National Forest. No relatively large, continuous blocks of this forest type exist on the LTA today. The second-growth longleaf pine stands still present are isolated forest fragments surrounded by off-site pine stands generally closed-canopied and infrequently burned. Stands which are burned and thinned on a regular basis exhibit open parklike conditions, while those not treated this way quickly develop a midstory of sweetgum and other hardwood trees and shrubs. This alters the structure of the habitat considerably, changing its suitability for many wildlife species. As in most of the Forest's uplands, forest stands today on LTA 5 are considerably less than 90 years old. As a result, some wildlife habitat attributes which were more abundant on older forests, such as snags, down logs, relict trees, and small canopy gaps, are less common today. Hardwood den trees and mast producers continue to exist in stream bottoms, ecotones, and as individual trees or clumps scattered throughout some upland stands.

In general, the current wildlife populations in this LTA are considered similar to those in LTA 1. Rare species associated with LTA 1 are also applicable to this LTA. Worth noting, however, is the low current population of RCW on this landscape. Only 3 percent of the Forest's active RCW cluster sites occur within this LTA. This is undoubtedly due to the magnitude of habitat alterations which have occurred here. Of the forested acres occurring within LTA 5 on the Forest, 72 percent are inside a tentative RCW HMA.

Future trends

As on LTAs 1 and 2, the inherent capabilities in LTA 5 landscapes provide unique opportunities for restoring and maintaining open longleaf pine ecosystems in this unique geologic setting. A longleaf pine forested landscape on this LTA may represent the most northerly occurrence of this forest on the outer Coastal Plain. The set of habitats, habitat conditions, and habitat attributes common to longleaf pine forests on LTA 5 are essential to maintaining viable populations of all native wildlife species associated with open, frequently burned pine communities.

These landscapes also provide some of the best potential for achieving long-term population objectives for the Red-cockaded Woodpecker as well as meeting the habitat needs of other rare wildlife species occurring on the Forest, such as Louisiana pine snake, hispid pocket mouse, Bachman's Sparrow, and Henslow's Sparrow. Popular game species such as Northern Bobwhite, Wild Turkey, white-tailed deer, and fox squirrel would also find suitable habitat conditions within this LTA.

Fish and aquatic organisms

Background

The Winn District contains all of LTA 5. Streams within this LTA have little gradient and are rarely perennial.

Current conditions

Samples in the LTA are limited to Couley and Cypress Creeks on the Winn District (Dean, 1996). Dissolved oxygen at these sites varied from 3.5 to 7.5 ppm. During at least one-quarter of the sampling year, oxygen levels were less than the 5.0 ppm minimum necessary to a healthy fish population. The pH values ranged from 6.0 to 7.6, while alkalinities and total dissolved solids showed up at 7–19 ppm and 10–40 ppm respectively.

Fish diversity was relatively low, with averages of 8.7 and 9.7 species noted in Couley and Cypress Creeks respectively. Only one darter was found in six samples. Most fish found were tolerant — able to acclimate to severe habitat conditions. These streams are dominated by sunfish species.

Future trends

Stream habitat conditions should improve with additional streamside habitat protection measures and watershed improvement practices.

Forest health

Background

The soils within LTA 5 consist primarily of fluvial deposits — clayey, sandy, and loamy sediments. The Forest sites are moderately well-drained clays and moderately to well-drained loams which are low in plant nutrients with moderate-to-high plant-available water. The predominant soil types are *Sacul*, *Savannah*, and *Boykin*. The low fertility of most of these soils historically favored the establishment of longleaf pine. This LTA received minimal damage during the 1985–86 SPB epidemic.

Current conditions

Low-nutrient soils increase the risk of a forest stand to insect and disease incidence. The Boykin and Savannah soils present risk for annosus root disease development, especially in slash and loblolly pine plantations after first thinnings. Conversion to longleaf pine on these soil types reduces the risk of annosus infestation.

Loblolly and slash pine are also the predominant hosts for fusiform rust on this landform. Disease management may consist of removing damaged trees during scheduled thinnings, culling diseased nursery stock during planting operations, or site / species selection that reduces risk of fusiform rust incidence.

TABLE 3–59, ACRES POTENTIALLY AFFECTED BY DISEASE IN LTA 5

Host Acres Relative to the Pathological Interactions of Host / Site and Age Classes

	1 Fusiform Rust		2 Annosus Root Disease		3 Brown-Spot		4 Red Heart	
Kisatchie NF Ranger District	Host Acres	% of LTA 5	Host Acres	% of LTA 5	Host Acres	% of LTA 5	Host Acres	% of LTA5
Winn	6,789	13	8,561	16	1,356	3	5,862	11

1. Loblolly, slash, pine and pine-hardwood acres in 0–10 age class
2. Loblolly, slash, shortleaf pine acres in age classes 11–40 years
3. Longleaf pine acres in 0–10 age class
4. Loblolly, slash, and shortleaf pine acres in age classes 71 and older; longleaf pine acres in age class 81 and older; and pine-hardwood acres 71 and older

LANDSCAPE SETTING

LTA 5 — WINN ROLLING UPLANDS

BIOLOGICAL ENVIRONMENT

Forest health

Longleaf pine regeneration stands are at risk for brown-spot needle blight. However, disease severity is usually mitigated through prescribed burning during the short-lived susceptibility of longleaf's grass stage. See tables 3–59 and 3–60.

Southern pine beetle outbreaks are common within the rolling uplands. However, the mixture of pine and pine-oak-hickory forest types generally allow for rapid suppression and prevent buildup of large SPB spots.

TABLE 3–60, SOIL RISK FOR ANNOSUS ROOT DISEASE IN LTA 5

Soil Conditions with the Greatest Risk for Annosus Development

Kisatchie NF Ranger District	High Risk Acres	% of LTA 5	Mod. Risk Acres	% of LTA 5
Winn	5,519	10	8,201	15

- The severity of soil risk is determined by soil texture and drainage as defined by soil series description
- Total risk acres: 26 percent of LTA 5

Future trends

The emphasis on longleaf pine restoration should continue, especially on the Boykin and Savannah soils that are risk sites for annosus development. Extended rotation age for longleaf pine and emphasis for RCW habitat would favor increase in red heart and the potential for cavity tree development. Pine resource losses due to SPB outbreaks would continue to be cyclic.

LTA 6 — FORT POLK ROLLING UPLANDS

LOCATION

This LTA occurs on 28,000 acres in the northern half of the Vernon Unit of the Calcasieu District.

PHYSICAL ENVIRONMENT

Soils

Background

The major surface geology of LTA 6 is the Blounts Creek member of the *Fleming* formation, deposited during the Tertiary Period. It is Pliocene and late Miocene in age. Blounts Creek deposits are typically silty clays, siltstones, and silts with abundant sand beds.

The land surface form is characterized as rolling with definite ridges and sideslopes. Average slope gradient is 1–12 percent with local relief of 80–100 feet per square mile. The area is generally dissected by intermittent and perennial stream channels and associated narrow floodplains and stream terraces.

Current conditions

The predominant soils in this LTA were formed in loamy sediments. Soils typically have a deep surface layer of loamy fine sand over sandy clay loam. They are mostly well-drained with moderately permeable subsoils. Runoff is moderately low. Soils are low in plant nutrients and have moderate available plant water. The major soil is *Briley*. The LTA also contains large areas of clayey soils. About 22 percent of this LTA contains frequently flooded, poorly drained, alluvial soils on narrow and medium size floodplains.

Future trends

The low fertility of most of the loamy and sandy soils appears to favor establishment of longleaf pine. Erosion and compaction would continue to be a concern on these soils.

Water

Background

Streams with significant portions of their watersheds in LTA 6 are limited to the Vernon

Typical of LTA 6

LANDSCAPE SETTING

LTA 6 — FORT POLK ROLLING UPLANDS

PHYSICAL ENVIRONMENT

Water

Unit — Upper reaches of Drakes, Whiskey Chitto, Six Mile, and Big Brushy Creeks.

Most streams are intermittent except for the higher order streams which tend to be perennial. This LTA generally provides high recharge potential to the Evangeline aquifer. Drainage density is about 3.8 stream miles per square mile.

Current conditions

Streams in LTA 6 are generally shallow and clear with sandy bottoms. Stream flows are highly variable and velocities tend to be high. Perennial streams are generally associated with narrow flood plains and terraces.

Future trends

No changes in designated lake and stream uses are expected through the next planning period.

BIOLOGICAL ENVIRONMENT

Vegetation

Background

Frequent burning caused longleaf pine plant communities to dominate upland landforms in LTA 6; longleaf forest covered about 20,000 acres. An open, parklike longleaf overstory dominated upland mesic-to-xeric ridgetops and sideslopes with sand to sandy loam soils. The associated understory consisted of native grasses, legumes, composites, and forbs. Hardwood and less-fire-tolerant pine species occupied drainage landforms and other areas. Topography limited fire intensity, creating areas isolated from frequent sweeping fires.

Embedded riparian plant communities frequently dissected longleaf pine areas and contained overstories of hardwood and mixed hardwood-pine. Hardwood species reflected moisture regimes varying greatly by landform and aspect, and influencing associated ground cover species. Smaller plant communities embedded in LTA 6 included hillside bogs, sandy woodlands, bayhead swamps, riparian forest, and wooded seeps.

Current conditions

Longleaf pine forest continues to dominate this LTA. Currently 15,000 acres of longleaf pine forest exists in a fairly large continuous block. The majority of this LTA is within the Ft. Polk Intensive Military Use Area. Military use has increased wildfire frequency, benefitting the longleaf pine landscape and its embedded communities.

Unique or under-represented communities in LTA 6 include hillside bogs and sandy woodlands. Numerous high-quality hillside bogs exist in this LTA. Well-developed sandy woodlands are uncommon-to-rare here.

Future trends

Management focus would center on maintaining and restoring the longleaf pine community whenever possible. These efforts would benefit many plant species and natural plant communities — including hillside bogs, sandy woodlands, and associated rare plants. Due to restricted access imposed by the military, opportunities to carry out management practices may be limited.

Wildlife

Background

Similar to LTA 1, the dominant landscape habitat type was old-growth longleaf pine forest (Grace & Smith, 1995). These forests' composition and open structure were similar to those of LTA 1, but soils here are sandy with steeper topography. These variations can affect wildlife habitat characteristics, availability, and quality, and may have influenced some species' population densities. Habitat features such as pine snags, down logs, hardwood den trees, mast producers, riparian areas, and ecotones were also comparable to those on LTA 1. The steep, hilly topography of this LTA may have influenced the spread and intensity of landscape fires which perhaps resulted in somewhat different vegetation patterns than those on LTA 1.

Again, the composition of wildlife communities on this LTA were probably comparable to those which occurred on LTA 1.

Current conditions

Open longleaf pine continues to constitute the major forest type on the portion of LTA 6 that is on the Forest. The original longleaf pine forest has been reduced by only 20 percent, and relatively large continuous blocks remain. Much of it is has received frequent fire and is in good condition. Today, most Forest stands on LTA 6 are much younger than those occurring before 1900. Therefore, some wildlife habitat attributes more abundant on older forests — snags, down logs, relict trees, and small canopy gaps — are less common. Hardwood den trees and mast producers continue to exist in stream bottoms, ecotones, and as individual trees or clumps scattered throughout some upland stands.

Wildlife populations in LTA 6 are generally considered similar to those on LTA 1. Rare species identified as being associated with LTA 1 are also applicable here. Approximately 19 percent of the active RCW cluster sites known on the Forest occur within this LTA. However, active cluster sites per total acres are more numerous here than in any other LTA. All of the Kisatchie's forested acres occurring in LTA 6 are within a tentative RCW HMA. Approximately 86 percent of this LTA is within the Fort Polk Military Intensive Use Area. Limited access imposed by the military restricts the Forest Service's ability to plan and carry out resource management.

Future trends

In contrast to other LTAs historically dominated by longleaf pine forests, LTA 6 continues to be a relatively intact, open longleaf pine ecosystem. The habitats and habitat conditions and attributes common to LTA 6 longleaf pine forests are essential to maintaining viable populations of native wildlife species associated with open, frequently burned pine communities. These landscapes provide some of the best potential for achieving long-term population objectives for the Red-cockaded Woodpecker and meet the habitat needs of the Forest's other rare wildlife species — such as Louisiana pine snake, hispid pocket mouse, Bachman's Sparrow, and Henslow's Sparrow. Popular game species such as Northern Bobwhite, Wild Turkey, white-tailed deer, and fox squirrel would also find suitable habitat conditions within this LTA. Our ability to maintain this ecosystem may be strongly influenced by future restrictions on management access.

Fish and aquatic organisms

Background

Excepting higher-order streams, which tend to be perennial, most LTA 6 streams are intermittent. All are generally shallow and clear with sandy bottoms. Stream flows are highly variable and velocities tend to be high.

Current conditions

Fisheries data in this LTA is currently limited to Six Mile Creek (Carver, 1969). Fish diversity from this study ranged from 6 to 9 species per monthly sample, with an average of 8.75 for the year. Although diversity appears low compared to LTAs 1–4, this only represents one site within LTA 6. Five darter species were collected in October of 1968 — indicative of optimal habitat quality and matching the current high of 5 species from Kisatchie Bayou in LTA 2. The Sabine shiner and southern hickorynut are rare aquatic species occurring in this LTA. Darters present include bluntnose, slough, cypress, dusky, and scaly sand darters. You may encounter freckled, black, and tadpole madtoms. The spotted sucker is a common resident. The sensitive Sabine shiner has been noted infrequently, due to this LTA's atypical swampy habitat.

Current studies (McCullough, personal communication) indicate that Bundick Creek is polluted with hydrocarbons. Heavy silt loading and erosion has also been noted in several creeks that drain onto the Vernon Unit. Those conditions may be a result of military activities in the upper portions of these watersheds.

Future trends

Aquatic habitat quality in this LTA would be expected to improve wih additional stream-

LANDSCAPE SETTING

LTA 6 — FORT POLK ROLLING UPLANDS

BIOLOGICAL ENVIRONMENT

Fish and aquatic organisms

Forest health

side habitat protection measures and watershed improvement practices. Such practices should aid in maintaining viable populations of fish and other aquatic organisms, including the Sabine shiner and southern hickorynut. Due to continued upstream military activities, however, degradation of water quality and aquatic habitats would remain management concerns.

Forest health

Background

The predominant soils in this LTA were formed as loamy sediments. They are mostly well-drained loams, low in plant nutrients with moderate plant-available water. The major soils are *Briley*, *Betis*, and *Ruston*. The low fertility of these soils favors longleaf establishment. These Forest stands were minimally damaged during the 1985–86 SPB epidemic.

Current conditions

The loblolly and slash pine stands growing on the loamy, well-drained soils are at risk for annosus development, especially plantations with first thinnings. Longleaf pine is somewhat resistant to this root disease.

Longleaf and shortleaf pine are also resistant to fusiform rust. Vernon parish is considered a low-risk area for fusiform rust in loblolly stands, and high-risk for slash pine stand in the 0–10 age class.

This LTA is a high-risk area for brown-spot needle blight during the grass stage of longleaf pine regeneration. Management techniques that limit the duration of the susceptible grass stage along with prescribed burning greatly reduce the impact of this disease. See table 3–61.

Southern pine beetle attacks occur primarily along the lower slopes and drainages in overstocked loblolly stands. Other insect damage in upland stands, including that from Ips, black turpentine, and ambrosia beetles, is usually associated with stress conditions from fire, drought, lightning strike, or RCW cavity trees.

Future trends

This LTA would continue to be managed predominately for longleaf pine. Impacts from fusiform rust, annosus root disease, and brown-spot needle blight would be minimal. Increased rotation ages for the pine component would increase potential for red-heart development and RCW habitat management. Impacts from bark beetles would continue, especially in stands that are overstocked or otherwise stressed by drought, fire, or injury. During SPB epidemic years, some losses in longleaf stands could also be anticipated.

TABLE 3–61, ACRES POTENTIALLY AFFECTED BY DISEASE IN LTA 6

Host Acres Relative to the Pathological Interactions of Host / Site and Age Classes

	1 Fusiform Rust		2 Annosus Root Disease		3 Brown-Spot		4 Red Heart	
Kisatchie NF Ranger District	Host Acres	% of LTA 6	Host Acres	% of LTA 6	Host Acres	% of LTA 6	Host Acres	% of LTA 6
Vernon Unit	281	1	554	2	1,273	5	668	2

1. Loblolly and slash pine acres in 0–10 age class
2. Loblolly, slash, and shortleaf pine acres in age classes 11–40 years
3. Longleaf pine acres in 0–10 class
4. Loblolly, slash, and shortleaf pine acres in age classes 71 and older; longleaf pine acres in age classes 81 and older; and pine-hardwood acres aged 71 and older

LTA 7 — RED RIVER ALLUVIAL PLAIN

LOCATION

This LTA corresponds most closely to the relatively small areas of the Forest occurring on the Red River alluvial floodplain in central Louisiana. It occupies approximately 5,500 acres within the Forest. It is present in 1,500 acres of the Bayou Beouf area on the Evangeline Unit of the Calcasieu District, 3,000 acres of Cunningham Brake on the Kisatchie District, and 1,000 acres along the southwestern boundary of the Winn District.

PHYSICAL ENVIRONMENT

Soils

Background

Recent alluvium and *natural levees* are Holocene age, deposited by past and present courses of the Red River during the Quaternary Period. These formations are generally characterized as having reddish brown clay, silty clay, and silt with varying amounts of sand and gravel.

The land-surface form over most of LTA 7 is flat-to-nearly level with slopes ranging from 0 to 1 percent. The local relief generally ranges from 0 to 10 feet per square mile.

Current conditions

Soils in the Red River alluvial plain formed in clayey alluvial river deposits. *Moreland* and *Perry* soils are somewhat poorly drained and poorly drained. They lie on broad, level flats, on backswamps, and on natural levees of the floodplains. Large areas of these soils are alkaline, high in organic matter, and relatively high in plant nutrients. *Yorktown* soils are found on old stream channel scars and depressional areas of the floodplain. These soils are very poorly drained and are wet year-round. Available water capacity is low-to-moderate on these soils, but the frequency of lengthy flooding and wetness characteristic of most of these soils provides a lot of available water. The resulting anaerobic soil conditions on much of this LTA favor the establishment of forested wetland vegetation. Most soils in this LTA are hydric, which is a criterion for classifying these areas as wetlands.

LTA 7 — RED RIVER ALLUVIAL PLAIN

LOCATION

PHYSICAL ENVIRONMENT

Soils

Typical of LTA 7

LANDSCAPE SETTING

LTA 7 — RED RIVER ALLUVIAL PLAIN

PHYSICAL ENVIRONMENT

Soils

Water

BIOLOGICAL ENVIRONMENT

Vegetation

Typical of LTA 7

Future trends

Anaerobic conditions of the wetter soils in this LTA favor the establishment of forested wetland species. Soils which are not as wet are still productive for other riparian species. Because of their wetness these soils are highly susceptible to rutting.

Water

Background

The extent of LTA 7 includes the lower reaches of Bayou Beouf in the Evangeline Unit, Kisatchie Bayou in the Kisatchie District, and Saline Bayou in the Winn District.

Because the red clayey soils are flat, saturated and frequently flooded, most of the LTA is considered wetland. Drainage density is the highest on the Forest, similar to LTA 2, with about 4.1 stream miles per square mile.

Due to the wetland nature of LTA 7, it has many perennial streams.

Current conditions

Much of this LTA is swampy, with relatively lengthy water detention producing a wetland character. Water passing through is therefore of good quality and relatively clear, though it may be dark in appearance due to the high organic content from acidic swamps.

Future trends

Designated uses of the streams are not expected to change through the next planning period.

BIOLOGICAL ENVIRONMENT

Vegetation

Background

A frequently flooded bottomland plant community, consisting primarily of deciduous hardwood species, dominated this landscape. Cypress occurred in sloughs, backwaters, and other low areas within the floodplain. Large-stream riparian forest covered approximately 5,500 acres in this LTA.

Moderately to densely stocked unevenaged wetland hardwood forest typified this bottomland community, with scattered large stems and open canopy gaps. Vines, shrubs and advanced regeneration of overstory species filled the gaps. Because of shade and flooding, little ground cover existed.

Current conditions

On national forest lands the existing vegetation on these landscapes shows little change from historical vegetation. About 55 percent of LTA 7 that lies inside the Forest is within Cunningham Brake and Bayou Beouf Research Natural Areas.

Future trends

National forest acreage within this association is minimal. Management practices would focus on maintaining the existing plant communities and vegetation structure.

Wildlife

Background

The major landscape habitat type prior to European settlement was riparian forest dominated by old growth bottomland hardwood forests and cypress swamps. The forest canopy was moderately closed to closed and contained a diverse mixture of wet-site oaks, gums, hickories, cypress, and other hardwoods. Small canopy gaps were scattered throughout. Hardwood snags, den trees, and down logs were common. The midstory was multilayered and diverse. Very little herbaceous understory was present. These landscapes were frequently inundated by annual flood events and remained underwater for substantial portions of the year.

These frequently flooded hardwood forests and backswamps provided suitable to optimal habitat conditions for a variety of wildlife communities. The Louisiana black bear, red wolf, panther, and Ivory-billed Woodpecker probably existed on these landscapes prior to European settlement. Other wildlife species characteristic of these landscapes included dwarf salamander, eastern newt, bird-voiced tree frog, painted turtle, cottonmouth, swamp rabbit, muskrat, white-tailed deer, Anhinga, Snowy Egret, Yellow-crowned Night Heron, Wood Duck, Red-shouldered Hawk, Barred Owl, Pileated Woodpecker, Prothonotary Warbler, and Northern Parula. Wildlife species more dependent upon forest interior habitats may have found suitable conditions on these areas.

Current conditions

Less than 6,000 acres of this landscape occurs on the Kisatchie National Forest — a minimal amount. Nearly all — 93 percent — of what does occur on the Forest remains forested in old-growth bottomland hardwoods and cypress swamps. Habitat conditions remain essentially the same as in the past and are altered primarily as a result of natural disturbances — such as flooding, natural mortality, and plant succession. The largest block of habitat on the Forest is only 2,700 acres in Cunningham Brake on the Kisatchie District. The Evangeline Unit contains 1,500 acres of Bayou Boeuf where it enters the Red River floodplain. Much of the remainder of the Red River floodplain has been converted to agriculture and other uses and is no longer forested.

With the notable exceptions of the species listed above, most wildlife known to have occurred on these landscapes prior to European settlement are here today. However, the size, location and isolation of these areas on the Forest may present long-term viability problems for some species dependent upon larger expanses of bottomland hardwood forest. Rare wildlife species associated with these landscapes include Worm-eating Warbler, Swainson's Warbler, Louisiana Waterthrush, alligator snapping turtle, and Louisiana slimy salamander.

Future trends

Current habitat conditions on a large majority of LTA 7 would continue into the future. Some opportunities for ecosystem restoration or other wildlife habitat improvement projects exist on approximately 136 acres of the Evangeline Unit. This is recently acquired land which was previously agricultural cropland.

Fish and aquatic organisms

Background

This LTA includes the lower portions of Bayou Boeuf, Kisatchie Bayou, and Saline Bayou — on the Evangeline Unit, and Kisatchie, and Winn Districts respectively — where each watercourse enters the Red River floodplain.

Current conditions

Recent work on Kisatchie and Saline Bayous (**Dean, unpublished report, 1996**) noted dissolved oxygen levels ranging from 6.0 to 11.5 ppm, with pH running from 6.4 to 7.7. Alkalinity and total dissolved solids are indicated to be 3–14 ppm and 10–30 ppm respectively.

Fish diversity in Kisatchie Bayou ranged between 9.7 and 10.7 species, while Saline Bayou averaged 8.7 species. Kisatchie Bayou

LANDSCAPE SETTING

LTA 7 — RED RIVER ALLUVIAL PLAIN

BIOLOGICAL ENVIRONMENT

Fish and aquatic organisms

Forest health

contained some darters and the uncommon Sabine shiner, both of which require higher water quality conditions. These species were not found in Saline Bayou. The bluehead shiner and squawfoot are conservation species known to occur in Bayou Boeuf.

Future trends

Improvement of aquatic habitat conditions in this LTA would be expected with additional streamside habitat protection measures and watershed improvement. Such practices should help maintain viable populations of fish and other aquatic organisms, including the bluehead shiner and the squawfoot.

Forest health

Background

The soils within LTA 7 were formed by fluvial action and periodic flooding of the Red River. They are poorly drained wet soils subject to periodic flooding and are relatively high in plant nutrients. This LTA was not impacted by the 1985–86 SPB epidemic.

Current condition

The predominant forest type of this LTA is bottomland hardwood, representing 80 percent of the current forest cover. Insect and disease problems of this hardwood forest are relatively minor, with some damage caused by insect borers and decay fungi. Decay fungi enter the host through fire scars, mechanical injury, dead branch stubs, insect wounds, and storm damage. Reduction of injury causing agents and prompt salvage of storm damaged trees reduces the impact of decay fungi and hardwood borers.

The remaining 20 percent of the forested area consists of upland hardwoods, mixed hardwood-pine and a small amount of pine / pine-hardwood stands. Impacts from insects and diseases are minimal. An occasional SPB spot occurs in pine stands and in the pine component of mixed pine-hardwood stands. Disease risk within the pine component is minimal.

Future trends

As rotation ages for hardwoods are extended, some increases in heartwood decay and butt-rot could be expected. Hardwood forest stands are suitable host for a number of defoliating insects, including the gypsy moth. Surveillance and monitoring for insect outbreaks would be ongoing efforts of integratedpest management.

LANDSCAPE SETTING
LTA 8 — CANEY LAKES LOAMY UPLANDS
LOCATION
PHYSICAL ENVIRONMENT
Soils
Water

LTA 8 — CANEY LAKES LOAMY UPLANDS

LOCATION

Occupying about 3,200 acres within the Forest, LTA 8 lies in the southwestern 1/3 of the Caney District's Caney Unit.

PHYSICAL ENVIRONMENT

Soils

Background

This LTA is geologically similar to LTA 1 in that it is predominantly *Quaternary high terrace* deposits of Pleistocene origin. It is characterized by tan-to-orange clays, silts, and sands, with large amounts of gravel.

Rolling uplands typify the land-surface form. These ridges and sideslopes have an average slope gradient of 1–10 percent and local relief of 60–100 feet per square mile. The area is generally dissected by narrow intermittent and perennial drainages and associated floodplains and terraces.

Current conditions

Soils in the Caney Lakes Loamy Uplands formed in loamy sediments. The predominant soils within this LTA are well-drained and moderately well-drained loams with moderately permeable subsoils. Runoff is moderately low. These soils are low in organic matter and plant nutrients. They have moderate plant-available water. The major soils are *Ruston* and *Malbis* on the ridge tops and *Smithdale* on moderate-to-steep sideslopes. About 7 percent of this LTA contains alluvial floodplain soils.

Future trends

Erosion and compaction would continue to be a concern for most of these soils.

Water

Background

The only drainage in LTA 8 is Caney Creek. Caney Lakes, two adjoining recreation lakes with a combined surface area of about one square mile, are in this LTA. This LTA is similar to LTA 1. Subsoils are permeable, runoff is low,

Typical of LTA 8

LANDSCAPE SETTING

LTA 8 — CANEY LAKES LOAMY UPLANDS

PHYSICAL ENVIRONMENT

Water

BIOLOGICAL ENVIRONMENT

Vegetation

Wildlife

and drainage density is low — about 2.8 stream miles per square mile. The LTA provides high recharge potential to the *Chicot / terraces* aquifer. Fewer than one-tenth of LTA 8 streams are perennial.

Current conditions

Stream flow in LTA 8 is less flashy than most other LTAs because of permeable soils. Base flows are well-sustained and flood peaks are relatively low. Streams are characteristically shallow with low sediment loads, sandy bottoms, clear water, frequent deep pools, and abundant large woody debris. Since soils in LTA 8 are low in nutrients, runoff from these soils is low in nutrients, lessening the production of receiving streams and lakes.

Future trends

No change is expected in the designated uses of streams and lakes through the next planning period.

BIOLOGICAL ENVIRONMENT

Vegetation

Background

The shortleaf pine / oak-hickory plant community dominated the landscape within this LTA, covering about 2,700 acres. Climate excludes longleaf pine even though other conditions would support it.

The uplands of these forests were open-canopied, mostly uneven-aged, and featured a moderate to fairly dense stocking of shortleaf pine and hardwoods. Various shrubs and regenerating hardwoods were present and may have formed a thick midstory. The ground cover was sparse-to-moderate and may have occurred in grassy patches. Relatively narrow intermittent and perennial drainages dissected the uplands. Embedded riparian communities occurred along these drainages.

Current conditions

The shortleaf pine / oak-hickory community has largely been replaced by loblolly pine stands. Many of today's stands still contain a shortleaf pine component. The hardwood component has been greatly reduced over much of the uplands. Due to past management practices and an altered fire regime, virtually no shortleaf pine / oak-hickory forest occurs in this LTA.

Future trends

The restoration of shortleaf pine / oak-hickory ecosystems to this LTA could aid in maintaining indigenous natural plant communities.

Wildlife

Background

Similar to LTA 3 to the south, the primary major landscape vegetation on LTA 8 prior to European settlement was old-growth shortleaf pine / oak-hickory (**Williams and Smith, 1995**). The forest canopy was multilayered and relatively open, with large amounts of within-canopy hardwoods. Snags, hardwood den trees and down logs were common. The effects of soil moisture and topography on fire frequency and intensity have caused wider and probably less distinct ecotones between the mixed pine-hardwood uplands and the riparian areas than those on LTAs 1 and 2. Mixtures of oaks, hickories and other hard mast producers were prominent throughout these landscapes.

Bottomland hardwood forests along Caney Creek and other large LTA 8 streams provide additional unique wildlife habitats within this landscape.

The mixed pine-hardwood habitats of these landscapes provided suitable-to-optimal habitat conditions for a variety wildlife communities. The Louisiana black bear, red wolf, and panther probably existed on these landscapes in years past. The marbled salamander, prairie king snake, golden mouse, fox squirrel, gray fox, white-tailed deer, Cooper's Hawk, Summer Tanager, Black-and-white Warbler, Eastern Screech Owl, Red-bellied Woodpecker, and Wild Turkey among many others were common inhabitants of these landscapes. Mixed pine-hardwood habitats appear to be of particular importance to neotropical migratory birds utilizing Kisatchie National Forest habitats (Barry, et. al., 1995). Game and nongame species preferring hard mast undoubtedly occurred at increased population densities within this LTA.

Current conditions

Only a minimal amount of LTA 8 occurs on the Forest. Nearly 95 percent of the shortleaf pine / oak-hickory habitats that occurred on lands that are today Kisatchie National Forest have been considerably altered from what they were prior to European settlement. Currently, many stands on LTA 8 have a relatively closed canopy and do not contain the prominent oak and hickory composition in their overstories as did those of the preceding forest. The shortleaf pine component has been largely replaced by loblolly pine. These factors have reduced the understory component and mast production over much of the area. These changes in Forest composition and structure have altered the habitat suitability for many native species. As on other LTAs, most Forest stands today are second-growth and are considerably less than 90 years old. As a result, some wildlife habitat attributes which were more abundant on older forests, such as snags, down logs, relict trees, and small canopy gaps, are less common today. Hardwood den trees and mast producers continue to exist in stream bottoms, ecotones, and as individual trees or clumps scattered throughout some upland stands. Caney Lakes reservoir provides this LTA an additional important habitat feature, especially for resident and migratory waterfowl.

With some exceptions, most of the wildlife known to have occurred on these landscapes prior to European settlement are here today. Rare wildlife species expected to find suitable habitat conditions and to potentially occur on LTA 8 include Red-cockaded Woodpecker, Bachman's Sparrow, Henslow's Sparrow, White-breasted Nuthatch, and Cooper's Hawk. The RCW is considered extirpated from that portion of LTA 8 within the Forest. None of this LTA occurs within a tentative HMA for the RCW.

Future trends

The physical and biological characteristics inherent in LTA 8 landscapes provide resource managers unique opportunities to restore and maintain shortleaf pine / oak-hickory ecosystems in an economically and ecologically efficient manner in north Louisiana. The set of habitats, habitat conditions, and habitat attributes common to shortleaf pine / oak-hickory forests on LTA 8 are important to maintaining viable populations of native wildlife species associated with mixed pine-hardwood communities in this portion of the State. These landscapes also provide some of the best potential for conserving many of the Forest's neotropical migratory birds as well as meeting the habitat needs of rare wildlife species occurring on the Forest, such as — White-breasted Nuthatch, Bachman's Sparrow, Henslow's Sparrow, and Cooper's Hawk. Popular game species such as Wild Turkey, white-tailed deer, and fox and gray squirrel would also find suitable habitat conditions within this LTA.

Fish and aquatic organisms

Background

Caney Creek is the primary drainage in this LTA, flowing into Caney Lakes. These two recreation lakes have a swampy character — shallow, prolific emergent vegetation, low alkalinity, and conductivity.

Current conditions

Recent samples from these lakes yielded a conductivity reading of 64 micromhos and alkalinity of 8 ppm. Fish populations were characteristic of swampy or natural lakes — with redfin pickerel, warmouth, longear sunfish, and brook silversides comprising a major component, especially in the upper lake. Chain pickerel and bowfins were also taken from the lower lake in 1983 (Ebert). Samples from Caney Creek above the lakes documented species representative of those in the lakes.

TABLE 3–62, ACRES POTENTIALLY AFFECTED BY DISEASE IN LTA 8

LTA 8 Timber Acres Susceptible to Annosus Disease

Kisatchie NF Ranger District	Annosus Root Disease[1] Host Acres	% of LTA 8
Caney	1,891	58

1. Loblolly and shortleaf acres in age class 11–40 years

TABLE 3–63, SOIL RISK FOR ANNOSUS ROOT DISEASE IN LTA 8

Soil Conditions with the Greatest Risk for Annosus Development

Kisatchie NF Ranger District	High-Risk Acres	% of LTA 8	Mod. Risk Acres	% of LTA 8
Caney	1,063	33	1,427	44

- Soil risk is determined by soil texture and drainage as described by soil series
- Total risk acres: 77% of LTA 8

Future trends

Stream habitat conditions in this LTA would be expected to improve with additional streamside habitat protection measures and watershed improvement. Such practices should aid in maintaining viable populations of fish and other aquatic organisms.

Forest health

Background

The soils in this LTA were formed as loamy sediments deposited by fluvial action. They include well drained and moderately well drained loams, low in organic material and plant nutrients. The major soils are *Ruston*, *Smithdale*, and *Malbis*. This LTA was only slightly impacted during the 1985–86 SPB epidemic.

Current condition

Within this landtype association, annosus root disease and SPB are pests with the greatest destructive potential. Management strategies to reduce these insect and disease impacts include hazard-rating pine stands for SPB and soil risk-rating for annosus root disease. *Ruston* and *Smithdale* soils pose high risk for annosus development, especially within pine plantations prescribed for first thinnings. *Malbis* poses moderate-risk for annosus development. Stand risk rating of soils prior to thinning allows for integrated pest management to reduce the risk within these stands. Summer thinnings, stump treatments, prescribed burning, and restoration of shortleaf pine are silvicultural tools used on the Caney District to reduce the impacts of annosus root disease.

The number of high-hazard SPB sites are substantially reduced by thinning overstocked pine stands, maintaining stand vigor, reducing off-site plantings, and preventing annosus root disease. For mature pines, the current risk of fusiform rust and brown-spot needle blight is minimal. See tables 3–62 and 3–63.

Future trends

Annosus root disease and SPB outbreaks would continue to be the predominant pest risks. Restoration of shortleaf pine on some Ruston and Smithdale soils with high-risk of annosus development would reduce the risk of both SPB and annosus infestation.

LTA 9 — NORTH LOUISIANA CLAYEY HILLS

LOCATION

Approximately 29,000 acres within the Forest are occupied by LTA 9. The entire Caney District, with the exception of the southwestern one-third of the Caney Unit, falls within this LTA.

PHYSICAL ENVIRONMENT

Soils

Background

This LTA is a combination of the *Cook Mountain* and *Cockfield* surface formations in north Louisiana. Both are members of the Eocene-aged *Claiborne* group, deposited during the Tertiary Period. The Cook Mountain formation is bedded marine sediments — mostly greenish-gray sideritic and glauconitic clays commonly containing ironstone concretions. The Cockfield formation is mainly nonmarine sediment composed of brown lignitic clays, silts, and sands.

The land-surface form over the majority of this LTA is characterized as rolling, with well-defined ridgetops and sideslopes having an average slope gradient of 1–12 percent. The local relief generally ranges from 60 to 100 feet per square mile. There are, however, generally hilly areas within this LTA, notably the southeast one-third of the Caney Unit. The slopes here are somewhat steeper and the local relief ranges from 80–140 feet per square mile. The entire area is generally dissected by relatively well-developed intermittent and perennial stream channels.

Current conditions

This LTA contains soils which formed in clayey and loamy sediments. They are mostly well- to moderately drained clays with some areas of loams. Permeability of subsoils is generally slow-to-very slow. Available water is high-to-moderate, but these soils are low in plant nutrients. The major soils are *Sacul*, *Darley*, *Wolfpen* and *Eastwood*. About 10 percent of this LTA is composed of frequently flooded alluvial soils on floodplains.

Typical of LTA 9

Typical of LTA 9

LANDSCAPE SETTING

LTA 9 — NORTH LOUISIANA CLAYEY HILLS

PHYSICAL ENVIRONMENT

Soils

Water

BIOLOGICAL ENVIRONMENT

Vegetation

Future trends

The erosion hazard is severe on most sideslope soils in this LTA. Compaction hazard is also severe on most of these soils. These would continue to be management concerns.

Water

Background

This LTA is limited to the Caney District. The major drainages are Caney Creek, Flat Lick Bayou, Cooley Branch, Middle Fork Bayou D'Arbonne, and Corney Bayou. Corney Bayou and Middle Fork Bayou D'Arbonne are State-designated scenic streams. Also, Corney Lake is located along Corney Bayou.

The soils are clayey with some loams, well-to-moderately drained, and the permeability of the subsoils is generally slow-to-very slow. Poor subsoil permeability results in significant precipitation runoff. Drainage density is about 3.8 stream miles per square mile. The Cockfield portion of this LTA provides moderate recharge to the Cockfield aquifer.

Current conditions

Streams in LTA 9 are generally shallow and slow-flowing. Channel bottoms are hard clay covered with silt, and frequently have deep holes. These streams tend to dry up from July through October, and pools form in the holes. The water is often turbid and moderate in pH and specific conductance.

Corney Lake was constructed as a WPA project in 1938–1939 and this 2,350-acre impoundment is a popular recreation lake for area residents. A history of maintenance problems is associated with Corney dam and spillway. It last failed in the early 1990's, draining the lake and permitting the free flow of Corney Bayou in its original channel through the lake bed. The dam and spillway have been reconstructed to current design standards, and the lake has returned to its original flood pool.

Future trends

The designated uses of the streams and lakes are not expected to change through the next planning period.

BIOLOGICAL ENVIRONMENT

Vegetation

Background

Shortleaf pine / oak-hickory made up the dominant natural plant community found on this LTA. Shortleaf pine / oak-hickory forests covered about 25,000 acres in LTA 9. The uplands were open-canopied, mostly uneven-aged, featured moderate to fairly dense stocking of shortleaf pine and hardwoods. Midstory and understory vegetation composition and structure were similar to that occurring on LTA 8. These landforms typically featured acidic clay soils. Relatively well-developed intermittent and perennial drainages dissected the area. Embedded riparian communities occurred along these drainages. Hardwood species dominated the alluvial floodplains within the drainage landform.

Current conditions

Many of today's stands, however, still contain a shortleaf pine component. The hardwood component has been reduced over much of the uplands. Because of past management practices and an altered fire regime, approximately 2,500 acres of shortleaf pine / oak-hickory forests occur in this LTA.

Future trends

Improving the shortleaf pine component on the upland sites would continue to be emphasized. The restoration of shortleaf pine / oak-hickory ecosystems to this LTA would aid in maintaining indigenous natural plant communities.

Wildlife

Background

The dominant landscape habitat type prior to European settlement was old growth shortleaf pine / oak-hickory (**Williams and Smith, 1995**). Composition and structure of these forests were similar to those of **LTA 8**. The primary differences between **LTA 8** and this **LTA** have to do with the steeper topography and predominance of clay soils on **LTA 9**. Perhaps the steep, hilly topography of this **LTA** influenced the spread and intensity of landscape fires, which may have resulted in slightly different vegetation patterns than those on **LTA 8**. Differences in forest composition, structure, and patterns affect wildlife habitat characteristics, availability and quality and might have influenced some species' population densities. The occurrences of habitat features such as pine snags, down logs, hardwood den trees, mast producers, riparian areas, and ecotones were also comparable to those on **LTA 8**.

The bottomland hardwood forests along Middle Fork Bayou, Corney Bayou, and other large **LTA 9** streams provide additional unique wildlife habitats within these landscapes.

The composition of wildlife communities on this **LTA** were probably comparable to those which occurred on **LTA 8**.

Current conditions

On **LTA 9**, approximately 80 percent of the shortleaf pine / oak-hickory habitats that occurred on what is now the Kisatchie National Forest are considerably altered from what they were prior to European settlement. The forest composition and structure of these stands are similar to those on **LTA 8** in that they are relatively closed, dominated by loblolly pine, and contain a greatly reduced overstory hardwood component. These factors have reduced the understory component and mast production over much of the area. Changes such as these have altered the habitat suitability for many native species.

As on other **LTAS**, most of today's forest stands are second-growth forest and are considerably less than 90 years old. As a result, some wildlife habitat attributes which were more abundant on older forests, such as snags, down logs, relict trees, and small canopy gaps, are less common today. Hardwood den trees and mast producers continue to exist in stream bottoms, ecotones, and as individual trees or clumps scattered throughout some upland stands. Corney Lake reservoir is found within this **LTA** and provides an additional important habitat feature, especially for resident and migratory waterfowl.

In general, current wildlife populations on this **LTA** are considered to be similar to those on **LTA 8**. Those rare species identified as being associated with **LTA 8** are applicable to this **LTA** as well. Although some inactive cluster sites still exist here, the Red-cockaded Woodpecker is considered to be extirpated from that portion of **LTA 9** on the Forest. None of this **LTA** occurs within a tentative **HMA** for the **RCW**.

Future trends

The inherent capabilities of **LTA 9** landscapes provide additional unique opportunities to restore and maintain north Louisiana shortleaf pine / oak-hickory ecosystems to this unique geologic setting in an economically and ecologically efficient manner. The set of habitats, habitat conditions, and habitat attributes common to shortleaf pine / oak-hickory forests on **LTA 9** are important to maintaining viable populations of native wildlife species associated with mixed pine-hardwood communities in this portion of the State. These landscapes also provide some of the best potential for conserving many of the Forest's neotropical migratory birds as well as meeting the habitat needs of rare wildlife species occurring on the Forest, such as White-breasted Nuthatch, Bachman's Sparrow, Henslow's Sparrow, and Cooper's Hawk. Popular game species such as Wild Turkey, white-tailed deer, and fox and gray squirrel would also find suitable habitat conditions within this **LTA**.

Fish and aquatic organisms

Background

A large Arkansas watershed is the primary drainage flowing into **LTA 9**, which in turn feeds into the Ouachita River system. This system supports some aquatic species that are unique to this **LTA**. Like **LTA 8**, lakes in **LTA 9**

TABLE 3–64, LTA 9 SOIL RISK FOR ANNOSUS ROOT DISEASE

Soil Conditions with the Greatest Risk for Annosus Development

Kisatchie NF Ranger District	High-Risk Acres	% of LTA 9	Mod. Risk Acres	% of LTA 9
Caney	4,286	15	4,407	15

♦ Soil risk is determined by soil texture and drainage as described by soil series.
♦ Total risk acres: 30% of LTA 9

LANDSCAPE SETTING

LTA 9 — NORTH LOUISIANA CLAYEY HILLS

BIOLOGICAL ENVIRONMENT

Fish and aquatic organisms

are swampy . Most streams are bayou-like, sluggish, and wide, with steep banks.

Current conditions

Lakes in this area include Corney Lake, a 2,350-acre recreation lake, and Kidd Lake, the Forest's only natural lake. Studies (**Cowan et al, 1995**) show Kidd Lake to be fairly diverse for a natural lake, with 41 macroinvertebrate taxa and 26 fish species collected in 4 seasons. Fish diversity in Corney lake is also high, with more than 20 species documented in past samples (**Ebert / LDWF, 1983**).

Limited data is available for streams within this LTA. The only known flow record was 60 centimeters per second in Greer Creek (**Ebert, 1983**). While alkalinity varies from 10 to 15 ppm, pH values range from 6.3 to 7.8. Conductivity ranges from 41 to 192 micromhos. In-stream fish diversity is low, varying from 2 to 13 species. The squawfoot is a rare species known to occur in Corney Bayou. The southern hickorynut is also known to occur in Corney Bayou.

Future trends

Since most of the watershed feeding this LTA is outside of national forest land, no improvement of habitat conditions is expected. The repair work being conducted by the Forest Service on the Corney Lake spillway would reduce much of the recent silt loading in Kidd Lake, but would mainly benefit habitats on private lands below the lake.

Stream haitat conditions in this LTA would be expected to improve with additional streamside protection measures and watershed improvement practices. Such practices should aid in maintaining viable populations of fish and other aquatic organisms, including the squawfoot and southern hickorynut.

Forest health

Background

This LTA contains clayey soils which were formed in loamy and clayey marine and nonmarine sediments. They are moderate-to-well-drained clays and loams, low in plant nutrients, with moderate-to-high plant-available water. The major soils are *Sacul*, *Darley*, *Wolfpen* and *Eastwood*. The pine stands in this LTA were moderately impacted during the 1985–86 SPB epidemic.

Current conditions

Southern pine beetle outbreaks and annosus root disease are the primary pest risks associated with this LTA. Clayey soils are generally low-risk for annosus; however, several of the soils types within this LTA have sandy or sandy-loam surface layers that increase the risk of annosus development. As shown in table 3–64, thirty percent of the sites are at risk for annosus. Wolfpen soil type is high-risk. Darley soil is classified as moderate risk.

Southern pine beetle outbreaks occur occasionally. Rapid detection and suppression prevent buildups of large SPB spots. Long-term management strategies may consist of hazard-rating stands, reducing basal area in over stocked stands, and prompt removal of damaged stands.

Claiborne Parish presents a moderate risk factor for fusiform rust in loblolly stands.

Future trends

Continued use of integrated pest management strategies would reduce pest impacts. Increases in shortleaf regeneration and management would also favor reduced pest risk.

Chapter 4

Environmental Consequences

PURPOSE AND ORGANIZATION OF CHAPTER 4

This chapter provides the scientific and analytic basis for comparing the alternatives that are presented in Chapter 2.

Environmental consequences are discussed in the short and long term. Although a Forest Plan based on any alternative would guide management for 10 to 15 years, effects beyond the first decade also must be considered. This information explores choices and helps reveal implications of implementing an alternative over the long term.

Chapter 4 first discloses environmental consequences for each environmental component at the subregional and landscape scales of the *National Hierarchical Framework of Ecological Units* (national hierarchy); and then compares impacts by alternative. The chapter concludes by summarizing cumulative effects of the alternatives; describing unavoidable adverse effects; the relationship of short-term uses and long-term productivity; irreversible and irretrievable commitments of resources; and other disclosures — including relationships with other agency plans or policies; and incomplete or unavailable information. Please note that the terms *effects* and *impacts* are synonymous in this document.

DESCRIPTION OF ENVIRONMENTAL CONSEQUENCES

Estimated effects of alternatives differ by scale for various mixtures of management prescriptions and land allocations. Depending on the area analyzed, these mixtures generate varying levels of resource outputs, goods, and services. The national hierarchy provides geographic boundaries at a resolution appropriate for analyzing effects to ecosystems from activities proposed in a forest plan.

Effects are disclosed by environmental component, including *physical environment*, *biological environment*, *land use and improvements*, *social and economic environment*, and *commodity production*. For each component, three discussions are presented:

- *General effects*, which occur at the subregional scale (section and subsection level) of the national hierarchy.
- *Effects by landtype association* (LTA), which occur at the landscape scale of the national hierarchy. For some components, there are no known differences in effects at this scale; when this occurs we will disclose it. To better compare and understand effects at this scale please refer to figure 3–12 on pages 3–118 and 3–119, which displays the location of LTAs.
- *Effects by alternative*, which compares differences between alternatives in environmental effects, outputs, and activities.

The effects disclosed, regardless of national hierarchy scale, are at the programmatic forest plan level. The analysis is presented for comparison and evaluation of alternatives forestwide. Future site-specific environmental analyses and decisionmaking will determine the location, design, extent, and impacts of project-level activities.

Environmental consequences for each component affected by the alternatives are described as *direct*, *indirect*, and *cumulative effects*. Direct effects are caused by actions and occur at the same time and place. Indirect effects also are caused by actions, but occur later or are farther distant and are reasonably foreseeable (***40 CFR 1508.8***).

Cumulative effects refer to incremental environmental impacts resulting from an action when added to past, present, and reasonably foreseeable future actions, regardless of what agency or person undertakes them. Impacts can accumulate from individually minor but collectively significant actions taking place over time (***40 CFR 1508.7***).

Mitigation measures include actions to avoid, minimize, reduce, eliminate, or rectify adverse impacts of actions proposed in the alternatives. Estimated consequences assume accomplishment of required mitigation.

PURPOSE AND ORGANIZATION OF CHAPTER 4

DESCRIPTION OF ENVIRONMENTAL CONSEQUENCES

PHYSICAL ENVIRONMENT

AIR

GENERAL EFFECTS

PHYSICAL ENVIRONMENT

AIR

GENERAL EFFECTS

Introduction

Pollution sources influencing a forest's air quality are produced by a number of sources. Forest management activities affecting an airshed include prescribed burning, slash burning, wildfires, dust and vehicular emissions from oil and gas exploration, military use, and general travel on Forest roads. Some off-Forest emission sources include pollutants from vehicles and factories, smoke from burning on private land, and airborne dust from unvegetated areas and agricultural lands.

Effects of fire management on air

Prescribed fire has more direct effect on the air quality than any other forest management activity. In the South, the major effects of smoke on air quality are respiratory impairment near the fire, and visibility reduction — especially near highways, at airports, and in populated areas (USDA Forest Service, 1989). Smoke from burning contains four pollutants of concern: PM2.5 (particulate matter), carbon monoxide, nitrogen oxides, and volatile organic compounds. In addition, trace amounts of toxic material have been identified in wood smoke. The potential impacts of these pollutants are listed in table 4–1.

Smoke can impair general air quality in sensitive areas downwind from extensive burning. Use of smoke management guidelines mitigates impacts by reducing smoke emissions and burning during atmospheric conditions that favor smoke dispersion (USDA Forest Service, 1989).

Emissions from prescribed fires vary depending on site-specific fuel loadings, fuel types, fire intensity, fuel moisture, and the number of acres treated. Prescribed burning plans require that ignitions occur during certain weather conditions and within specific ranges of fuel moisture. Proper timing of a burn generally allows pollutants to disperse fairly rapidly. Despite efforts to control smoke in designing and conducting prescribed burning treatments, some temporary impairment to visibility nevertheless occurs occasionally. It is important to note that prescribed burning conducted on a schedule and under planned conditions can improve air quality by reducing the acres that would burn catastrophically in future wildfires. The former is always cooler and much less intense than the latter and produces far less smoke, toxic material, and particulates.

For protection of human health the U.S. Environmental Protection Agency (EPA) has set limits on allowable pollutants through National Ambient Air Quality Standards (NAAQS). See table 4–2. All Kisatchie National Forest lands are considered to have air quality meeting or exceeding the NAAQS. Monitoring has revealed that PM10 concentrations measured 1/4–1/2 mile downwind from a prescribed fire should not violate NAAQS (Hunt, 1994). Emissions from prescribed burning would therefore not be expected to violate the standards beyond a burn site.

Ozone can form in the upper layer of smoke plumes exposed to sunlight. Concentrations of up to 0.1 PPM have been reached in some plumes, usually in the first hour and within 2 miles downwind. Formation of ozone by prescribed fire is a minor

TABLE 4–1, IMPACTS OF PRESCRIBED BURNING EMISSIONS

Volatile organics (VOC)	An ozone precursor.
Ozone (O_3)	A powerful oxidizing agent, potential respiratory passage damage, can damage vegetation, certain plants very sensitive to ozone and produce symptoms of ozone at concentrations less than NAAQS.
Particulate matter (PM2.5)	Impaired visibility, eyes, nose and throat irritation, small fraction less than 3 microns in diameter can cause lung damage. Small particles constitute 70% of smoke particles.
Carbon monoxide (CO)	Flammable gas, interferes with oxygen carrying capacity of blood, potentially lethal.
Nitrogen oxides (NOX)	Includes both nitrogen dioxide and nitric oxide, forms nitric acid in atmosphere-a source of acid rain. Acid rain produces stress on the environment, the extent of which is not fully understood. Excess nitrogen interferes with plants' ability to harden off for winter, is an ozone precursor, and reduces visibility.

problem due to intermittent occurrence (USDA Forest Service, 1989). Automobile engines and industrial processes produce most of the compounds that result in ozone (USDA Forest Service, 1994).

An inventory of prescribed burning volatile organics (VOC) emissions prepared for Grant Parish indicated that state standards for ozone would not be exceeded. See discussion in the effects by alternative section. In October 1995 the EPA declared Grant Parish an attainment area with limited maintenance for ozone. No studies have been conducted to determine ozone damage to the Forest's vegetation. Occasionally ozone levels are probably high enough to affect some plants, but unlikely to be serious.

Carbon dioxide is the other prescribed fire emission of environmental concern. Because it is a "greenhouse gas," its increasing concentration in the atmosphere has given rise to the issues of global warming and climate change. Complex environmental questions such as these are global in scope and thus beyond the scope of a forest plan. It must be recognized that fire has always been present in forest environments. The following quote describes this well:

> ***Prescribed and wild fires in temperate and boreal forests also release gross amounts of carbon that are withdrawn from the atmosphere in subsequent years as a result of forest growth. In the long term, forests must be in balance with respect to carbon. Otherwise they would contain either much more or much less carbon than observed. In the short term, trends in the frequency of fires may store or release carbon, but such short-term trends have not been evaluated globally. The most conservative assumption is that natural systems are in steady state with respect to carbon, neither releasing nor accumulating it (Haughton 1991).***

Wildfire has the highest potential to negatively impact air quality. Its frequency, the level of its emissions, the direction and dispersal of its smoke, and the persistence of smoke from it can neither be predicted nor controlled. Increased use of the Forest for recreation and project activities would increase the potential for human-caused wildfires. This could increase the frequency of adverse effects on air quality.

TABLE 4–2, NATIONAL AMBIENT AIR QUALITY STANDARDS

Pollutant		Primary (Health-related) Standard Level Averaging Time Concentration	Secondary (Welfare-related) Standard Level Averaging Time Concentration
PM2.5	Annual arithmetic mean	15 ug / m3	Same as primary
	24-hour b	65 ug / m 3	Same as primary
SO2	Annual arithmetic mean	(0.14 ppm) 80 ug / m3	(0.50 ppm)
	24-hour c	(0.14 ppm) 365 ug / m 3	
CO	8-hour c	9ppm 10mg / m 3)	No secondary standard
	1-hour c	35 ppm (40 mg / m 3)	No secondary standard
NO2	Annual arithmetic mean	0.053 ppm (100 ug / m 3)	Same as primary
O3	Maximum daily	0.08 ppm (185 ug / m 3) Average	Same as primary
Pb	Maximum quarterly average	1.5 ug / m 3	Same as primary

a — Parenthetical value is an approximately equivalent concentration.

b — PM10 was the indicator pollutant prior to the revised PM2.5 standard. The new standard went into effect in 1997, using PM2.5 (particles less than 2.5 microns in diameter) as the new indicator pollutant.

c — Not to be exceeded more than once per year.

d — The standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above 0.12 ppm is equal to or less than 1, as determined in accordance with Appendix H of the ozone NAAQS.

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EFFECTS BY LANDTYPE ASSOCIATION (LTA)

EFFECTS BY ALTERNATIVE

Effects of land and military use and improvements on air

Vehicle emissions produce PM2.5, carbon monoxide, nitrogen and sulfur oxides, volatile organic compounds, and carbon dioxide. In areas of vehicle concentration — such as military use areas, popular recreation sites, and communities in or near the Forest — air pollution could be noticeable at certain times of year, especially when combined with emissions from fire. Also, dust from construction, maintenance, and use of unpaved roads could temporarily impair visibility.

Most national forest oil and gas exploration and development is administered through individual permits granted by the Bureau of Land Management (BLM). This allows environmental impacts to be evaluated at site-specific levels. Depending on the size and type of drilling operation, large internal combustion engines power the drilling equipment, sometimes pumping equipment as well. Under certain conditions, some on-site processing is done. All these activities produce emissions, so they would preferably be evaluated for environmental impacts before an operation is permitted.

The Forest Service has less control over the activity when private mineral rights are being exercised, but would nevertheless analyze the effects and negotiate the best possible environmental controls.

EFFECTS BY LANDTYPE ASSOCIATION

The criteria that differentiate landtype associations (LTAs) on the Kisatchie are geology, historical landscape vegetation, and landsurface form. These criteria would not have any significant influence on the effects of proposed management practices on air quality. Therefore, the effects described in the general effects section for this resource are expected to occur equally across the LTAs.

EFFECTS BY ALTERNATIVE

Emissions produced by prescribed burning would vary by alternative, depending upon the amount and type of prescribed burning. In general, air quality decreases as more acres are burned. However, growing season and site preparation burns tend to produce more smoke due to the higher moisture content of fuels and total fuel load respectively than dormant season understory burns and therefore can produce more emissions.

As shown in table 4–3, for the first period Alternative C has the highest level of total proposed annual prescribed burning, followed by Alternatives F, Mod D, D, B and E. Alternative A would have the least amount of total annual prescribed burning. However, as table 4–7 on page 4–34 shows, Alternative D would have the highest amount of growing season and site preparation burns — 16,600 acres — as part of its total program; followed by Alternatives B — 16,200 acres, Mod D - 15,800, F — 15,200 acres, E — 14,600 acres, C — 14,400 acres, and A — 11,000 acres. Emissions would be of short duration, and would be reduced to an acceptable level in all alternatives through the implementation of mitigation measures.

Louisiana general conformity air quality regulations (LAC:33.III, Chapter 14, Subchapter A) would be applicable to all areas designated in nonattainment of the NAAQs. This includes any area operating under a state implementation plan (SIP), which contains a maintenance plan to ensure continued achievement of the NAAQs. The general conformity regulations set policy, criteria, and procedures for demonstrating and assuring conformity of federal actions to the applicable SIPs.

Grant Parish is in attainment of all NAAQs. It operates under an EPA-approved ozone SIP which contains a minimal maintenance plan. All federal activity resulting in ozone emissions to the air in Grant Parish, would therefore be subject to the general conformity regulations. Because Grant Parish operates under a nitrogen oxides waiver, the regulations would apply only to volatile organic compound (VOC) emissions.

In accordance with LAC:33.III, Section 1405, an applicability determination was made, considering direct and indirect emissions, for each of the alternatives. No indirect emissions were foreseen. Direct emissions were calculated for the following activities/equipment: off-road mobile sources; demolition activity; prescribed burning and site preparation. EPA's AP-42 calculations were applied to projected activity that would take place in Grant Parish under each alternative and are shown in table 4-4. Emissions from mobile support vehicles (pickup and transport trucks, dozers, and all-terrain vehicles) and helicopters were included in the VOC

TABLE 4–3, ESTIMATES OF FORESTWIDE ANNUAL PRESCRIBED BURNING

Displayed by Alternative and Period

10-Year Period	Alt A	Alt B	Alt C	Alt D	Mod D	Alt E	Alt F
Period 1 M-ACRES / year	47	72	100	82	84	70	84
Period 2 M-ACRES / year	45	74	101	83	85	70	85
Period 3 M-ACRES / year	46	74	101	84	86	71	85
Period 4 M-ACRES / year	49	73	101	84	85	71	85
Period 5 M-ACRES / year	49	74	102	84	86	72	86

emissions. Demolition (burning torch fuel) emissions were also included. Emissions from aerial ignition devices were calculated and determined not to be significant.

Alternatives A, B, D, Modified D, E, and F estimated annual emisisons fell below the general conformity determination threshold of 100 tons per year (increase over 1990 emissions from burn activity as included in EPA-approved Louisiana Department of Environmental Quality Area Source Emissions Inventory). Selection of alternatives A, B, D, Modified D, E, or F would fully satisfy all requirements of the general conformity regulations and no further action would be required.

Emissions from alternative C exceeded the 100 tons per acre de minimus increase over 1990 emissions, therefore a conformity determination would be required if alternative C were selected. However, alternative C could be found in conformity because the SIP does not set limits or establish emission budgets for Grant Parish during the Plan period. Consequently, no adjustments to or mitigation for the planned emissions may be required. Should alternative C be selected, a public notice and comment period on the conformity determination would be provided in accordance with LAC:33.III, Section 1408.

Emissions resulting from areas of concentrated vehicle use (military use areas, recreation sites, oil and gas exploration sites, road construction, reconstruction or maintenance, or nearby forest communities) would be similar among all alternatives and pose no significant impacts to air quality.

TABLE 4–4, VOLATILE ORGANIC COMPOUND (VOC) EMISSIONS ON NATIONAL FOREST LANDS IN GRANT PARISH

Prescribe Burn Purpose	All Other N. F. Acres	Grant Parish N. F. Acres	VOC's per ac in Tons	Total Annual Emmisions in Tons	Baseline Emmisions Tons in 1990	+/- Departure
ALTERNATIVE A						
Understory, dormant (Ac/Yr)	38,250	9,061	0.041	371.518	480.186	-108.667
Understory, growing (Ac/Yr)	6,750	1,599	0.038	60.765	0.000	60.765
Site Preparation (Ac/Yr)	2,000	474	0.021	9.808	347.410	-337.602
Subtotal:	47,000	11,134		442.091	827.595	-385.504
ALTERNATIVE B						
Understory, dormant (Ac/Yr)	59,500	14,096	0.041	577.918	480.186	97.732
Understory, growing (Ac/Yr)	10,500	2,487	0.038	94.523	0.000	94.523
Site Preparation (Ac/Yr)	3,000	711	0.021	14.711	347.410	-332.698
Subtotal:	73,000	17,294		687.152	827.595	-140.443
ALTERNATIVE C						
Understory, dormant (Ac/Yr)	85,000	20,137	0.041	825.597	480.186	345,411
Understory, growing (Ac/Yr)	15,000	3,554	0.038	135.033	0.000	135.033
Site Preparation (Ac/Yr)	1,000	237	0.021	4.904	347.410	-342.506
Subtotal:	101,000	23,927		965.533	827.595	137.938
ALTERNATIVE D						
Understory, dormant (Ac/Yr)	68,850	16,311	0.041	668.733	480.186	188.547
Understory, growing (Ac/Yr)	12,150	2,878	0.038	109.377	0.000	109.377
Site Preparation (Ac/Yr)	2,000	474	0.021	9.808	347.410	-337.602
Subtotal:	83,000	19,663		787.918	827.595	-39.678
ALTERNATIVE Modified D						
Understory, dormant (Ac/Yr)	70,550	16,713	0.041	685,233	480.186	205.047
Understory, growing (Ac/Yr)	12,450	2,949	0.038	112,062	0.000	112.062
Site Preparation (Ac/Yr)	1,000	237	0.021	4,977	347.410	-342.433
Subtotal:	84,000	19,899		802,272	827.595	-25.323
ALTERNATIVE E						
Understory, dormant (Ac/Yr)	57,800	13,693	0.041	561.406	480.186	81.220
Understory, growing (Ac/Yr)	10,200	2,416	0.038	91.822	0.000	91.822
Site Preparation (Ac/Yr)	2,000	474	0.021	9.808	347.410	-337.602
Subtotal:	70,000	16,583		663.036	827.595	-164.560
ALTERNATIVE F						
Understory, dormant (Ac/Yr)	70,550	16,713	0.041	685.245	480.186	205.059
Understory, growing (Ac/Yr)	12,450	2,949	0.038	112.077	0.000	112.077
Site Preparation (Ac/Yr)	1,000	237	0.021	4.904	347.410	-342.506
Subtotal:	84,000	19,900		802.226	827.595	-25.369

SOIL AND WATER

GENERAL EFFECTS

Introduction

Soil and water may be affected by fire, lands, military use, minerals, range, recreation, soil and water, transportation, and vegetation management activities. Management actions may affect soil chemical and physical properties — causing increases in compaction, displacement, erosion, sedimentation, stream channel alteration, and water nutrients. Erosion and sedimentation can be quantified by measuring or by estimating tons per acre of soil loss. Channel alterations can be measured in specific morphological parameters. Water nutrients can be measured in concentration per unit volume.

Some of the Forest's management activities can affect water resources. The most likely to be affected are *hydrology* — the condition of water flowing from the forest; *stream channel morphology* — the manner in which the channel responds to streamflow; and *water quality*.

Hydrology

Watershed hydrology depends on several factors, including soils, vegetation, slope, area, drainage density (stream length / unit area), impervious area, geology, elevation, aspect, and climate. Some factors are fixed and unlikely to be affected by on-the-ground management activities. Others, such as vegetation, drainage density, and impervious area — including soil compaction — are not fixed and can be affected. Management-induced effects to hydrology can be an increase or decrease in the total amount of water yield from the watershed, or a shift in flow distribution — for example: time to peak, peak flow, flow duration.

Channel morphology

Channel morphology depends on such factors as hydrology, land form, geology, slope, substrate, and valley features. As with hydrology, some factors are relatively fixed; others, such as hydrology, slope and valley features, are not. Management-induced effects to stream morphology include channel down-cutting, aggradation, braiding, widening, and straightening. Stream channels are dynamic and in a constant state of flux. Proportional relationships exist between sediment — the particle size and load, and stream energy — the flow and channel slope. Streams constantly adjust to natural variability in these factors and generally evolve to handle changes. Any activity producing abnormal shifts in sediment or stream energy would cause compensating shifts in the others, which generally results in one or more of the channel adjustments named above.

Water quality

Water quality includes physical, chemical and biological parameters, some of which are interrelated and dependent on the others. Important water quality parameters include sediment, pH, dissolved oxygen, temperature, nutrients, dissolved ions, organics such as fuels and lubricants, and forest chemicals — primarily herbicides. The water quality of forested streams is generally better than that of streams associated with other land uses. In addition to stabilizing soil, forest vegetation ties up nutrients and pollutants in its biomass. Activities reducing the ability of forest vegetation to tie up pollutants — or producing pollutants beyond the ability of the forest to absorb — would increase water pollutants and decrease water quality.

Effects of fire management on soil and water

Repeated burning of pine forests over long periods may have pronounced effects on the maintenance of soil fertility and soil development. Understory burns temporarily increase availability of some nutrients and reduce soil acidity. Concentrations of exchangeable phosphorus ions in the surface soil increased with the frequency of burning (**McKee, 1990**). Nitrogen and volatile material are lost from the forest floor.

Some loss of mineral nutrients occurs through runoff and leaching. Nutrients released from forest litter and plants are readily soluble in water. Runoff transports them to water bodies, thus increasing their nutrient concentrations. Reduced infiltration can affect the hydrology, which can in turn affect channel morphology and cause a resulting shift in stream aquatic habitat.

Most nutrients, however, are retained

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through plant uptake. This effect is greater for growing season burns than dormant season burns. Underburns done on less than three-year cycles reduce litter duff biota to an extent that they do not fully recover before the next burn (USDA Forest Service, 1989).

Annual burns may impair soil porosity, infiltration, and fertility of poor soils. Risk of impairment to soil productivity is minimal for soils in areas that are burned on schedules providing burns at greater than 3 year intervals. For 1- to 2-year underburns the risk of productivity impairment is extreme on poor soils (*USDA Forest Service, 1989*, p. IV-80–IV–86).

Most understory burns negligibly affect erosion on most soils. An exception would be deep sands (Betis) on side slopes and Kisatchie soils, which have a severe erosion hazard. Past monitoring of the *Kisatchie, severely eroded* soil type has shown that dormant season burning causes sheet erosion to occur at twice the rate for unburned areas and produces many times the tolerable rates for soil loss (Thill and Bellemore, 1986). Erosion rates for unburned areas also exceeded tolerable soil loss rates. Erosion rates for growing season burning on this soil type is much less than for dormant season burning but was still twice the rate of unburned areas and greatly exceeded tolerable soil loss rates (Haywood, 1994).

Firelines can produce severe erosion and resulting sedimentation. Plowed lines on slopes can become incised channels, causing erosion and gullying. Proper construction of firelines — including contouring and minimizing plowed lines on slopes and near water bodies — can limit the potential for erosion and sedimentation. Erosion control measures such as construction of water bars and revegetation are essential in reducing erosion.

Effects of lands and military use management on soil and water

Land use and rights-of-way can introduce erosion and cause stream sedimentation if erosion control structures are improperly constructed or maintained. Recreational off-trail use by off-road vehicles (ORVs) often occurs on pipeline and powerline rights-of-way, both of which provide easy access. Since these rights-of-way are not contoured to the land, but instead run straight cross-country, up long slopes, and across drainages, they can be subject to significant erosion and sedimentation. Closing these rights-of-way to ORV traffic when damage becomes evident can minimize erosion and sedimentation, though such closures may be difficult to enforce.

The potential direct, indirect, or cumulative effects of off-road military vehicle use on soil and water resources would be minimal on the southern portion of the Vernon Unit of the Calcasieu District as recurrent training activities that involve military vehicle activity is currently restricted to roads or trails leading directly to bivouac or assembly sites. Training activities that cause soil disturbance could decrease water quality by increasing the turbidity and siltation of streams. Concentration of vehicles and personnel at bivouac and assembly areas could cause soil compaction and erosion. Troops walking through the forest cause minimal soil compaction. Mitigation measures — such as resting of areas showing signs of overuse — could minimize impacts to soil and water resources.

Permittees are responsible for maintaining authorized sites. The conditions of authorization prescribe ways to mitigate damage to various special-use sites and rights-of-way. This includes the type, species, and amount of vegetation cover required; restrictions on the time of year mowing may be done; and any other requirements, such as closing a specific area to eliminate traffic. The effectiveness of these conditions, however, would depend on adequate enforcement.

Effects of minerals management on soil and water

The physical effects of mineral extraction include erosion, compaction, sedimentation, and potential groundwater contamination. Sedimentation and pollution of streams or wetlands can occur down-gradient from such activity sites. Though the impacts are pronounced, soil effects are localized, affecting a small acreage. Many of these impacts can be mitigated by implementing soil and water protection measures that are included in all operating plans and special-use permits. For more information on mineral operations, see Forest Plan Appendix D.

Below is a discussion of oil and gas extraction activities that may impact soil and water.

Well sites are cleared and a level pad constructed of sufficient size to set up the drilling rig and store pipes, compressors, and other equipment. Site access is developed by building a new road or improving an existing one. The required equipment generally includes bulldozers, backhoes, and motor graders. Existing roads may need improvements, such as crowning and ditching, or surfacing. A new road is usually constructed with a travelway 12 to 14 feet wide and a right-of-way 30 feet wide. Surface disturbance from road construction would be greater on steep slopes due to longer cut-and-fill slopes.

The drilling site is cleared and leveled. Topography and the anticipated well depth strongly influence site size; deeper wells generally require larger sites because the rotary rigs needed are larger. For exploration of the Austin Chalk the average well pad size would be 5 acres. Depending on such things as topography and site plan, as much as 6 to 8 acres may be needed. Typically the ideal well site is square, ranging from 100 to 450 feet on a side — usually about 250 feet. On each site the minimum amount of land reasonable and necessary for unobstructed operation would be approved.

Potential impacts of erosion and sedimentation are greatest during this construction phase. Soil loss from roads and pads could range up to 15 tons per acre during the first year after construction. As the area of access roads and pads increases there could be a corresponding increase in runoff and consequent water yield.

In oil and gas operations where well drill sites can be more readily relocated, the location of operating sites and facilities is done with consideration for landforms, topography and sensitive and erodable soils which exist in an area. It can be expected that erosion losses would be minimized with the use of effective erosion control, reclamation and revegetation procedures and the use of appropriate engineering design of roads.

A reserve pit to contain waste drilling fluids and drill cuttings would be constructed within the well site, along one side of the leveled area. Pit dimensions would vary according to the depth of the well and the drilling method. Deep wells and mud-drilled wells usually require reserve pits of greater capacity than shallow wells and air-drilled wells. Typically a reserve pit is roughly 40 feet by 150 feet and about 6 feet deep, and may be lined with bentonite clay or a plastic liner to prevent leakage. A closed system is used in some locations, eliminating need for a reserve pit.

The rotary rig is usually moved onto the site within one to two weeks after site construction is complete. Several truck loads are required to move rig sections. Portable derrick-type rotary rigs employing mud as the drilling fluid are most often used on the Kisatchie National Forest.

From 5,000 to 15,000 gallons of water daily may be needed for cleaning, mixing of drilling mud, and cooling engines. Water for drilling may be hauled or piped to the rig from rivers, creeks, reservoirs, or water wells; or a water well may be drilled at the location. Methods for taking water from federal lands must be approved by the Forest Service and the State of Louisiana.

Drilling is normally done using a rotating bit under pressure at the end of the drill string, a lengthy assembly of drill pipe. As the bit turns and cuts its way into the rock, cuttings are pushed up the hole surrounding the drill string — by compressed air, or by a mixture of water, clay, and chemical additives, depending on which drilling method is used. Air or mud pumped down the drill pipe exits through holes in the bit and returns to the surface, carrying cuttings and rock fragments upward outside the drill string.

As the hole deepens, it is cased with steel pipe which is cemented into place. Casing and cementing prevents caving of the hole, seals off other formations, and protects ground water resources.

Cuttings, drilling mud and waste drilling fluid is contained in the reserve or drilling pit. The potential hazard represented is measured by the level of various chemicals in the pit. Drilling muds, depending on local stratigraphy and formation pressure, may contain high specific-gravity mixtures containing toxic substances. Potential environmental problems include pollution of ground water and of surface streams in the project area.

The possibility of a spill or blowout increases during the drilling phase. Since oil and/or gas and saltwater pipelines are constructed and used in this phase, there is a possibility of a pipeline rupture. The number of tank trucks used in this phase of oil and gas activity would be increased significantly if oil and/or gas is found and would increase the possibility of a toxic substance spill occurring.

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Effects of oil spills on soils include: 1) oil, acting as a surfactant prevents soil from wetting, thereby creates an environment unsuitable for plant growth; 2) increased solar warming due to the darker color of the oil increases warming and evaporation; and 3) soil microbes begin to decompose the oil and use up oxygen in the soil. If more oxygen cannot enter the soil, iron and manganese become more soluble and thus toxic. Concentrations of oil in soils in the range of 2 percent weight/150 sq.ft./2 inches depth are categorized as light, oil content of 20 gallons per 150 sq.ft. is medium, and oil content of 103 gallons per sq.ft. (9-11% by weight) is heavily contaminated.

Biodegradation of oil in soil is a relatively slow process. When mixed into the upper six inches of topsoil to a concentration of 5%, oil degrades at a rate of 60 barrels of oil per acre per year. Oil stays tightly bound in soil while degradation is occurring; but the basic physical and chemical soil properties of the soil are not appreciably altered by the oil, and normal crops can grow in soil containing 5 to 10 percent oil (**Cresswell, 1977**).

Various types of wastewaters are generated by oil and gas operations. Wastewater can be characterized by fluids produced during drilling, stimulation fluids chiefly from hydrofracturing, and fluids obtained along with oil and gas from producing wells. A chief component of these wastewaters is naturally occurring saltwater (brine) found with the oil and gas. Brine fluids are environmentally regulated wastes that cannot be indiscriminantly discharged onto land or into waters of the United States (**Auchmoody and Walters, 1988**). The Safe Drinking Water Act maximum contaminant level for chloride is 250 mg/liter. Saltwater concentrations of chloride, sodium, calcium, and trace constituents are often high enough to cause drinking water concerns over disposal operations as well as concern over the impacts of chlorides and trace constituents on soils, vegetation, subsurface water supplies, and aquatic biota. Brine can cause significantly higher concentrations of constituents in surface and ground-water, particularly in first and second-order streams where assimilation capacity is low. Saltwater normally is disposed of by hauling or piping to a disposal site which is normally an injection well where the saltwater is injected below freshwater aquifers.

Operations conducted in compliance with approved plans should result in no impact to the groundwater from fluids and chemicals used in gas and oil activities. Drilling fluids, and toxic wastes produced or utilized by oil and gas operations, are disposed of in accordance with regulations enforced by the Louisiana Office of Conservation and the Department of Environmental Quality. However, if toxic substances produced from an oil and gas operation near a water course were spilled or discharged during periods of low stream flow volumes or no stream flow, the material would be concentrated (not diluted by water) and would remain within the area of the spill or drainage basin longer than during periods of high stream flow. If the stream is flowing, the spill could be spread out over a longer segment of the stream and could enter a body of water fed by the stream. Groundwater contamination could occur if a significant surface spill occurred and the contaminated water went into the groundwater basin.

After drilling operations cease, the disposal of fluids and cuttings would be accomplished within 30 days of completion of the drilling operations. The method of disposal would have been determined and approved by the Forest officer overseeing the operation prior to commencement of drilling. Disposal methods include:

- A fully containerized (closed) drilling system, allowing liquids to be pumped back down the hole. This is permitted only if approved by the Louisiana Department of Natural Resources, Office of Conservation; or the Bureau of Land Management (**BLM**).

- Burial of the waste on site. This is permitted only if an independent laboratory has tested the material and provided the Forest Service with proof that all federal and state waste disposal requirements have been satisfied.

- Waste material would be removed from the site and disposed of appropriately outside national forest land.

The drilling rig and most of the support equipment would be moved away from the well site after the casing is cemented in the hole or after the producing zone is treated. If economically recoverable oil and gas are discovered, the well would be “shut in” (temporarily sealed) until production facilities can be installed. The operator would vent or flare the gas for a short period to clean up the well and to test its capabilities. The drilling equipment connected to the casing must also be replaced by a wellhead that will regulate the flow of gas or oil from the well. If no oil or gas are discovered, or if the amounts encountered are infeasible to produce economically, the well would be plugged and abandoned in accordance with state and federal standards.

Some operators prefer to transport all products from each well to a central processing plant in one pipeline, usually 5 to 8 inches in diameter. All products would be separated at the central plant, then transported or disposed of separately as appropriate. This is normally preferred where several wells would be drilled in close proximity to one another within a short period.

The size of the transmission line may range from 6 to 16 inches and would be buried 8 feet deep unless otherwise authorized by the Forest officer. Regardless of the size of the transmission line, the installation requires a right-of-way width of at least 20 feet. The width would be no greater than the minimum that would accommodate the need. Additional temporary rights-of-way may be needed during the construction period. Pipeline rights-of-way would follow existing roads or utility corridors whenever feasible. Frequently, the oil is hauled out by truck.

The gathering lines are 2- to 4-inch lines from the well to the transmission line. They require a right-of-way width of at least 10 feet. In most cases, the gathering lines would be buried 2 to 3 feet; however, they may be allowed to lay on top of the ground, depending on the particular situation.

For natural gas wells, one facility per field, sometimes called a service station, may be required. Its function would be to equalize the pressure and clean the gas in the gathering lines before it is pumped into the transmission line.

If applicable, the gas and oil metering equipment and separator are installed in a small on-site building. The separator is a cylindrical metal structure about six to eight feet tall and one to two feet in diameter. Water separated from the gas and oil is stored in metal tanks or earthen pits. This water may be periodically hauled away to be stored in approved injection wells. The maintenance and operation procedures for the wellhead, pipelines, and facility site include right-of-way maintenance, periodic inspections for gas leaks, frequent trips to the metering equipment and occasional repair of problems in the well and pipelines.

Abandonment consists of removing all equipment and plugging the wells. Plugging procedures are similar to those used with dry holes. Pipelines may remain in the ground if tests indicate that all contaminants have been purged and the lines are determined to be environmentally safe. Otherwise, the pipelines may be removed and the disturbed area would be revegetated.

Reclamation is performed by the operator according to Forest Service specifications. The operator may be required to terrace, slope the site, and install silt fences or other erosion control devices on the site. The reserve pit would be backfilled and fluids contained in the pit would be disposed of in a manner approved by the overseeing Forest officer.

Effects of range management on soil and water

Cattle traffic and vegetation cover removal from grazing causes impacts to soil and water resources, including increased soil erosion and compaction. Additional effects are introduced by prescribed burning for range management — disclosed in the earlier discussion of *effects of fire management on soil and water*.

Compaction directly reduces infiltration and increases runoff. Indirectly it increases erosion and sediment yield. Reduced infiltration rates may reduce the soil moisture available to trees and plants. Winter grazing especially impacts soils with high potential for compaction.

Trampling can cause stream banks to shear off into streams by weakening them and making them more susceptible to erosion. Riparian grazing can remove vegetation cover, exposing those soils to erosive flooding. Excessive grazing of riparian vegetation reduces its root vigor and reduces their binding strength, making riparian soils even more susceptible to erosion. With little opportunity to filter the erosion of riparian soil before it reaches a stream, most of it becomes stream sediment.

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Livestock deposit waste in riparian areas as they feed and rest, and directly in streams as they water. This increases the fecal coliform content of impacted streams, thus reducing water quality for recreation and municipal uses. Rotation of feeding, salting, and watering areas to disperse cattle away from riparian areas and streams help reduce the soil and water impacts associated with livestock grazing.

Effects of recreation management on soil and water

Impacts to soil and water resources in developed recreation areas occurs mainly during the construction or reconstruction of recreation facilities. Soil compaction, displacement, and erosion can occur, but would be minimized through facility location, layout, and application of erosion control measures during construction or reconstruction.

Dispersed recreation such as off-road vehicle (ORV) trail use causes increased compaction, displacement, erosion, and sedimentation on trails being used. Although the extent of compacted areas is typically small, minimizing the length of trails on soils with high compaction and rutting hazards can minimize such impacts. Proper location, layout, and construction of designated trails incorporating waterbars and switchbacks on long slopes can help to minimize erosion and sedimentation. Avoiding soils with high erosion hazard can also reduce erosion. Properly constructed stream crossings would minimize sedimentation. Rerouting trail sections and constructing erosion control diversions as problems begin to develop are essential to limiting erosion and sedimentation. Adequate trail monitoring and mitigation work should minimize adverse soil and water impacts.

Off-trail ORV traffic causes erosion, compaction, and sedimentation throughout the Forest. The extent of impacts is difficult to assess. Traffic occurs on a wide variety of soils and landforms, and often occurs along easements (see *effects of lands management on soil and water*). Erosion control structures such as waterbars and diversions may be severely damaged by high ORV traffic. Vegetation in high-use areas is often destroyed, causing erosion of bare soils. Construction and maintenance of erosion control structures when an erosion problem is first seen can reduce impacts and keep erosion from becoming severe.

Effects of soil and water management on soil and water

Erosion and sediment control practices and watershed improvement projects decrease erosion and sedimentation by revegetating bare soil and stabilizing eroding areas. Soil productivity would be restored on degraded, compacted, and infertile sites. These projects include the restoration of eroding abandoned borrow pits, old roads, streambanks, certain oil well locations, gullies, and other bare eroding areas. If past rates continue, about 70 acres of degraded sites would be restored each year, causing a soil loss reduction of about 3,500 tons per year, and a reduction of sedimentation of about 1,750 tons annually. Soil productivity would be restored on these acres. In accordance with the Forest Service's management strategy for riparian areas in the Southern Region, emphasis would be given to protecting and improving riparian areas and wetlands. Aerial fertilization of severely eroded Kisatchie soils on Kisatchie District is complete.

The primary objective in restoring severely eroding areas is establishing stable vegetation cover as quickly as possible, to minimize soil erosion and sedimentation. Nonnative plant species have been used effectively to reestablish temporary cover on drouthy, infertile areas. Native species may be an alternative on more fertile, less-erodible sites.

Effects of transportation management on soil and water

Roads are the most common source of Forest erosion and sedimentation. As miles of roads increase in a given watershed, so does the potential for watershed damage. Effects on water quality from sediment is the primary concern about road-associated erosion.

Primary sources of road sediment are runoff from cut and fill areas, stream crossings, and ditches. Fifty to 75 percent of erosion and sedimentation from roads occurs during and immediately after construction.

Because roads are less permeable than the forest floor, rainfall infiltrates them to a lesser degree. As a road network expands it introduces more rainfall runoff to streams. Road drainage systems expand the drainage network of a watershed, thus making it more efficient in storm drainage. This combination delivers more water to streams faster. Water yields are increased. Higher storm peak flows occur sooner and over shorter times. However, road construction and reconstruction are not expected to appreciably affect current water yields or stream responses to storms because the Forest's road network is essentially in place.

The erosion and sediment associated with roads can be mitigated but not totally eliminated. Following state and Kisatchie National Forest best management practices would help to ensure that state water quality standards would be met. Frequent diversion of road drainage to a stable forest floor reduces erosion and disperses sediment before it reaches streams. Mitigation measures dealing with road location and road construction standards would help reduce erosion and sediment production.

Effects of vegetation management on soil and water

Timber harvest

Regeneration harvests followed by intensive site preparation can increase total watershed yields, storm peak flows, erosion, and sedimentation. This can also increase the concentration of nutrients and other chemical elements in water bodies.

Harvesting activities cause soil compaction. This would not be significant under good logging conditions, but could increase if logging occurs when soil moisture content is high. Logging under such conditions would produce severe rutting, temporary destruction of soil structure, decreased permeability, and greater resistance to root penetration. Tree and plant growth would be reduced on these compacted areas. More than half of the soils on the Forest have a severe compaction hazard and therefore could suffer loss of soil productivity due to harvesting activities, if logged when soil moisture is high. Preliminary results from the Southern Research Station's long-term soil productivity study currently underway on the Palustris Experimental Forest indicate that severe compaction on Malbis soil reduced height growth for loblolly pine by 11 percent and reduced total biomass on the compacted area by 39 percent after 5 years (**personal communication — Dr. Allan Tiarks, SRS**).

Logging ruts can capture sheet runoff, thus concentrating overland flow. This flow would have higher erosive energy than sheet flow, and could result in rill and gully erosion. Surface soil compaction could result in lowered infiltration of rainfall through the soil, thus increasing runoff. This could cause higher storm peak flows and total water yield until surface bulk density recovers.

Natural recovery of coastal plain soils from harvesting compaction is slow. The time required for a site to revert to pre-sale logging conditions depends largely on soil texture, moisture content at the time of logging, and post-sale area treatment. Estimated time of recovery for severely compacted soils to recover ranges from 12 to 40 years. Soil compaction can also reduce seed germination, survival, and growth rate. However, actions can be taken to avoid or minimize potential damage or to repair it when it does occur. Logging activities on soils with high compaction hazard should be confined to the dry periods when compaction would be less serious. Correct layout and design of timber sale harvest areas is important to minimize compaction. Mitigation of compaction and rutting would include shaping, ripping, disking, and reestablishing vegetation. This would reduce the impact to nearly pre-logging conditions by the end of the third year.

The continuous but small leaching losses of forest soil nutrients which result from normal percolation would be temporarily accelerated by tree removal and the use of logging equipment. Minor nutrient losses from the site would also result from removal of wood fiber. Preliminary results from the long-term soil productivity study cited above indicate that removal of limbs from clearcut harvesting sites reduced total biomass by 14 to 39 percent 5 years after harvesting (**personal communication — Dr. Allan Tiarks, SRS**). Whole-tree harvesting or other methods involving the removal of limbs from a logging site are sometimes employed for the first thinning of a stand. Trees may also be de-limbed at a central location. These methods would cause nutrient loss from the site. However, the practice of spreading limbs back over the site, particularly skid trails and other disturbed areas, would prevent adverse impacts to soil productivity.

Some nutrients are lost from forest soils through a temporary increase of erosion, and the reduced rate of water uptake because of trees removed by harvest. Surface runoff delivers these nutrients to water bod-

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ies during and after harvesting, and for a time following site preparation.

Timber harvesting reduces evapotranspiration. This makes more water available for subsurface flow, some of which can move to stream channels and increase low flows. Increased summer low flows can be beneficial to aquatic biota, especially during summer water stress. Soil moisture could also be increased, requiring less rainfall to saturate soils and increase total runoff and peak flows from frequent, low intensity storms.

Timber harvest has been shown to have little effect on total water yields or the peak flows from large, infrequent storms. Changes in streamflow and water quality from regeneration harvests are relatively short-term and minor, and quickly move back toward preharvest conditions due to reforestation and other vegetation regrowth.

Similar impacts from harvesting operations apply to both even- and uneven-aged management systems. Over a rotation, about the same acreage would be used for skid trails and landings. With uneven-aged management these areas would be reused, allowing reduced recovery time between entries. Uneven-aged management requires more frequent entries to harvest many small areas. This can cause similar overall compaction, throughout the rotation. In the long term, the total erosion for each acre of transportation system could be similar. Because mechanical site preparation and slash burns would not be performed on uneven-aged areas, however, the probability of substantial erosion would be greatly reduced. The uneven-aged system is not conducive to whole-tree harvesting; therefore the loss of nutrients associated with such methods would not be expected to occur.

Site preparation

Mechanical site preparation can produce more sediment and erosion than any other vegetation management activity associated with timber harvesting. These effects would be greater during the winter months.

Shearing with windrowing poses the greatest threat to long-term soil productivity. Scraping the remnant biomass from the forest floor into windrows along with topsoil results in serious nutrient losses. Extensive bared soil caused by such scraping can produce high erosion and sedimentation rates. Monitoring of sheared and windrowed areas on the Forest has shown that tolerable soil loss rates can be exceeded on slopes if care is not taken to minimize scraping. However, shearing and windrowing is not a recommended practice on the Forest. It is generally not used except for southern pine beetle control, where large accumulations of remaining slash and brush make brush chopping infeasible.

Brush chopping alone and chopping with burning are the most widely used site preparation methods on the Forest because of their potential to provide the best survival for regenerated species. Chopping alone crushes the slash down to the ground, creating a rough surface for overland flow. This creates small, numerous storage areas for erosion carried by surface runoff, thus reducing sedimentation. It also breaks up the travel distance of overland flow between obstructions on the ground, thereby reducing the carrying energy of sediment. Slowed overland flow velocity retains water on slopes for longer periods, allowing better infiltration and more gradual release of excess rainfall, hence more normal stream flows from frequent storms.

Brush chopping alone or chopping with burning tends to leave residual organic matter and nutrients in place, incorporating them into the soil. This provides a nutrient pool for the newly established stand. The residual organic matter also plays a vital role in increasing the moisture-holding capacity of the soil. This can be extremely important in increasing the survival rate on dry soils. The possibility exists that soil productivity could be adversely affected, but that probability is low if mitigation measures are used.

Some localized compaction would result from mechanical site preparation, but because most of the work is done during the summer and fall, when soil moisture is lowest, the potential for soil compaction is slight. Brush chopping would cause the least compaction, followed by shear-only, then by shearing and windrowing, which causes the most. Compaction would be greatest near the windrows and decrease outward. The length of time needed for the site to return to its previous condition would depend on the method of site preparation used, the soil texture, and the soil moisture content at the time of site preparation.

Moderate slash burns pose no risk to soil productivity or soil erosion. Severe burns on slopes can cause high rates of soil erosion, sedimentation, and increased nutrient loading of water bodies. Controlling fire intensity is important, to keep most litter and duff from being consumed and exposing an excessive amount of bare mineral soil on slopes. Monitoring conducted on the Forest indicates that tolerable soil loss rates should not be exceeded on areas receiving moderate-intensity burns.

Restoring longleaf pine ecosystems could involve intensive site preparation activities possibly including slash burns or herbicide and burn procedures plus frequent burning thereafter to reduce competition. Increased frequency of burns can decrease soil productivity by causing loss of nutrients, particularly phosphorus. Reduction of the litter cover would cause increased risk of soil damage by raindrop impact, surface runoff, and consequent erosion. Frequent burning could cause areas on slopes with high erosion hazard soils to be at risk for high erosion and exceed tolerable soil loss rates. Taking care that areas with poor and severely eroded soils do not receive high-intensity burns and are burned less frequently would reduce the possibility of high erosion or impairment of soil productivity.

Initial restoration, if carried out at sufficient scale, could temporarily alter the local hydrology of streams and stimulate alterations in channel conditions and aquatic habitat. Nutrients lost from the soil would represent a gain for water bodies, and increased upland erosion could increase sedimentation.

Pinestraw collection

Pinestraw collection can detrimentally affect soil productivity. Pine litter plays an important role in recycling nutrients back to the soil, thus supporting tree and plant growth. Pinestraw raking removes nutrients from the system. This represents a long-term loss if nutrients are not replaced by fertilization. Pinestraw also has an important "mulching" effect which helps in retaining soil moisture. When it is removed, even by a one-time mild treatment such as pitchfork raking of the topmost "red straw" layers, the resulting water stress causes plant growth reductions (**Ginter, et al., 1979; Mcleod, et al., 1979**).

Tentative results of a Southern Research Station study being conducted on the Longleaf Tract of the Palustris Experimental Forest indicate a reduction of 7.5 percent in longleaf pine tree growth (cu ft / acre) after one raking (**Haywood, et al., 1994**). Similar reductions in tree growth have been shown by several other studies (**Jamison, 1943; Koch and McKensie, 1976; Reinke, et al., 1981; Vancleve and Dyrness, 1983**). Although the methods used for commercial raking may vary, the results of the Longleaf Tract study can be used to approximate the loss of soil productivity on areas that are raked one time on the Kisatchie, and could represent a long-term loss on areas that are not fertilized.

Streamsides and wetlands

Streamside habitat protection zones (**SHPZs**) provide important buffers, protecting streams and aquatic life from upland management activities. Roots of **SHPZ** vegetation provide soil binding strength to help hold stream banks together and prevent excessive erosion. Vegetation of **SHPZs** provide: shade for water temperature control; roughness of floodplains, reducing flood velocities, erosion, and downstream flood peaks; large woody debris to channels, helping to dissipate stream energy and protect stream integrity; and increased bank storage of water for later release to streams as base flows.

Actively growing vegetation in **SHPZs** helps remove water pollutants, taking them up through root systems. Plants may break down pollutants or incorporate them in biomass. Soil cover provided in **SHPZs** reduces surface runoff velocity from uplands to streams, trapping eroded soil particles and reducing sedimentation and contamination from pollutants adhered to the particles.

Past monitoring on the Forest indicates that the size of the **SHPZs** for all the Plan alternatives would be more than adequate to filter sediment and prevent it from reaching the stream channel. Draft criteria for filter strips on forestland for the Natural Resource Conservation Service (**NRCS**) South Central Region recommend a strip 45 to 55 feet wide, which will provide a 70–80 percent entrapment of pollutants and sediment on slopes between 8 and 12 percent (**NRCS, Draft Conservation Practice Standard, November 1996**). The draft revision of the voluntary best management practices for the State of Louisiana recommends a filter strip that is at least 35 feet wide on intermittent streams and 100 feet on large perennial streams.

A study of east Texas clearcut forests examined water quality parameters in 3

TABLE 4–5, TONS OF SOIL LOSS / ACRE / YEAR

From Various Management Activities

	LAND TYPE ASSOCIATION								
MANAGEMENT ACTIVITY	1	2	3	4	5	6	7	8	9
Natural Geologic Erosion	0.01	0.03	0.01	0.00	0.01	0.01	0.00	0.01	0.01
Logged (clearcut / seed-tree / group selection)	0.26	0.69	0.26	0.05	0.32	0.18	0.03	0.20	0.31
Thin / Single Tree Selection	0.09	0.22	0.08	0.02	0.10	0.06	0.01	0.06	0.10
Burned by Prescription	0.37	0.91	0.35	0.06	0.42	0.24	0.04	0.26	0.41
Site Preparation (chopping / burning)	1.16	2.79	1.07	0.19	1.31	0.72	0.12	0.80	1.25
Shear / Windrow	3.91	9.42	3.60	0.67	4.40	2.44	0.41	2.71	4.20
Access Roads (new)	15.64	37.68	14.40	2.70	17.60	9.76	1.64	10.84	16.80

1) The maximum tolerable soil loss per acre per year for soils on the Kisatchie National Forest is between 5 and 9 tons/acre/year. **2**) Sediment yield estimate = 0.123 X soil loss (in tons / acre / year)

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classes of riparian streamside buffer zones (**Brown, 1988**): *wide* (more than 50 meters), *medium* (20–50 meters), and *thin* (less than 15 meters). Study results indicated that streams with wider riparian buffer zones showed less non-point pollution inputs. Turbidity, total solids, and nitrogen were lower in streams with wider zones.

Impacts of harvesting to soil compaction and erosion have been discussed above. Since mechanical site preparation would not be allowed in SHPZs, erosion and sedimentation from timber management would be minimal. There could be some sedimentation from timber management activities in swales feeding runoff into the SHPZ channels. Forest Plan standards and guidelines and timber sale contract requirements would be applied to these areas to minimize sedimentation. Prudent timber sale administration would include locating skid trails, roads, and landings on upland areas away from swales.

Mitigation measures applying to SHPZs and *riparian area protection zones* (RAPZs) would limit disturbance and would specify the minimum standards of activity that can occur there — standards that would maintain and enhance the stability and integrity of these areas. The mitigation measures that apply to these zones would greatly minimize the possibility of erosion, compaction, and sedimentation. The zones would be maintained and enhanced to provide the maximum benefit to water quality, stream condition, and soil productivity upon which many related and desirable resources depend. Management of these zones would provide for decreased erosion of stream channels, decreased flood flows, and decreased concentrations of water pollutants.

EFFECTS BY LANDTYPE ASSOCIATION (LTA)

Surface disturbing activities from timber management, road construction, rights-of-way, military use, minerals development, and ORV use can cause severe erosion and sedimentation in all LTAs. See table 4–5. Kisatchie soils in LTA 2 have the highest erosion hazard while riparian soils in LTA 4 and 7 have the lowest. However, potential for sedimentation of streams is highest in LTAs 4 and 7. Application of soil and water mitigation (Forest Plan standards and guidelines) would greatly reduce the likelihood of soil loss and sedimentation.

Transportation facilities would most likely occur on LTAs 1, 2, 5, and 6 since these LTAs are predominantly upland, well-drained, sites with many roads already in place. As indicated in table 4-5, soil loss from new roads could exceed maximum tolerable soil loss during the first year after construction in LTAs 1, 2, 3, and 5. As discussed previously, mitigating measures dealing with road construction and location would keep soil loss to a minimum so that tolerable soil loss would not be exceeded in subsequent years. Road work in LTAs 4 and 7 would generally require more roadbed improvement since these LTAs are predominantly poorly-drained floodplains and stream terraces.

LTAs 2, 5, and 9 would have the highest risk for erosion from prescribed, natural, and wildfire due to the rolling topography and sandier soil textures. LTAs 4 and 7 would have the least erosion potential. Kisatchie soils in LTA 2 and deep sands such as Briley and Betis soils, found mostly in LTAs 1, 2, and 6, could be impaired due to loss of nutrients from frequent burning. These soils are phosphorus deficient, with sands being more prone to excessive nutrient leaching. By avoiding too-frequent burning, loss of soil productivity can be avoided.

Due to erodible soils, drainages are most susceptible to sedimentation in LTA 2. Kisatchie Bayou, which has had high levels of total dissolved solids in the past, drains much of the watersheds containing these soils. Minimizing burning frequency on these soils would minimize sedimentation in these watersheds.

Mineral development would have the highest potential to cause compaction in LTAs 4 and 7 due to the predominance of clayey soil textures. Also, consequences from accidental spills would be more detrimental within these LTAs because of the higher drainage density and higher water table. Oil and gas production facilities are expected to occur predominantly in LTAs 1, 5, 6, and 9, so there should be little opportunity for adverse effects to occur in LTAs 4 and 7.

TABLE 4–6, EFFECTS OF ALTERNATIVES ON SOIL AND WATER RESOURCE MANAGEMENT

Displayed by Alternative and Indicator

Indicator	Alt A	Alt B	Alt C	Alt D	Mod D	Alt E	Alt F
Streamside protection (acres)	79,248	172,152	183,182	182,284	173,594	181,338	189,104
Natural baseline soil loss (tons / yr)	5,472	5,472	5,472	5,472	5,472	5,472	5,472
Road construction soil loss (tons / yr)	11,766	9,336	2,780	9,025	8,946	8,823	8,261
Mechanical site prep soil loss (tons / yr)	27,849	11,587	2,584	20,184	17,996	10,188	10,274
Prescribed burn soil loss (tons / yr)	175,098	260,068	271,931	289,834	293,290	251,834	284,075
Total soil loss (M tons / yr)	**220**	**286**	**283**	**325**	**326**	**276**	**308**
Sediment yield (M tons / yr)	**27**	**35**	**35**	**41**	**41**	**35**	**39**
ORV use closed (% of Forest)	15	17	17	21	22	23	23
ORV use open (% of Forest)	85	83	83	79	78	77	77
Acres available for grazing	140,000	86,000	86,000	86,000	86,000	86,000	86,000
Estimated amount of top priority trail construction (miles)	66	0	176	129	193.5	86	121
Final harvest (acres / yr)	2,460	2,002	488	1,772	1,576	1,336	1,165
Pine straw raking allowed	N	Y	N	Y	Y	N	N

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EFFECTS BY LANDTYPE ASSOCIATION (LTA)

EFFECTS BY ALTERNATIVE

Soil and water mitigation and rehabilitation work would generally vary by LTA. Those LTAs on rolling or undulating topography (LTAs 1, 2, 3, 5, 6, 8, and 9) would require more waterbar construction, seeding, and fertilization work than in LTAs that are flat or nearly level (LTAs 4 and 7).

Erosion potential from timber harvesting and site preparation would be greatest in LTAs 2 and 5 and lowest in LTAs 4 and 7. Although all LTAs have some soils with a severe compaction hazard, LTA 4 soils are most at risk. LTA 7 has a severe rutting potential as well. Mitigation measures within timber sale and site preparation contracts would help to minimize these impacts.

EFFECTS BY ALTERNATIVE

Alternative A would have the lowest estimated total soil loss, 220 M-TONS / year and Alternative Mod D the highest, 326 M-TONS / year. See table 4–6. Soil loss for Alternatives B, C, D, E, and F would be between the levels for A and Mod D. The overall soil loss estimate is largely a result of prescribed burning — which has minimal effects on a per acre basis but collectively high on a Forestwide basis, due to the large amount of burning that would take place. See table 4–3.

Alternative A would have the lowest estimated sediment yield: 27 M-TONS / year. However, it should be noted that the sediment yield estimates for all alternatives do not take into account the larger streamside habitat protection zones used in Alternatives B–F. In Alternative A, the zones extend a minimum of 33 feet from each side of a stream channel and encompass 79,248 acres. In Alternatives B–F, streamside habitat protection zones (SHPZs) would extend a minimum of 50 to 150 feet from scour channels, and would total from 172,152 to 189,104 acres. These larger zones should provide for lower total sediment yield because they effectively prevent most sediment from reaching stream channels.

In Alternative A, final harvest acres and acres available for grazing would be highest at 2,460 and 140,000 respectively; potential for loss of soil productivity due to compaction would therefore be greater; and soil loss from mechanical site preparation and road construction would also be highest. At 488 acres, harvesting would be least in Alternative C, as would annual soil loss from mechanical site preparation at 2,584 tons and road construction at 2,780 tons. Alternatives B, D, Mod D, E, and F would have impacts greater than C and less than A for these factors.

Potential risks of increased stream sediment, compaction, groundwater contamination, and soil loss from minerals development would be the highest in Alternative A which has the most acreage available for leasing and would require the least restrictive lease stipulations. Risks would be lowest in Alternative C which withdraws all Forest lands from leasing as existing leases expire (see Chapter 2, page 2-42 for a more detailed description of leasing differences by alternative). Many of these impacts would be avoided by implementing mitigation measures for protection of soil and water which are included in all operating plans and special-use permits.

Alternatives A, C, E, and F would prohibit pinestraw collection, therefore not impacting soil productivity. Alternatives B, D and Mod D would allow limited collection, but mitigation pertinent to methods and locations should sufficiently protect soil productivity.

BIOLOGICAL ENVIRONMENT

VEGETATION

GENERAL EFFECTS

Introduction

Management activities most affecting biological diversity of Kisatchie National Forest's vegetation are in fire, forest health, military use, minerals management, recreation, vegetation, wilderness, and wildlife.

Effects of fire management on vegetation

General vegetation

Fire management includes both suppression of wildfires and the intentional creation of fire through prescribed burning. Both activities strongly affect vegetation. Burning kills plants which have no method of avoiding or minimizing the effects of fire. Less fire-resistant species are killed by fire, but the characteristics of many plant species allow them to survive it. These include underground stems which readily resprout after fire; natural tolerance to ground fires, like that of the longleaf pine; or the competitive ability to rapidly invade burned-over areas, such as that of sweetgum. Generally, fire sweeps through an area, removing less resistant plants. Fire-adapted or fire-tolerant species thrive, especially if burning occurs periodically. Fire suppression favors fire intolerant species, while prescribed fire favors a completely different set of species which tolerate fire and thrive in ecosystems where fires reduce their competition.

Fire suppression and the application of prescribed fire affect biological diversity. A mosaic landscape is created when fire burns hotter in dry areas, while not burning or more rarely burning in wetter habitats. This provides a wider diversity of habitats than conditions where wildfires are suppressed. Species adapted to periodic fire thrive in the resulting habitats. Some become scarce or rare when fire suppression is the rule over large areas. Fire kills some plants directly, while other species receive indirect benefits when competing vegetation is lost to fire.

Active fire suppression over long periods of time permits fuel buildups. When fires occur, they can grow larger and hotter if control is not or cannot be maintained. Fire suppression can thus lead to a decrease in diversity due to the shading effect of a closed canopy and competition. Or diversity can decrease because of rare but intense fires burning over large areas and destroying the mosaic conditions. Allowing periodic fires to burn in mosaic patterns over a long period maintains a variety of habitats for a variety of species.

One cumulative effect of fire suppression on private lands throughout the southeastern United States has been the limitation of habitat available to several plant species that thrive in fire adapted communities. Roughly one-fourth of species listed as rare by state natural heritage programs do best in areas which burn regularly. Wildfire suppression limits the habitat available to them, causing them to become less common than they would be in a community controlled by fire.

Wildland fire is a significant component of nearly all North American ecosystems. High-intensity stand replacement fires are normal in certain ecosystems (**Cohen, 1991**).

Repeated burning in our native ecosystems would maintain and restore biological diversity and ecological integrity (**Kay, 1994**).

Diversity between communities is high within areas having a burning regime and is affected by season and frequency of burning. Herbaceous plant abundance increases with increasing fire frequency (**White, Waldrop, and Jones, 1991**).

Maintenance of long-term diversity within an ecosystem that is under relatively static climatic conditions requires implementation of fire at various times of the year. Through growing season burning, which promotes seedling establishment and maximizes species productivity, vegetation diversity is assured. The size of such growing season burns should not be so extensive as to adversely affect the resident invertebrate population of an area. Such small-scale growing season burns are probably representative of the natural ecosystem in which sufficient fuel is present to support a fire but where the amount of green matter in the fuel bed would not have supported a high intensity, widespread fire (**Bragg, 1991**).

Although plants in the southern pine ecosystems are well-adapted to fire, it is the regime incorporating fire intensity, frequency, and season — rather than fire itself,

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to which plant species are adapted. Along a fire disturbance gradient, the observed differences in species composition of understory plant communities are explained by reference to differences in fire tolerance and competitive vigor. Differences in fire frequency and season produced four distinct plant communities in South Carolina flatwoods which, when viewed as communities distributed over the landscape, resulted in relatively high beta diversity (**White, Waldrop, and Jones, 1990**).

Fire can be used as a means of reducing litter accumulation and controlling woody stems, to assure maintenance of the native herbaceous vegetation within the longleaf pine plant community. Exclusion of fire contributes to a general decrease in herbaceous plant productivity (**Haywood and Thill, 1994**).

Vegetation response of a longleaf pine site to 12 years of biennial (every 2 years) seasonal burning during March, May, and July showed significantly larger longleaf pine stems on May burn areas. Conversely, July burns drastically reduced the number of pine stems, hardwood stems, and shrubs. March burns top-killed woody stems (**Grelen, 1975**).

Researchers on the Kisatchie National Forest found that burning reduces the number of woody species and increases the number and productivity of herbaceous species. Grasses were the dominant type of herbaceous vegetation on growing season burned areas (**Haywood, 1994**).

Prescribed fire can be used to control the degree of vertical diversity produced by thinning. Thinning stimulates the growth of understory plants which may shade out many herbaceous species. Burning controls woody stems thus maintaining an understory with greater species and structural diversity.

Burning at different times of the year promotes diversity. Summer burns may eliminate sprouting hardwoods and favor grasses, while winter burns foster sprouts.

Fire exclusion would change the vertical structure of forested landscapes by allowing the development of a midstory of trees and shrubs. It can also reduce the availability of early successional habitat.

Burning improves habitat for some wildlife by making new growth more nutritious and more digestible. By consuming dead materials, new growth is made more accessible. The frequency and intensity of prescribed burns influence fruit production of native ground cover.

Exotic plants, insects, and infectious diseases can stress native trees and compete with native biota. A frequent burning regime would afford some control of exotics.

Past and present climate conditions have interacted with soil development, resulting in distinct nutrient conditions in southeastern coastal plain ecosystems. Fire favored the dominance of plant species requiring fire for successful regeneration and growth. Except for some loss of nitrogen from the forest floor, burns cause negligible effects on overall nutrient loss from the system. Much of the nitrogen loss is offset by increases through atmospheric deposition. Pine ecosystems are limited by phosphorus and potassium availability, and fire significantly increases available levels of these nutrients in the soil (**Gilliam, 1990**).

Phosphorus and potassium availability typically increase after a fire. The effect on the herbaceous layer varies depending on season of burn, but a substantial increase in species diversity can be expected in areas with fire regimes. Data demonstrates the importance of fire in promoting successful regeneration of longleaf pine. Fire serves significant functions that are both required and unique at all scale levels — from the population, to the community, to the ecosystem (**Gilliam, 1991**).

Frequent fires over long periods are needed to create and maintain the open character of pine forests (**Waldrop and Lloyd, 1991**).

Mesic, annually burned pine savannas result in higher species richness than less frequently burned sites. Fire enhances savanna diversity by reducing woody plants, removing grass and sedge foliage which can shade smaller grasses and forbs, stimulating flower and seed production, and by opening microsites for new seedling establishment (**Walker and Peet, 1983**). Variation in the timing of fires can affect which species may flower, the times of flowering, and the spacing of flowering peaks among species (**Platt, Evans, and Davis, 1988**).

May burns stimulate growth of longleaf pine seedlings. Grass stage seedlings survive, begin height growth, and grow taller on areas burned in May than on March burned areas. May fires favor growth of older seedlings and are more effective in the control of brown-spot needle blight. Seedling response to May burning is related to the eradication of both brown-spot needle blight and of woody and herbaceous competition at a critical growth period (**Grelen, 1978**).

A May burn on eroded Kisatchie soils within hilltop glades may adversely affect the frequency and occurrence of woody plants, but the richness of the herbaceous plant community can recover by summer's end (**Haywood, 1994**).

Olson and Platt (**1995**) examined the differences of shrub resprouting in upland and seepage savannas on the Vernon Unit (Calcasieu District) of the Kisatchie National Forest following single prescribed fires conducted during June or August. They found that low shrub mortality and the ability to resprout to pre-burn levels indicated that shrubs can reach such sizes as to persist in the landscape despite frequent dormant season burns. Frequent low intensity dormant season fires have resulted in large shrub encroachment in both upland and seepage savannas. While shifting to more growing season burns in these areas may block shrub recruitment, additional management may be required to reduce the number of large shrubs to their presettlement patterns of size and abundance.

Rebertus, Williamson, and Platt (**1993**) examined temporal variation of fire occurrences over millennia, decades to centuries, and season at which fires occur. They concluded that longleaf pine and oak in upland sandhill habitats of the southeastern coastal plain depend upon frequent fires of at least once a decade. As fire frequency increases and as early growing season lightning fires become more common, longleaf pine abundance increases compared to oaks. Frequent early growing season lightning fires result in open pine savannas where oaks are restricted to less frequently burned sites.

In frequently burned savannas, longleaf pine may be only one among many species contributing to a matrix of pyrogenic fuels which collectively serve to maintain the existence of these communities against encroachment by hardwoods. Season of burning seems to have the greatest impact on woody species. Repeated spring fires at close intervals may have cumulative effects on oaks, regardless of fire intensity (**Platt, Glitzenstein, and Streng, 1991**).

Platt, Evan, and Rathbun (**1988**) suggested that the tendency of longleaf pine to promote frequent ground fires has resulted in the long-term presence of environmental conditions in which longleaf pine, but not other tree species, can survive and reproduce.

Longevity of longleaf pine, their spatial distribution in the population, and likelihood of regeneration increase by facilitating frequent low-intensity fires that buffer the population, decrease the chances of declines to very low densities and prevent replacement by other tree species (**Platt and Rathbun, 1993**).

Fire can also strongly influence the spatial distribution of juvenile longleaf pine by reducing the variation in juvenile density and by producing different densities of juveniles at low and high adult tree densities. Juveniles that survive fire tend to be significantly larger and occur in areas containing fewer adults as a result of less needle accumulation and cooler fire temperatures (**Grace and Platt, 1995**).

During frequent low-intensity burning, hardwoods more than 5 inches **DBH** are protected by thick bark. Most hardwood stems less than 5 inches are either killed or girdled, particularly by growing season burning. However, root systems survive and produce multiple sprouts. Small hardwoods are replaced by large numbers of sprouts during the early years of burning. Later, those sprouts are replaced by grasses and forbs. This gradual change is completed only by applying growing season burning treatments. Periodic burns do little to reduce numbers or vigor of hardwood sprouts. Annual growing season burning over a 20-year period may eliminate hardwood sprouts. Without growing season burns, it is questionable whether hardwood sprouts can be eliminated by fire. An occasional high-intensity fire or other disturbance would eliminate large hardwoods. Hotter fires cause higher mortality rates of hardwood sprouts (**Waldrop and Lloyd, 1991**).

Streng, Glitzenstein, and Platt (**1993**), in a literature review of season of burn studies, concluded that while growing season burns are more damaging to hardwoods than dormant season burns, there was no convincing evidence that growing season burns reduce growth or survival of pines more than dormant season burns. They suggest that spring burns are most effective in eliminating oaks. Glitzenstein, Platt, and Streng (**1995**) further noted no consistent seasonal pattern to the vulnerability of longleaf pine to fire damage in frequently burned sandhill or flatwood habitats. This, they conclude, helps explain

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the widespread dominance of longleaf pine in the presettlement forest, as longleaf could not have dominated the landscape if it were highly vulnerable to summer burning.

In order to retain adequate density of loblolly and shortleaf pines in uneven-aged stands subjected to prescribed winter burns, at least 200 trees per acre of pine seedlings and saplings should be taller than 8 feet in height, or greater than 1.5 inches diameter at ground line, and crown scorch must be less than 60 percent. If the majority of the pines stems are smaller than these specified sizes, density of the smaller pines should probably exceed 1,200 trees per acre before burning in anticipation of losing 85 percent of the population (Cain, 1993).

Two dormant season prescribed burns, implemented as release treatments in a sapling hardwood-loblolly pine stand on the Kisatchie National Forest, did not significantly influence the natural shift in species composition from hardwood-pine to pine (Haywood, 1994).

Oak forests have been historically maintained in a regime of frequent fire. Frequent fire over an indefinite time period favors oak establishment by reducing understory and midstory competition from fire-intolerant species and by creating preferred conditions for acorn caching by squirrels and blue jays. Fire also reduces populations of insects which prey on acorns and young oak seedlings.

Once established in the understory, oaks resprout tenaciously even when tops have been killed repeatedly by fire. The ability to resprout when numbers of other sprouting hardwoods have been reduced by fire allows oak to accumulate in the advance regeneration pool and dominate the next stand when suitable conditions prevail. Intense fires in logging debris also favor establishment and development of high quality oak-dominated stands (Van Lear, 1991).

Threatened, endangered, sensitive, and other rare plant species

Impacts to rare plant species are similar to those presented in the preceding discussion. As previously stated, roughly one-fourth of the plants listed by southeastern state natural heritage programs as rare do best in areas which burn regularly. Perhaps a third of plant species listed by the Kisatchie National Forest live among communities that thrive in areas maintained by periodic fire — such as bogs, prairies, or longleaf pine landscapes. Wildfire suppression allows other fire-susceptible species to survive and outcompete these rare plants, increasing their rarity. Prescribed fire reintroduces the factors which allow these rare plants to survive.

Fire tolerance differs among rare listed species living in communities which see fire occasionally. Some species would not tolerate fire, and most of a population would be lost in a fire. Conversely, other species may suffer setbacks but would survive. Some species probably benefit from the long-term effects of fire on their required habitat, but lose individuals from some populations during a single fire event.

Effects of forest health management on vegetation

General vegetation

Suppression of forest pests can involve vegetation removal. Openings created generally increase biological diversity in the short term. Openings allow the introduction of pioneer species and, later, other seral stage species, to invade forested habitats. Grasses and forbs may increase in abundance temporarily with the increase of sunlight on the forest floor. Herbicides used in pest management can have similar effects by creating similar openings, although they can potentially decrease biological diversity when broadcast herbicides limit some species and favor herbicide-resistant species.

Limited herbicide use in localized areas should not negatively impact forest diversity on the whole. Localized effects would be overcome by gradual dispersal of plants into any areas where they have been reduced. Areas opened up by insect and disease management practices would naturally revert back to forest, so the effect of increased diversity due to the presence of pioneer and seral stage species would be eventually lost. Continued use of control practices would allow an ongoing presence of pioneer and seral stage species, increasing the diversity of the forest as a whole. Such an increase in diversity may not always be desirable if the pioneer species invading forested lands are introduced noxious weeds.

Endemic populations of insects and disease are a normal component of the forest communities on the Kisatchie and are a part of the biological diversity within the Forest.

Mortality caused by the southern pine beetle (SPB) greatly affects biological diversity within the southern pine forest. Endemic populations of SPB attack pines under stress, with an average spot consisting of 15–35 trees and covering 0.10–0.25 acres. Scattered beetle spots throughout the forest community cause several long-term effects. Weakened, suppressed, or damaged trees are killed, providing snags and habitat for numerous decay fungi and serving as hosts to wood-boring insects. Dead pines also provide nesting and feeding areas for woodpeckers, other birds, and small mammals. Beetle-killed trees serve as brood areas for insect predators of southern pine beetles. The SPB / predator ratio is an important factor in beetle population dynamics.

Pine mortality creates openings in the forest canopy. This increases sunlight to the forest floor and stimulates a succession of plants and organisms for a more diverse landscape.

Undesired effects of endemic southern pine beetle populations and subsequent mortality are a reduction of growing stock and a potential for expanding populations. Endemic populations serve as a reservoir for periodic epidemics.

The effect of increasing longleaf pine and decreasing loblolly and slash pine on selected management sites of the Forest would generally benefit forest health and diversity. Longleaf pine is the most resistant southern pine to SPB attack. It also resists annosus root disease and fusiform rust. Longleaf pine is well-adapted for sandy, dry, low-nutrient sites, and it responds well to periodic prescribed burning regimes. Regeneration techniques are now available to establish well-stocked, healthy longleaf stands. Long-term effects of longleaf restoration on the forest communities are a reduction of insect and disease risk, and the development of forest communities more suitable for extended rotation ages and red-cockaded woodpecker (RCW) habitat.

As forest stands age, growth and vigor are reduced, making stands more susceptible to insect and disease attacks. As pine stands exceed the age of 70 the risk of red-heart decay increases. Maintaining old-growth forest provides for more trees that would be suitable for nesting RCW habitat, but there is also increased risk of southern pine beetle attack on older cavity trees.

The long-term effects of insect and disease interactions on the restoration of longleaf communities and maintenance of old growth forest components are a more biologically diverse landscape with varying age classes of pine and pine-hardwood stands with enhanced RCW habitat.

Threatened, endangered, sensitive, and other rare plant species

The preceding forest health discussion applies to listed rare plant species. Pine mortality from forest pests helps to create some forest openings which would benefit some species and be detrimental to others, but these forest openings are a natural part of the landscape. For example, Louisiana bluestar thrives in roadside ditches which may mimic the openings created in streamside zones by SPB infestations. While complete control of infestations might limit the habitat available for this species, the openings created to limit the size of infestations would likely be beneficial to this species. Overall, forest health management might limit the size of some openings. The expected impacts to rare plants would be minimal, with any damage from timber activities probably offset by the creation of openings. Some species, such as the Kentucky ladyslipper, which might suffer from the opening of the canopy, probably had to tolerate natural canopy disruption from forest pests during presettlement times.

Effects of military use on vegetation

Potential impacts of recurrent training activities on vegetation include physical damage, mortality, and short- or long-term habitat disturbance.

Off-road vehicle use would have the largest and most lasting impacts to plants from ruts and trails that result in plants being damaged or killed. Vehicles can cause changes in the surface hydrology of bogs, disrupting the surface flow of water and drying some bogs so that rare bog plants can no longer survive. The potential direct, indirect, or cumulative effects of off-road military vehicle use on vegetation would be minimal on the southern portion of the Vernon Unit as recurrent training activities that involve military vehicle activity is currently restricted to roads or trails leading directly to bivouac or assembly sites.

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Concentration of vehicles and personnel at bivouac and assembly areas could cause soil compaction and erosion resulting in the loss of some plants. Designated bivouac and assembly areas are selected on sites with vegetation and soils suitable for those activities and without the occurence of rare plants or sensitive soils.

Troops walking through the forest may impact rare plant sites by trampling plants and causing soil compaction. Airborne activities should not adversely affect plant communities as all landing zones are in place and are regularly maintained for that purpose.

Effects of minerals management on vegetation

Minerals management affects general vegetation and rare plants and their habitats in a variety of ways. The effects of oil on plants varies according to the type and amount of oil, the degree of weathering, time of year, and species and age of the plants. Effects include oil trapping by vegetation, yellowing and death of oiled leaves, reduction of seedlings and annual species, differing susceptibilities and recovery rates of perennials, a competitive advantage to some species, and growth stimulation. Chronic oil pollution may completely eliminate vegetation. (**Baker, 1970**).

Environmental conditions can affect the toxicity of oil on vegetation. Oil sprayed on young plants during daylight hours when stomata are open can kill plants, while if applied at night when stomata are closed, plants may not be harmed. Sunny days, hot weather, high humidity, and drought conditions also increase toxicity of oil. (**Baker, 1970**).

Oil reduces plant transpiration rates (**Knight, Chamberlin, and Samuels, 1929; Baker, 1970**). Oil has variable impacts on plant respiration. Plant respiration may cease, be reduced, or with some plants, respiration may increase (**Baker, 1970**). Oil also reduces the rate of photosynthesis (**Knight, Chamberlin, and Samuels, 1929; Baker, 1970**). This varies depending upon the type and amount of oil and species of plant. Some plants, such as conifers, are resistant to injury from lighter oils and oil has been used as a weedkiller where conifer seedlings are grown (**Baker, 1970**). Oil may prevent seedling germination and emergence (**Bossert and Bartha, 1985**). Leaves of plants adapted to xerophytic or arid conditions are more resistant to oil than softer mesophytic or succulent leaves (**Knight, Chamberlin, and Samuels, 1929**).

Impact to vegetation can also occur from other fluids that are generated during drilling operations. Fluids that are mixed with and recovered with oil during drilling and production operations mainly consist of brines with high salt concentrations. Brine released into the environment can kill all vegetation in the discharge zone, and prevent the establishment of plants from dormant seed stored in the soil or from wind-transported seed. Rapid reestablishment of a variety of annual and perennial plants and tree species occurs after the elimination of the brine discharge. Residual phytotoxicity of brine is short-lived due to its rapid removal through soil leaching (**Auchmoody and Walters, 1988**).

Mitigation measures controlling all mineral operations — such as storage facilities for materials capable of causing pollution if accidentally discharged — would minimize impacts to vegetation. For more information on mineral operations, see Forest Plan Appendix D.

Effects of recreation management on vegetation

Recreation impacts to general vegetation and rare plants and their habitats comes in several forms, but usually as some form of habitat disturbance limiting the area available for species to survive. Off-road vehicles have the largest and most enduring impacts. Ruts, trails, and ORVs themselves result in crushed individual plants. They displace and compact soil, allowing weedy plants to invade previously undisturbed habitat. Also they can create changes in the surface hydrology of bogs, disrupting the surface flow of water and drying some bogs so that rare bog plants can no longer survive. Individuals may impact rare plant sites simply by crushing minute rare plants as they walk through a site or by collecting plants — such as pitcher plants — disrupting the habitat of rare plant species. Numerous parks have documented such impacts when a high level of foot traffic degrades rare plant habitat. In addition, the establishment of horse trails through rare plant habitat can lead to the introduction of weedy exotic plant species from horse manure into otherwise intact habitats. On occasion, recreation sites such as boat ramps may have been created before existing rare plant sites were recognized. This allows incidental human impacts from trampling or other recreation activities. Thus, the impacts caused by recreation on rare plants centers on various physical influences on rare plant sites, from simple human presence in fragile habitats — such as areas with Riddell's spikemoss, which is easily crushed — to disturbance from ORVs and horses.

Effects of vegetation management on vegetation

Timber harvest

Timber management affects vegetation biological diversity in a variety of ways. The initial disturbance created by timber cutting activities establishes habitat for pioneer species which invade the forest during the initial stages of stand replacement, thus increasing biological diversity. As new disturbances create additional pioneer habitat, older disturbances undergo changes allowing species typical of other seral stages to thrive. In this way, timber management initially increases biological diversity by creating new habitats. However, some timber management activities can also decrease diversity.

Periodic disturbances in managed forests may increase the frequency of some species, making them more common than in the past. Diversity probably increased along with growth of the timber management program due to the wide variety of seral stage conditions created by these activities. Conversely, intensive management can lead to an overall decrease in forest diversity when species unable to tolerate disturbances are lost to the system.

Restoration involves the reestablishment of native plant communities where existing species are determined to be off-site. The restoration of native species most appropriate for the site results in a forest with increased vigor and health.

Thinning treatments would open up the canopy, allowing more sunlight to reach the forest floor. Additional light would influence the quantity and quality of ground cover.

Heavy thinnings of the forest crown can significantly alter the microclimate within a forested landscape. Thinnings can change vertical diversity, thus altering species richness, by allowing a midstory of tolerant species to develop. Crown thinning can create an open canopy that enhances the development of herb and shrub strata and promotes the development of a deeper crown on residuals. Low thinnings and crown thinnings can reduce vertical structure and species richness. Removing low-quality stems in groups would foster a greater understory response than removing individual trees.

Thinning also increases growth by reducing competition. The value of residual stems is improved by increasing the size and quality of the remaining trees.

Regeneration harvests change the vegetation structure, vigor, composition, and successional patterns of the landscape.

The following information is summarized from the *Final Environmental Impact Statement for the Management of the Red-cockaded Woodpecker and its Habitat on National Forests in the Southern Region* (USDA Forest Service, June 1995). The more detailed disclosure of effects in that document is incorporated here by reference.

Regeneration methods for pine and hardwood species include *clearcutting*, *coppice*, *seed-tree*, and *shelterwood* for even-aged stands; *clearcutting with reserves*, *seed-tree with reserves*, *and shelterwood with reserves* for two-aged stands; and *group and single-tree selection* for uneven-aged stands.

Clearcutting, coppice, and clearcutting with reserves methods — have been successfully used to regenerate hardwoods, loblolly, shortleaf, longleaf and slash pine. These methods would remove the entire stand in one cutting, except for inclusions or reserve trees. Each one of them would immediately create an opening in the main tree canopy usually ranging from 10 to 80 acres. There would usually be more site disturbance and vegetation damaged or killed at one time than with any other regeneration method. The amount of sunlight reaching the forest floor would be greatest with these methods than with any other. Stands which are planted would usually grow more trees to larger sizes in a shorter time than with other methods. (USDA Forest Service, 1995).

The seed-tree method — has been most successfully used to regenerate loblolly, shortleaf and slash pine. This method would remove the old stand in one cutting — except for a small number of seed-trees left singly or in small groups — as inclusions or reserve trees. It would also provide a continuing cover of some large pine trees for a

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short period. Less light would reach the forest floor during the regeneration period than with clearcutting. Good seed crops for loblolly, shortleaf and slash pine usually occur every 3–6 years. Additional seedbed preparation and control of competing vegetation may be required to obtain a good crop of seedlings. Root competition from seed trees could seriously affect growth and development of adjacent new trees and first-year survival on droughty sites or during droughts on many sites. Loblolly, shortleaf and slash pine stands regenerated by the seed-tree method would usually have 2 logging disturbances within 5–10 years which would remove trees during the seed cut and final removal cut. Damage to remaining seed-trees may occur during logging. Seed-trees may also be lost to wind, ice, lightning or insects. Pine seedlings and other vegetation in the seed-tree removal cut may be damaged by logging. The seed-tree method usually takes longer to establish a new stand of pine trees than clearcutting. Control of competing vegetation may be required from 1 to 3 times, usually in a 5–10 year period, during stand establishment (site preparation) and development (release). The establishment, growth, and development of age classes for loblolly, shortleaf and slash pine trees established by the seed-tree method would usually be 2 to 10 or more years behind trees planted following clearcuts. (**USDA Forest Service, 1995**).

The seed-tree with reserves method — leaves some parent pine trees scattered or clumped across each stand for an indefinite period. For loblolly, shortleaf and slash pine the effect of leaving trees scattered over a stand depends on the basal area, growth, mortality, original basal area retained, how long retained, when any partial removal cuts were made, and the age, size, and vigor of the new age class of trees when the residual parent trees would be reduced. For longleaf pine, the effect of leaving parent trees scattered over a stand varies by size of trees and total basal area. The growth of young longleaf would be reduced about 55 percent under 9 square feet of basal area per acre and over 80 percent under 18 square feet, as compared to the stand where seed trees were removed. Clumping reserve trees on each acre allows more of the younger pine tree age classes to be free of competition from adjacent parent trees. Usually younger loblolly, shortleaf and slash pine would be affected up to about 30 feet around each parent clump. Young longleaf pine would be affected up to about 60 feet around each parent clump. The effects of leaving 20 percent of the stand in 1 to 2 acre or larger clumps would allow many more pine trees in the younger age class to be free of parent tree competition and suppression. (**USDA Forest Service, 1995**).

The shelterwood method — has been successfully used to regenerate loblolly, shortleaf, longleaf and slash pine. This method would usually remove the old stand, with two cuttings extended over a relatively short period of the rotation. Inclusions or reserve trees may be retained. The shelterwood method normally leaves about two to five times as much basal area per acre in seed trees as does the seed-tree method. The amount of light reaching the forest floor would be less than with the seed-tree method. Since fewer trees would be removed in the first cut, logging usually results in less seedbed scarification. Due to the variability of good seed production, additional seedbed preparation and control of competing vegetation may be required before a good seed crop occurs. Because of the greater number of seed trees left with the shelterwood method, there would be more root competition and effect on growth and development of the new trees and first year survival, on droughty sites or during droughts, on many sites compared to the seed-tree method. Shelterwood cutting may also produce too much pine reproduction, thereby requiring additional release treatments. The shelterwood seed cut and the final removal cut would result in 2 logging disturbances usually within a 5- to 20-year period for longleaf pine and a 5- to 10-year period for loblolly, shortleaf and slash pine. Because of the larger number of seed trees remaining, there would usually be more logging damage to residual trees compared to the seed-tree method. Additionally, some seed trees would be lost to wind, ice, lightning or insects before the final removal cut. Because more trees would be removed, logging damage to seedlings and other vegetation would usually be greater with shelterwood than with the seed-tree method. It normally would take longer to establish a new stand of pine trees using shelterwood than with clearcutting. Competing vegetation therefore, may need to be controlled with herbicides 1 to 3 times, usually in the 5- to 15-year period, for stand establishment (site preparation) and development (release). (**USDA Forest Service, 1995**).

Consistent natural regeneration of longleaf pine can be achieved using the shelterwood system. Key treatments necessary for success include hardwood control, timely preparatory and seed cuts, seed crop monitoring, seedbed preparation, protection of established seedlings, prompt removal of parent trees when stocking is adequate, and control of competition and brown-spot disease. Establishing the new crop primarily from the first 20 percent of seedlings emerging from the grass stage maximizes growth rates and tends to preserve inherited vigor and resistance to brown-spot (**Croker and Boyer, 1975**).

The shelterwood with reserves method — would produce a stand of trees containing two age classes for a long period of time or for most of the rotation. The irregular shelterwood method is an untested regeneration method for loblolly, shortleaf, and slash pine. Where the method has been tested in longleaf pine over a 35-year period, the results suggest that longleaf pine stands containing two or more age classes would fall far short of fully utilizing the productive capacity of the site. A staged reduction of parent trees would be required to prevent many trees in the younger age class from dying or being severely suppressed. (**USDA Forest Service, 1995**).

Group selection method — has been successfully used to regenerate loblolly, shortleaf, and longleaf pine. To begin converting well-stocked even-aged longleaf pine stands to an uneven-aged stand structure using group selection, enough trees would be removed in a heavy thinning to allow adequate numbers of longleaf seedlings to become established in parts of the stand.

During the next entry, openings ranging in size from 1/4 to 2 acres would be cut in some parts of the stand where longleaf seedlings are present. Width of group openings would not exceed twice the height of dominant surrounding trees. Other parts of the stand would be thinned, where needed, during the same cycle.

During the next cycle, either the existing group openings would be enlarged where there are longleaf seedlings under the trees to be removed, or new openings would be made in other areas where longleaf seedlings are present in the understory. Thinnings would be made where needed in the remainder of the stand. (**USDA Forest Service, 1995**).

More tolerant hardwoods and shrubs may outcompete pine seedlings in the openings under these light and moisture conditions, except in the center of an opening with a diameter at least twice the height of the surrounding large pine trees. Young pine trees overtopped by hardwood and shrub competition would usually need a release within 2 to 5 years after establishment in each group opening. From about age 4 to 10, height growth of surviving loblolly and shortleaf pine seedlings and saplings would usually be 20 to 50 percent less than trees grown in large openings.

In many cases, essentially even-aged stand structures could be changed to uneven-aged stand structure over time with the group selection method. Stands which contain irregular patches of mature pine trees and some groups and patches of seedlings and saplings could be changed to a balanced uneven-aged structure sooner than stands with even-aged structure.

Size of opening would have a significant effect on the environmental conditions created and the vegetation that can survive, grow and develop. The smaller the opening size, the greater the edge effect on survival, growth, and development of smaller pine trees from shade and root competition of adjacent larger pine trees. Trees in the center of the group would usually be larger than trees around the edge. Many of those trees would stay under some level of suppression for a number of years and would respond in varying degrees to release from the older pine trees. Longleaf seedlings would be more affected by root competition of the parent trees and edge effect than other pine species.

Ten to 20 years after the small group openings are made, many of the longleaf seedlings would still be in the grass stage and would not have started height growth because of the root competition from the adjacent trees around the opening. Most group openings made in longleaf stands would be enlarged with succeeding cycles to reduce the edge effect on longleaf growth and development. Trees in each group would be essentially even-aged. To maintain an

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adequate uneven-aged structure, establishment of regeneration would be necessary at least once every 10 years. Some pine trees and other vegetation would be damaged or killed by logging every cutting cycle.

Prescribed burning would have very limited use in uneven-aged stands of loblolly or shortleaf pine managed using group selection. Pine seedlings would usually be present at all times. Most seedlings and smaller, thin-bark saplings would be killed even on a 10-year burning cycle. Most hardwoods and shrubs would not be controlled at that burning frequency. Those competing hardwoods and shrubs would need to be periodically controlled, usually with herbicides, so that some of the young pine seedlings and saplings could survive, grow and develop.

In uneven-aged loblolly and shortleaf pine stands, competition control may range from once every ten years on moist productive sites (90+ site index) with numerous vigorous hardwoods, to once every 20 years on droughty less productive sites (70 site index or less) with few vigorous hardwoods. The regular use of prescribed fire in uneven-aged group selection longleaf pine stands, in which an appropriate grass-forb layer is absent, usually would not adequately control the hardwoods due to variations in fuels and fire intensity across the stand. This competing vegetation would need to be controlled, usually with herbicides, about every 20 years. (USDA Forest Service, 1995).

No serious problems are known which might suggest that natural longleaf stands on longleaf pine-bluestem plant community sites cannot be managed and sustained under a group selection system. That system would require regular burning for multiple purposes: seedbed preparation, competing vegetation control, and hazard reduction (Farrar and Boyer, 1990).

Group selection could be used to approximate the intensive small-scale disturbances that create large openings within stands, such as those that occur naturally from localized insect infestations, a locally severe wind, or flareups from surface fires (Guldin, 1996).

Regulation may be achieved using the group selection method of regeneration harvest by recognizing the silvical requirements of the desired species to set opening size and use area control to determine the number of openings to create each cutting cycle. Small openings favor the more shade-tolerant species while larger openings create conditions favorable to shade-intolerant ones (Murphy, Shelton, and Graney, 1993).

Openings of 1/3 acre can provide adequate sunlight for intolerant pines, but hardwood regeneration may overtop these pines where hardwood residuals are felled and no herbicide is applied. Hardwood vigor can be reduced in a 1/10 acre opening and where residual stems are not felled. The combination of a larger opening to provide sufficient sunlight and herbicide to control hardwood growth would provide the most success for establishing a pine-hardwood mixture (Waldrop, 1990).

The single-tree selection method — has been successfully used to regenerate loblolly and shortleaf pine. Stands containing irregular patches of mature pine trees and some groups and patches of seedlings and saplings could be changed to a balanced uneven-aged structure sooner than stands with an even-aged structure. Even-aged stands containing more than 100 square feet of basal area per acre would need to be thinned prior to making the first single-tree selection cut. Stand basal area would determine the cutting cycle, with an objective of a leave basal area of about 60 square feet per acre — up to a maximum of about 75 square feet.

Cutting cycles would usually be more frequent with the single-tree selection method than with group selection in order to provide varying levels of light, moisture and nutrients to the younger trees. The first single-tree selection cut would reduce the average stand density to about 60 square feet of basal area per acre.

A number of scattered small openings would be created by the cutting of a single mature tree or several trees. The remaining parts of the stand would also be thinned where needed to improve the growing space for adjacent trees. Pine seedling establishment would usually occur in aggregations throughout the stand. Aggregations of pine seedlings would usually be dominated by more high pine shade and root competition than with any other regeneration method. Depending on basal area growth, stands should receive another single-tree selection cut in 3 to 15 years to prevent stand densities — in trees over 3.5 inches in diameter — from exceeding 75 square feet of basal area per acre. Survival, growth, and development of young pine trees would usually be severely affected when the basal area exceeds 75 square feet per acre.

Effects on survival and growth from high pine shade and root competition, hardwood tree, and shrub competition would usually be greater than that which occurs with the group selection method due to the small opening size and high residual basal area per acre. The amount of light reaching the forest floor is the least of any regeneration method. Most hardwood trees and shrubs — unless controlled — can compete better than loblolly and shortleaf seedlings under these light and moisture conditions.

Single-tree selection can approximate the smallest scale of disturbance such as those caused by disease, insects, lightning, windthrow, or a combination of those (**Guldin, 1996**).

To maintain an adequate uneven-aged structure, establishment of regeneration would usually be necessary at least once every 10-year period. More pine trees and other vegetation would be damaged or killed by logging due to more frequent cutting cycles. The effects of prescribed burning and competition control in stands managed using single-tree selection would be the same as disclosed above in the group selection discussion. (**USDA Forest Service, 1995**).

The response pattern of a pine-hardwood plant community following a stand disturbance is primarily a general growth decline, rather than an elimination of established species or an introduction of new species (**Blair and Brunett, 1975**).

Failure of oak seedlings to survive and increase in vigor, even when released from competition, is a major regeneration challenge. Slow juvenile growth is an inherent trait. Dense understory of shade-tolerant species prevent adequate oak seedling development. Seedling development is improved when the understory is removed. Existing oak stands on more mesic sites developed after fires, or were periodically subjected to fire and other disturbances, which removed understory and sub-canopy trees (**Lorimer, 1992**).

Tall understory vegetation is a factor in the poor development of oak seedlings beneath mature stands. Areas where understory has been removed contains 10–140 times as many oak seedlings after five years as undisturbed areas. Annual height growth averages 4–6 centimeters. Disturbances such as fire that reduce the understory layer can probably improve the prospects that oak would be self-perpetuating, but development of competitive natural oak seedlings is a slow process that may take several decades to achieve (**Lorimer, Chapman, and Lambert**).

Bottomland oaks depend on advance reproduction and stump sprout potential for successful natural regeneration. Large seedlings must be present or be developed prior to harvest to ensure successful regeneration of oaks. Small oak seedlings, with their slow initial growth rates, are unable to compete with the faster initial growth of other species (**Clatterbuck and Meadows**).

Characteristics such as early root growth, deep root systems, high water use efficiency, and stomatal closure only at very low water potentials enable oaks to compete more successfully on drier sites (**Hodges and Gardiner, 1992**).

Establishing oak regeneration that would go on to develop is nearly impossible using the single-tree selection system. Harvesting single trees to achieve and maintain a specific diameter distribution does not provide the microclimate needed for oak regeneration, but does provide the conditions needed for the establishment and growth of shade-tolerant species. Over time, single-tree selection would convert a stand from oaks to shade-tolerant species (**Sander and Graney, 1992**).

Site preparation

Site preparation following timber harvest may be accomplished using prescribed fire, herbicides, manual or mechanical methods. The effects of prescribed fire were disclosed in the earlier discussion of effects of fire management on vegetation. Much of the following information is summarized from the detailed method-specific effects disclosed in the *Final Environmental Impact Statement for Vegetation Management in the Coastal Plain / Piedmont*, January 1989, as amended. The more detailed disclosure of effects in that document is incorporated here by reference.

Herbicides are designed to injure or kill vegetation. Effects of herbicide treatments are the result of interacting factors including: initial vegetation onsite; selectivity of the herbicide and application method used; pattern in which the herbicide is applied; biochemical effects of the herbicide on vegetation; and timing of the treatment. Broadcast application of a herbicide selective to woody species generally results in a vegetation cover composed of grasses, sedges and forbs. Spe-

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cies resistance to an herbicide complicates this generalization. Target specificity of herbicide would influence the species composition of residual vegetation on a site. Selective applications permit significant manipulation of vegetation. Species which would be potential hazards due to height, noxious nature, or other consideration can be selectively controlled. Depending on the selection process, selective stand treatment can be used to favor almost any species. Herbicidal site preparation, broadcast or more selectively done, is reported as having beneficial effects on both height and diameter growth of hardwoods and conifers. (**USDA Forest Service, 1989**)

Manual methods injure or kill vegetation by completely severing or girdling woody stems. Plants such as most hardwood species and woody shrubs that resprout would usually be injured. Plants, such as most pine species, that do not resprout would usually be killed. Long-term effects of manual methods on vegetation would be negligible. Sprout growth and crown closure rapidly reoccupy the site. (**USDA Forest Service, 1989**)

Mechanical methods also injure or kill vegetation. Mechanical tools, in increasing order of intensity are: mowing, chopping, shearing, scarifying, ripping, piling, raking, disking, and bedding. The use of mechanical methods can be severely restricted due to seasonal impacts. In the Coastal Plain/Piedmont, the use of heavy mechanical equipment predominantly occurs during the driest months of the year -June through September. (**USDA Forest Service, 1989**)

Physical impacts on forest soils from harvesting and mechanical site preparation activities occur primarily through displacement of soil and changes in its physical properties. Compaction and puddling occur when sites are harvested and prepared incorrectly or at the wrong time. When considerable topsoil is removed during site preparation, wood yields are greatly reduced. Alterations in bulk density, soil structure, and pore space from harvesting and site preparation operations can adversely affect root elongation and the availability and movement of gases, water, and nutrients through the soil (**Burger, 1982**).

For all site preparation methods, the greater the degree of soil disturbance, the greater the likelihood of changes in the herbaceous plant communities. Site preparation generally accelerates succession by decreasing competition. Light site preparation would increase diversity. Intensive site preparation reduces diversity due to more rapid tree canopy development. Site preparation that eliminates cull trees, snags, and logs reduces biological diversity.

Stand improvement

Precommercial thinning and release practices would establish and maintain stand composition, reduce insect and disease susceptibility, control stem density, and increase growth rates. Release treatments accelerate succession by helping the crop trees dominate the site sooner.

A single herbicide treatment of hardwood tree stems in a pine stand, followed by periodic prescribed fire at any season, would prevent midstory hardwood encroachment (**Boyer, 1990**).

Herbicide applications reduce competition within the treated area. All vegetation could be killed or injured, depending on the selectivity of the herbicide, application method, and the type of vegetation.

Herbicides produce more lengthy residual effects on target vegetation and plant species richness than either manual cutting or burning. Applications can be used to maintain or build diversity in such areas as those with closed canopies, and by creating snags.

Drift from broadcast applications may cause temporary browning of nontarget vegetation. Other application methods would cause little or no impact to nontarget plants.

A herbicide release treatment targeting hardwood stems within a hardwood-loblolly stand will result in a site with more than 80 percent of the total tree basal area in pine 4 years following herbicide application (**Haywood, 1994**).

High-quality stem development is promoted through close spacing of young hardwood stems, with gradual release of crop trees (**Von Althen, 1991**).

Stand fertilization would accelerate succession. Fertilizer and lime alter conditions for forest invertebrates, bacteria, and fungi, causing a corresponding change in population and species mixture.

Threatened, endangered, sensitive, and other rare plants

A goal of rare plant management is to maintain the biological diversity of national forest lands. Activities directed to the benefit of individual rare plants and habitat should protect the overall biological diversity of the Forest by maintaining unique habitats. A lack of active T&E or sensitive plant management could, through time, lead to the loss of these rare elements from the flora of the Kisatchie National Forest.

Pine straw collection

Several issues and concerns exist about the effects of pine straw collection on the diversity and abundance of herbaceous plants and vegetation, including mechanical actions of the straw raker digging up plants, the use of herbicides to create a clean understory, the interruption of appropriate fire frequency, and the mechanical disruption of flowering or seed production. Another issue would be the exclusion of pine straw collection from special areas of the Kisatchie National Forest, including designated old-growth forest patches, bogs and glades (including buffer zones), research natural areas, registry natural areas, and special interest areas.

Damage to the herbaceous layer is almost universal in raking of natural communities. Pine straw raking could decrease the diversity of herbaceous flora. Rakes tear and uproot grasses and herbs, and sometimes dig into the soil. Because so many herbs in these communities regenerate slowly, damage would accumulate with each raking, with progressive loss of ground cover and species richness (a reduction in the number of species present) at each raking. While pitchfork raking would create a smaller loss, it would cause some damage. (Schafale and Weakly, 1990)

This loss of herb cover is frequently visible at a glance after several years of raking. Haywood (personal communication) observed a decrease of bluestem and other native grasses and herbs in research plots on the Evangeline Unit of the Calcasieu District. These species tended to be replaced by more weedy grasses such as panic grasses and carpet grass. After raking ceased, the original species appeared to rebound, but careful measurements of the herbaceous flora were not part of this study. Schafale and Weakly (1990), using plots in North Carolina, found 65–130 species per tenth hectare plot in unraked areas compared to 13–40 species per plot in areas that had been raked for pine straw. They also noted that during the past decade many areas raked for pine straw were nearly devoid of herbaceous plants. Legumes and grasses especially seemed to disappear. This could cause a negative impact to wildlife species such as quail. While several studies look at the effects of pine straw raking on wood production, objective data do not seem to be available for Louisiana for the effects of pine straw raking on the herbaceous species.

Morris, et. al. (1992) noted that to be effective in a pine straw harvesting operation, herbicides should achieve 90 percent control of understory vegetation. They further state that the grass-free and shrub-free understory conditions ideal for pine straw harvesting operations would provide little understory vegetation diversity and few wildlife benefits. This type of understory vegetation control concerns some individuals, but the Forest does not manage lands specifically for pine straw production. Thus, while concern exists, the near-complete control of understory vegetation to benefit pine straw collection activities is not done on national forest lands and should not be an issue.

Pine straw collection would create another effect by removing fuels needed to carry a fire for a prescribed burning program. Numerous studies have shown that longleaf pine communities are dependent on periodic fire to retain their natural nutrient cycling, to keep shrubs and hardwoods from proliferating, to maintain their high species diversity, and to allow reproduction of many of the component species. Some regard raking as a substitute for prescribed burning to reduce wildfire hazard, but it does not substitute other beneficial effects of fire to the habitat. Fires in raked areas tend to be patchy and ineffective. Schafale and Weakley (1990) note that pine straw raking disrupts controlled burning programs. They found that after raking, most stands had too little fuel to carry a prescribed fire.

Little information is available on the effect of pine straw collection in Louisiana on the flowering and seed production of native plant species. Raking would probably reduce the numbers of mature plants present, but it also disrupts the cycle of reproduction.

Streamsides and wetlands

The creation of streamside habitat protection zones (SHPZs) permits the continued presence of species which require continuous mesic conditions to survive. Significant overstory removal in these areas allow the areas to dry

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to such an extent that some species can be lost from these areas as they become more like the surrounding uplands. An absence of SHPZs over long periods of time could cause some species to be lost to the Forest.

Old-growth forest

Some species require old-growth forest characteristics for continued survival. By designating some areas as old-growth forest, their habitat can be maintained, increasing the diversity of the Forest as a whole.

An abundance of old-growth forest over long periods of time could limit the amount of habitat available to pioneer and seral-stage species.

Effects of wilderness management on vegetation

The concept of wilderness suggests absence of human disturbance. In reality, it also suggests active fire suppression. This combination of management activities can actually decrease biological diversity when fire disturbance-dependent species are lost to the system. Fire suppression allows trees and shrubs to shade the forest floor and to outcompete many species growing at that level. Fires create gaps which allow fire-tolerant species to thrive.

Effects of wildlife management on vegetation

Fire and other management activities which improve habitat for the Red-cockaded Woodpecker (RCW) and other wildlife species change the habitats used by many plants. Some species decrease in dominance and numbers from physical removal or burning. Others benefit from the elimination of competing species and the increased sunlight available on the forest floor after prescribed burning, midstory removal, and other such treatments. Several sensitive plant species benefit from wildlife management practices.

Much ecological evidence indicates that recurring fires have been a long standing, evolutionary agent of habitat change to which native species are adapted in the southeast. Wildlife mortality from flames or smoke is generally insignificant in southern forests. Many upland resident species thrive in herb-shrub stages occurring in post-fire succession beneath pine canopies. These species diminish when hardwood overstories begin to shade lower plant strata. Brushy patches, inclusions of deciduous sub-canopies, and groups of large living and dead hardwoods add diversity to open pine forests with grassy-forb ground cover (**Landers, 1987**).

Extensive fire suppression across the southeastern United States leaves many plant species without appropriate habitat to thrive in large numbers. Prescribed burning for wildlife benefits these species.

Adequate foraging stratum for the Red-cockaded Woodpecker requires the existence of 8,490 pine stems greater then 5 inches DBH of which 6,350 pine stems are equal to or greater then 10 inches DBH within one-half mile of a RCW cluster site. This habitat need would affect the establishment, survival, growth, development, and mortality rates of pine trees within the fixed area. Providing a continuing supply of foraging habitat would require periodic adjustment in the areas designated as foraging which would allow regeneration harvest to maintain a flow of age classes through time (***FEIS-RCW, 1995***).

Midstory control of hardwood stems would change the structure and species composition of a plant community. Additional sunlight would reach the forest floor increasing the density and diversity of the herbaceous ground cover.

EFFECTS BY LANDTYPE ASSOCIATION (LTA)

The effects of fire management on vegetation would differ by LTA. In LTAs **4** and **7** fire suppression would have a negligible effect on vegetation. In LTAs **1, 2, 5,** and **6,** however, fire suppression would drastically change the character of the landscape vegetation since communities within these LTAs evolved in a frequent fire regime.

Longleaf pine communities, characteristic of LTAs **1, 2, 5,** and **6,** are the most resistant southern pine to southern pine beetle (SPB) attack, annosus root disease, and fusiform rust. These communities adapt well to sandy, dry, low-nutrient sites and respond well to periodic burning. The long-term effects of maintaining or restoring longleaf communities in these LTAs would be a reduction of insect and disease risk and development of forest communities more suitable for extended rotation ages, old growth, and red-cockaded woodpecker (RCW) habitat.

Recreational use by ORVs would affect kinds and placement of vegetation in areas of heavy use. Because LTAs 4 and 7 have a higher potential for rutting and compaction, sites within these LTAs would most likely retain areas of bare soil longer than on less compacted sites. On LTAs 2 and 5, the potential for soil movement is greater than for the other LTAs. On these areas, loss of productivity could occur, influencing species composition.

Military intensive use occurs predominantly in LTAs 1 and 6. Soil compaction and erosion are less of a problem in these LTAs and therefore have less influence on species composition.

Mineral development would have the highest potential to cause compaction and therefore impact vegetation in LTAs 4 and 7 due to the predominance of clayey soil textures. Oil and gas production facilities are expected to occur predominantly in LTAs 1, 5, 6, and 9. Vegetation restoration in LTAs 1, 5, and 6 with longleaf pine historic landscape vegetation, and LTA 9 with shortleaf pine/ oak-hickory historic landscape vegetation, would be minimally impacted due to the small number of acres affected.

Heavy equipment use for timber harvesting would occur in all LTAs outside of streamside habitat protection zones. Mechanical site preparation would most likely occur in LTAs 1, 3, 6, 8, and 9 where soil compaction and erosion would be less of a problem. In other LTAs, manual site preparation would be used more extensively to avoid compaction in floodplains and stream terraces (LTAs 4 and 7) and erosion on steep slopes (LTAs 2 and 5).

Herbicide use would occur most frequently in LTAs 1, 2, 5, and 6 where restoration of longleaf pine communities are prescribed. Soil applied herbicides for site preparation and release would be most effective in LTAs 1, 2, 5, and 6 where soils are moderately to well drained.

Pinestraw collection would occur primarily in LTAs 1 and 6 on gentle slopes. Longleaf pine communities associated with these LTAs may temporarily be unable to carry fire immediately after raking. Repeated raking may adversely affect soil fertility and decrease the abundance of herbaceous flora.

Streamside habitat protection zones and riparian area protection zones occur in all LTAs but are most abundant in LTAs 4 and 7. Over time, an increase in acreage of mesic hardwood communities is expected to occur.

If fire is excluded from the Kisatchie Hills Wilderness, species composition in that portion of LTA 2 would change over time from predominantly longleaf pine-scrub oak to more shortleaf / oak-hickory.

Wildlife management activities within the wildlife management preserves (WMPs) and the RCW habitat management areas (HMAs) would have effects on vegetation that would vary by LTA. LTAs with longleaf pine historic landscape vegetation (LTAs 1, 2, 5, and 6) would change over time to more open, frequently burned longleaf pine stands. LTAs with shortleaf / oak-hickory and mixed hardwood/ loblolly pine historic landscape vegetation (LTAs 3, 4, 7, 8, and 9) would change over time to more uneven-aged mixed pine and hardwood stands.

EFFECTS BY ALTERNATIVE

Fire management

All alternatives plan prescribed burning for vegetation improvement and therefore would affect biological diversity within stands, across landscapes, and across the Forest. Table 4–7 displays a comparison of all burning types by alternative.

Alternatives C, D, Mod D and F plan the most landscape burning and would be expected to provide the most benefit to the Kisatchie's ecosystems that are adapted to frequent fire, such as longleaf pine. The higher prescribed burning frequencies in these alternatives would increase herbaceous plant abundance in the understory and create a mosaic landscape overstory. Alternatives A and E plan the least amount of landscape burning and would be expected to provide the most benefit to the Forest's ecosystems that tolerate infrequent or dormant season burns, such as mixed hardwood-loblolly pine and shortleaf pine / oak-hickory. Within-stand diversity in these alternatives would remain the same or decrease due to the shading effect of a closed canopy and from competition.

Alternatives C, D, Mod D and F would plan the most growing season landscape burning and be expected to reduce the amount of sprouting hardwoods and favor grasses. Alternatives A and E plan the least amount of growing season burning and would be expected to foster more sprouting hardwoods.

All alternatives would maintain or increase the oak component within stands and across landscapes. Alternatives C, D, Mod D and F

TABLE 4–7, ESTIMATED TYPES OF ANNUAL PRESCRIBED BURNING

Displayed by Alternative and Practice

Indicator	Alt A	Alt B	Alt C	Alt D	Mod D	Alt E	Alt F
Release burning — for wildlife, range,fuels reduction (M-ACRES)	45	66	67	73	74	63	71
Site prep burning (M-ACRES)	2	3	1	2	1	2	1
Old-growth burning (M-ACRES)	0	3	15	7	8	4	10
Amenity burning (M-ACRES)	0	1	18	1	1	1	2
Maximum acres burned during growing season (20% of release burns)	9,000	13,200	13,400	14,600	14,800	12,600	14,200
All non-timber burning (M-ACRES)	45	70	100	81	83	68	83

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would reduce oak competition within stands containing more fire sensitive hardwoods, thereby indirectly improving oak growth and development. The other alternatives would allow more within-stand competition to remain but would assure little or no direct oak mortality from prescribed burning.

Alternative A plans the least prescribed burning and is most similar to current levels. It would have the lowest risk of physically injuring or killing existing hardwoods. Consequently, hardwoods already within stands would be preserved.

Alternatives C, D, Mod D and F would create the most favorable conditions for currently listed sensitive plant communities, as most thrive in areas maintained by periodic fire.

Forest health management

All alternatives use the same suppression guidelines to control insect and disease infestations. Control method effectiveness would not be expected to differ by alternative.

Alternatives A, D and Mod D would restore more of the Forest to a longleaf pine plant community, as shown in table 4–10 on page 4–63. Because longleaf is the most resistant southern pine to the SPB, annosus root disease, and fusiform rust, overall forest health conditions would improve most in these alternatives.

Military use

The amount and types of military use would not vary significantly by alternative. Site-specific impacts to vegetation would be mitigated as activities are planned by the military. As a permittee, they are responsible for maintaining authorized sites. The conditions of authorization prescribe ways to mitigate impacts.

Minerals management

Vegetation loss from roads, pipeline rights-of-way, and well pads as well as potential risks of increased impacts to vegetation from soil compaction, oil spray, or root uptake of discharge fluids would be highest in Alternative A as it has the most acreage available for leasing and would require the least restrictive lease stipulations. Risks would be lowest in Alternative C which withdraws all Forest lands from leasing as existing leases expire (see Chapter 2, page 2-42 for a more detailed description of leasing differences by alternative). Many of these impacts would be avoided by implementing mitigation measures for protection of vegetation and soil and water which are included in all operating plans and special use permits.

Recreation management

Alternatives A, B, and C allow the most off-road and off-trail use by ORVs (table 4–6) and would therefore have the highest risk

TABLE 4–8, ESTIMATES OF FORESTWIDE VEGETATION MANAGEMENT PRACTICES

Displayed by Alternative and Practice

Indicator	Alt A	Alt B	Alt C	Alt D	Mod D	Alt E	Alt F
Even-aged (acres)	499,617	330,382	105,228	302,588	299,124	294,116	256,556
Uneven-aged (acres)	96,431	257,362	501,290	304,799	308,685	301,429	348,571
Hardwood / riparian (acres)	136,058	187,272	197,884	201,590	192,240	274,873	212,736
Precommercial thin (acres / year)	0	1,332	283	13	11	650	189
Site preparation, artificial (acres / year)	2,176	905	202	1,577	1,406	796	803
Site preparation, natural (acres / year)	0	882	175	9	8	340	184
Site preparation, chemical (acres / year)	588	379	94	457	409	354	285
Site preparation, burning (acres / year)	2,176	2,687	602	1,594	1,420	1,816	1,024
Chemical release (acres / year)	870	1,075	238	637	568	705	400
Planting (acres / year)	2,176	905	202	1,577	1,406	796	803
Timber-suitable lands, 0–10 age class							
Period 1 (M-ACRES)	69	58	25	54	53	54	51
Period 5 (M-ACRES)	43	28	8	28	28	22	21
Percent change	–38	–52	–68	–48	–47	–59	–59
Timber-suitable lands, 20–60 age classes							
Period 1 (M-ACRES)	248	193	58	189	189	185	168
Period 5 (M-ACRES)	197	146	48	144	141	130	115
Percent change	–21	–24	–17	–24	–25	–30	–32
Timber-suitable lands, 60+ age classes							
Period 1 (M-ACRES)	120	74	17	69	66	65	56
Period 5 (M-ACRES)	197	151	44	140	140	152	139
Percent change	+64	+104	+159	+103	+112	+134	+148

of disrupting or destroying rare plant habitats or individual plants. However, if mitigation measures are followed, impacts would be minimal.

Vegetation management

Table 4–8 displays various vegetation management practices by alternative. Alternatives A and B would plan the most even-aged regeneration harvests for timber management while Alternative C would plan the least. Alternatives A and B would do the most to change the vegetation structure, vigor, composition, and successional patterns across landscapes.

Even-aged timber harvests along streamside or riparian areas would be highest in Alternatives A, B, D, and Mod D. All alternatives would provide for stream protection by leaving an uncut area of vegetation immediately adjacent to stream channels. Alternative A would have the narrowest streamside habitat protection zones (33 feet on each side), and would therefore have the highest risk of species' loss along stream courses.

All alternatives that use even-aged harvest methods would plan natural regeneration of existing stands 50 percent of the time where restoration is not the objective. When restoration is the objective and offsite species conversion is desirable, artificial regeneration would be used almost exclusively. Alternatives A, D,and Mod D, which have restoration themes, would use artificial regeneration most during the first 50 years and would therefore do the most to expeditiously convert existing yellow pine stands to longleaf. Once longleaf pine stands are restored, however, longer rotations as-

TABLE 4–9, EFFECTS OF ALTERNATIVES ON WILDLIFE AND TIMBER MANAGEMENT

Displayed by Alternative and Practice

Indicator	Alt A	Alt B	Alt C	Alt D	Mod D	Alt E	Alt F
Percent of Forest in HMA	61	61	61	61	61	61	61
Percent of HMAs in tentative foraging	42	42	42	42	42	42	42
RCW population objective (clusters)	1,405	1,405	1,405	1,405	1,405	1,405	1,405
Average acres of tentative foraging per cluster	109	109	109	109	109	109	109
Active and tentative clusters within 1 1/2 miles of active RCW	1,049	1,049	1,049	1,049	1,049	1,049	1,049
Tentative clusters beyond 1 1/2 miles of active RCW	356	356	356	356	356	356	356
Acres of tentative foraging per cluster within 1 1/2 miles of active RCW	118	118	118	118	118	118	118
Acres of tentative foraging per cluster beyond 1 1/2 miles of active RCW	83	83	83	83	83	83	83
Even-aged component on wildlife management preserves	69%	42%	23%	26%	25%	15%	12%
Multi-aged component on wildlife management preserves	31%	58%	77%	74%	75%	85%	88%
Percent of Forest in managed old-growth patches	0%	4%	27%	11%	13%	10%	15%
Streamside protection area (acres)	79,248	172,152	183,182	182,284	173,594	181,338	189,104
Thinning acres (acres / year)	22,866	18,148	5,468	16,582	16,836	16,314	14,710
MI habitat – longleaf pine, all stages (M acres)							
@ 5 years	134	113	141	117	121	112	121
@ 45 years	199	115	143	175	169	131	148
MI habitat – shortleaf pine / oak-hickory, early stages (M acres)							
@ 5 years	1	1	0	0	0	0	0
@ 45 years	3	4	3	3	5	9	1
MI habitat – shortleaf pine / oak-hickory, mid-late stages, (M acres)							
@ 5 years	17	12	27	15	16	19	17
@ 45 years	14	10	27	14	15	21	17
MI habitat – mixed hardwood-loblolly pine, early stages (M acres)							
@ 5 years	56	46	21	43	42	42	28
@ 45 years	4	24	6	8	11	15	8
MI habitat – mixed hardwood-loblolly pine, mid-late stages (M acres)							
@ 5 years	320	262	225	247	252	250	248
@ 45 years	308	281	235	221	230	246	239
MI habitat – riparian, small streams (M acres)							
@ 5 years	39	79	92	89	85	89	96
@ 45 years	39	79	92	89	85	89	96
MI habitat – riparian, large streams (M acres)							
@ 5 years	40	94	101	96	92	96	96
@ 45 years	40	94	101	96	92	96	96
Quality habitat for white-tailed deer (M acres)	225	225	242	273	266	242	254
Quality habitat for turkey (M acres)	328	308	335	387	385	338	352
Quality habitat for quail (M acres)	182	112	143	152	157	118	141
Quality habitat for fox squirrel (M acres)	153	210	236	228	224	227	238
Quality habitat for gray squirrel (M acres)	83	174	193	187	181	187	194

sociated with longleaf pine management would limit the amount of area which would be regenerated each entry period.

All alternatives use the even-aged silvicultural system to some extent within RCW habitat management areas (HMAs) and comply with the RCW FEIS direction and guidance for managing HMAs with even-aged harvesting systems. Alternatives A, D, and Mod D would use the even-aged system and prescribed fires more than the other alternatives to control hardwood midstory on upland sites within the HMAs.

Alternative C would plan the most acres of uneven-aged stands while Alternative A would plan the least. Uneven-aged management within areas suitable for timber production would be done almost exclusively by group selection. Areas not suitable for timber production — for example, along streams, within old growth areas, and within other amenity-valued areas — would use single-tree selection techniques predominantly. Alternative C would create multi-aged stands mainly by single-tree selection techniques while the other alternatives would create uneven-aged stands primarily through group selection. Alternatives D,Mod D, E, and F would provide the most stand acreage managed by group selection. Within the National Catahoula and Red Dirt Wildlife Management Preserves, Alternative F would make the most use of uneven-aged silviculture (table 4–9).

Alternatives D,Mod D, E, and F, which use the group selection method of uneven-aged management more than single-tree selection, would be more compatible with effective restoration of longleaf pine communities than Alternative C. The group selection method would allow more sunlight to reach the forest floor, aiding development of shade-intolerant longleaf seedlings. Also, cutting cycles would usually occur less frequently than with single-tree selection, thus reducing the likelihood of damaging other pines and vegetation in the residual stand.

Alternative C, which would be expected to make the most use of single-tree selection techniques, would allow more shade-tolerant hardwood trees and shrubs to develop, due to smaller openings and higher residual basal area. Oak would be more difficult to establish in this alternative if single-tree selection techniques are the primary means of harvest. Herbicide use or fire would be needed to regulate species composition where pine communities are desirable. Prescribed fire would not be compatible with uneven-aged stands of loblolly and shortleaf, leaving only herbicide available for stand improvement.

Mitigation for streamside protection would minimize impacts to riparian vegetation and would be similar to impacts expected in areas of even-aged management (see earlier discussion). Because single-tree selection techniques would be used predominately in streamside areas, all alternatives would slowly change their composition to more shade-tolerant species.

All alternatives that propose even-aged harvests on timber-suitable lands use the same thinning cycles. Alternative A would thin the most even-aged timber-suitable acres per year, and Alternative C would thin the least (table 4–9). However, since the effects to vegetation are similar between even-aged thinnings and single-tree selection, Alternative C would effectively promote understory grasses, woody shrubs, and vines.

Alternative C would provide the most opportunity to selectively leave large diameter, older trees that would benefit RCW nesting habitat. Although thinnings proposed in Alternative C would favor the development of longleaf pine within HMAs, the combination of thinnings and even-aged regeneration cuts proposed in Alternatives A, D, and Mod D, would do the most to quickly restore native longleaf.

Site preparation is highest in Alternatives A, B, D and Mod D and lowest in Alternative C (see table 4–8). Mechanical site preparation is expected to be highest in Alternatives A, D, and Mod D due to conversion of off-site species to longleaf pine. Site preparation by prescribed burning is expected to be highest in Alternative B because it utilizes prescribed burning, alone or along with mechanical site preparation, for regeneration of all even-aged stands. In all alternatives, site preparation by herbicides is expected on 25 percent of the pine acres that would be regenerated by even-aged management; and on 25 percent of the patch acres cut for uneven-aged management by group selection.

Alternatives A, D, and Mod D would use more intensive methods of site preparation to achieve restoration. This would generally accelerate succession and reduce biological diversity by reducing competition, allowing more rapid canopy development, and eliminating more cull trees, snags, and logs within site preparation areas. Alternative C, which

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would use less intensive methods of site preparation, would generally increase within-stand biodiversity.

Alternative C allocates the most acreage of the Forest to old-growth community management. Alternative A allocates none. The other alternatives vary from 4% in Alternative B to 15% in Alternative F (see table 4-9). Alternatives that allocate more old-growth would gradually raise the average age of the Forest, providing more late-successional overstory vegetation for understory plants that need it. Lack of scheduled harvesting would increase the number of trees lost to natural mortality since stands would not be thinned periodically to capture mortality and improve residual stand vigor. This increase in the range of stand ages and plant habitats would improve forestwide and within-stand diversity. Therefore, Alternatives B, E, D, Mod D, F, and C would respectively provide increased biodiversity across the Forest.

Alternatives A and B advocate greater use of chemical release for more control over species development, especially where restoration to longleaf and mixed shortleaf-oak-hickory is desirable (see table 4–8). Alternatives D, Mod D and F advocate more burning for release (see table 4–7). These alternatives would most closely mimic natural fire history and favor native plant communities.

Wilderness management

Wilderness management varies slightly between the alternatives. See the discussion of effects on vegetation under the *wilderness* heading in this section.

Wildlife management

All alternatives are consistent with the direction found in the RCW FEIS for managing habitat within the RCW HMAs. Minimum foraging and nesting habitat for active and tentative cluster sites would be provided by maintaining sufficient basal area within stands designated for these purposes. Table 4–9 shows how the Forest HMA's have been modelled to provide RCW habitat needs. The overall effect of HMA management on vegetation for all alternatives would be to increase the acres of longleaf pine stands through species conversion practices, encourage the creation of more open stands through increased use of prescribed fire, and reduce the amount of midstory hardwoods dispersed within stands on upland sites through prescribed fire and intermediate harvest treatments.

WILDLIFE AND FISH

GENERAL EFFECTS

Introduction

Wildlife, fish and other aquatic organisms, and their habitat on the Kisatchie are affected primarily by fire, lands and minerals, military use, range, recreation, structures, transportation, vegetation, and wilderness management.

Effects of fire management on wildlife and fish

The Kisatchie National Forest is composed of largely fire-dependent ecosystems. Wildlife species indigenous to this area are accustomed to fire and its effects. Wildfire suppression however, can produce long-term changes in habitat types that can be detrimental to wildlife. Periodic prescribed burning conducted to reinvigorate habitats, reduce hazardous fuels, control competing vegetation, and to restore pre-European habitat conditions would be beneficial to indigenous wildlife.

General wildlife and fish

Direct effects of fire on wildlife can include physical injury or mortality. Less mobile species, such as reptiles and amphibians are occasionally killed, but such rare mortality is usually not associated with slow-moving prescribed fires (**USDA Forest Service, 1989**).

The eggs or nestlings of ground or shrub nesting birds could be destroyed. Insects that cannot fly or burrow into the ground would likely be burned. More mobile species, such as birds and mammals are seldom killed by prescribed burning (**USDA Forest Service, 1989, 1995**). Larger animals such as white-tailed deer usually move calmly away from advancing fires. There is no evidence that wildlife is harmed by smoke. Raptors, quail, turkey, and insectivorous birds are often attracted to recently burned or actively burning and smoking areas (**USDA Forest Service, 1989**).

Indirect and cumulative effects of fire reflect impacts to short-term and long-term habitat alteration and species diversity. The use of fire under prescribed conditions is the most efficient management tool available for wildlife habitat enhancement. Large acreages can be burned and quickly improved for native wildlife species.

Game species benefitting from periodic fire include the white-tailed deer, Eastern Wild Turkey, and Bobwhite Quail. White-tailed deer browse usually declines immediately following a burn, but increases rapidly for years afterward. Sunflowers, grapes, and greenbrier sprout vigorously after exposure to fire, offering deer nutritious and palatable browse. Hardwood sprouts occurring on a burned site, such as red maple and various species of oak, are preferred browse species. Lack of fire can result in preferred browse growing beyond the reach of deer. Burning too often however, can reduce deer browse by increasing annual forbs and perennial grasses. Repeated burning may reduce the production of hard mast, lessening the suitability of the site for deer, turkey, squirrels, and many other species. Optimal fruit production probably occurs when pine stands are burned every three years. Prescribed fire, particularly patchy annual or biannual burning, appears to be beneficial to rabbits (**USDA Forest Service, 1989**).

Eastern Wild Turkey and Bobwhite Quail find suitable feeding and brood rearing cover in sites that were formerly burned. Although prescribed fire enhances brood rearing cover, fire can reduce production by destroying nests of ground nesting birds. Maintaining the burn mosaic across the landscape would offer unburned sites for nest selection and burned areas for rearing broods. The Bobwhite Quail is a species closely tied to regular presence of fire (**Landers, 1987**). The production of seeds used by quail increase dramatically in response to fire, usually peaking the first or second season (**Warren, 1981**). Although annual burns appear to provide the most benefit for quail, leaving areas unburned for 2–3 years can optimize nesting and fruit production. (**USDA Forest Service, 1989**)

Burning causes other effects to bird species. It removes standing dead trees that may be used for cavities, yet produces snags when it kills trees. Burning seems to increase species such as the Bachman's Sparrow and Pine Warbler, which benefit from the open grassy understory in mature pine stands. Variations in fire result in patchy responses of vegetation, which can increase the overall diversity of bird species in a given area. Bird species most likely to be affected are those requiring shrubby midstory vegetation for nest sites, such as Red-eyed Vireo and Hooded Warbler.

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If a particular bird species cannot find suitable nesting within a stand, it would be eliminated from the stand and decrease within-stand species diversity (USDA Forest Service, 1995).

Some species of hardwood trees and shrubs may be eliminated or greatly reduced through prescribed burning, which could lead to a decrease in the availability of mast on which some species are dependent. Overstory mast producers probably would not be affected. Because of the limited mast production capabilities of midstory species and the fact that overstory mast producers would be minimally impacted, the overall impact to mast dependent species should also be minimal. The mast dependent species most likely to be affected by the cumulative effects of prescribed burning would be the gray squirrel. In frequently burned pine-dominated forests they would be found primarily in mature upland hardwood inclusions, drains, and bottomland hardwood stands where they likely occurred historically under a natural disturbance regime (USDA Forest Service, 1995).

Small mammals need the early successional vegetation response to fire that produces increased abundance of seed and grass species. Numbers of hispid cotton rats and fulvous harvest mice increase following prescribed fire, while insectivorous mammals such as the short-tailed shrew tend to decrease. However, increases in other rodent species usually cause an increase in shrews.

Streamside habitat protection zones would provide protection along streams during prescribed burns. Except for intense fires that destroy much of the ground cover and increase sedimentation in small streams, prescribed burns should have little impact on fish populations (USDA Forest Service, 1989).

In summary, the resulting mosaic of burned and unburned areas provides suitable habitat conditions for a wide variety of wildlife. A natural fire regime should contribute to habitat structure and composition similar to those that likely existed historically (USDA Forest Service, 1995). The shifting mosaic of different vegetation patterns across the landscape should increase overall diversity and species richness should increase at a landscape scale.

Threatened and endangered wildlife and fish

Due to its rarity on the Kisatchie, it is unlikely that the Bald Eagle would be adversely impacted by prescribed fire. If the Louisiana black bear were present within the area, they would probably benefit from prescribed burning. Because the black bear is omnivorous, burning should make a given area more suitable for the species, as it usually increases the production of fruits after the first year and produces succulent, more palatable vegetation.

Prescribed burning is the most cost-effective tool for creating and maintaining suitable RCW habitat. Dormant- and growing season burns would maintain the open, park-like habitat they prefer, by reducing the amount of midstory and providing higher-quality nesting and foraging habitat (Rudolph and Conner, unpublished data).

Growing season burning has been shown to reduce the primary prey (spiders and ants) of Red-cockaded Woodpeckers; while dormant season burning has little effect on the number of prey or prey biomass available for the woodpeckers (New and Hanula, 1998).

Fire could kill a RCW adult or a nestling, or damage eggs — if the fire burns an occupied cavity. Fire could also burn the cavity and damage it, leading to enlargement and usurpation by a cavity competitor. There is also the potential to stress nestlings during prescribed fires in the nesting season. Heat, smoke, and disruption of feeding patterns by adults are all sources of stress. However, prescribed burning during the nesting season apparently does not affect nestling survival (USDA Forest Service, 1995). Current guidelines require the protection of RCW trees by raking around them to prevent or reduce the likelihood that they might ignite.

Due to the uncontrolled conditions prevailing in a wildfire, it usually has a higher intensity than a prescribed burn and could result in additional loss of cavity trees. As the fuels near a cavity tree increase and the amount of resin on the tree increases, the chance increases that it could catch fire. Regular burning reduces the amount of fuel and controls the midstory, increasing the suitability of a cluster. As the use of prescribed burning increases and becomes more effective, RCW populations should benefit and increase (Hooper, et al., 1991). In addition, tree species providing long-term benefit to the RCW, such as longleaf pine, also benefit from fire due to reduced competition.

Improper fireline placement or construction, or inappropriate fire intensity that results in increased stream sedimentation could impact the threatened Louisiana pearlshell mussel. Impacts to the mussel and its habitat from prescribed fire activities would be minimal as long as mitigation measures for placement and construction of firelines and for fire intensity within streamside habitat protection zones are implemented.

Sensitive wildlife and fish

Many sensitive species would benefit from the use of prescribed fire. Bachman's Sparrow and Henslow's Sparrow would profit from vegetation changes that follow burning. They utilize the high-quality habitat resulting from regrowth for feeding and nesting. Limited impacts to forest interior species would include nest loss and reduction of the woody shrubs, but improvement in general forest condition. The open conditions that result after burning would likely be beneficial for raptors such as the Cooper's Hawk. Because most rodent species benefit from prescribed fire, it is plausible that the hispid pocket mouse would benefit. The long-tailed weasel should benefit from the resulting increased prey base following a fire. Rudolph and Burgdorf (1997) have proposed that changes in the historic fire regime (reduced frequency and seasonal changes in occurrence) have had a negative impact on pocket gopher abundance, which because of its close association with Louisiana pine snakes, has resulted in the decline of Louisiana pine snake distribution and abundance.

The Rafinesque's big-eared bat and the big brown bat seem to prefer foraging along streams unaffected by prescribed fire. Because they roost in large trees and snags, fire could reduce the number of suitable roosting sites by burning snags. However, as the fire removes snags it can also kill trees, thus producing future snags. Prescribed fire impacts to sensitive fish and other aquatic sensitive species — such as increased stream sedimentation — would be minimal as long as mitigation measures are implemented.

Effects of lands and minerals management on wildlife and fish

Land adjustment

A wide variety of wildlife, fish, and other aquatic species would benefit from land purchases or exchanges that make the Kisatchie more continuous. Increased acreages could contribute to greater biodiversity by providing more control over suitable habitat for species requiring larger home ranges. Mitigation measures focusing the highest priority for acquisition on lands with riparian ecosystems, those containing critical habitat for federally endangered or threatened species, and environmentally sensitive lands such as wetlands and old-growth forest would benefit Forest wildlife, fish, and other aquatic species.

Land use and rights-of-way

The effects on wildlife of utility, pipeline, and road rights-of-way (ROWs), and special use permits for buildings or residences are similar to those disclosed in the structures and transportation narratives. Wildlife, fish, and other aquatic species could be injured, killed, or disturbed during the construction and maintenance of ROWs. Short-term and long-term habitat alteration could occur, along with habitat fragmentation. Many wildlife species utilize early successional habitats provided by ROWs.

Minerals management

Oil and gas exploration activities and the excavation of common variety minerals could impact many species of wildlife. Heavy equipment used to clear or excavate sites could injure or kill animals, with higher impacts on less mobile species such as small mammals, reptiles, and amphibians. Permanent loss of habitat and isolation due to habitat fragmentation could also occur. Clearing of suitable cluster stands could impact RCWs, as could the reduction of available foraging habitat by cluster and recruitment stand isolation, by disturbance from noise associated with drilling activities, and through overall increased human disturbance. When these activities cannot be located on other ownerships, impacts can be reduced by locating well sites, gravel pits, production facilities, and pipeline corridors within existing permanent openings or ROWs, on other non-forest land, or areas of unsuitable habitat whenever possible. Mitigation measures restricting clearing for non-timber purposes within RCW habitat management areas should protect the RCW from significant adverse impacts due to oil and gas exploration activities.

Crude oils are known to cause biological damage primarily by their viscous properties

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which include: coating, asphyxiation, and contact poisoning; ecological impacts due to destruction of food organisms; chronic toxicity resulting in reduced resistance to infection and other stresses; interference with behavioral patterns, such as prey location or predator avoidance (Killebrew 1993). Oil films on the surface of receiving streams can interfere with gaseous exchange and can settle out, forming a layer of sludge on the bottom (McDaniel 1993). Microbial digestion of the oil could also lead to a deficit in dissolved oxygen. The escape of oilfield brine into the aquatic environment could contribute to a reduction in species density and diversity of microbes, as well as delaying biodegradation of organic matter. Brine and associated compounds have been shown to increase the incidence of fish tumors, alter biotic community composition, and eliminate benthic communities (Killebrew 1993). Polyaromatic hydrocarbons (PAHs) are present in refined oils and are toxic to aquatic wildlife. These compounds can be present in oil that has been heat treated in a typical wellsite production facility. These carcinogenic compounds most readily bioaccumulate in mussels and crayfish.

Saturated hydrocarbons from oil spills may contribute most of the total hydrocarbon concentrations in both water and sediment. Total hydrocarbons may be much more concentrated in stream sediment than in surface water and may have deleterious effects on benthic communities. In one study, species diversity of benthic macroinvertebrates was reduced below water effluent from an oilfield, with almost complete elimination of stoneflies (*Plecoptera*) and caddisflies (*Trichoptera*).

The extraction of common variety minerals would be prohibited within streamsides and riparian area protection zones, and therefore, should have no impact on populations of fish and other aquatic species. Where oil and gas leasing would be allowed, it would be permitted with restrictions within these zones to protect fish and other aquatic species, such as the Louisiana pearlshell mussel.

Effects of military use on wildlife and fish

The effects to wildlife, fish, and other aquatic species from military use are proportional to intensity, frequency, and duration of use. As use intensity and frequency increases, so generally does potential disturbance to species and their habitat. Large troop concentrations and intensive mechanized operations could cause short-term and long-term habitat alteration and stream degradation. While military exercises are ongoing, activities in military intensive use or military limited use areas have the potential to injure or kill wildlife. Additional impacts would result from disturbance during breeding, nesting, or rearing of young. Restrictions on use during breeding or nesting seasons, limitations on off-road travel, and locations of bivouac or assembly areas would reduce potential impacts to wildlife, including the RCW, fish, and other aquatic species.

Effects of range management on wildlife and fish

The impact of grazing on wildlife populations is difficult to predict because the degree of competition for food between cattle and various wildlife species is still a matter of scientific debate. In a study on the Palustris Experimental Forest (Evangeline Unit of the Calcasieu District), Thill et al., found in 1995 that prescribed burning and seasonal influences had greater impact on deer diets than cattle grazing levels. They concluded that seasonal or yearlong cattle grazing at moderate levels — 40 to 50 percent herbage removal — did not adversely affect deer nutrition.

Prescribed burning to enhance range forage would have a beneficial effect on many wildlife species. Range management standards and guidelines that call for utilizing not more than 50 percent of annual growth of key forage species should provide adequate forage for other resource needs. Past range management practices have been beneficial to species favoring open woodlands.

Livestock grazing within streamside and riparian areas have the potential to impact fish and other aquatic species through vegetation removal and soil disturbance or compaction which could cause increased sedimentation of streams. Streambanks could also be eroded by watering livestock. Impacts can be minimized through mitigation measures such as fencing, rotational and seasonal grazing, supplemental feeding, salting, and water hole placement. If cattle watering areas or crossings occur immediately above a Louisiana pearlshell mussel bed, there could be adverse impacts resulting from increased sedimentation and organic input from the cattle. Mitigation measures that discourage grazing of riparian areas by attracting livestock away from areas by feeding, salting, and the use of prescribed fire should adequately protect the mussel and its habitat.

The overall effects of range management practices on wildlife, fish, and other aquatic species would be slight due to the small range program. Relatively little grazing currently exists in the Forest. Range management practices would diminish if the range program continued to decrease.

Effects of recreation management on wildlife and fish

Impacts to wildlife, fish, and other aquatic species from recreation management are similar to those disclosed in the effects of structures and transportation management narratives, below. The construction and maintenance of developed and dispersed recreation facilities, and recreation use, increase the potential for wildlife to be injured or killed.

Additional impacts result from short-term and long-term habitat alteration, and disturbance during breeding and nesting seasons, or rearing of young. Recreation roads and trails could fragment habitats, preferred by various wildlife species, and impact streams. Many trails however, due to their location across the landscape and narrow widths, are also used by some larger wildlife species, such as deer and turkey, as travel corridors. Recreation use in some areas could also increase the likelihood of harassment and poaching of wildlife.

The RCW could be impacted through the reduction of available foraging habitat, by cluster and recruitment stand isolation, by disturbance from noise associated with recreation use and management, and through overall increased human disturbance. Impacts to the RCW and its habitat would be reduced through the implementation of mitigation measures regarding the construction and development of multiple-use trails, trail heads, and camp sites, and scheduling of events within cluster sites before or after the nesting season.

Effects of structures management on wildlife and fish

As a general rule, structures impact species through short-term and long-term habitat alteration. The sites they occupy generally provide little food or cover for animals, although landscaping, using plant species beneficial to wildlife, would provide some habitat on facility grounds. Additionally, human-wildlife interactions in the vicinity of facilities increase the overall risk of injury or mortality to wildlife.

In the past cumulative effects of structures management on wildlife and fish have been slight due to the small amount of land on the Forest occupied by facilities, and little new administrative facility construction is anticipated.

Effects of transportation management on wildlife and fish

Road management impacts on wildlife normally involve the extent and timing of use, and the designation of a travelway for a particular type of use. Generally, as road network density increases in a given area, the quality of habitat for wildlife decreases in terms of reduced food and cover sources, and increased predation.

Open or closed roads often fragment habitats preferred by various wildlife species. Roads open to vehicular traffic increase the likelihood that wildlife would be injured or killed more than if the roads were closed. The impacts are probably greater on less-mobile terrestrial species, such as small mammals, reptiles and amphibians, than with highly mobile species. High open road densities also increase the likelihood of harassment and poaching of wildlife. They have also been found to increase the incidence of stress-related diseases (MacArthur, 1978). Lesser impacts would be expected from open roads with little traffic; increasing the amount of vehicular traffic would increase the potential for harm.

Roadsides do provide early successional habitats that are utilized by wildlife. This habitat type can provide very beneficial brood-rearing habitat for ground-nesting birds such as Bobwhite Quail and Eastern Wild Turkey. Use of such sites, however can increase the potential for loss due to poaching or predation.

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Threatened and endangered wildlife on the Forest, such as the Louisiana black bear, Bald Eagle, and the RCW, could be impacted if human interaction with these species increased due to open roads and vehicular access. Most suitable black bear habitat is in bottomland riverine systems, and little such habitat exists throughout the Forest. Impacts to black bear would therefore be remote. Eagles are also uncommon on the Forest, and it is unlikely that they would be significantly impacted from open or closed road management.

Open roads with high use, near cluster sites, may impact the reproductive success of RCWs. The potential for this would be higher where new construction / reconstruction occurs in areas that have had little recent human disturbance. However, empirical evidence and observations have also shown that RCW are known to colonize adjacent to road corridors and other openings associated with concentrations of human activity and are successfully breeding and fledging young. Increased human-wildlife interactions may also lead to increased RCW mortality, although such an effect is unlikely. Loss of specific trees may occur due to off-road use, which increases near open roads. Compaction under the canopy, or tree injury from direct contact, can increase the susceptibility of cavity trees to insect or disease.

Impacts to sensitive wildlife species would be similar to the impacts on threatened and endangered animals: increased potential for loss of individuals, roost sites, and nest sites due to human-wildlife interaction.

Road construction / reconstruction and maintenance within or adjacent to streamside or riparian areas can affect fish and other aquatic species by increasing the deposition of sediment into streams thereby reducing water quality. The threatened Louisiana pearlshell mussel could be impacted by siltation and changes in water quality as it requires a stable sand or gravel substrate and good water quality. Construction debris or improperly placed structures such as culverts, can also impede fish migration. Mitigation measures for road construction, reconstruction, and maintenance would minimize potential impacts to wildlife, fish and other aquatic species.

Effects of vegetation management on wildlife and fish

Introduction

Vegetation manipulation affects each species' habitat differently, benefiting some and harming others. When natural succession is interrupted, species requiring early successional stages usually benefit. When natural succession is allowed to continue, species requiring later successional stages usually benefit.

Vegetation management also affects wildlife, fish, and other aquatic species when it impacts a key habitat element such as food or cover. For example, site preparation may increase or reduce the number of snag trees available for cavity-nesting birds. Also, numbers of soft mast-producing plants may be increased or decreased. The effects of a management activity are most telling on wildlife species composition and abundance when it affects the structural diversity of vegetation. Much of the following information is summarized from the detailed effects discussions disclosed in the *Final Environmental Impact Statement for Vegetation Management in the Coastal Plain / Piedmont*, January 1989, as amended (**USDA Forest Service, 1989**); and, the *Final Environmental Impact Statement for the Management of the Red-cockaded Woodpecker and its Habitat on National Forests in the Southern Region* (**USDA Forest Service, 1995**) The more detailed disclosure of effects in those documents are incorporated here by reference.

Even-aged regeneration methods

Vegetation management utilizing even-aged regeneration methods directly alters the vertical structure and plant species composition of a stand. These regeneration methods — clearcutting, coppice, seed-tree, and shelterwood — mimic natural disturbance patterns such as wind storms, tornadoes, or catastrophic fire by removing most or all of the overstory and encouraging growth of similarly even-aged seedlings. Historically, the natural range of variability might be exemplified by a small group of trees being blown down by winds, miles of linear felling due to tornadic activity, or many acres killed by catastrophic fire or insect epidemics.

Prior to harvest, vertical structure may include the understory, midstory and overstory, with the understory primarily composed of shade-tolerant plants, depending on stand density. After the overstory is removed by harvest the midstory probably would not persist. As a result, increased sunlight to the ground can result in an initial flush of diverse herbaceous and woody vegetation lasting 5–7 years, before the saplings begin to restrict the amount of sunlight reaching the understory.

Due to the structural and compositional changes, wildlife species would vary depending on vegetation successional stage and habitat suitability. In addition, site preparation methods and stand-tending after seedling establishment result in different vegetation responses. Intensive site preparation methods typically favor annual herbaceous vegetation, resulting in stands that benefit wildlife that prefer early successional habitat. Stand-tending methods such as thinning and prescribed burning tend to keep the area open and interrupt succession — reducing woody vegetation and favoring herbaceous forbs and grasses. For restoring native tree species, even-aged harvest methods offer rapid conversion to historical vegetation, which is typically advantageous to native wildlife.

General wildlife and fish — Many wildlife species benefit from opening a canopy through even-aged regeneration harvesting. As the canopy trees are removed, the new understory would benefit species of wildlife needing low-ground horizontal structure for nesting, feeding, brood-rearing, or protective cover. Even-aged regeneration areas would provide early successional habitat scattered across the landscape (**USDA Forest Service, 1995**).

The variety of species and population levels would be determined by the remaining overstory, site preparation methods, stand-tending frequency, and understory plant species, structure, and size of the opening. Species requiring small openings would dominate in small harvest areas and may only occur along the edges of larger openings. Wildlife species could be directly impacted through the loss of potential nesting or denning sites, and the loss of a given year's reproductive output if nests or dens are destroyed or abandoned (**USDA Forest Service, 1995**). Primary or obligate cavity-nesting species that need and utilize large trees for cavity excavation would be displaced by the complete removal of trees — until the new stand ages sufficiently.

Even-aged silvicultural techniques should result in increases in abundance and distribution of wildlife species that prefer early successional vegetation. These same techniques could result in decreases in abundance and distribution of species that prefer late successional vegetation. They would be displaced to adjacent suitable habitat. Researchers have shown that clearcuts provide excellent habitat for White-eyed Vireo, Yellow-breasted Chat, Prairie Warbler, Northern Cardinal, and Indigo Bunting (**USDA Forest Service, 1995**).

Generally, seed-tree and shelterwood harvest methods would lower the carrying capacity for birds that utilize the overstory, yet would probably raise the suitability for birds that utilize the understory. This enhancement of bird populations may stem from increased production of insects in the understory or by exposing normally obscured seed sources in the ground litter.

Seed-tree and shelterwood methods cause less adverse impact on the bird population than clearcutting, depending on the amount of residual overstory and the length of time the seed-trees are retained. Depending on its cumulative amount, patch size, and distribution across the landscape, such fragmentation would increase the susceptibility of neotropical migrants to nest parasitism and predation. Although the openings tend to favor Yellow-breasted Chats and Indigo Buntings, they tend to displace or reduce the suitability for forest interior species such as the Hooded Warbler and Worm-eating Warbler. Because nest predators and parasites are more effective near edges, nest parasitism and predation are of particular concern to the long-distance migrants who produce single clutches in low, open nests (**Hunter, 1990**).

Small mammal populations usually increase after an overstory harvest and offer additional prey base for raptors. Many rodent species are opportunistic omnivores, and food is a limiting influence on differential habitat utilization between most species (**Smith, 1983**). As a result of harvesting, sites with high stem densities would favor the golden mouse while a high density of grasses may favor the fulvous harvest mouse (**Smith, 1983**). Canopy removal would reduce habitat suitability for the cotton mouse, which prefers stands with a closed

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canopy, while enhancing the potential for the white-footed mouse, which prefers early successional forest vegetation.

Many game species such as white-tailed deer would benefit from even-aged regeneration methods. The herbaceous and woody stem production after cutting, provides a high-quality food source, good fawning cover, and valuable bedding and protective cover. The areas are heavily utilized for the first few years. The Bobwhite Quail and the Eastern Wild Turkey utilize harvest areas and edge for feeding, nesting and brood-rearing. The vegetation provides high-quality brood-rearing habitat because open travel lanes exist under herbaceous cover until woody species encroach on the area. Nesting habitat usually exists if bunch grasses and small woody shrubs are present to provide the nest and brooding adult with sufficient overhead cover. Stand-tending methods can extend suitability by opening the canopy and retarding succession.

Even-aged regeneration harvests within streamside or riparian areas could impact fish and other aquatic species' populations through increased sedimentation when vegetation is removed or soil is disturbed. When sufficient vegetation is removed in these areas, they could lose their effectiveness as filter strips, allowing sediment and debris to reach streams. Loss of riparian canopy could also result in increased water temperatures, impacting aquatic biota and their reproduction. Organic inputs, such as twigs, leaves, and needles could create oxygen deficits as they decompose and may also introduce high levels of tannins into the water, thereby reducing the pH. The introduction of large woody material could also alter stream courses and flows. Mitigation measures limiting harvest within these areas would minimize risk to aquatic resources.

Threatened and endangered wildlife and fish — The Bald Eagle, due primarily to the lack of large water impoundments across most of the Forest and lack of documented nesting on the Forest, is unlikely to be affected by timber harvest. If nesting was noted, then opening of the canopy and leaving large diameter, tall trees within 1/4 mile of large impoundments would improve nesting potential.

Because the habitat essential for recovery of the Louisiana black bear is primarily bottomland hardwood along the major river systems in northeastern Louisiana and the Atchafalaya Basin, it is unlikely that the bear's restoration would be affected by even-aged harvest methods. Harvest methods promoting important food items may improve habitat suitability when the production of grasses, berries and fruits are increased. When logging slash and vegetation regrowth from clearcuts and shelterwood cuts are near thick natural understories, the quality of the escape cover could be enhanced (ATCO, 1990). In addition, harvest treatments not only offer refuge but also provide additional opportunities for feeding and denning. Maximizing hardwood vigor and hard mast production, along with maintenance of a diversity of stand types, age classes, and vegetation composition would optimize the potential for black bears.

Forests managed with balanced even-aged stands — from clearcutting, seed-tree or shelterwood methods — would provide more potential RCW cavity trees and foraging habitat than two-aged and uneven-aged forests. Even-aged systems are more easily implemented and would allow essential control of hardwood midstory by use of fire without damaging younger age classes of pines (USDA Forest Service, 1995).

Rudolph and Conner (1996) contrasted effects to the overall ecosystem and Red-cockaded Woodpeckers from irregular shelterwood and single-tree selection regeneration methods. They raised 5 issues for consideration: 1) ease of implementation - minor variations in trees selected during single-tree harvest could have significant impacts on forest structure and Red-cockaded Woodpeckers for decades; 2) timing of management would be critical - implementing the technically difficult single-tree selection with declining budgets and workforce; 3) site disturbance, soil erosion and road network factors between methods - may vary from 3-4 harvest entries per 100 years (irregular shelterwood) to 10-20 entries per 100 years (single-tree selection); 4) for other than longleaf pine, the ability to use fire with single-tree selection would be very limited; and, 5) impacts to old-growth habitat characteristics - irregular shelterwood could result in a forest with all size classes represented and limited age classes spread over a very wide range, while in single-tree selection trees approaching the maximum potential ages and sizes would be rare.

The RCW requires older trees for cavity

excavation. If the harvest of trees includes all older, large-diameter individuals, it would reduce the availability of potential cavity trees and reduce the likelihood that the area would be suitable for future colonization. Removal of all trees in a single cutting cycle would result in a harvest unit unsuitable for foraging until the regeneration reaches approximately ten inches in diameter, according to USFWS foraging guidelines (Henry, 1989).

When restoration is the objective, retaining old trees of the species being restored, such as longleaf pine, results in parts of a stand remaining usable to the RCW to a small degree. When the younger stand reaches foraging size, some of the older trees may be suitable as potential cavity trees. Restoration would have a definite long-term benefit to the RCW as the species being restored, such as longleaf, would live longer, be more resistant to insects and disease, and would be preferred by the RCW for cavity construction. Although clearcutting would have more potential to fragment RCW habitat than other methods, extended rotations would limit the amount of an area which could be regenerated during each entry period. Restoration efforts in unoccupied RCW habitat — beyond 1.5 miles of an active cluster — would reduce potential foraging habitat in those areas. However, there should be no effect to RCW in unoccupied habitat. (USDA Forest Service, 1995).

Stands receiving seed-tree or shelterwood cuts, where reserve trees are retained in the harvest area, would retain some RCW suitability. The effects would be the same as for clearcutting, with areas of regeneration with scattered reserve trees providing potential cavity trees across the landscape. (USDA Forest Service, 1995).

Even-aged timber harvest within streamside or riparian areas could impact the Louisiana pearlshell mussel through increased sedimentation or deposition of debris into mussel streams when vegetation is removed or soil is disturbed. Mitigation measures limiting harvest and soil disturbance within streamside and riparian areas would minimize risk to the pearlshell mussel.

Sensitive wildlife and fish — Even-aged regeneration methods would produce a flush of herbaceous vegetation which, if predominated by understory perennial grasses, would be suitable habitat for Bachman's and Henslow's Sparrows. The Cooper's Hawk primarily hunts near gaps or small openings, and may utilize the edge of larger units. Impacts to the Worm-eating Warbler, Warbling Vireo, White-breasted Nuthatch, and the Louisiana Waterthrush would be minimal as they typically prefer riparian, riverine, hardwood, or streams which would be excluded from most regeneration areas.

The Louisiana pine snake is a rare and seldom seen resident of west-central Louisiana usually associated with sandy soil and longleaf pine forest, and may not be affected by even-aged operations. If broomsedge bluestem were present in the understory it may be suitable for the hispid pocket mouse while long-tailed weasels may use downed logs for refuge.

The Rafinesque's big-eared bat and the big brown bat utilize large trees and snags for roosting, although they often seek man-made structures such as lofts, barns, or abandoned buildings (Lance 1996). Throughout the southeastern U.S., both species roost in trees and other foliage. They forage near small creeks and probably would not be impacted by timber harvest if a sufficient number of large trees and riparian foraging habitat were available. Several species of bats select larger, older trees for roosting and in the Pacific northwest, bats are 3–10 times as abundant in old-growth than in younger, less mature stands (Barclay, et al. 1988).

Impacts to sensitive fish and other aquatic sensitive species' populations would be the same as disclosed under general wildlife and fish, in this section.

Uneven-aged regeneration methods

The effects would be similar to those described in even-aged regeneration methods, but the principal difference is in the scale of treatment and the resulting vegetation response. The single-tree selection method results in removing numerous individual trees over large acreages — the method mimics thinning prior to regeneration. Single-tree selection effects to wildlife result from tree removal and stand-tending methods. The group selection method involves the removal of patches of trees, resulting in small gaps across a stand. Additional sunlight then reaches the ground, resulting in an initial flush of herbaceous and woody vegetation. Group selection favors more shade-intolerant trees, while single-tree selection favors more

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shade-tolerant species. Because wildlife habitat preference varies depending on the vegetation community, the species occupying group selection sites would be different from single-tree harvest units.

General wildlife and fish — Most of the vertical structure is retained in single-tree selection and more shade-tolerant plant species would be favored. Due to the amount of foliage height diversity, most bird species should benefit from uneven-aged harvest cutting methods (USDA Forest Service, 1995). However, those wildlife species needing large amounts of early successional vegetation would not be favored. Group selection allows more sunlight to reach the ground within the harvest patch. Wildlife species needing more herbaceous and woody vegetation to feed, nest, or rear young would be favored — yet not to the degree or magnitude of even-aged harvest methods. The canopy gap would be small in terms of landscape scale, resulting in numerous small gaps scattered over a large area.

Because of small opening size, fragmentation probably would be minimal with single-tree or group selection. This should provide additional benefit to forest interior bird species by reducing the adverse impacts associated with nest predators. However, uneven-aged harvest treatments may reduce the suitability for open-habitat bird species such as the eastern bluebird.

Game species are not likely to benefit from uneven-aged management. Dense overstories would restrict forage and fruit production for deer and turkey (USDA Forest Service, 1995). However, the numerous small patches scattered across a large area would result in a higher percentage of edge habitat and may be more heavily utilized than the large even-aged harvest units.

Impacts to fish and other aquatic species would be the same as disclosed under general wildlife and fish for even-aged methods.

Threatened and endangered wildlife and fish — It is unlikely that the Bald Eagle, the Louisiana black bear, or the Louisiana pearlshell mussel would be impacted by uneven-aged management practices.

Stands managed by uneven-aged methods would have reduced suitability as nesting habitat for RCW due to the presence of a pine midstory. Because most of the vertical structure would exist after harvest, the indirect effects on the RCW would be similar to thinning. As a regeneration harvest method, uneven-aged management would promote more than one age class. Use of uneven-aged harvest methods would reduce or eliminate the habitat fragmentation associated with even-aged systems. Depending on the management objective and stand-tending methods, numerous entries for harvest may result in removal or protection of the oldest and largest individuals throughout the stand, and may or may not provide potential cavity trees on every acre. Because of the spatial arrangement of harvest scattered across the stand, far fewer potential cavity trees would be present (USDA Forest Service, 1995).

Because longleaf seedlings and saplings are shade-intolerant, single-tree selection may not provide sufficient numbers of longleaf for future colonization. Due to the cutting cycle and continuous supply of regeneration, single-tree selection methods have a continual presence of midstory which may cause abandonment of a cavity tree if allowed to reach cavity height.

Impacts to the Louisiana pearlshell mussel from timber harvest using uneven-aged regeneration methods would be similar to those disclosed under the discussion of timber harvest using even-aged regeneration methods in this section.

Sensitive wildlife and fish — It is unlikely that any Forest sensitive wildlife, fish, and other aquatic sensitive species would be adversely affected by the use of uneven-aged regeneration methods. Species' habitat preference would result in a beneficial effect due to the harvest or it would not be affected because the species would be unlikely to occur in the area. Small-scale alterations of the vertical structure and understory would probably benefit most species. Over several periods, timber access roads may be used more frequently for uneven-aged harvests than for even-aged. However, because lower harvest volumes per entry are expected, and most timber roads are already in place, road construction and reconstruction would occur less often than on even-aged areas. The small gaps caused by group selection would result in similar effects as listed in the even-aged timber harvest narrative. Single-tree selection harvest might be suitable to animals that benefit from minimal canopy removal and feed or nest in shade-tolerant plant species.

Timber harvest thinning

Thinning promotes tree growth and vigor, reduces insect and disease potential, and provides suitable spacing to allow sunlight penetration to the ground. Typically, thinning is utilized across a stand and may include large acreages. Although not a regeneration method, thinning can open the canopy sufficiently to promote some shade-tolerant and -intolerant hardwood species, and would usually produce a temporary increase in herbaceous and woody vegetation. Thinning promotes understory grasses, woody shrubs, and vines which yield a variety of seeds preferred by many wildlife species.

General wildlife and fish — As a result of thinning, wildlife species benefitting from open stands and a continuous canopy would be favored while wildlife species needing thick cover may be reduced. Species needing thick protective cover may be reduced locally by thinning and rotational burning; yet at a landscape scale, protective cover usually would be found in unburned strips near streamside zones or other unburned mesic patches.

Bobwhite Quail and Eastern Wild Turkey are associated with open stands which have grass and forb understories for nesting, feeding and brood rearing. Initially after thinning, optimal conditions exist. Within a few years, however, woody vegetation begins to take over. Winter thermal cover is usually provided by woody shrubs that occur in a clumped or linear fashion. The most beneficial plant species for providing thermal cover are greenbriers and sumac which respond favorably to thinning and prescribed fire. Maintaining high quality habitat for Bobwhite Quail would require burning the harvest area on a rotation designed to provide the mosaic of vegetation patterns needed throughout the year.

Thinning would prove beneficial to forest interior bird species by providing good nesting and foraging habitat — without increasing the potential for nest predation commonly associated with forest fragmentation. Many native bird species are associates of the open forests which result from thinning and fire.

Impacts to fish and other aquatic species would be minimal due to mitigation measures limiting vegetation removal within streamside and riparian areas.

Threatened and endangered wildlife and fish — Impacts to the Bald Eagle or the Louisiana black bear from thinning would be minimal. If black bear were present on the Forest, thinning could be a useful harvest method for stimulating the production of a continual supply of high quality mast, although this would produce less soft mast than regeneration harvest openings. However, thinning without maintaining thick protective cover would result in a lower suitability for the black bear.

Thinning of forest stands is key to producing quality RCW habitat. The direct effect of thinning would be the reduction of foraging trees, although promoting stand health would reduce susceptibility to damage from wind and southern pine beetles (SPB). Thinning also increases tree vigor and reduces competition, resulting in rapid growth of smaller-diameter trees which would reach foraging size sooner. The types of trees remaining after thinning can indirectly affect the RCW, depending on the age and size of leave trees.

Thinning can be a valuable tool in restoring historical vegetation patterns. Tree species susceptible to insect or disease could be removed, favoring more resistant native species. The long-term effect of molding the species composition to resistant species would be healthier, more suitable, and longer-lived trees for the RCW. Thinning can be used to favor older, larger-diameter trees for future occupation or improved foraging. Because RCW population expansion is limited by suitable cavities whose numbers are in turn limited by sufficient numbers of old relicts, thinning could result in the availability of more relict trees in the future. The residual tree basal areas, the retention of relicts, and larger and older trees, in thinned areas would contribute little to fragmentation.

Thinning within streamside or riparian areas could impact the Louisiana pearlshell mussel through increased sedimentation or debris input into mussel streams when vegetation is removed or soil is disturbed. Mitigation measures which limit the amount of vegetation removal and soil disturbance within streamside and riparian areas would minimize impacts to the mussel.

Sensitive wildlife and fish — Thinning would open a stand to the extent that is preferred by Bachman's and Henslow's Sparrows. It

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probably would be suitable for the Cooper's Hawk if the basal area is sufficiently low or gaps are present. Other sensitive bird species prefer hardwood or riparian-riverine habitat and would only be impacted if thinning occurred in bottomlands or streamside zones. Sensitive bat species prefer to roost in large-diameter and older trees. They forage for flying insects along creeks and in streamside zones. Because thinning can be used to increase the number of older, larger trees it could be beneficial for the Rafinesque's big-eared bat and the big brown bat. When broomsedge and logs are present, it may be suitable habitat for the hispid pocket mouse and long-tailed weasel. Impacts to sensitive fish and other aquatic sensitive species' populations would be minimal due to mitigation measures limiting vegetation removal within streamside and riparian areas.

Timber harvest salvage

Trees struck by lightning or stressed by environmental conditions, spacing, or damage — or nonnative species — are particularly susceptible to insect infestations. Although many wildlife species feed on insects and exert some control on initial insect outbreaks, at times an infestation overwhelms natural controls, resulting in single or multiple tree mortality (Thomas, 1979). Dead trees, whether standing or down, provide critical ecological benefit to the forest. They provide structural and functional components to forested ecosystems. Salvage operations remove many of the dead or dying trees associated with active SPB outbreaks.

General wildlife and fish — At least 25 species of birds, 10 mammals, 17 reptiles, 15 amphibians, many fish and macroinvertebrate species, and potentially thousands of insects and invertebrates utilize snags and downed logs on the Kisatchie. They use these substrates for nesting, roosting, egg laying, hiding and other needs. They provide vertical structures for pileated woodpecker nest cavities or down logs for skinks to lay eggs. Removal of all snags during salvage operations would reduce the suitability of a given area to wildlife. Protecting or reserving vacated SPB trees would increase the availability of standing snags and downed logs. Impacts to fish populations would be minimal due to mitigation measures restricting salvage within streamside and riparian areas.

Threatened and endangered wildlife and fish — It is unlikely that the Louisiana black bear or the Bald Eagle would occur in areas available for salvage, or be adversely affected by salvage operations.

Removal of snags increases the likelihood that cavity competitors would usurp or compete more heavily for existing cavities. Leaving snags would provide cavity competitors such as the Red-headed Woodpecker with alternative sites for roosting and nesting, thus lessening the pressure on the RCW (Kappes, in prep). Presently, the availability of cavities is probably the limiting factor preventing RCW population expansion. Dead and dying trees provide an efficient foraging substrate for the RCW and may reduce the foraging acres required by a clan and might improve reproductive success.

Impacts to the Louisiana pearlshell mussel from timber salvage activities would be similar to those disclosed for thinning activities above. Mitigation measures prohibiting or restricting salvage within streamside and riparian areas would minimize impacts to the mussel.

Sensitive wildlife and fish — As the snags fall due to decay or fire, they would benefit the long-tailed weasel. Impacts to sensitive fish and other aquatic sensitive species would be minimal due to mitigation measures restricting salvage within streamside and riparian areas.

Site preparation

Following a regeneration harvest, sites are prepared to receive natural or artificial seeding or planting. Site preparation typically includes a variety of herbicide, mechanical, manual, and fire methods.

Herbicide methods would include the use of herbicides to reduce the amount of competing vegetation. Mechanical methods may include mowing, chopping, shearing, scarifying, ripping, piling, raking, disking, and bedding. Manual methods include a variety of hand-held tools used by personnel to remove or reduce competing vegetation. The use of fire as a site preparation method includes a range of firing techniques used to slow succession and allow desirable regeneration an opportunity to compete.

Structural diversity of vegetation is important in determining wildlife species abundance and composition. Site preparation methods alter vegetation structure and composition by reducing woody understories and increasing herbaceous ground vegetation. Species such as white-tailed deer often benefit from additional food sources, but site preparation may affect songbird habitat by reducing woody understories.

General wildlife and fish — Mechanical methods may occasionally cause direct mortality of adult animals or result in destruction of eggs or young. Normally, vertebrate species would be able to flee in advance of equipment and escape harm, although some reptiles and amphibians may be killed. Mowing, chopping, shearing, raking, disking, and other mechanical tools could cause some direct mortality to invertebrates, but, because of large populations and high reproductive rates, populations would not be hurt. Destruction of eggs and young depends upon season of treatment and could occur when equipment is used during the nesting season (USDA Forest Service, 1989).

Disturbance caused by equipment used for site preparation may result in abandonment of young or nests. With larger vertebrates such as deer or rabbits, abandonment is normally temporary. Ground-nesting birds may permanently abandon nests if disturbance occurs soon after nesting begins but would tolerate greater disturbance when eggs are close to hatching. Although most ground-nesters would re-nest, survival rates for young from late season nesting attempts are generally lower (USDA Forest Service, 1989).

Mechanical site preparation treatments typically increase the number of plant species and amount of herbaceous ground cover as compared with uncut, mature forest stands. More intensive mechanical methods, however, such as raking would reduce the number of woody fruit-producers. The immediate vegetation response following mechanical treatment favors weedy annuals or sprouting from deep-rooted perennials. The new growth of annual grasses benefits many native species for the first year after disking or chopping. Panic grasses respond favorably and would provide white-tailed deer with a good source of green winter forage. Because sprouting can be common with mechanical methods, additional soft mast and browse may be provided. The flush of vegetation after treatment also encourages ragweed production, providing valuable seeds for Bobwhite Quail during the fall and winter months. Mechanical methods could also cause reductions in the availability of protective cover due to structural changes. This may decrease the suitability for nesting birds or other animals requiring protective cover for camouflage or thermal shelter. Additionally, the number of snags available for snag-dependent species could be reduced by mechanical methods. Fish and other aquatic organisms could be affected by mechanical site preparation if erosion caused by soil disturbance results in stream siltation. Mitigation measures prohibiting or restricting the use of mechanical site preparation within streamside and riparian areas would result in minimal impacts to fish and other aquatic species.

Herbicides would be used to control competing vegetation. Acute oral toxicity to many herbicides has been shown for bird species such as Bobwhite Quail and Mallard (USDA Forest Service, 1989). Herbicides indirectly affect wildlife by altering vegetation species composition and structure. Depending on the type of herbicide, application rate and method, and vegetation affected, treatments could be beneficial or detrimental to wildlife. Effects on wildlife habitat could include an increase in snag availability, a reduction or increase in hard mast, soft mast, forbs, grasses, and foliage height diversity (USDA Forest Service, 1989). Structural changes initially occur at a slower rate than with mechanical methods, yet last longer due to the death of selected plants. Succession normally resumes within two to three years after the latest application. The differential effects of herbicides on vegetation also would dramatically change species composition.

Herbicides may be applied alone or in combination with prescribed fire or mechanical methods. Site preparation with herbicides could be accomplished by broadcast application or by treating individual stems by injection, thin line, or foliar spray application. Sites prepared by herbicide without mechanical treatment typically support a greater diversity and abundance of bird populations due to downed and standing woody material. When herbicides are applied more selectively, deer forage production is somewhat higher the first year following treatment. Areas treated with only herbicides also have numerous snags which would benefit many raptors, and also provide potential nesting and foraging habitat for cavity nesters and insectivorous birds. Herbicides used with fire

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could result in an area with initial sparse ground cover favoring early successional species such as Mourning Doves and small mammals (USDA Forest Service, 1989).

Typically herbicides would be applied to selected plants, resulting in the release of other less-susceptible plants from competition. Herbicide use near den trees, hardwood inclusions, and streamside zones would not be recommended for soil-activated herbicides. Sufficient buffers should be included to prevent impacts to nontarget species, streams and other special areas. Such places should be clearly marked prior to treatment.

Manual site preparation methods would include the use of powered and non-powered hand-operated tools such as chainsaws, brush axes, brush saws, or bank hooks. Manual methods would rarely cause direct injury or mortality to wildlife; however, the disturbance may cause temporary or permanent abandonment of young or nests (USDA Forest Service, 1989). As plants are severed above ground level, minimal soil disturbance would occur. Root sprouting can occur with some species and these sprouts may be highly desirable as overhead cover for brood rearing or browse for deer. Because manual cutting is selective, a stand could be modified to favor beneficial wildlife plant species. If additional mast production is desired, oaks could be favored by manual cutting or girdling procedures. Many species can resprout quickly, so additional treatments may be necessary. Regrowth occurs quickly and exclusion of light may decrease suitability for early successional species.

The use of fire for site preparation is common to the South. As many plant and wildlife guilds evolved with fire, this method could be beneficial for a variety of wildlife species. Burning changes the species composition and structural composition within the stand. Burning increases seed production, palatability, nutrition, and soft mast production. As a result, increased use of an area by wildlife species could be expected. Burning during late summer or early fall, a method often used in site preparation, sets succession back to the grass-forb stage. This would favor fast-growing annuals that are utilized by wildlife in the winter and early spring. Depending on the timing, nesting cover may or may not be reduced. If burned during the fall, sufficient regrowth would be available before the next nesting season. Top-kill of many woody plants can cause increased root sprouting that would offer browse and low-ground cover for wildlife. Additional impacts to wildlife, fish, and other aquatic species from fire are disclosed in the effects of fire management on wildlife and fish in this section.

Threatened and endangered wildlife and fish — Site preparation methods may reduce habitat suitability for the Louisiana black bear. Due to its uncommon occurrence on the Forest, direct impacts would be minimal. Within a few years, vegetation cover would return and provide suitable protective cover. Fire may increase the suitability on the second or third year when soft-mast production in enhanced. Otherwise, little impact can be anticipated because primary habitat for bear occurs in large bottomland areas. The Bald Eagle usually occurs near large water bodies and probably would not be impacted by site preparation areas or by site preparation methods.

The RCW could benefit from site preparation methods if trees of foraging size could be produced in fewer years with less competition. Herbicide use could decrease the suitability for RCWs and result in injury or mortality if applied to, or brought into contact with, an RCW. Structural changes could benefit the RCW by opening up the stand, if precautions are made to preclude injury or death. Mechanical methods could reduce the number of snags, thus reducing the foraging suitability of an area. Prescribed fire could greatly enhance suitability by opening and maintaining a stand. Using site-preparation methods during the nesting season would not be advisable. Any influence that limits or restricts brooding or feeding of a clutch could lower the reproductive success of the cavity-tree cluster.

Impacts to the Louisiana pearlshell mussel from site preparation methods would be the same as disclosed earlier in this section, in the general wildlife and fish discussion. Mitigation measures prohibiting or restricting the use of various site preparation methods — such as herbicides or mechanical means — within streamside and riparian areas would minimize impacts to the Louisiana pearlshell mussel.

Sensitive wildlife and fish — Site preparation methods may decrease the number of snags, reducing nesting suitability for some sensitive species. Rafinesque's big-eared bat and the big brown bat may be affected by some treatments. These insectivorous mammals would be susceptible to alterations in the supply of winged insects. If the number of large trees and snags were reduced, the number of suitable bat roost sites would decline. The Bachman's Sparrow and Henslow's Sparrow may benefit from the initial openings created by stand-tending treatments, but would find the stand initiation stage to be unsuitable habitat. The hispid pocket mouse and many other rodents may find habitats unsuitable after treatment, depending on the availability of seed-producing grasses.

Impacts to sensitive fish and other aquatic sensitive species would be the same as disclosed under the general wildlife and fish discussion in this section.

Stand improvement

After stand initiation, stand improvement could be used to develop vegetation and favor preferred species. If hardwood-pine was preferred, stand improvement practices could be used to favor hardwood development and benefit mixed forest wildlife species. If longleaf pine was preferred for the RCW, the stand could be burned regularly to promote longleaf and to discourage midstory encroachment.

Increased sunlight following release or precommercial thinning would result in additional herbaceous vegetation. If sufficiently open, many species of early successional wildlife would utilize the new growth for food or cover. Species such as the Bobwhite Quail and white-tailed deer would benefit from increased seed production and forage associated with openings in the canopy. If a stand of regeneration was too thick, it could be released through a variety of methods.

General wildlife and fish — Herbicide release includes using herbicide to kill or injure certain plants, thereby reducing competition. Regular use of many broadleaf herbicides would reduce the plant diversity of the area and result in increased levels of grasses. Applied selectively for wildlife stand improvement, herbicides would release mast producing hardwoods and increase mast production for deer, turkey, squirrel, bear, and other species. When hardwood midstories are reduced, production of deer forage would increase, especially when prescribed fire is also applied. When used for timber stand improvement, injection of competing hardwood stems in mixed pine-hardwood stands would reduce hard-and soft-mast production unless selected stems are left. This reduction may harm species such as deer, gray squirrel, and various songbirds (USDA Forest Service, 1989). While herbicide release methods can be selective, sufficient buffers should be used around any special wildlife, streamside, and riparian areas.

Herbicide use could increase the number of snags and provide suitable perching sites and future cavity sites for many species of birds. However, snags created by herbicides tend to remain standing for shorter periods than those created by other methods, such as girdling (USDA Forest Service, 1989).

Using prescribed fire as a method of release or precommercial thinning would reduce the amount of fire-intolerant plants — such as many species of hardwood — and allow fire-tolerant species to continue growing. If fire were used often, the amount of fuels present would be low, thus decreasing the intensity of wildfires. Regular burning would help maintain early successional plants utilized by many game species. As a stand improvement practice, application of prescribed fire would closely mimic natural fire history, favoring native plants and animals. Most wildlife have adapted to fire and the associated vegetation conditions, making injury or mortality an unlikely occurrence.

Mechanical release or precommercial thinning methods typically include mowing, chopping, ripping, or disking tools. These methods can be severely restricted due to seasonal impacts. Usually utilized during the driest season, most mechanical methods would be used during late summer or early spring. Mowing would allow many species to resprout, while other methods would result in a high mortality of plants. Mechanical methods would shift species composition from woody to herbaceous. This could be beneficial to early successional habitat wildlife species; however, it would reduce the suitability for nesting birds that require woody vegetation. Recovery would vary depending on treatment method and may take 5–10 years for full woody recovery. Size of equipment would determine the size of the opening and thus the amount of release. Potential impacts associated with mechanical release also include soil disturbance, soil compaction, and a reduction of snags important to obligate cavity-nesters.

Manual stand improvement methods would be the most selective, providing good opportunities to favor selected tree species.

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Wildlife which depend on specific plants for food, cover, or nesting habitat could benefit directly from alterations in stand composition and structure when selected plant species are favored. Manual methods could be used throughout the year, but repeat treatments may be necessary if sprout development is not the objective. If allowed to persist, sprouts produce valuable woody cover and browse for many wildlife species.

Biological stand improvement would consist of the use of cattle to release pine regeneration from competing vegetation. Insignificant direct injury or mortality could occur if livestock trample nests or young of ground-nesting birds. Light to moderate cattle grazing has little adverse impact on seed-producing plants important to ground feeders. Short periods of intense grazing could reduce grasses and increase forbs eaten by deer and turkey and may improve Bobwhite Quail habitat (USDA Forest Service, 1989).

Threatened and endangered wildlife and fish — While site improvement methods potentially could affect the amount of protective cover and forage available for the Louisiana black bear, this would be unlikely due to its uncommon occurrence on the Forest.

It is unlikely that Bald Eagles would occur in or utilize treatment areas. If present, buffers or method of stand improvement could be modified to limit any adverse impact.

For the RCW, use of mechanical means for stand improvement may result in increased loss of snags, while herbicide methods could cause losses of nontarget species. The reduction in snags may reduce foraging suitability for the RCW. Biological stand improvement methods are unlikely to affect RCW habitat. Manual methods are commonly used to control vegetation near cavity tree clusters — if used and maintained with fire. Protection of cavity trees would be necessary when fire is used for stand improvement.

Impacts to the Louisiana pearlshell mussel from stand improvement practices would be the same as those disclosed above in the general wildlife and fish discussion. Mitigation measures prohibiting or restricting mechanical equipment and the use of herbicides within streamside and riparian areas would minimize impacts to the mussel.

Sensitive wildlife and fish — Some sensitive species would benefit from limited openings created by stand-tending practices; however, loss of snags may result from mechanical methods. Use of fire may reduce the number of large snags, suitable for cavity nesters, but would increase the number of newly created snags for future occupation. Conditions following a burn would favor hunting by raptors and would attract many species of predatory birds. The Bachman's Sparrow and Henslow's Sparrow would benefit from the use of fire to create early successional conditions, yet mechanical or herbicide methods may be too efficient in reducing woody vegetation. Maintaining a stand in an open condition with an herbaceous understory would result in suitable habitat for both species.

The long-tailed weasel and hispid pocket mouse would find suitable habitat in sites with sufficient downed logs and understory grasses. Frequent fire use may reduce the number of down logs, while increasing perennial grasses. Many rodent species may be affected by herbicide treatments.

The Rafinesque's big-eared bat and the big brown bat may benefit from many treatments that produce openings in a canopy. Of particular concern would be the loss of large trees and snags associated with some treatments. Buffers or alternative treatments could be used to reduce the likelihood that the sensitive bat species would be impacted by the treatments.

Impacts to sensitive fish and other aquatic sensitive species would be the same as those disclosed under the general wildlife and fish discussion in this section.

Streamsides, wetlands, and old-growth forest

Natural communities adjacent to and including streams are extremely important to the overall biological diversity and ecological health of an area. For wildlife and fish species, these communities contain key habitat components such as hard and soft mast producers, water, snags, den trees, and a variety of food and cover — including vegetative cover for aquatic species. These areas provide corridors between habitat components within the home range of some species of wildlife and serve as important travel routes for nongame birds during migration.

As a result, these natural communities help maintain genetic flow between potentially isolated populations in adjacent mature stands, and thereby help to maintain population genetic viability. Mesic to aquatic forests have been found to be essential in maintaining landscape scale diversity and providing appropriate water and nutrients to support downstream systems (**Dickson and Warren, 1993**).

Retention of mature vegetation along streams in harvest areas has been recommended for song birds, turkeys, squirrels, and deer. Southern riparian forests support dense bird populations during the critical winter period (**Dickson and Warren, 1993**). Dickson and others (**1995, 1996**) recommend wide streamside zones to accommodate wintering birds, breeding birds, and a wide variety of other vertebrate species in southern forests. They found that wide zones provided breeding habitat for several bird species associated with mature hardwood and hardwood-pine stands on mesic sites. They also note that these habitats and associated bird species are diminishing as mature forest stands are converted to young plantations, agricultural land, and other human-related land uses. To enhance the number of bird species on a landscape scale, Dickson and others (**1995**) recommend retaining a minimum 30-meter and preferably a 50-meter wide streamside zone of mature trees when stands are harvested.

Hurst and Dickson (**1992**) found that in the South, landscapes with substantial pine plantations could accommodate turkeys if streamside zones or other mature hardwood stands are present. Burk and others (**1990**) demonstrated the importance of streamside zones to turkeys and concluded that turkeys apparently used these areas for traveling, roosting, feeding, loafing and possibly as cool areas in the hot, humid months.

Dickson (**1989**) found that streamside zones narrower than about 50 meters do not appear to be capable of supporting permanent resident populations of squirrels. Squirrels were observed regularly in wide (greater than 50 meters), very rarely in medium (30 to 40 meters) and never in narrow streamside zones (less than 25 meters).

White-tailed deer, especially, have a high potential to heavily utilize these habitats. Habitat carrying capacity for deer generally is higher in bottomland and streamside zones than in other habitat types. A wide variety of high-quality food-producing vegetative species makes bottomland hardwoods the most productive forest type for white-tailed deer in the coastal plains of the United States. Conversely, homogenous loblolly and slash pine forests provide the lowest quality habitat for deer (**Newsom, 1984**). To find sufficient food deer move more in poor habitat than in good; in bottomland and streamside zones, which characteristically have good food supplies, deer usually do not have to venture far to meet nutritional needs. Bottomlands and streamside zones also usually provide a constant drinking water supply for them. Deer are good swimmers and will quickly take to water to escape predators and humans (**Halls, 1978**) Additionally, the potential availability of dense understory patches for hiding cover is high in bottomlands and streamside zones.

Streamside zone width have been found to influence the abundance of amphibians and reptiles. Rudolph and Dickson (**1990**) found fewer amphibians and reptiles in narrow streamside zones (0 to 25 meters) than in wider zones (30 to 95 meters). The wider zones in their study were characterized by an intact overstory and midstory, sparse shrub and herbaceous vegetation, and abundant leaf litter; the narrow zones lacked those characteristics and had dense shrub and herbaceous vegetation — similar to that of the adjacent pine plantations. However, more small mammals were captured in narrow streamside zones where they could find abundant low, dense vegetation with sufficient forage, fruits, and seeds as well as down logs and logging slash (**Dickson and Williamson, 1988**).

Old-growth provides the habitat needed by many animal species. The RCW, which relies on older pines for nesting habitat, would benefit from the presence of old-growth forest. Old-growth areas provide snags and downed logs for use as substrates for nesting, roosting, egg laying, hiding, and other wildlife needs. Dead and dying snags provide alternative nesting sites for animals that compete with the RCW for cavities, indirectly benefiting RCW habitat.

Effects of wilderness management on wildlife and fish

Young pine and pine-hardwood habitats existing today in the Kisatchie Hills Wilderness resulted from wildfire and past southern pine beetle infestations. Species such as deer, quail, turkey, and many songbirds requiring early succession vegetation stages for a portion of their habitat have benefitted, but over time these habitats will decline without further manipulation. Species such as squirrel, which require more mature forests, would benefit.

Overall, the change in habitat capability for game species would not be significant because the wilderness area is relatively small. Using prescribed natural fire in the wilderness would provide some additional early successional habitats beyond those occurring naturally. This would maintain limited RCW habitat, and favor longleaf reestablishment to upland sites. Without additional midstory control however, fire alone may not provide optimal RCW habitat.

EFFECTS BY LANDTYPE ASSOCIATION (LTA)

Transportation facilities would occur at higher densities in LTAs 1, 2, 5, and 6 than in other LTAs and create proportionately more acres of early successional roadside habitats along travel corridors. Road closures to protect soil and water resources would be more likely to occur in LTAs 4 and 7 and would provide more solitude to wildlife as well as reduce poaching opportunity.

In general, periodic dormant-season prescribed fire would occur more often in LTAs 3, 4, 8, and 9 than in the other LTAs, providing beneficial habitat to wildlife species that depend on browse vegetation and soft mast. Frequent prescribed burning (3–5 year cycle) as well as growing-season burning would occur more often in LTAs 1, 2, 5, and 6. Wildlife species dependent on an abundance of grass/forbs and other herbaceous understory vegetation would benefit most in these LTAs. Prescribed fire would occur very infrequently in LTAs 4 and 7 and would benefit those wildlife species that prefer hard mast production and closed canopy hardwood vegetation.

Oil and gas production potential is highest in LTAs 1, 5, 6, and 9 and could adversely affect wildlife habitat through habitat fragmentation and loss of RCW foraging and nesting substrate.

Military intensive use occurs predominantly in LTAs 1 and 6. Because these LTAs also support habitat for much of the Kisatchie's RCW population, military use would have the potential to affect habitat by increasing disturbance during critical nesting periods, and altering suitable habitat conditions.

Recreation access (roads and trails) would occur predominantly in LTAs 1, 2, 5, and 6 since these LTAs contain upland, well-drained, sites with many roads already in place. Road rights-of-way could affect habitat of forest interior species by fragmenting their habitat. Also, road and trail construction and reconstruction in LTAs 2 and 5 have the potential to adversely affect aquatic habitat from erosion and sedimentation.

Most manipulation of vegetation would occur in LTAs 1, 2, 5, and 6. In general, more dramatic shifts in habitat conditions would be expected to occur in these LTAs. Optimal long-term RCW habitat and other species associated with longleaf habitats would be expected to increase significantly in these LTAs. The least manipulation would occur in LTAs 4 and 7 and consequently, less dramatic shifts in vegetative conditions would occur. Habitat in LTAs 3, 4, 8, and 9 would be expected to slowly return to a more mixed species composition, benefiting wildlife species preferring this type of habitat.

Regeneration harvesting and site preparation activities would occur most often in LTAs 1, 2, 5, and 6 and would benefit those wildlife species that utilize early successional vegetation. Even-aged regeneration harvests would not be allowed in streamside habitat protection zones which comprise a large portion of LTAs 4 and 7; therefore, habitat within these LTAs would favor wildlife species preferring mid to late successional vegetation.

Streamside areas and wetlands would remain contiguous within all LTAs, maintaining habitat linkages for species utilizing riparian corridors and providing local supplies of hard mast.

EFFECTS BY ALTERNATIVE

Fire management

All alternatives plan prescribed burning for wildlife habitat improvement. Table 4–7 on page 4-34 shows a comparison of all nontimber burning by alternative.

Alternatives C, D, Mod D and F recommend the most landscape burning and would be expected to provide the most benefit to game species like white-tailed deer, Eastern Wild Turkey, and Bobwhite Quail. The higher production of soft mast and browse expected in these alternatives would improve white-tailed deer habitat while turkey and quail would benefit from the higher production of suitable feeding and brood-rearing cover. The high levels of burning in these alternatives would tend to reduce the widespread availability of hard mast within pine uplands and relegate it more to streamside areas and hardwood stands. This would eliminate some upland squirrel habitat but not significantly reduce population numbers.

Alternatives C, D, Mod D and F would also provide the most benefit to birds like Bachman's Sparrow, Pine Warblers, Red-eyed Vireos, and Hooded Warblers. Small mammals such as the hispid cotton rat, fulvous harvest mouse, and other rodents would also benefit.

Alternative A plans the least amount of prescribed burning and is most similar to current levels (table 4–7). Compared to other alternatives, Alternative A would have a lower risk of physically injuring or killing wildlife or destroying eggs and nestlings of ground or shrub nesting birds during prescribed burning. Alternative A would also have less likelihood of burning standing dead trees that may be used for nest cavities and perches. Because less prescribed burning would help to preserve dispersed hardwoods within upland stands, mast dependent species like gray squirrels would not have to adapt as much to changes in location of hard mast in Alternative A as in the other alternatives.

Alternatives C, D, Mod D and F would also do the most to create suitable habitat for RCW through prescribed burning in HMAs. Dormant and growing season burns would maintain open, parklike habitat by reducing the amount of midstory and create high quality nesting and foraging areas.

Sensitive species like Bachman's Sparrow, Henslow's Sparrow, Cooper's Hawk, hispid pocket mouse, and long-tailed weasel would benefit most from the more frequent prescribed burning planned in Alternatives C, D, Mod D and F. Rafinesque's big-eared bat and the big brown bat would benefit most from the lower frequency of burning planned in Alternative A.

Fish and aquatic habitat would have the highest risk of being affected by sedimentation induced by prescribed burning in Alternatives C, D, Mod D and F. However, if managers employ mitigation measures, sedimentation would be reduced sufficiently to minimize differences between the alternatives.

Lands and mineral management

Land uses and mitigation for rights-of-way would not vary significantly by alternative. Effects on the quality of wildlife habitat would be similar for all alternatives.

Minerals management and mitigation would vary by alternative. Habitat loss from roads, pipeline rights-of-way, and well pads as well as potential risks of increased impacts to habitat from soil compaction, oil spray, or contact with discharge fluids would be highest in Alternative A since it has the most acreage available for leasing and would require the least restrictive lease stipulations. Risks would be lowest in Alternative C which withdraws all Forest lands from leasing as existing leases expire (see Chapter 2, page 2-42 for a more detailed description of leasing differences by alternative). Many of these impacts to wildlife and wildlife habitat would be avoided by implementing mitigation measures for protection of vegetation and soil and water which are included in all operating plans and special use permits. If the Austin Chalk formation within the Vernon and Evangeline Units of the Calcasieu District should become more productive, more habitat would be lost where vegetation is modified for roads, pipeline rights-of-way, and pad site construction (see table 4–30). In addition to habitat loss, wildlife disturbances would also become more prevalent. The highest potential for habitat degradation would occur to RCW foraging and nesting habitat because many known and tentative clusters occur within the Austin Chalk exploration zone. Louisiana pearlshell mussel populations also would have the potential for habitat degradation since the Austin Chalk does extend into known mussel watersheds.

Military use

The amount and types of military intensive use would not vary significantly by alternative. Site specific impacts to wildlife habitat would be mitigated as projects are planned by the military. Any modifications to Forestwide mitigation measures that protect threatened and endangered species, would be made through consultation between the military and the U.S. Fish & Wildlife Service.

Range management

Alternative A plans the most acres of grazing. However, since the forestwide allocation for grazing is relatively small (23 percent of the Forest in Alternative A and 14 percent of the Forest in the other alternatives), and the trend has been toward less grazing use,

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impacts would not be expected to vary significantly by alternative (see *range analysis* for more detail).

Recreation management

Although recreational facilities construction varies by alternative, with proper mitigation their effects to wildlife, fish and other aquatic species' habitat would not vary significantly by alternative. Although new construction would affect wildlife habitat and solitude, this would occur for only a short period.

All alternatives would limit or restrict the types of recreational use within the Saline Bayou Scenic River Corridor, the National Catahoula and Red Dirt Wildlife Management Preserves, the Kisatchie Hills Wilderness, developed recreation sites, walk-in hunting areas, and scenic and historic areas. The effects to wildlife would be to lower the likelihood of harassment and poaching as well as lower the likelihood that wildlife would be injured or killed by users in recreation areas.

Impacts from recreation facility management in the alternatives are not likely to vary significantly for RCW, Louisiana black bear, eagle, or Louisiana pearlshell mussel habitats if managers employ mitigation measures.

Transportation management

Although facilities' construction and reconstruction vary by alternatives, with proper mitigation, their effects to wildlife and fish habitat would not vary significantly by alternative. New road construction would have more of an effect on wildlife habitat and solitude than reconstruction, but as seen in table 4–24 on page 4–102, relatively little new construction is planned for any alternative.

All alternatives would limit or restrict travel within the Saline Bayou Scenic River corridor, the National Catahoula and Red Dirt Wildlife Management Preserves, the Kisatchie Hills Wilderness, developed recreation sites, research natural areas, experimental forest areas, walk-in hunting areas, scenic and historic areas, Stuart Orchard, Breezy Hill no-entry areas, Ft. Polk Intensive Use Area, Peason Ridge Artillery Range, and the USAF Claiborne Range and safety fan. The effects would be reducing the likelihood of wildlife harassment and poaching in these areas as well as minimizing the likelihood that wildlife would be injured or killed by motorists.

Among the alternatives, impacts from road management are unlikely to vary significantly for RCW, Louisiana black bear, or eagle habitats if managers employ mitigation measures.

Vegetation management

Alternatives A and B would plan the most even-aged regeneration harvests for timber management while Alternative C would plan the least (see table 4–8 on page 4–35). Alternatives A and B would do the most to alter the vertical structure of stands and benefit wildlife species that prefer early successional habitats. The risk for direct loss of potential nesting and denning sites within harvested stands is also highest in these alternatives.

Even-aged timber harvests along streamside or riparian areas would be highest in Alternatives A, B, D and Mod D. All alternatives would provide for streamside protection by leaving an uncut area of vegetation immediately adjacent to stream channels. Alternative A would have the narrowest streamside habitat protection zones — 33 feet on each side, and would therefore have the highest risk of impacting fish and other aquatic species' populations from sedimentation and debris.

Early successional habitat wildlife species that would benefit from the high level of even-aged regeneration harvests planned in Alternatives A and B include the Rufous-sided Towhee, White-eyed Vireo, Prairie Warbler, and Indigo Bunting. The herbaceous and woody stems produced in the first few years after harvest would provide high quality food, good fawning cover, and valuable bedding and protective cover for white-tailed deer. Eastern Wild Turkey and Bobwhite Quail would also utilize the high quality edge for feeding, nesting, and brooding. Canopy removal in harvested areas would also benefit raptors by increasing small mammal populations.

All alternatives that use even-aged regeneration methods would plan natural regeneration of existing stands 50 percent of the time where restoration is not the objective. When restoration is the objective and off-site conversion is desirable, artificial regeneration would be used almost exclusively. Alternatives A, D, and Mod D, which have restoration themes, would use artificial regeneration the most (table 4–8) during the first 50 years in order to expeditiously convert existing yellow pines stands to longleaf. Fragmentation of habitat would have a higher likelihood of occurring during this time in these two alternatives than in the other alternatives. Fragmentation of habitat, if not carefully monitored, could adversely affect RCW, neotropical migrants, and other forest interior species. Once longleaf pine stands are restored, however, longer rotations associated with longleaf pine management would limit the amount of area which would be regenerated each entry period.

All alternatives use the even-aged silvicultural system to some extent within RCW habitat management areas (HMAs) and comply with the RCW FEIS direction and guidance for managing HMAs with even-aged harvesting systems. More potential RCW cavity trees and foraging habitat would be provided over time in Alternatives A, D and Mod D than in the other alternatives because they actively restore native longleaf habitat and utilize prescribed fire to facilitate control of hardwood midstory.

Regeneration areas created by even-aged management would have some beneficial effect on sensitive species that utilize openings like Bachman's and Henslow's Sparrows, and Cooper's Hawk. Alternatives A, B, and D would produce the most openings and therefore provide some benefit to these species. The Worm-eating Warbler, Warbling Vireo, White-breasted Nuthatch, Louisiana Waterthrush, and Louisiana pine snake would not be significantly affected by even-aged harvest openings.

Alternative C would plan the most acres of uneven-aged stands while Alternative A would plan the least (table 4–8). Uneven-aged management within areas suitable for timber production would be almost exclusively by group selection whereas areas not suitable for timber production, for example, along streams, within old growth areas, and within other amenity-valued areas, would use single-tree selection harvests predominately. Alternative C would create uneven-aged stands mainly by single-tree selection while the other alternatives would create uneven-aged stands primarily through group selection. Alternatives D, Mod D, E, and F would provide the greatest acreage of stands managed by the group selection method. Within the Catahoula and Red Dirt wildlife management preserves, Alternative F would make the most extensive use of uneven-aged silvicultural methods (see table 4–9).

Forest interior bird species would benefit from the increased uneven-aged area generated in Alternatives C and F while those species that prefer early successional vegetation, such as the Eastern Bluebird, would benefit the least. Alternatives D, Mod D, E, and F, however, which predominately use group selection method of uneven-aged management, would provide many scattered within-stand openings of early successional vegetation.

Table 4–9 shows how quality habitat would be provided for demand wildlife species, by alternative. Alternative A would be expected to provide the most acres of quality habitat for Bobwhite Quail because of the larger proportion of even-aged harvests needed for conversion to longleaf pine and the high frequency of burning associated with growing open stands for RCW habitat. Alternative D would provide the most quality habitat for white-tailed deer and Eastern Wild Turkey, while Alternatives C and F would provide the most quality habitat for fox and gray squirrels. This occurs primarily because Alternative D would propose more even-aged harvest cuts and more prescribed burning than Alternatives C and F, and Alternatives C and F would propose the most conversion to mixed forest types and would provide the most acreage in streamside habitat areas. The highest overall acres of quality habitat would occur in Alternatives D, Mod D, and F (1,227, 1,213, and 1,179 acres respectively).

Game species like deer, turkey, and quail would benefit less from single-tree selection harvest techniques used in Alternative C, than from the edge furnished by small group harvests utilized in Alternatives D, Mod D, E, and F.

Wildlife management indicator habitat acres for the first and fifth 10-year periods are also shown for all the alternatives in table 4–9. Alternatives A, Mod D, and D would provide the most change from mixed hardwood-loblolly pine landscapes to longleaf pine landscapes. Alternatives B and C would provide the least change in existing habitat.

Mitigation for streamside protection would minimize impacts to fish and other aquatic species and be similar to those expected in areas of even-aged management.

Effects to Louisiana black bear and Bald Eagle would be slight, similar to even-aged management, and not expected to vary significantly by alternative. Generally, Alter-

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native C would provide the least benefit to RCW nesting habitat since much of the midstory would need to be maintained during single-tree selection cuts and restoration to the native longleaf pine community within the HMAs would not occur as quickly. Alternative C, however, would create the least amount of fragmentation and generate the least risk to cavity trees and older, large diameter trees.

The effects of uneven-aged management practices on sensitive wildlife species would be similar to those described for even-aged harvest cuts near openings where the group selection method is used.

All alternatives that plan even-aged harvests on timber-suitable lands use the same thinning cycles. Alternative A would thin the most even-aged timber-suitable acres per year and Alternative C would thin the least (table 4–9). However, since the effects to wildlife are similar between even-aged thinnings and single-tree selection, Alternative C would effectively promote understory grasses, woody shrubs, and vines.

Effects to Louisiana black bear and Bald Eagle populations would not vary significantly from the thinnings planned in each alternative.

Alternative C would provide the most opportunity to selectively leave large diameter, older trees that would benefit RCW nesting habitat. However, rapid improvement of RCW habitat would be achieved best through the restoration of native longleaf pine communities. Although thinnings proposed in Alternative C would favor the development of longleaf pine within HMAs, a combination of thinnings and even-aged regeneration cuts, as proposed in Alternatives A, D, and Mod D would do the most to quickly provide long-term habitat within the HMA areas.

Thinnings would have some beneficial effect on sensitive species that utilize open stands—like Bachman's and Henslow's Sparrows, and Cooper's Hawk. Alternative C would provide the most of this type of habitat. However, Alternatives A, B, D, and Mod D would produce more openings and therefore provide moderately better habitat for these species.

All the alternatives handle salvage of dead and dying trees equally. They all protect or reserve vacated SPB trees to provide snags and downed logs for use as substrates for nesting, roosting, egg laying, hiding and other wildlife habitat needs. Dead and dying snags would provide alternative nesting sites for animals that compete with RCW for cavities, indirectly benefiting RCW nesting habitat. Differences in effects to wildlife between alternatives would not vary.

Site preparation is highest in Alternatives A, B, D, and Mod D and lowest in Alternative C (table 4–8). Mechanical site preparation is expected to be highest in Alternative A, D and Mod D due to conversion of off-site stands to longleaf pine. Site preparation by prescribed burning is expected to be highest in Alternative B because it plans prescribed burning, either alone or in conjunction with mechanical site preparation, for regeneration of all even-aged stands. In all alternatives, site preparation by herbicides is expected to occur on 25 percent of the pine acres that would be regenerated by even-aged harvest cutting methods and on 25 percent of the patch acres cut for uneven-aged management by group selection.

The effects of the alternatives on wildlife habitat from mechanical site preparation would be the same as described earlier for even-aged regeneration harvests. Alternatives A, B, D, and Mod D would utilize herbicides for site preparation the most (table 4–8) and therefore would furnish more areas containing snags and downed trees, benefiting many raptors, and supplying potential nesting and foraging habitat for cavity nesters and insectivorous birds. Alternatives A, B, D, Mod D, and E would utilize prescribed burning for site preparation the most; all but Alternative E would use it in conjunction with herbicide site preparation. The effects of prescribed burning alone, by alternative, are the same as those described earlier in this section. The effects to wildlife from a combination of prescribed burning and herbicide use, used most frequently for restoration of longleaf in Alternatives A, D, and Mod D, would benefit early successional habitat wildlife, especially Mourning Doves and small mammals.

Alternative C allocates the most acreage of the Forest to old-growth community management and would therefore benefit wildlife species such as the RCW, neotropical migrants, and other forest interior species. Alternatives F, Mod D, D, E, and B respectively provide less of this habitat across the Forest. Alternative A does not allocate any area specifically for old-growth. The other alternatives vary from 4% in Alternative B to

15% of the Forest in Alternative F (see table 4-9). Alternatives that allocate more old-growth would gradually raise the average age and stand size on the Forest and provide more large, late-successional habitats for those animals that need it. This increase in the range of stand ages, sizes, and plant habitats would improve forestwide habitat diversity.

Alternatives A and B use chemical release the most. Chemical release would affect wildlife habitat by providing more control over species development, especially where restoration to longleaf and mixed shortleaf-oak-hickory is desirable (table 4–8). Alternatives D, Mod D, and F plan the most burning for release (table 4–7). These alternatives would most closely mimic natural fire history and favor native plants and animals.

Wilderness management

Wilderness management varies slightly between the alternatives. See the discussion of effects on wildlife and fish in this section, under the *wilderness* heading.

FOREST HEALTH

GENERAL EFFECTS

Effects of vegetation management on forest health

Two key elements of pine management for promoting productive and healthy forest stands are maintaining site / species integrity and utilization of hazard rating systems to determine potential pest risk. All forest species being managed are suitable, in varying degrees, for the site conditions and rotation length. Risk rating systems are available for predicting potential damage that may occur due to specific pest and site conditions.

Overstocked stands of loblolly, slash and shortleaf pines are most susceptible to southern pine beetle attacks. Monitoring stocking levels of pine stands and implementing precommercial and commercial thinning to maintain optimum growth are the most effective methods for reducing impacts.

Loblolly and slash pines are susceptible to annosus root disease. Longleaf is moderately resistant. Disease incidence is most often associated with thinnings of plantations on well drained sandy or sandy loam sites. Mortality, growth loss, and increased risk to southern pine beetle attacks are the impacts caused by this disease. These impacts can be effectively reduced by converting loblolly pine on high risk sites to longleaf pine and reducing frequencies of thinnings in susceptible stands.

Longleaf pine is highly susceptible to brown-spot needle blight during the seedling grass stage. High quality, disease-free, fungicide root-dipped planting stock and well prepared sites promote good growth and reduces the duration of the susceptible grass stage. Natural regeneration of longleaf may increase risk of brown-spot but prescribed burning is an effective control. Increased acres of longleaf restoration would increase risk of brown-spot but damage would be minimized through prescribed burning and effective regeneration techniques.

There are little historical data recording the effects of insects and disease on uneven-aged managed southern forests. Stand density, vigor, and pine species are the most prominent factors determining stands' susceptibility to southern pine beetle attacks. Since all ages classes are represented in uneven-aged managed stands, beetle risk is likely to be variable. Increased harvest entries would increase risk of damage to residual stands and would increase susceptibility to beetle attacks and annosus root disease.

The mix of rotation ages and harvest cutting methods currently used in even-aged management integrates pest management principles to reduce impacts created by insects and disease.

Effects of silvicultural systems, even-aged, two-aged, or uneven-aged, on forest health are relative to site specific conditions and management sensitivity to the complexities of the forest communities.

The integration of silvicultural systems for the management of the Forest would allow for mixed pine hardwood stands, longleaf pine restoration, red-cockaded woodpecker habitat, old growth forest, and a productive forest with minimal impact caused by forest pests. Southern pine beetle would continue to have the greatest impact within the Forest, especially during epidemic cycles.

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FOREST HEALTH

EFFECTS BY LANDTYPE ASSOCIATION (LTA)

EFFECTS BY LANDTYPE ASSOCIATION (LTA)

The most predominant risks to forest health in LTA 1 would be southern pine beetle infestations and annosus root disease.

Thinning overstocked pine stands is a vegetation management practice for managing Red-cockaded Woodpecker foraging and recruitment stands as well as for reducing risk of southern pine beetle attacks. Sandy soil types present in LTA 1 would present a greater risk for the development of annosus root disease within pine stands during thinning operations. The short-term effect of thinning would be an increase in annosus risk under certain soil conditions but long-term effects would be increased vigor and growth potential of stands, improved red-cockaded woodpecker habitat, and reduced risk of southern pine beetle attacks.

The most effective mitigation for southern pine beetle and annosus root disease for LTA 1 would be longleaf pine restoration. The effect of increasing the longleaf pine component and decreasing loblolly and slash pine on selected sites would, in general, be improved health and diversity of the forest. Longleaf pine would be well suited for the sandy, dry, low-nutrient sites found in LTA 1 and it responds well to periodic prescribed burning regimes. Long-term effects of longleaf restoration on the forest communities would be a reduction of insect and disease risk, and the development of forest communities more suitable for extended rotation ages and Red-cockaded Woodpecker habitat.

The forest components and associated insect and disease impacts in LTA 2 would be similar to LTA 1. In LTA 3, vegetation management activities in general would favor good growth potential of forest stands with minimal impacts from insects and disease. The clay soils would be low-risk sites for annosus root disease development. Longleaf and shortleaf pine stands would be at minimal risk for fusiform rust. Loblolly regeneration stands would have a moderate risk for fusiform rust. The oak component of these stands serve as the secondary host for fusiform rust development. Prescribed burning regimes would generally prevent brown-spot needle blight from being a serious pest during longleaf regeneration. Stand management at optimum stocking levels and a mixture of pine and pine-hardwood stands would help keep southern pine beetle outbreaks at a controllable level during endemic years. Extended rotation ages for pine management in Red-cockaded Woodpecker habitat management areas would increase the risk of southern pine beetle attacks and increase red heart decay within older pines in this LTA.

The effects of vegetation management activities in LTA 4 would be predominately within loblolly pine, pine-hardwood, bottomland hardwood and upland hardwood stands. Sites within this LTA would be of low risk for annosus root disease and brown-spot needle blight. The loblolly pine stands and pine-hardwood stands would be at risk for fusiform rust. Disease management would consist of removing canker-damaged trees during scheduled thinning, culling diseased nursery stock during planting operations, and site / species selection that reduces risk of fusiform rust incidence.

There would be a risk that southern pine beetle outbreaks would be more frequent in the pine and pine-hardwood stands, but rapid detection and suppression would prevent buildup of large southern pine beetle spots. Cut-and-remove would be the primary suppression method. Cut-and-remove of southern pine beetle spots would include the removal of southern pine beetle infested trees and a buffer strip of uninfested green trees. The effect of this management action would be to reduce the southern pine beetle population expansion by interrupting the beetle's life cycle and allowing for prompt utilization of the timber resource. Within LTA 4 increased emphasis in hardwood and pine-hardwood management would be expected. Southern pine beetle outbreaks would continue to be the most significant pest. Management emphases include prompt detection and control of infestations, and, continuing to reduce the acreage of high-hazard stands through thinning.

The forest components and associated insect and disease impacts in LTAs 5 and 6 would be similar to LTA 1.

The predominant forest type of LTA 7 is bottomland hardwoods, representing 80 percent of the current Forest cover. Effects of insect and disease management would be relatively minor since there is only limited damage caused by insect borers and decay fungi. Decay fungi enter the host trees through fire scars, mechanical injury, dead branch stubs, insect wounds and storm damage. Reduction of injury-causing agents and prompt salvage of storm-damaged trees would reduce the impact of decay fungi and hardwood borers.

An occasional southern pine beetle spot would be expected to occur in the pine stands and pine component of the pine-hardwood stands. Often these southern pine beetle spots die out without active management or suppression; however, if the spot exceeds 1/4 acre in size, control would be recommended, usually through salvage or cut and leave.

The effects of extended rotation ages for hardwood would increase the risk of heartwood decay, butt-rot, and increased defects of wood quality. Hardwood forests would be suitable hosts for defoliating insects, including gypsy moth. Surveillance and monitoring for insect outbreaks would continue as part of integrated pest management.

Within LTAs 8 and 9 annosus root disease and southern pine beetles would be the pests with the greatest destructive potential. Management strategies to reduce these impacts would include risk rating pine stands for southern pine beetles and soil hazard rating for annosus root disease. Summer thinnings, stump treatments, prescribed burning, and restoration of shortleaf pine would reduce impacts of annosus root disease.

The amount of high risk southern pine beetle sites would be reduced by thinning overstocked pine stands, maintaining stand vigor, reducing off-site plantings, and preventing annosus root disease. The effect of these vegetation management activities would be to prevent severe losses to forest stands caused by insects and disease. Species / site selection would favor shortleaf pine regeneration in these LTAs. Continued use of integrated pest management strategies would continue to reduce pest impacts.

EFFECTS BY ALTERNATIVE

Alternatives with the highest levels of thinning to maintain optimal stand growth, and restoration of longleaf pine to improve site / species integrity would lower the risk of catastrophic losses from southern pine beetles (SPB) and have the greatest impact on the overall health of the Forest. Alternatives which focus on longleaf pine restoration would also decrease mortality, growth loss, and risk of SPB as well as impacts from annosus root disease. Other forest health interactions that would be affected by the alternatives would be fusiform rust, brown-spot needle blight, and red-heart decay in old-growth stands. Southern pine beetle suppression methods would not vary by alternative.

Alternatives A, B, D, and Mod D would thin the most acres on the Forest. However, Alternatives A, D, and Mod D would restore more acres of longleaf pine. The thinnings in Alternatives A, B, D, and Mod D would increase the risk of annosus root disease in the short-term, but in the long-term, for Alternatives A, D, and Mod D longleaf restoration would provide a species more resistant to annosus, fusiform rust, and SPB. While Alternative B thins more acres of high-hazard SPB stands (those yellow pine stands greater than 50 years old, with a basal area greater than or equal to 120, and occurring on sandy, dry sites), it would restore the least acres back to longleaf pine, thereby maintaining more high-risk stands. Alternative F

TABLE 4–10, EFFECTS OF ALTERNATIVES ON FOREST HEALTH CONDITIONS

Displayed by Alternative and Indicator

Indicator	Alt A	Alt B	Alt C	Alt D	Mod D	Alt E	Alt F
Longleaf restoration (ac / yr)	2,102	43	349	1,634	1,456	63	631
Mixed species restoration (ac / yr)	73	47	458	166	178	730	445
All restoration (ac / yr)	2,175	90	807	1,800	1,634	793	1,076
High-hazard SPB stands harvested (ac / yr)	3,567	4,173	950	1,079	1,070	1,311	920
Acres thinned per year	22,866	18,148	5,468	16,582	16,836	16,314	14,710

would have the fourth highest amount of longleaf restoration, but it would also have the lowest amounts of thinning in high-hazard stands. Overall thinning acres would also be lower than in Alternatives A, B, D, Mod D, or E (table 4–10).

Alternative C would utilize uneven-aged management (table 4–8) techniques the most, which, due to the greater number of harvest entries, may result in a higher risk of SPB attacks and annosus root disease from harvest damage. Alternative C would also have a low amount of longleaf restoration. With little longleaf restoration, and a reliance on single-tree harvesting of more susceptible loblolly, slash, and shortleaf pines, overall risk of catastrophic losses from SPB would be high in this alternative.

Alternatives C, Mod D, and D allocate more of the Forest to old-growth than the other alternatives (see table 4-11). These alternatives would provide the most opportunity for red-heart decay to occur in pines and increase the risk for bark beetle attack in loblolly and shortleaf pines.

To see additional impacts to forest health, refer to the *commodity production*, *timber* narrative.

SCENERY

GENERAL EFFECTS

Introduction

The scenic resource is affected by management activities altering the appearance of what is seen in the landscape. Research shows that people generally value natural-appearing landscapes most highly. Management activities that change the natural appearance of the landscape affect the scenic resource. Short-term scenic effects are usually considered in terms of the degree of visual contrast with existing or adjacent conditions that result from the management activity. The scenic value of a landscape can be affected over the long term, or cumulatively by the alteration of the visual character. *Scenic integrity objectives* (SIOS) are assigned to all national forest lands. They define the acceptable degree of human-caused deviation in the landscape. Management activities which result in visual alterations inconsistent with the assigned SIO, even with mitigation applied, affect scenery. The five scenic integrity levels are: *very high* (unaltered), *high* (appears unaltered), *moderate* (slightly altered), *low* (moderately altered), and *very low* (heavily altered). Scenic integrity is evaluated by measuring the degree of alteration in line, form, color, and texture from the natural, natural-appearing, or other desired landscape character. A more detailed explanation of SIOS and the scenery management system in general is presented in Appendix F.

Management activities altering the appearance or the landscape or its components can affect scenery. The end result may be positive or negative, depending on the nature of the change and the landscape character desired. Management activities may result in short-term negative scenic effects that are condoned if the action is needed to achieve a long-term scenic objective such as the restoration of longleaf pine. Management activities with the greatest potential of affecting scenery are road construction, vegetation management, insect and disease control, special-use utility rights-of-way, and mineral extraction. Other management activities that also can impact the scenic resource, but to a somewhat lesser degree, include threatened and endangered (T&E) species habitat management, prescribed burning, fire suppression, land exchange, old-growth forest management, military use, range management, recreation and administrative site facility construction, and wildlife management.

Effects of fire management on scenery

Fire suppression and prescribed fire activities alike can affect scenic resources. The primary effect associated with fire suppression is the visual contrast resulting from fireline construction. Browned vegetation and charring of tree trunks from prescribed burning is a strong color contrast with preexisting conditions and adjacent unburned areas. The resulting levels of contrast and duration vary with fire intensity. Browned vegetation usually lasts a short time, but charring of trees may be evident for many years.

Repetitive prescribed burning reduces overall visual diversity. It often results in the loss of valued mid- and understory species such as flowering dogwood, but tends also to promote herbaceous flowering species. Prescribed fire repeated over time produces stands with open understories allowing views farther into the landscape. It also facilitates access and use of the forest.

Effects of forest health management on scenery

Even though they are natural processes, insect infestations and diseases can cause strong, unattractive visual contrasts in the landscape. Management efforts to control insect infestations and diseases can minimize or reduce effects. Control efforts that include removal of infected trees and buffer areas often cause openings perceived by forest visitors as clearcutting. Because the locations of such areas are unplanned, they can occur in areas of high scenic value.

Effects of lands management on scenery

Utility rights-of-way (ROW) have a high potential of affecting the scenic resource for a long duration. Cleared ROWS, and in some cases utility structures, contrast and are incongruent with preexisting conditions and the adjacent landscape. Cleared ROWS contrast in form, line, color and texture compared with natural conditions.

Effects of minerals management on scenery

Locations for oil and gas exploration and production are heavily altered and unnatural in appearance, contrasting sharply with preexisting conditions and adjacent landscapes. The drilling rig, buildings, storage areas, holding ponds, disturbed earth, and other elements associated with a drilling site contrast sharply against the form, line, color, and texture of natural conditions. Mineral development activities can involve major landform alteration, causing a substantially adverse scenic effect.

Effects of range management on scenery

Fences, cattle guards, and other structures associated with range management are human-made elements. They contrast with the natural appearing landscape.

Effects of recreation management on scenery

Recreation facilities are unnatural features which can clash visually with the natural appearing landscape. Forest Service recreation facilities are designed to blend into the landscape without major visual disruption.

Effects of transportation management on scenery

Road maintenance, especially right-of-way maintenance, affects scenery. Mowing frequency and timing alters the perceived quality of scenery viewed from roads. Road construction introduces unnatural visual elements contrasting with the surrounding landscape. Road management affects scenery by controlling the areas that are viewed by most forest visitors.

Effects of vegetation management on scenery

Timber harvest

Even-aged management has the greatest potential to alter landscape scenic resources — form, line, color, and texture. Among even-aged regeneration methods, clearcuts, coppice, and seed-tree harvests produce the highest visual contrast because they remove the most forest canopy and create openings. These openings would vary in their effects on scenery depending on size, shape, location and nearness to other openings. Openings that mimic the size and general character of surrounding natural openings would affect scenery more favorably. Large harvest openings — as opposed to natural ones — are shaped differently than the biophysical features of the landscape, and thus would more adversely affect scenery. Single-tree selection and group selection harvests are normally less evident because they do not cause large openings in the canopy. Uneven-age regeneration methods, however, can affect scenery, mostly because of contrasts in line, color, and texture from slash production. All effects of timber harvests are short-term because of rapid vegetation growth in this landscape.

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Timber harvest practices can cause long-term effects on scenery by altering landscape character through species conversion; reduction in species diversity; manipulation of the predominant age class; and the alteration of opening size, location, and frequency. The potential effects may be positive or negative, depending on their consistency with the desired future condition of the landscape.

Site preparation

Site preparation activity affects scenery by exposing soil, and killing and browning other vegetation. These effects are generally short-term; site preparation usually improves the appearance of a harvest area by removing unmerchantable trees and most broken stems. Stand improvement work can affect scenery by browning vegetation, reducing visual variety through elimination of target species.

Streamsides and wetlands

Management activities to protect and enhance streamsides and wetlands, which are often of high scenic value, affect scenery in a positive manner.

Old-growth forest

Management of old-growth forest positively affects scenic resources. Lands supporting old-growth forest generally are perceived as visually more attractive than a younger forest.

Effects of wilderness management on scenery

Designation of wilderness generally causes positive effects on scenery because of the old-growth forest character which would, over time, result from designation.

Effects of wildlife management on scenery

Forestwide prescribed burning and midstory manipulation in Red-cockaded Woodpecker cluster sites are common wildlife management practices on the Forest. Midstory removal and prescribed burning reduce overall visual diversity, often resulting in the loss of valued scenic resources such as flowering dogwood trees. Midstory removal and prescribed burning in time produces stands with open understories allowing longer views into the landscape.

Browned vegetation and charred tree trunks resulting from prescribed burning causes strong color contrasts with preexisting conditions and adjacent unburned areas. The level and duration of the contrasts vary with fire intensity. The browned vegetation is usually short-lived, but charring on tree trunks may be evident for many years.

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SCENERY

EFFECTS BY LANDTYPE ASSOCIATION (LTA)

EFFECTS BY LANDTYPE ASSOCIATION (LTA)

Overall variations in the magnitude and intensity of potential adverse effects to the scenic resources of each LTA are linked primarily to the levels of even-aged regeneration harvests, road construction, mineral extraction, and other land-altering actions planned under each alternative. See table 4–11. Potential adverse effects to the scenic resource would be adequately mitigated in all LTAs and under all alternatives. The scenic resource would be protected and enhanced in all LTAs under all alternatives.

LTA 1, because of its size and the expected amount of even-aged regeneration harvests and associated transportation system development, would be subjected to the highest potential levels of total adverse effects to the scenic resource.

LTA 2 exhibits the highest level of inherent scenic attractiveness as a result of its steeper slopes, rock outcrops, and unique vegetative patterns. Therefore, LTA 2 lands would generally be assigned more restrictive Scenic Condition Objectives under all alternatives. Because of the steeper slopes, sensitive, less fertile soils and sparse vegetation, LTA 2 lands would require the most care and mitigation efforts to protect the scenic resource.

LTAs 4 and 7 would be subjected to less potential adverse scenery resource effects than the other LTAs because of the limited quantity of even-aged regeneration harvests planned under any alternative.

LTAs 3, 5, 6, 8, and 9 would be subjected to moderate levels of potential adverse effects to the scenery resource under all alternatives.

EFFECTS BY ALTERNATIVE

EFFECTS BY ALTERNATIVE

The variations in the acreages assigned the different *scenic integrity objectives* (SIO) under each alternative reveal the overall level of emphasis placed on the protection and enhancement of the scenic resource. See table 4-12 for SIO assignments by alternative. The assigned SIOs are linked to and are consistent with management area desired future conditions, for each alternative. See Appendix F for a description of how the scenery management system would be implemented on the Forest.

The *very high* SIO would be considered appropriate only for designated areas where only ecological changes are allowed. Under Alternatives B, C, D, Mod D, E, and F Kisatchie Hills Wilderness would be identified for the very high SIO. Under Alternative A, the *no action* alternative, two existing RNAs are also assigned the very high SIO. That SIO for RNAs may no longer be appropriate.

Saline Bayou National Scenic River corridor would be assigned the *high* SIO under all alternatives. Under all action alternatives, MAs 9 (military intensive use) and 12 (Palustris Experimental Forest) would be assigned the SIO of *low*.

TABLE 4–11, FORESTWIDE EFFECTS OF ALTERNATIVES ON SCENERY CONDITIONS

Displayed by Alternative and Indicator

Indicator	Alt A	Alt B	Alt C	Alt D	Mod D	Alt E	Alt F
Even-aged final harvest cuts (acres / yr)	2,460	2,002	488	1,772	1,576	1,336	1,165
Even-aged thinnings (acres / yr)	22,866	18,148	5,468	16,582	16,836	16,314	14,710
All multi-aged stands (acres)	96,431	257,362	501,290	304,799	308,685	301,429	348,571
All prescribed burning (acres / yr)	47,093	72,024	100,345	82,493	83,780	70,420	84,180
Old-growth allocation (gross acres)	0	23,195	164,214	66,189	81,451	60,197	92,389

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EFFECTS BY ALTERNATIVE

All action alternatives would result in substantial increases in lands assigned the *high* and *medium* SIO, over the *no action* alternative assignments.

Alternatives assigning the largest acreage to *high* and *medium* SIOs, such as Alternative C, would result in more protection and enhancement of scenic resources than alternatives assigning fewer acres to higher SIOs, such as Alternative B. Compliance with mitigation measures would result in an adequate level of protection and enhancement of scenery under all alternatives.

Negative impacts to scenery from roads, pipeline rights-of-way, drilling rigs, buidlings, storage areas, holding ponds, and well pads, as well as potential risks of increased impacts to scenery from soil discoloration, oil spray, or discharge fluids, would be highest in Alternative A as it has the most acreage available for leasing and would require the least restrictive lease stipulations. Impacts would be the lowest in Alternative C which withdraws all Forest lands from leasing as existing leases expire (see Chapter 2, pages 2-17 through 2-35, and page 2-42 of this EIS for a more detailed description of leasing differences by alternative). However, as mentioned previously, many of these impacts to scenery would be avoided by implementing mitigation measures for protection of vegetation and soil and water that would be included in all operating plans and special use permits.

TABLE 4–12, FOREST TOTAL SIO ASSIGNMENTS

Displayed in Acres

	Alt. A	Alt. B	Alt. C	Alt. D	Mod D	Alt. E	Alt. F
Very high – *preservation*	9,628	8,699	8,699	8,699	8,699	8,699	8,699
High – *retention*	28,941	87,844	203,523	93,980	93,980	143,475	106,027
Medium – *partial retention*	19,413	80,350	113,536	89,155	89,155	98,054	121,395
Low – *modification*	68,933	421,943	280,811	415,020	415,020	354,675	369,925
Very low – *maximum modification*	470,846	9,280	1,531	1,278	1,278	3,233	2,081

Displayed as Percent

	Alt. A	Alt. B	Alt. C	Alt. D	Mod D	Alt. E	Alt. F
Very high – *preservation*	1.6	1.4	1.4	1.4	1.4	1.4	1.4
High – *retention*	4.8	14.4	33.5	15.5	15.5	23.6	17.4
Medium – *partial retention*	3.2	13.2	18.7	14.7	14.7	16.1	20.0
Low – *modification*	11.5	69.4	46.2	68.2	68.2	58.3	60.8
Very low – *maximum modification*	78.8	1.5	0.3	0.2	0.2	0.5	0.3

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Introduction

National forest management could affect recreation by constructing or removing recreation facilities and improvements; restricting, prohibiting or encouraging use; altering the land to make it suitable or unsuitable for use; and changing the landscape setting, thus altering the type or quality of recreation opportunities that are available, desirable, and appropriate.

Evaluation of potential recreation effects requires consideration of three essential elements: the *activities*, such as camping and hiking; the *setting* in which the activities would occur; and the resulting *experiences*. Forest visitors enjoy high-quality recreation experiences when they can enjoy preferred activities in preferred settings. Management actions influencing these activities and settings affect experience quality.

Outdoor recreation activities, settings, and resulting experiences can be classified in terms of relative urban or primitive qualities. For management and conceptual convenience the possible activities, settings, experience opportunities, and possible mixes or combinations have been arranged across a management universe called the *recreation opportunity spectrum* (ROS). Each of six ROS classes is defined in terms of its combined activity, setting, and experience opportunities: *primitive*, *semi-primitive nonmotorized*, *semi-primitive motorized*, *roaded natural*, *rural*, and *urban*. See the *ROS Users Guide* for a more complete description. Management activities altering ROS class eligibility would affect recreation. If a class change is consistent with the desired future condition of an area, the effect would be positive rather than negative.

Within each ROS class, recreation opportunities are offered at developed sites or in general undeveloped forest areas. Developed sites are areas dedicated to and managed primarily for recreation, such as campgrounds and swim sites, and usually include constructed facilities. The general undeveloped areas of the Forest support dispersed recreation activities such as hunting, nature study, hiking and primitive camping — activities requiring no constructed facilities other than a trail. Normally, management activities can affect dispersed recreation more than developed recreation. This is because developed recreation sites are dedicated primarily to recreation use rather than production of multiple-resource benefits.

Effects of fire management on recreation

Fire management affects recreation, primarily through its effects on scenery. Prescribed fire would temporarily reduce understory vegetation and maintain open forested conditions with more opportunity for views and vistas. Periodic fire would promote numerous flowering plants. Light burns create a charred appearance on tree trunks and lower limbs that would last three to four months. With more intense burns and in hot spots, more of the tree would be charred and the effect could last three to five years or more. Smoke accumulations on relatively calm days could reduce visibility in downwind areas and disturb or displace recreationists. Windier days would disperse smoke faster and keep visibility higher, but may affect larger areas (USDA Forest Service, 1989).

Prescribed fire also affects recreation access by altering quantities of understory plants, making it easier for people to travel through undeveloped areas of the Forest.

Effects of forest health management on recreation

Insect and disease management would affect recreation by minimizing land area adversely impacted by insects and disease. It would also reduce the likelihood that high value recreation lands such as developed recreation sites would be altered.

Effects of lands management on recreation

Land adjustment

Consolidation of forest ownership improves the quality of recreation opportunity offered. Additional recreation opportunities could result from land purchases or exchanges which serve to make the Kisatchie National Forest more continuous. Increased

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acreages could contribute to greater variety of recreation opportunities and provide for increased dispersal of recreationists. Mitigation measures focusing the highest priority for acquisition on lands of high recreational value, such as Saline Bayou National Scenic River corridor, lands on water frontage such as lakes and major streams, lands having unique historical or cultural value, and lands of value for outdoor recreation or needing protection for aesthetic purposes, would benefit Forest recreation opportunities and management.

Land use and rights-of-way

Utility rights-of-way could provide improved recreation access to dispersed areas, but could adversely affect scenery, as they contrast greatly from a natural-appearing landscape.

Effects of military use management on recreation

On military intensive use areas recreation use would be allowed only when it does not conflict with the military mission. Due to the intensity of training activities, most of the intensive use areas would be closed to public access during exercises. Hunting would be allowed, within State seasons, but would be subject to closure during exercises.

Recreation use on limited use areas would not be prohibited during exercises, but recreation may be disrupted by military convoys, airborne operations, and troop patrols.

Some areas of the Forest are designated as “no entry” due to unexploded ordnance. No developed or dispersed recreation would be allowed in these areas. Additional restrictions or prohibitions on recreation use may occur in two former military camps — Camp Livingston and Camp Claiborne — because of safety hazards.

Effects of minerals management on recreation

Recreational settings would be disturbed through increased activity, noise, and use of heavy equipment associated with minerals activities. Recreation use of active mineral extraction sites would be temporarily eliminated.

Effects of range management on recreation

Range management could affect recreation through its impacts on scenery and access. Heavy grazing by livestock could result in an altered landscape which would detract from some recreational settings. The greatest impact to access would occur along trails. Range fences, cattle guards and gates could limit access for recreationists. This could cause conflicts in use between recreationists and livestock permittees.

Effects of roadless area management on recreation

Roadless area management activities would favor recreation activities at the primitive end of the ROS. This may adversely affect recreation use which must depend on more highly developed settings.

Effects of structures management on recreation

The quality of structure management bears directly on the quality of recreation opportunities and experiences offered at developed recreation sites. High-quality facility management and maintenance affect recreation user satisfaction and enjoyment positively while low quality causes negative effects.

Effects of vegetation management on recreation

Timber harvest

Timber management affects recreation by altering recreation settings. The effects may be positive or negative, depending on the desired future condition. Recreation use of regenerated lands may be displaced for several years after harvest because dense vegetation may restrict access and travel. As natural settings are altered, the capacity of the Forest to provide some types of dispersed recreational settings and experiences would be diminished.

Site preparation and stand improvement

Recreational activities could be displaced from areas where site preparation or timber stand improvement is underway. These activities would also impact recreation through their affect on scenery.

Mechanical methods could expose soils and generally reduce vegetation to ground level or less than three feet in height. Considerable seasonal browning could occur and broken stems would create an unsightly landscape. Raking and piling leave debris that may be visible three to four years before being obscured by new growth, unless windrows or piles are burned. Mechanical treatments would reduce shading vegetation and allow more wildflowers and other sun-tolerant plants to come into the area until trees and shrubs shade or crowd them out.

Manual treatments leave browned slash and a graying appearance for a season to a year. Regrowth and residual vegetation would obscure the effect within a few months. Canopy heights would be reduced, but species variety is maintained.

Herbicide treatments reduce variety by eliminating target species, but the space would usually be filled quickly by lower-growing shrubs or herbs. Herbicides also create a browning and then a graying that could last from one season to several years, depending on the height of treated vegetation and the herbicide's persistence. Broadcast applications would create a stronger visual effect than more selective ones, which create irregular or spot patterns of brown and gray and cover less total area (USDA Forest Service, 1989).

Effects of wildlife management on recreation

Wildlife management activities such as prescribed burning, stand improvement, or restrictions on access may displace or disturb recreationists. Most impacts however, would be temporary. Enhanced populations of wildlife species would provide increased recreational opportunities for hunting, viewing wildlife, or nature study.

EFFECTS BY LANDTYPE ASSOCIATION (LTA)

Overall variations in the potential of adverse effects to the recreation resources and opportunities of each LTA are linked primarily to the levels of even-aged regeneration harvests , road construction, mineral extraction and other setting-altering actions planned under each alternative. Potential adverse effects to recreation would be adequately mitigated in all LTAs and under all alternatives. Recreation resources and opportunities would be protected and enhanced in all LTAs under all alternatives. All LTAs would have the capacity to support projected use under all alternatives.

LTA 1, because of its size and the expected amounts of even-aged regeneration harvest and associated transportation system development in all alternatives except C, would be subjected to the highest level of recreation setting alteration of any LTA. Recreationists preferring good road access or engaged in recreation pursuits that benefit from regeneration harvests, such as deer hunting, would be positively affected by the management activities proposed for this LTA. Recreationists that would prefer the most natural-appearing settings, the most solitude, and the least evidence of management activities could be adversely affected by the expected amount of vegetation management in this LTA.

LTA 2 exhibits the highest level of inherent scenic attractiveness as a result of its steeper slopes, rock out crops and unique vegetative patterns. Therefore LTA 2 recreation resources have greater potential of being affected by management activities that alter the natural setting than the other LTAs.

LTAS 4 and 7 would be subjected to less potential recreation resource effects than the other LTAs because of the limited quantity of even-aged regeneration harvests and road construction planned under any alternative. These LTAs would tend to be favored by recreationists preferring unaltered settings with limited road access compared to the other LTAs.

LTAS 3, 5, 6, 8, and 9 would be subjected to moderate but varying levels of potential effects, both positive and negative to the recreation resource under all alternatives.

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The alternatives vary in potential effects on recreation settings as a result of the level of management emphasis placed on recreation use and facilities and other management activities. The Forest is expected to meet the overall demand for developed and dispersed recreation opportunities under all alternatives. However, the alternatives vary in responding to the needs for specific types of facilities and opportunities that are not currently being met.

Table 4–13 presents planned ORV closures by alternative. The acreage of the closed area would range from 93,469 acres under Alternative A to 138,320 acres under Alternative F — 15 to 23 percent of the Forest, respectively.

The recreation management program under Alternative A would focus on providing a wide range of recreation opportunities, emphasizing developed and dispersed, fee and non-fee, equally. Recreation construction and reconstruction efforts would be concentrated on keeping existing sites up to standard and upgrading existing facilities as needed. New sites would be considered if strong public demand was demonstrated. Recreation sites may be offered and promoted for operation by concessionaires. Protection and enhancement of the scenic resource in visually sensitive areas would be a high priority. Approximately 15 percent — 93,469 acres — of the Forest would be closed or seasonally restricted to use by ORVs, the smallest amount of any alternative. The potential effects to recreation that are associated with timber harvest activities would be greatest under this alternative.

Under Alternative B, the recreation management program would focus on reducing operation and maintenance costs and producing revenue. Recreation use fees would be increased and additional developed sites would be designated as fee sites. Recreation sites receiving low levels of use would be closed. Recreation construction and reconstruction efforts would emphasize types of development with the greatest potential of producing revenues. Dispersed recreation use would be permitted, but may be restricted or controlled as needed to minimize adverse effects to the production of other commodities, such as timber. A fee program for dispersed use would be implemented. Recreation sites would be offered and promoted for operation by concessionaires if determined to be the most cost-efficient method of operation for the Forest Service. Protection of the scenic resource would not be a high priority. Approximately 17 percent — 102,069 acres — of the Forest would be closed or seasonally restricted to use by ORVs (table 4–13). The potential effects to recreation that are associated with timber harvest activities would be less than under Alternative A but greater than under the rest of the alternatives.

Enhancing the quality and quantity of both developed and dispersed recreation opportunities offered on the Forest would be a high priority in Alternative C. The Forest would be managed to maximize recreation benefits at the possible expense of commodity production. Forest visitors would be provided enhanced opportunities to derive maximum benefit from amenity values. The current recreation fee program would not be substantially expanded except to include new developments in the program. Fees would not be charged for new kinds of uses. Protection and enhancement of the scenic resource would be a high priority. Approximately 17 percent — 103,365 acres — of the Forest would be closed or seasonally restricted to use by ORVs (table 4–13). The potential effects to recreation associated with timber harvest activities would be less than under any other alternative.

The recreation management program of Alternatives D and Mod D would focus on providing non-urbanized outdoor recreation opportunities in a natural-appearing forest of high ecological integrity. Providing a balance of high quality dispersed and natural resource dependent developed recreation opportunities would be the top recreation priority. Forest visitors would be provided enhanced opportunities to derive maximum benefit from restored historic vegetation. Long-term public recreation interests would be protected by maintaining and enhancing open space options, public accessibility, heritage, wilderness, scenic and natural resource values. New sites would be considered if strong demand was indicated and the improvements would support or enhance natural resource dependent recreation. Recreation opportunities that encourage the study and enjoyment of nature and scenery, highlight the importance of conservation, and instill appreciation of the nation's history and heritage would be featured. Interpretation of unique and historical biological communities would be a priority. In Alternative D, approximately 21 percent — 127,736 acres — of the Forest would be closed or seasonally restricted to use by ORVs (table 4–13). For Alternative Mod D, approximately 22 percent — 129,947 acres — of the Forest would be closed or seasonally restricted to use by ORVs (table 4–13). The potential effects to recreation that are associated with timber harvest activities in Alternatives D and Mod D would be moderate; less than the potential effects of Alternatives A, B and E but more than Alternatives C and F.

The recreation management program of Alternative E would focus on providing non-urbanized outdoor recreation opportunities in a natural-appearing forest of high ecological integrity. Forest visitors would be provided enhanced opportunities to derive maximum benefit from the increased hardwood component. Providing a balance of high quality dispersed and natural resource dependent developed recreation opportunities would be the top recreation priority. Recreation construction and reconstruction efforts would be concentrated on keeping existing sites up to standard and upgrading existing facilities as needed. New sites would be considered if strong demand was indicated and the improvements would support or enhance natural resource dependent recreation. This alternative would protect long-term public recreation interests by maintaining and enhancing open space options, public accessibility, heritage, wilderness, scenic and natural resource values. Recreation opportunities that encourage the study and enjoyment of nature and scenery, highlight the importance of conservation and instill appreciation of the nation's history and heritage would be featured. Approximately 23 percent — 137,636 acres — of the Forest would be closed or seasonally restricted to use by ORVs, second only to Alternative F (see table 4–13). The potential effects to recreation associated with timber harvest activities would be moderate, less

TABLE 4–13, AREAS WITH YEARLONG OR SEASONAL ORV USE CLOSURES

Displayed by Alternative and Area

Indicator	Alt A	Alt B	Alt C	Alt D	Mod D	Alt E	Alt F
All developed recreation sites	6,162	6,162	6,162	6,162	6,162	6,162	6,162
Research natural areas	2,507	2,507	4,150	2,507	2,507	2,507	4,150
Special interest areas	1,040	1,640	1,293	2,252	4,463	2,252	1,293
Sensitive habitat protection				12,000	12,000	20,000	20,000
Saline Bayou National Scenic River	5,150	5,150	5,150	5,150	5,150	5,150	5,150
Kisatchie Hills Wilderness	8,700	8,700	8,700	8,700	8,700	8,700	8,700
Walk-in hunting areas							
Caney District		8,000	8,000	15,556	15,556	15,556	15,556
Catahoula District				5,499	5,499	5,499	5,499
Evangeline Unit of the Calcasieu District	5,085	5,085	5,085	5,085	5,085	5,085	5,085
Kisatchie District	5,784	5,784	5,784	5,784	5,784	5,784	5,784
Vernon Unit of the Calcasieu District	4,110	4,110	4,110	4,110	4,110	4,110	4,110
Winn District	9,185	9,185	9,185	9,185	9,185	9,185	9,185
Stuart Seed Orchard	540	540	540	540	540	540	540
Breezy Hill No-Entry Area	856	856	856	856	856	856	856
US Marshall Service use area	37	37	37	37	37	37	37
Military intensive use areas	43,713	43,713	43,713	43,713	43,713	43,713	43,713
Other areas closed by order of the Forest Supervisor	600	600	600	600	600	2,500	2,500
Total Acres	**93,469**	**102,069**	**103,365**	**127,736**	**129,947**	**137,636**	**138,320**
Percent of Entire Forest	**15**	**17**	**17**	**21**	**22**	**23**	**23**

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than the potential effects of Alternatives A and B but more than Alternatives C, D and F.

Alternative F would focus on providing non-urbanized outdoor recreation opportunities in a natural-appearing forest of high ecological integrity. Providing high quality dispersed and natural resource dependent developed recreation opportunities would be the primary focus of the recreation management program. Protecting and enhancing both consumptive and non-consumptive wildlife opportunities would be the top priority. Forest visitors would be provided enhanced opportunities to derive maximum benefit from a wide range of suitable habitats for all native wildlife. New sites would be considered if strong demand was indicated and the improvements would support or enhance wildlife dependent recreation. The alternative would protect long-term public recreation interests by maintaining and enhancing open space options, public accessibility, heritage, wilderness, scenic and natural resource values. Recreation opportunities that encourage the study and enjoyment of nature and scenery, highlight the importance of conservation and instill appreciation of the nation's heritage would be featured. Approximately 23 percent — 138,320 acres — of the Forest would be closed or seasonally restricted to use by ORVs, the largest amount of any alternative (table 4–13). The potential effects to recreation that are associated with timber harvest activities would be less than all alternatives except C.

The alternatives vary in the overall amount of land closed to ORV use, either seasonally or annually. The following sections compare the consequences of different alternatives on other elements of the recreation program.

Recreation opportunity spectrum

Tables 4–14 and 4–15 show how the assignments of ROS class vary by alternative, presenting these assignments in acres and as a percentage of the total. Appendix G presents the Forest's implementation of the *recreation opportunity spectrum* (ROS). The acres assigned to the different ROS classes differs by alternative due to variations in management area goals, objectives, desired future conditions, and special management area emphasis. Class assignments are linked directly to management areas and other areas with special management emphasis. So, as these areas vary among alternatives, ROS class assignments vary also.

Assignment of ROS classes was as follows:

- *Management Area 13* (Kisatchie Hills Wilderness) would be assigned *primitive (P)*.
- *Management Area 10* (National Scenic Rivers), special interest areas, research natural areas and walk-in areas, if not designated above as *P*, would be assigned *semiprimitive nonmotorized (SPNM)*.
- *Management Area 7* (Hardwoods) and designated old growth areas, if not designated above as *P* or *SPNM*, would be assigned *semiprimitive motorized (SPM)*.
- *Management Areas 2* (amenity values), *4* (RCW amenity values), *8* (wildlife habitats), and *11* (national wildlife management preserves), uneven aged management areas, Louisiana natural and scenic river corridors and riparian area protection zones, if not designated above as *P*, *SPNM* or *SPM* would be assigned *roaded natural-appearing (RN-A)*
- *Management Areas 1* (forest products), *3* (native community restoration), *5* (RCW native community restoration), and *6* (RCW wildlife habitats), if not designated above as *P*, *SPNM* or *SPM* or *RN-A* would be assigned *roaded natural modified (RNM)*
- *Management Area 12* (Palustris Experimental Forest), all administrative sites, and all developed recreation sites would be assigned *rural*.

No lands on the Forest were assigned the *urban* class. The Breezy Hill no-entry area and management area 9 (military intensive use) were not assigned a ROS class because recreation use is excluded or severely restricted from these areas.

Tables 4–16 and 4–17 present the maximum and reasonable dispersed recreation visitor day capacity by alternative and ROS class.

Recreation construction and reconstruction

The recreation construction and reconstruction program would focus on providing a wide range of developed recreation opportunities at varying development levels.

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The degree to which a recreation site is modified or improved for recreation use is called *development level*. The Forest Service recognizes five levels of development or modification:

- *Level 1, minimum site modification* — Rustic or rudimentary improvements are designed primarily for site protection rather than user comfort. Use of synthetic materials in construction is prohibited. Motorized access is not provided or permitted. Landscape plantings are not provided.
- *Level 2, little site modification* — Rustic or rudimentary improvements are designed primarily for site protection rather than user comfort. Synthetic materials in construction are generally avoided. Motorized access over primitive roads is permitted. Landscape plantings would consist of native species, but generally are not provided.
- *Level 3, moderate site modification* — Facilities offer about equal protection of the site and comfort for users. Contemporary or rustic improvements are provided, usually constructed of natural materials. Primary access may be over primitive roads or high-standard paved roads. Landscape planting would consist of native species.

TABLE 4–14, FOREST ROS CLASS ASSIGNMENTS IN ACRES

Displayed by Alternative and Indicator

Indicator	Alt A	Alt B	Alt C	Alt D	Mod D	Alt E	Alt F
Primitive	0	8,700	8,700	8,700	8,700	8,700	8,700
Semiprimitive nonmotorized	33,096	41,461	42,757	55,128	57,269	55,128	55,812
Semiprimitive motorized	0	43,004	178,339	90,649	89,963	76,386	108,866
Roaded natural-appearing	527,897	214,424	151,724	214,152	217,152	209,310	201,478
Road natural modified	0	252,107	196,961	196,126	191,671	212,573	191,018
Rural	2,615	6,162	6,162	6,162	6,162	6,162	6,162
Urban	0	0	0	0	0	0	0
Not assigned	34,153	37,142	18,357	32,083	32,083	34,741	30,964
Total Acres	**597,761**	**603,000**	**603,000**	**603,000**	**603,000**	**603,000**	**603,000**

TABLE 4–15, FOREST ROS CLASS ASSIGNMENTS AS PERCENT

Displayed by Alternative and Indicator

Indicator	Alt A	Alt B	Alt C	Alt D	Mod D	Alt E	Alt F
Primitive	0	1	1	1	1	1	1
Semiprimitive nonmotorized	6	7	7	9	10	9	9
Semiprimitive motorized	0	7	30	15	15	13	18
Roaded natural-appearing	88	36	25	36	36	35	34
Road natural modified	0	42	33	33	32	35	32
Rural	0	1	1	1	1	1	1
Urban	0	0	0	0	0	0	0
Not assigned	6	6	3	5	5	6	5

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- *Level 4, heavy site modification* — Some facilities are designed strictly for the comfort and convenience of users. Luxury facilities are not provided. Facilities may be of contemporary or rustic design and constructed, at least in part, of synthetic materials. Access is usually over paved roads. Landscape planting would consist of native species.

- *Level 5, high site modification* — Most facilities are designed for the comfort and convenience of users. Facilities are commonly of contemporary design and constructed of synthetic materials.

In Alternative A recreation construction and reconstruction efforts would be concentrated on keeping existing sites up to standard and upgrading existing facilities as needed. New sites would be considered if strong public demand was demonstrated.

The recreation construction and reconstruction program in Alternative B would focus on reducing operation and maintenance costs and producing revenue. Recreation construction and reconstruction efforts would emphasize the types of development with the greatest potential of producing revenues and hardening sites to minimize operation and maintenance costs. Sites

TABLE 4–16, MAXIMUM DISPERSED RECREATION VISITOR DAY (RVD) CAPACITY

Displayed by ROS Class

Indicator	Alt A	Alt B	Alt C	Alt D	Mod D	Alt E	Alt F
Primitive	0	28,580	28,580	28,580	28,580	28,580	28,580
Semiprimitive nonmotorized	120,800	151,333	156,063	201,217	209,032	201,217	203,714
Semiprimitive motorized	0	329,626	1,366,968	694,825	689,566	585,499	834,458
Roaded natural-appearing	7,707,296	3,130,590	2,215,170	3,126,619	3,170,419	3,055,926	2,941,579
Road natural modified	0	6,441,344	5,032,354	5,011,019	4,897,194	5,431,240	4,880,510
Rural							
Urban							
Not assigned							
RVD Totals	**7,828,096**	**10,081,473**	**8,799,135**	**9,062,260**	**8,994,791**	**9,302,462**	**8,888,841**

TABLE 4–17, REASONABLE DISPERSED RECREATION VISITOR DAY (RVD) CAPACITY

Displayed by ROS Class

Indicator	Alt A	Alt B	Alt C	Alt D	Mod D	Alt E	Alt F
Primitive	0	7,895	7,895	7,895	7,895	7,895	7,895
Semiprimitive nonmotorized	33,372	41,807	43,114	55,588	57,747	55,588	56,278
Semiprimitive motorized	0	91,062	377,639	191,952	190,500	161,750	230,528
Roaded natural-appearing	2,129,220	864,858	611,964	863,761	875,861	844,231	812,641
Road natural modified	0	1,779,485	1,390,239	1,384,346	1,352,900	1,500,436	1,348,291
Rural							
Urban							
Not assigned							
RVD Totals	**2,162,592**	**2,785,107**	**2,430,851**	**2,503,542**	**2,484,903**	**2,569,900**	**2,455,633**

at the higher development levels or with significant fee generation potential would have precedence.

In Alternative C, enhancing the quality and quantity of developed recreation opportunities offered on the Forest would be high priority. This alternative would provide the highest level of support for improving developed recreation sites. The recreation construction and reconstruction program would focus on providing major enhancements to the quality and quantity of developed recreation offered on the Forest. The Forest would strive to respond quickly to demonstrated public need for additional or enhanced facilities. Existing sites would be reconstructed to standard and enhanced. Construction of new sites that broaden the range of developed site opportunities offered would be a Forest priority. The boundaries of certain developed sites would be revised to include additional lands to mitigate potential effects that could occur on adjacent lands. New developed recreation sites to support enhanced dispersed area opportunities resulting from management for the *amenity* DFC, would be constructed. Sites at varying development levels would be provided. Some sites could be upgraded to level 5 developments.

The recreation construction and reconstruction program in Alternatives D and Mod D would focus on providing non-urbanized outdoor recreation opportunities in a natural-appearing forest of high ecological integrity. Providing a balanced range of high quality natural resource-dependent developed recreation opportunities would be the top recreation opportunity. New sites would be constructed if strong demand was indicated and the improvements would support or enhance natural resource dependent recreation. Recreation sites that encourage the study and enjoyment of nature and scenery, highlight the importance of conservation and instill appreciation of the nation's history and heritage would be priorities. Sites that interpret unique or historical biological communities would be a priority. Recreation sites at lower development levels would have precedence, but level 3 and 4 sites would also be the focus of construction and reconstruction efforts.

In Alternative E the recreation construction and reconstruction program would focus on providing non-urbanized outdoor recreation opportunities in a natural-appearing forest. Providing a balanced range of high-quality, natural resource-dependent developed recreation opportunities would be a top priority, but sites at the lower development levels would have precedence. Recreation construction and reconstruction efforts would be concentrated on keeping existing sites up to standard and upgrading existing facilities as needed. New sites would be constructed if strong demand was indicated and the improvements would support or enhance natural resource-dependent recreation.

The developed recreation management program in Alternative F would focus on providing non-urbanized outdoor recreation opportunities that support the appreciation and utilization of wildlife in a natural-appearing forest. Recreation sites at the lower end of the development scale would have priority. Recreation construction and reconstruction efforts would emphasize protecting and enhancing both consumptive and nonconsumptive wildlife opportunities. Forest visitors would be provided enhanced opportunities to derive maximum benefit from a wide range of suitable habitats for all native wildlife. New sites would be constructed if strong demand was indicated, and the improvements would support or enhance wildlife-dependent recreation.

Table 4–18 lists 48 of the Forest's most important known recreation construction and reconstruction projects. These projects do not represent all foreseeable recreation construction projects; only those for which a need has been identified for accomplishment during the next 10-year period. Ideally — and at optimum funding levels, all the projects would be accomplished. Actual funding during the period is unlikely to support all the projects. Therefore they have been prioritized under the alternatives in accordance with the management emphasis of each. The priorities would guide capital improvement project (CIP) funding requests. Also, listing here does not constitute final project approval. Site-specific environmental analysis and appropriate NEPA documentation will be required for these projects.

Table 4–18 also ranks each project's dispersed recreation use support. Recreation sites whose primary function is to support visitors engaged in dispersed activities such as trail riding or hunting would receive a high rating. Recreation sites used mostly by visitors not participating in dispersed activities away from the developed sites, would receive a low or minimal rating.

TABLE 4–18, SCHEDULED RECREATION PROJECTS

Construction and Reconstruction Priorities

Ranger District / Name of Facility	Level	Action Needed	Dispersed Use Support	Alt. A Priority	Alt. B Priority	Alt. C Priority	Alt. D Priority	Mod D Priority	Alt. E Priority	Alt. F Priority
Calcasieu, Evangeline Unit										
Kincaid Complex	4	Master plan implementation	low	med	top	high	med	high	low	low
Kincaid Entrance Road	4	Existing site reconstruction	medium	top	high	top	med	med	low	med
Loran Site Campground (in CIP)	3	New site construction	high	med	low	top	med	top	med	low
Valentine Lake Complex	4	Existing site reconstruction	medium	med	high	high	med	med	low	med
Calcasieu, Vernon Unit										
Blue Hole Complex	3	Master plan Implementation	low	low	low	high	low	low	med	low
Enduro Campground	2	New site construction	high	med	low	top	low	high	med	low
Fullerton Lake Complex	3	Existing site reconstruction	low	med	low	high	med	high	med	low
Little Cypress Complex	3	Existing site enhancement	low	low	low	med	med	med	med	low
Longleaf Scenic Area	3	Natural attraction enhancement	high	med	low	med	top	med	high	high
Vernon Camp	2	Existing site enhancement	high	med	low	med	top	top	high	top
Caney										
Caney Lakes Complex	4	Master plan implementation	medium	high	top	top	med	med	low	low
Caney Lakes Complex (in CIP)	4	Existing site reconstruction	low	top	top	top	top	top	med	med
Corney Lake Complex	3	Master plan implementation	medium	high	top	high	top	med	high	top
Catahoula										
Beaver Pond Wildlife Viewing Site	3	New site construction	low	low	low	high	top	low	high	top
Big Creek Boat Launches	2	New site construction	high	low	low	med	med	top	high	high
Big Creek Campground	2	New site construction	medium	low	low	med	low	top	low	low
Breezy Hill Enduro Campground	2	New site construction	medium	low	low	high	med	med	low	low
Camp Catahoula Horse Camp	4	New site construction	medium	low	low	high	med	med	med	low
Camp Livingston Shooting Range	3	New site construction	high	med	low	high	high	top	med	high
Catahoula NWMP Hunter Camps	2	Existing site enhancement	high	med	low	high	high	high	med	high
Iatt Lake Complex	2	New site construction	high	med	low	top	top	med	top	top
Mosley Hill Fire Tower	4	Master plan implementation	low	med	med	top	top	high	high	med
Pearson Camp	2	Existing site expansion	high	med	low	high	high	high	med	high
Stuart Lake Campground	4	Existing site reconstruction	medium	high	top	high	med	top	high	low
Stuart Lake Complex Expansion	4	Existing site expansion	medium	low	high	high	low	med	low	low
Kisatchie										
Anderson Pond Fishing Site	3	Existing site enhancement	medium	low	low	med	high	high	top	top
Cane Campground	3	Existing site reconstruction	high	top	low	high	med	top	med	low
Kisatchie Bayou Camp (in CIP)	3	Existing site enhancement	medium	top	top	top	high	top	med	low
Longleaf Trail Interpretaion	3	Master plan implementation	high	med	low	high	top	top	high	low
Longleaf Vista Picnic	4	Existing site reconstruction	low	low	low	high	med	high	med	low
Lotus Campground	3	Existing site enhancement	high	low	low	med	med	high	med	low
Red Dirt NWMP Hunter Camps	2	Existing site enhancement	high	med	low	high	med	high	med	high
Winn										
Catahoula NWMP Hunter Camps	2	Existing site enhancement	high	med	low	high	high	high	med	high
Cloud Crossing Boat Launch	3	Existing site reconstruction	medium	med	low	high	med	med	high	high
Gum Springs Complex	4	Existing site reconstruction	low	top	top	top	high	high	low	low
Hwy 126 Boat Launch	3	Existing site enhancement	high	high	low	high	top	high	high	high
W-D Equestrian Camp (in CIP)	3	Existing site enhancement	high	med	high	top	top	top	high	med
Winn Shooting/Archery Range	3	New site construction	high	med	high	high	top	top	high	med
Forest Wide										
Primitive Camps (in CIP)	2	Existing site enhancement	high	med	high	top	top	top	high	med

The proposed projects are classified into six basic types:

- *Existing site reconstruction* — Reconstructing an existing site to meet current design, safety, sanitation and accessibility standards for this development level; and to correct or prevent resource degradation. Site development level is generally not altered, and capacity is not increased significantly.

- *Existing site enhancement* — Improvement of an existing site to improve the quality of recreation opportunities provided. Site development level may be increased. The site would be reconstructed to meet current design, safety, sanitation and accessibility standards for sites at the desired development level. Site capacity may be increased significantly.

- *Existing site expansion* — Expansion of an existing site, primarily an increase in PAOT capacity. Development level is generally not altered. Expanded facilities would meet current design, safety, sanitation and accessibility standards for sites at this development level, older parts of the development may not be brought up to standard.

- *New site construction* — Construction of a new recreation area where none currently exists. The site may currently support concentrated dispersed use, but no improvements exist.

- *Master plan implementation* — Implementation of a recreation master plan which has existing approval or which has been partially implemented.

- *Natural attraction enhancement* — Construction of improvements to facilitate enjoyment of a natural attraction by the public, or to protect the unique qualities of the attraction from impacts associated with human use.

Implementation priority of different types of projects may vary by alternative, management area, and desired future condition. Project components dealing with public safety and sanitation are always top priority. Projects relating to improvement of access for persons with disabilities also have a high priority. See table 4–18, scheduled recreation projects.

Recreation trail construction and reconstruction program

Table 4–19 lists the Forest's current proposed trail construction and reconstruction projects — 354 miles total, identified for action during the next 10-year period if funding is adequate. The total consists of 204 miles of new trails, 76 miles of additions to existing trails, 25 miles of reconstruction to standard, 40 miles of hardening problem segments and 9 miles to be hardened for accessibility.

A total of 119 miles of proposed trail would be open for hiking, mountain biking, horseback riding, and ORV use. A total of 98 miles of proposed trail would be open for hiking, mountain biking and horseback riding, but not ORV use. A total of 125 miles of proposed trail would be open for hiking and mountain biking, but not horseback riding or ORV use. The 12-mile Iatt Lake Pirogue Trail would be open only to nonmotorized watercraft.

The need and public demand for these trails has been identified and documented but at less than optimum funding levels it may not be feasible to construct all of them during this 10-year period. Therefore, the construction priority of the proposed trails has been ranked based on the recreation management emphasis of each alternative. Also, listing here does not constitute final project approval. Site-specific environmental analysis and appropriate NEPA documentation will be required for these projects.

Recreation use

The quantity of recreation use occurring on the forest would vary by alternative. Table 4–20 presents projected total annual use for the next 10-year period from 1997 through 2006. Table 4–21 presents an annual average of the projected recreation use for the next 10-year period, broken out by nonhunting and fishing use and hunting and fishing.

The projected growth rates for each alternative are based on historic use trends, regional use projections, data from the *Kisatchie National Forest Recreation and Wildlife Supply and Demand Analysis*, July 1995. Growth rates also vary in planned recreation emphasis, facility improvements, and dispersed use enhancements under each alternative. Accurate projections of actual recreation use are difficult to develop because of the highly discretionary nature of the activity. Overall,

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Forestwide use rates are not currently limited by dispersed area or developed site capacity. Projected use is below overall reasonable capacities for the forest. However, use at certain developed sites and dispersed use areas is approaching capacity levels. Unsatisfied demand exists for specific types of opportunities and "niche" activities.

Total recreation use on the Forest has grown over the last 10 years from 475,700 RVDs in 1986 to 598,800 in 1996 — a growth rate of 2.1 percent annually. This growth is in part attributable to the construction of new recreation sites, improvement of existing sites and the construction of new trails.

Recreation use under Alternative A is expected to continue to grow at the same rate that has occurred over the last 10 years — 2.1 percent annually. The estimated average annual use over the next 10-year period is 673,038 RVDs.

Under Alternative B recreation use would continue to increase each year but at a reduced rate. The projected growth rate for recreation use would decline from the current rate of 2.1 percent to 1.4 percent annually. The decline is attributable to the overall reduced emphasis on recreation management under this alternative and the associated reduction in the quality and quantity of recreation opportunities available. The estimated average annual use over the next 10-

TABLE 4–19, SCHEDULED TRAIL PROJECTS

Construction and Reconstruction

Ranger District / Name of Trail	Action Needed	Length in Miles	Uses Allowed	Alt. A Priority	Alt. B Priority	Alt. C Priority	Alt. D Priority	Mod D Priority	Alt. E Priority	Alt. F Priority
Calcasieu, Evangeline Unit										
Claiborne	Harden problem segments	20	Hiking, biking, horse, ORV	high	high	high	medium	medium	high	high
Kincaid	Harden for accessibility	6	Hiking, biking	low	low	high	top	top	top	medium
Lakeshore	Harden problem segments	5	Hiking, biking	high	high	top	top	top	high	top
Valentine	Addition to an existing trail	7	Hiking, biking	low	low	high	low	top	medium	high
Valentine	Harden for accessibility	3	Hiking, biking	low	low	high	medium	medium	high	high
Wild Azalea NRT	Harden problem segments	15	Hiking, biking	high	high	top	top	top	top	high
Calcasieu, Vernon Unit										
Enduro	Addition to an existing trail	24	Hiking, biking, horse, ORV	low	low	high	low	top	medium	low
Vernon Camp	Construction of new trail	30	Hiking, biking, horse	medium	low	medium	high	high	medium	high
Whiskey Chitto	Reconstruction to standard	10	Hiking, biking	medium	low	high	medium	medium	medium	high
Caney										
Corney Lake	Construction of a new trail	12	Hiking, biking	medium	low	high	medium	medium	top	high
Caney Unit	Construction of a new trail	20	Hiking, biking, horse	top	high	top	top	top	medium	medium
Corney Lake Horse	Construction of a new trail	16	Hiking, biking, horse	top	high	top	top	top	top	top
Middle Fork	Construction of a new trail	20	Hiking, biking, horse	low	low	high	high	high	medium	medium
Sugar Cane NRT	Addition to an existing trail	15	Hiking, biking	medium	low	top	high	high	high	medium
Catahoula										
Breezy Hill	Construction of a new trail	60	Hiking, biking, horse	low	low	high	high	medium	high	top
Camp Catahoula	Construction of a new trail	10	Hiking, horse	medium	low	top	medium	medium	top	top
Catahoula Loop	Construction of a new trail	18	Hiking, biking	medium	low	high	medium	high	high	high
Hickman	Complete planned trail	50	Hiking, biking, horse, ORV	top	low	top	top	top	high	low
Iatt Lake	Construction of a new trail	18	Hiking, biking	low	low	top	high	medium	high	top
Iatt Lake Pirogue	Construction of a new trail	12	Water craft nonmotorized	medium	low	top	top	top	top	top
Kisatchie										
Kisatchie Bayou Loop	Construction of a new trail	2	Hiking, biking	medium	low	high	high	high	medium	medium
LL Vista Interpretive	Reconstruction to standard	1.5	Hiking	high	high	high	top	top	high	high
Sandstone	Harden problem segments	15	Hiking, biking, horse, ORV	high	high	top	top	top	top	high
Sandstone	Addition to an existing trail	10	Hiking, biking, horse, ORV	high	high	top	top	top	top	high
Winn										
Bayou	Addition to an existing trail	18	Hiking, biking	low	low	top	medium	medium	medium	top
Gum Springs Horse	Addition to an existing trail	12	Hiking, biking, horse	medium	low	top	high	top	medium	top
Gum Springs	Construction of a new trail	6	Hiking, biking	low	low	high	high	high	low	medium
Winn	Construction of a new trail	60	Hiking, biking, horse, ORV	medium	low	high	high	high	low	medium

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year period is 646,899 RVDs.

The amount of recreation use occurring on the Forest would be the greatest under Alternative C. Recreation use is expected to grow at 3.4 percent a year. Alternative C places the greatest emphasis on amenity values that enhance recreation experience quality and opportunity. Overall there would be a greater quantity and quality of recreation opportunities available under this alternative than with the others. The estimated average annual use over the next 10-year period is 723,012 RVDs.

Alternatives D and Mod D would result in an anticipated recreation use growth rate of 2.3 percent annually. Because these alternatives provide a balanced program of dispersed and developed opportunities that would be natural resource-dependent, recreation use is expected to be moderately higher than under Alternatives A and B, but lower than under Alternatives C, E and F. The emphasis of Alternatives D and Mod D on the restoration of natural plant communities could have a negative effect on recreation use during the first 10-year period because of the magnitude of recreation setting alteration. In the long term, restoration of natural plant communities would have a positive effect on recreation settings and should result in increased use. The estimated average annual use over the next 10-year period is 680,023 RVDs.

Under Alternative E, recreation use is projected to grow by 2.5 percent annually — slightly higher than Alternatives D and Mod D. The increased emphasis on the management of hardwood and mixed stands would result in a landscape with greater scenic appeal to recreationists. The wildlife habitat improvements would increase wildlife populations and attract more hunters. The estimated average annual use over the next 10-year period is 687,630 RVDs.

TABLE 4–20, PROJECTED ANNUAL RECREATION USE IN RVDs — DEVELOPED AND DISPERSED

Displayed by Alternative and Year

Year	Alt A	Alt B	Alt C	Alt D	Mod D	Alt E	Alt F
1997	611,460	607,183	619,159	612,572	612,572	613,770	615,566
1998	624,388	615,684	640,211	626,662	626,662	629,114	632,802
1999	637,588	624,303	661,978	641,075	641,075	644,842	650,521
2000	651,068	633,044	684,485	655,820	655,820	660,963	668,735
2001	664,833	641,906	707,758	670,903	670,903	677,487	687,460
2002	678,889	650,893	731,821	686,334	686,334	694,424	706,709
2003	693,243	660,005	756,703	702,120	702,120	711,785	726,497
2004	707,899	669,245	782,431	718,269	718,269	729,580	746,839
2005	722,866	678,615	809,034	734,789	734,789	747,819	767,750
2006	738,149	688,116	836,541	751,689	751,689	766,515	789,247

TABLE 4–21, EFFECTS OF ALTERNATIVES ON FORESTWIDE RECREATION USE

Displayed by Alternative and Indicator

Indicator	Alt A	Alt B	Alt C	Alt D	Mod D	Alt E	Alt F
Recreation use (non-hunt / fish, MRVDs)	497	478	534	503	513	512	518
Wildlife / fisheries use (hunt / fish, M-WFUDs)	175	168	187	178	158	179	181
Amenity DFC prescription (NET ACRES)	0	7,342	180,432	10,541	12,119	10,094	21,868

Alternative F offers the second-highest projected growth rate at 2.8 percent per year — based primarily on anticipated increases in dispersed use resulting from the alternative's wildlife emphasis. Wildlife habitats and populations would be enhanced, attracting more hunters and nonconsumptive wildlife recreationists, such as birdwatchers. The estimated average annual use over the next 10-year period is 699,213 RVDs.

Negative impacts to recreation from increased minerals development activity, noise, and use of heavy equipment would be highest in Alternative A as it has the most acreage available for leasing and would require the least restrictive lease stipulations. Impacts would be lowest in Alternative C which withdraws all Forest lands from leasing as existing leases expire (see Final EIS, Chapter 2, page 2-42 for a more detailed description of leasing differences by alternative). However, as mentioned previously, many of these impacts to recreation would be avoided by implementing mitigation measures for protection of vegetation, special areas, and soil and water that are included in all operating plans and special use permits.

NATIONAL SCENIC BYWAYS

Longleaf Trail National Scenic Byway

The differences between alternatives in potential effects to the Longleaf Trail National Scenic Byway (Byway) would be negligible. The desired future conditions (DFCs) of the lands the Byway passes through, or are adjacent to, vary insignificantly between alternatives. The predominant management areas that would be visible from the Byway include wilderness, national wildlife management preserves, and red-cockaded woodpecker habitat management areas. The management emphasis of these areas would be compatible with the objectives of a national scenic byway designation. Also, there are substantial areas with special allocations of uneven-aged management and old-growth forest along the Byway in all action alternatives.

Under all alternatives mitigation measures would ensure protection and enhancement of the Byway's unique and sensitive characteristics. A 2,000-foot zone on both sides of the Byway would be assigned a *high* SIO ensuring that the corridor's positive visual characteristics would be conserved under all alternatives.

SPECIAL INTEREST AREAS

GENERAL EFFECTS

Effects of fire management on special interest areas (SIAs)

Wildfires could destroy vegetation and disrupt ongoing research. However, because wildfire is a natural process that would be expected to occur on occasion in any given area, it would not necessarily detract from the scientific values of an SIA. Prescribed fire may also be appropriate in some SIAs.

Fire was a natural component of the presettlement upland areas of the Kisatchie National Forest. Fire suppression has altered species composition in many areas by providing a competitive advantage to less fire-tolerant species. The relative rarity of some species may be a consequence of the rarity of habitats or may be a function of human-caused alterations. The use of prescribed fire in a controlled situation followed by monitoring would allow Forest managers to learn more about the effects of fire on rare plants.

Effects of recreation management on SIAs

The designation of SIAs could bring increased recreational traffic into these areas. This dispersed recreation could have a negative impact on the botanical areas from trampling of vegetation, soil compaction, increased erosion and sedimentation from trails, or from recreational plant collection or flower picking which could severely affect some rare species.

There is also a possibility of introduction of noxious weeds into natural areas when trails, especially horse trails, cross SIAs. Horse manure normally contains the seeds of weedy species, which when introduced into natural areas, can start infestations of invasive weeds into systems of native vegetation. These weeds can replace the native vegetation especially in areas with disturbance, such as along a trail. Potential exists for the introduction of noxious weeds which could invade even undisturbed natural areas.

Effects of vegetation management on SIAs

Timber harvest could adversely impact rare plants and their habitat directly through loss of individuals during road construction or reconstruction, skidding, and decking. Habitat alterations, including changes in canopy cover, species composition, and structural diversity, could indirectly affect Forest-listed rare plant habitat. Little is known of the ecological relationships between rare plants and other components of their ecosystems, such as mycorrhizal organisms found in rotting logs and roots. In the absence of a natural fire regime, some vegetation management may be necessary to maintain the character of these areas, including prescribed fire and the imitation of wildfire by bush-hogging of prairies or the cutting of invading trees.

EFFECTS BY LANDTYPE ASSOCIATION (LTA)

The criteria that differentiate landtype associations (LTAs) on the Kisatchie are geology, historical landscape vegetation, and land surface form. Because most special interest areas occur at less than the landscape scale, these criteria would be too broad to significantly influence the effects of proposed management practices on special interest areas. Therefore, the effects described in the *general effects* section for this resource are expected to occur regardless of the LTAs.

EFFECTS BY ALTERNATIVE

Special interest areas (SIAs) are designated by the Forest Service to protect and, where appropriate, foster public use and enjoyment of the areas with scenic, historical, geological, botanical, zoological, paleontological, or other special characteristics.

Forest-listed rare plants occur in several areas proposed for SIA designation. The National Forest System provides for protection or conservation of these species and their habitats regardless of whether an area has a specific management area designation.

Designated SIAs would be protected from off-road motorized use. Travel would be restricted to designated trails and roads. Recreational use would emphasize education and interpretation of the area while protecting the values for which the areas were designated. Generally, SIAs could receive improvements for viewing and interpreting special features, habitats, and resources.

The potential for negative impacts to SIAs from increased minerals development activity, noise, and use of heavy equipment would be highest in Alternatives A, B, D, Mod D, E, and F as they have the most acreage available for leasing and require less restrictive lease stipulations than in Alternative C which withdraws all Forest lands from leasing as existing leases expire (see Final EIS, Chapter 2, page 2-42 for a more detailed description of leasing differences by alternative).

Under all alternatives SIAs would be managed essentially the same way — in conformance with the special interest area standards and guidelines. The areas proposed for designation vary by alternative. Table 4–22 presents the specific areas proposed for SIA designation under each alternative.

Under Alternative A, the Forest's two existing SIAs — Castor Creek and Longleaf Scenic Areas, totaling 371 acres — are the only SIAs that would be designated. The lack of SIA designation for other areas displayed in table 4–22 could decrease their potential for recreational use and scientific study. The unique character of the areas would remain unrecognized by the public. The areas would also lack special protection from normal land management activities and generally lack management designed specifically to enhance the unique characteristics of the areas.

Certain types of activities or developments adjacent to existing or within potential SIAs could result in disturbance to the specific values to be protected, studied, or enjoyed. In the remaining non-established areas, future designation may be precluded by resource development activities such as timber harvest, road construction, or natural events such as fire or flood. The most significant effect upon the potential SIAs would be whether or not the areas are preserved. For areas that receive designation, only the incidental effects associated with recreation development, use, or natural processes would be anticipated.

Alternative B would designate an additional 1,254 acres as SIA in 4 areas — Castor Creek Scenic Area Expansion, Cooter's Bog, Kieffer Prairie and Whiskey Chitto. As Botanical SIAs, Cooter's Bog, the Keiffer Prairies, and the Whiskey Chitto Area would receive protection from many forest management activities. The SIA designation would highlight

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SPECIAL INTERST AREAS

EFFECTS BY ALTERNATIVE

the botanical importance of these unique areas, potentially attracting researchers and recreational wildflower observers. The expansion of the Castor Creek area would more than double the streamside land base of this scenic area, and improve the protection of the scenic resources by inclusion of the larger area. Alternative B would designate only 143 acres of the Whiskey Chitto area (the vicinity of Leo's Bog) as an SIA. This compares to 429 acres in Alternatives D, Modified D, and E and 924 acres for RNA designation in Alternatives C and F. This small area sets aside a minimum number of acres and leaves the remaining acres for other uses.

Alternatives C and F would result in the designation of 905 additional acres of SIA in 4 areas, Castor Creek Scenic Area expansion, Kieffer Prairie, Malaudos Glen and Wild Azalea Seep. The SIA designation of the Keiffer Prairies, Malaudos Glen, and Wild Azalea Seep would attract recreational and research attention to these areas. The expansion of

TABLE 4–22, SPECIAL INTEREST AREA DESIGNATIONS BY ALTERNATIVE

Displayed In Acres, By Type

	Alt. A	Alt. B	Alt. C	Alt. D	Mod D	Alt. E	Alt. F
Bayou Luce					Geological 1,499		
Castor Creek *existing designation*	Scenic 90	Scenic 90	Scenic 90	Scenic 90	Scenic 90	Scenic 90	Scenic 90
Castor Creek Expansion		Scenic 90	Scenic 90	Scenic 90	Scenic 150	Scenic 90	Scenic 90
Cooter's Bog		Botanical 367	***	Botanical 447	Botanical 447	Botanical 447	***
Drake's Creek			***	Botanical 146	Botanical 146	Botanical 146	***
Kieffer Prairie		Botanical 654	Botanical 654	Botanical 654	Botanical 654	Botanical 654	Botanical 654
Longleaf *existing designation*	Scenic 281	Scenic 281	Scenic 281	Scenic 281	Scenic 281	Scenic 281	Scenic 281
Malaudos Glen			Scenic 38	Scenic 38	Scenic 38	Scenic 38	Scenic 38
Tancock Prairie					Botanical 729		
Whiskey Chitto		Botanical 143	***	Botanical 429	Botanical 429	Botanical 429	***
Wild Azalea Seep			Botanical 123				Botanical 123
Total acres	**371**	**1,625**	**1,276**	**2,175**	**4,463**	**2,175**	**1,276**

*** Identifies areas proposed for RNA designation under an alternative. Details are presented in that section.

the Castor Creek area would double the streamside land base of this scenic area. Alternatives C and F would not designate Cooter's Bog or Whiskey Chitto as SIAs because they would receive RNA designation. See the RNA narrative in this section of Chapter 4 for further discussion.

Alternative D and E would designate an additional 1,804 acres in 6 areas, Castor Creek Scenic Area expansion, Cooter's Bog, Drakes Creek, Kieffer Prairie, Malaudos Glen and Whiskey Chitto. Alternative Modified D designates 2 additional areas — Bayou Luce area (1,499 acres), and the Tancock Prairies area (729 acres) — and expands Castor Creek an additional 60 acres. The SIA designation, as proposed here, allows the special designation while allowing a more flexible management plan. By defining these areas as SIAs, attention and protection is drawn to them. For Cooter's Bog, Alternatives D, Mod D and E expand the acreage to 447 acres over the 367 acres of Alternative B. The larger areas for Whiskey Chitto (429 acres, compared to 143 acres in Alternative B) expands this area to include more than just the vicinity of Leo's Bog (143 acres). The larger SIA would make landscape-scale management and protection of this area more prominent.

All of the areas proposed for SIA designation under one or more of the alternatives have been recognized as possessing unique or special characteristics. The protective management and public recognition that would result from SIA designation of each of these areas would be foregone if not designated. However, Cooter's Bog, Drakes Creek, and Whiskey Chitto are proposed for RNA designation under certain other alternatives when not proposed for SIA designation. In addition, Bayou Luce area, Castor Creek Scenic Area, Castor Creek Scenic Area expansion, Cooter's Bog, Drakes Creek area, Longleaf Scenic Area, Tancock Prairie area, Whiskey Chitto area, and Wild Azalea Seep are proposed for management as old growth under one or more alternatives, which could result in a level of resource protection similar to SIA designation.

NATIONAL WILD AND SCENIC RIVERS

GENERAL EFFECTS

Introduction

As part of its land use planning process, the Forest Service has elected to identify and evaluate rivers for their potential as additions to the National Wild & Scenic Rivers System. Kisatchie National Forest identified and evaluated 10 rivers, located either wholly or partially within the Forest proclamation boundary, for inclusion in the National Wild & Scenic Rivers System. The rivers identified for study were listed by the National Park Service on the *Nationwide River Inventory* (National Park Service, January 1982), designated by the state of Louisiana as a State Natural and Scenic River, or recommended by others. Appendices D and E present the results of the eligibility and suitability studies of these rivers. Of the 10 rivers studied for eligibility, 6 segments possessed one or more outstandingly remarkable river-related values, as shown in Appendix D. Appendix E, the study report, addresses the suitability of the six segments of rivers for inclusion in the National Wild & Scenic Rivers System. The study river segments included Castor Creek, Drakes Creek, Kisatchie Bayou, East Fork of Six Mile Creek, West Fork of Six Mile Creek, and Whiskey Chitto Creek.

Saline Bayou is the only National Scenic River currently in the Kisatchie National Forest. Management emphasis for the rivers and their corridors would be focused on protection and enhancement of the values for which they were established, without limiting other uses that do not substantially interfere with public use and enjoyment of those values. The establishment values include *scenery*, *recreation use*, and *free-flowing water*.

National forest management could potentially affect the rivers by constructing or removing recreation facilities and improvements; restricting, prohibiting or encouraging use; altering the land to make it suitable or unsuitable for use; changing the landscape setting, thus altering the type or quality of available, desirable, and appropriate recreation opportunities; and by altering other river values.

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NATIONAL WILD AND SCENIC RIVERS

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Effects of fire management on National Scenic Rivers

Fire management primarily affects the scenery of national rivers by altering the visual qualities of landscape elements. Color and texture would be altered most by prescribed fire. Smoke could cause short-term impacts to recreationists in the area.

Effects of lands and minerals management on National Scenic Rivers

Land adjustment

Consolidation of national forest ownership would improve the quality of recreation opportunities offered. This would also facilitate the protection of river values through more efficient management. Mitigation measures focusing the highest priority for acquisition on lands within river corridors would benefit recreation opportunities and management.

Land use and rights-of-way

Utility rights-of-way could provide improved access to dispersed areas, but could also negatively affect scenery and other river values by introducing strong linear elements incongruent with the natural-appearing characteristic landscape.

Minerals management

Prohibitions against the sale of common-variety minerals would protect river values. Oil and gas leasing could occur; however, a lease stipulation of *no surface occupancy* within 600 feet of the centerline of the river in Alternatives A, B, D, Mod D, E, and F, and withdrawl from leasing in Alternative C, would protect river values. The exercise of reserved and outstanding mineral rights could affect river values by introducing constructed features that contrast visually with the surrounding landscape or by altering biophysical resources.

Effects of recreation management on National Scenic Rivers

A river corridor management priority would provide high-quality recreation opportunities. Construction of additional recreation facilities in the corridors would increase recreation opportunities. Additional developed facilities could alter recreation settings.

Where appropriate, restrictions on boat motors would protect river values and ensure recreation opportunities at the more primitive end of the *recreation opportunity spectrum* (ROS). Restricting the number of outfitter guides operating in the corridors where applicable would protect river values and ensure that overcrowding does not occur. Prohibition and restriction of off-road vehicles negatively affects that recreation activity, but would protect river values from potential adverse impacts and ensure a more primitive experience for other types of recreation.

Maintaining river channels for boating where applicable would improve the quality of the recreation experience provided to river users. Construction of hiking trails along the river corridors would enhance recreation use opportunities.

Effects of scenery management on National Scenic Rivers

Protection and enhancement of scenic resources would positively affect river values.

Effects of structures management on National Scenic Rivers

Structures management directly affects the quality of recreation opportunities offered in the river corridors. High-quality facility management and maintenance would positively affect the rivers by providing recreationists with high-quality recreation experiences, while minimizing impacts to other resources.

Effects of vegetation management on National Scenic Rivers

Timber management efforts in the river corridors would focus on protecting and enhancing river values. Intermediate, special, and sanitation cuts would protect and enhance river values by removing hazard trees, performing wildlife stand improvement, controlling insects and diseases, improving aesthetics, and removing trees designated for salvage.

Effects of wildlife management on National Scenic Rivers

Wildlife habitat improvement activities would be consistent with river management objectives. In-stream fish habitat cover structure could cause a detrimental effect to boating where applicable if channels are not kept clear of major blockages. Prohibition of commercial fishing and trapping in the rivers and their corridors would positively affect wildlife populations as well as consumptive and nonconsumptive wildlife uses. Trapping of nuisance beaver to control or prevent resource damage would enhance river and corridor values. Retention of all cavity trees would positively affect wildlife populations and the scenic condition of the corridors. Using manual methods, prescribed fire, and herbicides as tools to manipulate vegetation for wildlife habitat improvement would enhance wildlife populations within the river corridor.

EFFECTS BY LANDTYPE ASSOCIATION (LTA)

The criteria that differentiate LTAs on the Kisatchie are geology, historical landscape vegetation, and land surface form. Because all existing and suitable rivers are within riparian areas in LTAS 1, 2, 4, 6, and 7, and effects would not vary significantly between these LTAs, the effects described in the *general effects* section for this resource are expected to occur throughout the area.

EFFECTS BY ALTERNATIVE

The Forest currently has one designated national wild and scenic river: Saline Bayou National Scenic River. See Appendices D and E of this document.

Saline Bayou National Scenic River is managed to protect its free-flowing condition and to preserve and enhance the values for which it was established. The national forest lands and waters within the designated river corridor would be managed the same under all alternatives. The variations in management and potential consequences that would result from implementation of the alternatives outside the boundary of the scenic river corridor would not have a significant effect on the river.

Potential negative impacts to the scenic quality along the Saline Bayou National Scenic River from minerals development would be slightly higher in Alternatives A, B, D, Mod D, E, and F. These alternatives have more acreage available for leasing and apply a *No Surface Occupancy* (NSO) lease stipulation within 600 feet of the centerline of the River, whereas, in Alternative C, all Forest lands would be withdrawn from leasing as existing leases expire (see Chapter 2, pages 2-17 through 2-35, and page 2-42 for a more detailed description of leasing differences by alternative).

The designated Louisiana natural and scenic rivers on the Forest would be adequately protected under all alternatives. Their corridors would receive an equal level of protection under all alternatives. Under all alternatives, a zone of 100 feet on each side of the channel — a total of 200 feet — which is the corridor of concern addressed in the Louisiana Natural and Scenic Rivers Act, would be designated as a *streamside habitat protection zone* (SHPZ) on all Louisiana natural and scenic rivers on the Forest.

The SHPZ would provide for a level of protection that exceeds the minimum requirements of the Louisiana Natural and Scenic Rivers Act. Certain types of actions, if proposed, such as bridge construction, would require the approval of Louisiana Department of Wildlife and Fisheries.

All tributaries in watersheds of scenic streams would have SHPZs that would provide for maximum protection of water quality. Protection of downstream water quality in scenic stream watersheds would not vary significantly by alternative.

The SHPZ requirements and other Forestwide and management area standards and guidelines, would ensure the equal protection of the scenic resource under all alternatives within the 200-foot corridor. Lands beyond the corridor but still visible from the river channels, would potentially be affected differently by the alternatives. These potential scenic effects would be mitigated to an acceptable level by the forestwide and management area standards and guidelines. The foreground zone (2,000 feet) on each side of the channel would be assigned a SIO of *high* under all alternatives.

Alternative options for recommending the eligible rivers for federal or state designation were considered and evaluated. This analysis can be found in Appendix E of this Final EIS. No alternative would propose federal or state rivers designation for Castor Creek or Drakes Creek. The resource values of these creeks would be protected through forestwide mitigation measures to protect streamside and riparian habitats. Castor Creek would have additional protection through mitigation measures to protect the Louisiana pearlshell mussel; while additional mitigation measures would be afforded Drakes Creek by its inclusion within the Drakes Creek Natural Area.

Alternative C would recommend Kisatchie Bayou for national scenic river designation. Alternatives A, B, D, Mod D, E, and F would propose no federal scenic designation, but the resource values of Kisatchie Bayou would be protected through its designation as a Louisiana Natural and Scenic River and by forestwide mitigation measures to protect streamside and riparian habitats.

No alternative would propose federal river designation for Six Mile Creek (East and West Forks) and Whiskey Chitto Creek. The resource values of these creeks would be protected through their designation as Louisiana Natural and Scenic Rivers and by forestwide mitigation measures to protect streamside and riparian habitats.

WILDERNESS

GENERAL EFFECTS

Introduction

The 8,700-acre Kisatchie Hills Wilderness (KHW) is the only designated wilderness on the Forest. It was designated in 1980 by the Colorado Wilderness Act. Kisatchie Hills would be managed to ensure that its wilderness character and values endure and remain dominant. Opportunities for solitude and unconfined primitive recreation would be protected and enhanced.

Effects of fire management on wilderness

Suppression

Suppression of all human-caused wildfires would minimize the potential effects on wilderness values. It would also reduce the risk to private property, human life, and to threatened and endangered species. Allowing lightning-caused fires to burn if prescribed conditions are satisfied would be consistent with the wilderness management objective of permitting natural processes to operate unimpeded.

Using primarily nonmotorized fire fighting tools — unless there is an unacceptable risk to private property, life, or threatened and endangered species — would protect and enhance opportunities for solitude and primitive types of recreation.

Rehabilitating firelines as soon as possible after a fire is controlled would help minimize the effects normally associated with fire suppression.

Prescribed fire

Use of management-ignited fire in the absence of prescribed natural fire — such as lightning-caused fires — would reduce to an acceptable level the risks and consequences of wildfire occurring within, or escaping from, the wilderness.

Maintaining fuel loadings at 8 to 12 tons per acre would duplicate natural conditions and maintain ecosystem integrity.

Use of natural fire breaks and minimum-standard fire lines would minimize potential soil disturbance. Use of hand tools and draft animals for fireline construction would maintain opportunities for solitude and reduce other wilderness resource effects.

Effects of forest health management on wilderness

Allowing indigenous insect and plant diseases to play their natural ecological role as nearly as possible would be consistent with wilderness management principles.

The risk of allowing insect and disease to play a near-natural role in wilderness would be minimized by allowing control practices to take place for an individual SPB infestation when it threatens: 1) an active RCW cluster site or foraging area, or, 2) an area within 1/4-mile of susceptible host type on State or private land, or high-value, non-commercial, Federal forest resources. Using modified control methods would reduce the amplitude of potential effects to solitude and other wilderness resources and values.

Use of motorized ground vehicles in SPB control efforts, which could occur only with Regional Forester approval, would ensure that potential adverse effects on solitude and other wilderness values are minimized.

Effects of lands and minerals management on wilderness

Permitting special uses on a case-by-case basis could result in increased benefits to society while protecting wilderness values. Prohibiting competitive events, survival exercises — including military — and other activities of this nature would insure protection of wilderness values. The prohibited activities would normally be permitted outside the wilderness.

Curtailing leases or sales of common variety minerals would eliminate risks to wilderness values associated with common-variety mineral extraction. Potential benefits to society from minerals that could be extracted would, however, be forgone. No leasing would occur for oil and gas exploration or development, but if drainage did occur, affected wilderness lands could be leased with a *no surface occupancy* stipulation under all alternatives except C, where the Forest would be totally withdrawn from leasing as existing leases expire.

Effects of range management on wilderness

Prohibition of grazing would preserve and protect values that could be affected by grazing activity. Grazing lands outside the wilderness would be available.

Effects of recreation management on wilderness

Allowing overnight use without a permit would be consistent with the wilderness management principal of providing opportunities for unconfined recreation with minimum regulation and minimal risk to wilderness resource values.

Prohibiting groups larger than 25 people would minimize risks to wilderness values without adversely affecting the majority of groups desiring to use the wilderness.

Encouraging visitors to practice *"leave no trace"* camping techniques and discouraging them from camping at trailheads and parking areas would protect and perpetuate wilderness values.

Locating campsites to take advantage of vegetation and topographic screening would provide moderate-to-high solitude. Locating campsites at least 100 feet from trails, streams, key interest features, and other campsites would provide increased opportunities for solitude as well as protecting and enhancing other wilderness values.

Banning camp fires during periods of high fire danger would minimize risk to wilderness values and to recreationists.

Requiring voice control or physical restraint for pets would protect wilderness values without unnecessarily restricting visitor freedom.

Prohibiting the use of mechanical transport except in emergency situations would normally protect wilderness values.

Use of the *limits of acceptable change* (**LAC**) system would insure wilderness values are protected while allowing reasonable use.

Allowing equestrian use of certain trails and zones, but prohibiting equestrian use on other trails and zones, would protect and enhance wilderness values while allowing reasonable use.

Allowing new trail construction would insure that reasonable future demand could be accommodated.

Providing only minimal levels of signing on trails would insure protection of opportunities for primitive recreation.

Effects of transportation management on wilderness

Old roads in existence at the time of wilderness designation are being slowly obliterated — by natural processes and the passage of time. However, some abandoned roads have been selected as hiking / horse trails which create positive effects on the wilderness recreation experience.

Effects of vegetation management on wilderness

Classifying wilderness as unsuitable and not available for timber production would protect and enhance wilderness values.

Allowing fire and other natural processes to determine plant composition and distribution would be consistent with wilderness management objectives and could positively affect wilderness attributes.

Effects of wildlife management on wilderness

Activities to improve wildlife and fish habitats would usually be prohibited in wilderness — except to maintain habitat for threatened or endangered species.

EFFECTS BY LANDTYPE ASSOCIATION (LTA)

The Kisatchie Hills Wilderness contains portions of **LTAs 2** and **7**. Fire suppression in **LTA 2**

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EFFECTS BY LANDTYPE ASSOCIATION (LTA)

EFFECTS BY ALTERNATIVE

would affect the development of vegetation by allowing longleaf-scrub oak communities to slowly develop into shortleaf-oak communities over time. Use of prescribed or natural fire in LTA 2 could adversely affect soil productivity, especially on Kisatchie soils, and increase the potential for erosion and sedimentation. Lack of human-caused forest health management activities in LTA 7 would allow the mixed hardwood-loblolly pine stands to become more susceptible to losses from SPB. Over time, LTA 7 would slowly become a bottomland hardwood area.

Other effects described in the *general effects* section would not vary significantly by LTA and would apply throughout the area.

EFFECTS BY ALTERNATIVE

The analysis of management options for Kisatchie Hills Wilderness was developed using the *limits of acceptable change* (LAC) system. The LAC system defines a framework for establishing acceptable and appropriate resource and social conditions in wilderness settings. The LAC process consists of a series of interrelated steps leading to development of a set of measurable objectives that define desired wilderness conditions and the management actions necessary to maintain or achieve them. A complete description of the process can be found in "The Limits of Acceptable Change (LAC) System for Wilderness Planning" January 1985, George H. Stankey and others. Options were developed and assigned to plan alternatives for important and sometimes controversial management issues and elements. Options were not developed for management elements in the Kisatchie Hills Wilderness that do not vary from alternative to alternative, such as scenery and timber management direction.

Group use and permit requirements

Maximum group size in Alternative A would not be restricted. Groups over 25 would be required to obtain a group-use permit in accordance with current regulation. Implementation of this alternative would result in the greatest potential for adverse effects to wilderness values from group use but also allows the most unrestricted use of the wilderness by visitor groups.

In Alternatives B, D, Mod D, and E maximum group size would not exceed 25 total individuals, stock, or pets; for example, 12 people on 12 horses with 1 dog would equal 25. Adverse impacts to wilderness values that could result from use of the area by groups of more than 25 would be avoided. Large groups would not have the opportunity to experience the wilderness together but they would have the option of dividing into smaller groups before entering the wilderness.

In Alternative C maximum group size would not exceed 25 total individuals. Groups of 10 or more would need to obtain a permit for overnight use. In addition to these requirements, this alternative would allow management to exercise greater control of groups between 10 and 25 individuals, thereby minimizing potential impacts to wilderness values. Groups of more than 10 individuals would be inconvenienced by the requirement to obtain a permit, and increased administrative costs to the Forest Service would be incurred.

Maximum group size in Alternative F would be 10 total individuals. All users would be required to obtain a permit for overnight use. This alternative offers the highest level of protection of wilderness values from potential effects of group and overnight use but also reduces recreation use convenience and opportunities.

Opportunity zones and trail system

One of the primary steps in the LAC process is development of opportunity zone descriptions. Opportunity zones (OZ) descriptions provide qualitative descriptions of the kinds of resource and social conditions acceptable in each zone. In the LAC process all wilderness acres are allocated to one of the defined zones. The three opportunity zones established for Kisatchie Hills Wilderness are described below, followed by explanation of the alternatives and consequences.

Opportunity Zone I (OZ I)

- Includes all lands beyond 660 feet (1/8 mile) of any developed trail, trailhead, perimeter road or adjacent developed recreation site.
- Contains no developed and maintained trails. Discernible, unmaintained travel routes resulting from previous off-trail

use may exist. No equestrian use is allowed.

- Evidence of previously used campsites is very uncommon.
- Exotic plant species are not evident.
- Past evidence of human activity is not readily apparent. Evidence of natural occurrences that alter the landscape, such as fire and southern pine beetle infestations, is apparent in parts of this zone.
- Opportunities for solitude are high, the likelihood of contact with other wilderness visitors is low. The potential for contact with Forest Service personnel is also low. Maintenance and compliance activities are scheduled on an as-needed basis.

Opportunity Zone II (OZ II)

- Includes all low standard secondary trails open only to human foot travel and all lands within 660 feet of these trails.
- Contains low standard hiking trails. The trails are more difficult than **OZ III** trails, with narrow tread widths and clearing limits as well as steeper grades. Trail maintenance would be less frequent that on **OZ III** trails. Discernible, unmaintained travel routes resulting from previous off-trail use may also exist.
- Evidence of previously used campsites is uncommon.
- Exotic plant species are not evident.
- Past evidence of human activity is not readily apparent. Evidence of natural occurrences that alter the landscape, such as fire and southern pine beetle infestations, is apparent in parts of this zone.
- Encounters with other wilderness visitors may occasionally occur on the trails, but are unlikely while off-trail or camped. The potential for contact with Forest Service personnel is low-to-moderate.

Opportunity Zone III (OZ III)

- Includes all primary trails open to human foot travel and equestrian use and all lands within 660 feet of these trails. Discernible, unmaintained travel routes resulting from previous off-trail use may exist. The trail is designed, constructed and maintained to support hiking and equestrian use. For hiking, the trail difficulty level is *easiest*; for equestrian use, *more difficult*. Trail maintenance is more frequent than for **OZ II** trials.
- Previously used campsites are occasionally seen.
- Past evidence of human activity is not common. Evidence of natural occurrences that alter the landscape, such as fire and southern pine beetle infestations, is apparent in parts of this zone.
- Encounters with other wilderness visitors are fairly common on the trails, but are less likely while off-trail or camped. The potential for contact with Forest Service personnel is moderate.

In Alternatives A and C the existing trail and corridor system would be managed in accordance with **OZ III** standards. Additional trails would be allowed in accordance with **OZ II** standards if demand warrants. The remainder of the Wilderness would be managed in accordance with **OZ I** standards.

These alternatives would provide the least primitive experiences and challenge because all existing trail would be managed at **OZ III** standards.

In Alternative E, the Backbone Trail and corridor from FS Road 339 to the intersection with the Turpentine Hill Trail and the Turpentine Hill Trail and corridor, would be managed in accordance with **OZ III** standards. The remaining developed trails and associated corridors would be managed in accordance with **OZ II** standards. Management for the remainder of the Wilderness would be in accordance with **OZ I** standards. No additional trail construction would be allowed.

This alternative would provide for a wide range of wilderness experiences that should meet the needs of a large number of wilderness visitors.

In Alternatives D and Mod D, the Backbone Trail and corridor from FS Road 339 to the intersection with the Turpentine Hill Trail and the Turpentine Hill Trail and corridor, would be managed in accordance with **OZ III** standards. The remaining trails would

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be managed in accordance with OZ II standards. The remainder of the Wilderness would be managed in accordance with OZ I standards. Additional trail construction would be allowed in accordance with OZ II standards, if demand warrants.

This alternative would provide for a wide range of wilderness experiences that should meet the needs of a large number of wilderness visitors and the opportunity for additional trail construction.

In Alternative F all existing trails and associated corridors would be managed in accordance with OZ II standards. No additional trail construction would be allowed. The remainder of wilderness would be managed in accordance with OZ I standards.

Equestrian use of the trail system would be prohibited. This alternative would offer more challenge for wilderness visitors than Alternatives A, C, D, Mod D, and E, but not as much as Alternative B. Visitors desiring a wilderness experience consistent with OZ III standards would be adversely affected.

Maintenance of the trail system would be discontinued under Alternative B. The entire Wilderness would be managed to OZ I standards. This alternative would provide the highest level of challenge and most primitive experience for wilderness visitors but would make access too difficult for many people to enjoy the area.

Fire management

Wildfire

In Alternatives A, B, and E, all lightning- and human-caused fires would be suppressed using suppression strategies documented in the *Fire Management Action Plan* (FMAP).

These alternatives would result in the accumulation of unnaturally high fuel loads which would support intense fire if ignited. This unnaturally intense fire could damage wilderness values, endanger wilderness visitors and threaten adjacent private lands. Potential impacts to the vegetation, wildlife, soil, and water resources would be much higher under these alternatives than those that allow fires of low intensity to burn the area on a periodic basis. Excluding fire would eliminate the natural cyclic burning that occurred in the Kisatchie Hills Wilderness and therefore interferes with the free play of natural processes.

In Alternatives C, D, Mod D, and F, all human-caused fires would be suppressed using suppression strategies documented in the FMAP. Lightning-caused fires would be allowed to burn if prescribed conditions are met as documented in the FMAP. Lightning-caused fires would be suppressed when prescribed conditions are exceeded.

Allowing lightning-caused fires that meet prescribed conditions to burn would mimic natural processes and could contribute to maintaining fuel loadings at a desirable level. The real probability of lightning-caused fires occurring often enough to maintain fuel loadings at a desirable level, is considered remote.

Prescribed fire

Both prescribed natural fire (PNF) and management-ignited fire would be prohibited under Alternatives A, B, and E.

These alternatives would result in extremely hazardous fuel loadings and the potential for intense fire that cannot be controlled by ordinary means. This unnaturally intense fire could damage wilderness values, endanger Wilderness visitors and threaten adjacent private lands. Potential impacts to the vegetation, wildlife, soil and water resources would be much higher under these alternatives than those that allow management fires of low intensity to burn the area on periodic basis. Excluding fire eliminates the natural cyclic burning that occurred previously in the Kisatchie Hills Wilderness and therefore interferes with the free play of natural processes.

In Alternative C only PNF would be allowed. No management-ignited fires would be permitted. If natural ignitions meeting prescribed conditions do not occur, this alternative would result in extremely hazardous fuel loadings and the potential for intense fire that cannot be controlled by ordinary means. The real probability of lightning-caused fires occurring often enough to maintain fuel loadings at a desirable level is considered remote. The unnaturally intense fire that could occur would damage wilderness values, endanger Wilderness visitors and threaten adjacent private lands. Potential impacts to the vegetation, wildlife, soil and water resources would be much higher under this alternative than those that allow management fires of low intensity to burn the area on periodic basis. Without the use of management-ignited fire, it is not likely that low intensity fires would occur on a cyclic basis and natural processes would not be mimicked.

In the absence of PNF, management-ignited fire would be used under Alternatives D and Mod D at the landscape level or on specific areas to maintain fuel loadings at a level that reduces, to an acceptable level, the risks and consequences of wildfire occurring within or escaping from the Wilderness. Natural fuels would be maintained at 8 to 12 tons per acre, resulting in a high fire hazard level rating. Fuel loadings would be monitored and burning planned based on actual fuels present. The estimated burning frequency needed to maintain fuels below 12 tons per acre is 5 to 8 years.

Periodic burning to reduce fuel loads would mimic natural processes and therefore would have a positive effect on wilderness values. It would also result in a more open understory in many areas and contribute to scenic diversity. The more open understory would facilitate cross-county travel by Wilderness visitors.

In the absence of PNF, management-ignited fire under Alternative F would be used at the landscape level or on specific areas to maintain fuel loadings at levels which reduce to an acceptable level the risks and consequences of wildfire occurring within or escaping from the Wilderness. Natural fuels would be maintained at 4 to 8 tons per acre, resulting in a moderate fire hazard level rating. Fuel loadings would be monitored and burning planned based on actual fuels present. The estimated burning frequency needed to maintain fuels below 8 tons per acre is 3 to 5 years.

Periodic burning to reduce fuel loads would mimic natural processes and therefore would have a positive effect on wilderness values. Periodic burning would result in a more open understory in many areas and contribute to scenic diversity. The more open understory would facilitate cross-county travel by Wilderness visitors.

Alternatives D, Mod D, and F would minimally affect soil and water resources. Prescribed burning would be expected to exceed tolerable soil loss rates unless limited on severely eroded Kisatchie soils. A large area of these soils is located southeast of Longleaf Vista. Implementation of mitigation measures would protect these soils from adverse impacts. Prescribed burning to reduce loading to a moderate level may not be needed because of the low fertility of these soils.

Permanent firelines

No permanent fireline would be constructed under Alternatives A, B, C, and E. The lack of a permanent fireline would increase the difficulty of fire suppression efforts and increase the probability of wildfires escaping the Wilderness and impacting adjacent private lands.

In Alternatives D, Mod D, and F an easement to construct and maintain a permanent fireline adjacent to the Wilderness area on private lands would be pursued.

A permanent fireline would facilitate wildfire suppression and management ignited burning efforts.

Use of fire suppression tools

Primarily nonmotorized fire fighting tools such as rakes, axes, shovels, flaps, and Pulaskis would be used under Alternatives A, D, Mod D, E, and F. If an unacceptable risk to private property / life or proposed, endangered, threatened, or sensitive species occurred, appropriate motorized fire fighting tools would be used, with Forest Supervisor approval. Chain saws, ATVS, blowers, fire line explosives and aircraft could be used where needed for suppression of the target fire at the smallest possible size. Only with Regional Forester approval could tractor plow units be used within the boundary of the Wilderness, after other techniques have proven to be unsuccessful.

In Alternatives B and C, primarily nonmotorized fire fighting tools such as rakes, axes, shovels, flaps and Pulaskis would be used. If an unacceptable risk to private property / life or proposed, endangered, threatened, or sensitive species occurred, appropriate motorized fire fighting tools would be used with Forest Supervisor approval. Chain saws, ATVS, blowers, fireline explosives and aircraft could be used where needed for suppression of the target fire at the smallest possible size. Tractor plow units would not be used within the Wilderness. Subject to landowner's approval, tractor plow units could be used in emergency situations to construct temporary firelines on private lands adjacent to the Wilderness.

LAND USE AND IMPROVEMENTS

WILDERNESS

EFFECTS BY ALTERNATIVE

Lands

Land acquisition or easements for permanent firelines

No easement would be needed under Alternatives A, B, C, and E, since no permanent firelines would be constructed.

In Alternatives D, Mod D, and F, acquisition of easements or land along the boundary of the Wilderness for use in the development of permanent firelines would be pursued.

Wildlife and fish

During consultation on the *Environmental Impact Statement for the Suppression of the Southern Pine Beetle*, the U.S. Fish & Wildlife Service declared some wilderness RCW groups essential to the recovery of the species. The Kisatchie Hills Wilderness RCW groups were not among those considered as essential (**USDA, Forest Service 1987**). The alternative selected for implementation from the *Final Environmental Impact Statement for the Management of the Red-cockaded Woodpecker and its Habitat on National Forests in the Southern Region* (**USDA, Forest Service, 1995**) considers all wilderness RCW groups as nonessential to recovery of the species. That determination was based on new technology consisting of artificial cavities and translocation which have developed since 1987. In addition, it is expected that all recovery populations can meet recovery objectives without wilderness acres and support populations — such as those on the Kisatchie District — can maintain short-term viability without wilderness acres. However, due to obligations under the Endangered Species Act, wilderness RCWs should be managed. Alternatives that proposed no active management for the KHW RCW groups must go through formal consultation with the U.S. Fish & Wildlife Service and must obtain an incidental take statement. Other than the RCW, no management for any other wildlife or fish species would be considered in the Wilderness under any alternative.

The KHW would be excluded from an RCW *habitat management area* (HMA) in all alternatives. Alternatives A, B, D, Mod D, and E would have no active management for existing RCW cluster sites located inside the Wilderness. The use of artificial cavities, associated midstory control, and prescribed burning outside the Wilderness boundary would encourage existing active RCW clusters to relocate outside the Wilderness.

Alternatives A, B, and E, with the suppression of all wildfires and no use of management-ignited prescribed fire would cause accumulation of unnaturally high fuel loads — which if ignited could diminish habitat, causing the groups to move out of the Wilderness. Aside from the threat of loss of habitat due to wildfire, without periodic fire or other vegetation manipulation the habitat would become unsuitable for the RCW in the Wilderness due to the development of dense hardwood and pine midstory. Midstory conditions have made most of the Wilderness unsuitable for RCW (**USDA, 1995**).

Alternatives D and Mod D would allow for the use of prescribed natural fire and also management-ignited prescribed fire. Periodic fire would result in the maintenance of some suitable habitat for the active RCW clusters in Wilderness while the Wilderness groups were being encouraged to move to suitable habitat outside of the Wilderness. However, the expected 5–8 year frequency may not be sufficient to control midstory encroachment.

Alternative C would allow only the use of hand tools to reduce midstory and maintain active KHW RCW cluster sites. The use of artificial cavities, associated midstory control, and prescribed burning outside the Wilderness boundary would encourage existing active RCW clusters to relocate outside of the Wilderness.

Alternative C would also allow for the use of prescribed natural fire. Its utilization — along with the use of hand tools for midstory control — would provide some marginal to suitable habitat for Wilderness RCW clusters. The likelihood of significant beneficial effects to RCW habitat from prescribed natural fire would be remote due to the low probability of its occurrence. Midstory control would benefit Wilderness clusters while the Wilderness clusters were being encouraged to move to suitable habitat outside of the Wilderness.

Alternative F would allow the use of prescribed burning at the landscape level and hand tools to maintain active KHW RCW cluster sites. The use of prescribed natural fire would also be allowed. The use of management-ignited prescribed fire, prescribed natural fire, and hand tools would provide suitable habitat for Wilderness RCW clusters.

Southern pine beetle

The SPB is a recurrent component of Kisatchie Hills Wilderness. As indicated in the introduction of this section, the KHW RCW clusters are considered nonessential to the recovery of the species. In all alternatives except F, SPB control would not be initiated to protect active Wilderness RCW clusters or their foraging habitat. However, SPB control could be initiated within the Wilderness to protect RCW clusters or their foraging habitat outside of the Wilderness if they are immediately adjacent (within 1/4 mile) to the Wilderness boundary. Foraging habitat that occurs in the Wilderness would not be protected. The same guidelines that apply to the protection of private land in the 1987 SPB ROD (pages 30–33) would also apply to the protection of RCW clusters or foraging habitat immediately adjacent to the Wilderness. For example, if an RCW cluster or foraging habitat occurred across a road from Wilderness, and the infestation is predicted to leave the Wilderness, control within the Wilderness would be justified providing it meets the criteria as outlined in the 1987 SPB ROD.

No SPB control action would be taken in Alternatives A, B, C, D, Mod D, and E in KHW unless infestation occurs within 1/4 mile of susceptible host on private lands or high value forest resources on Federal land, or within 1/4 mile of active RCW clusters / foraging immediately adjacent to (within 1/4 mile) of KHW, and is predicted to spread, causing unacceptable damage. Control actions could include cut and leave, cut and hand spray, cut and remove, or combinations of the above.

In Alternative F, control of SPB would occur in KHW to protect only active RCW clusters. The criteria that would trigger initiation of control action are: SPB infestations must be within 1/2 mile of an active cluster, adverse effects are likely to occur within the next 30 days, and the continued existence of the cluster is in question. The SPB control actions to protect private lands and RCW clusters / foraging outside the Wilderness would be the same as all other alternatives.

ROADLESS AREAS

GENERAL EFFECTS

Federal regulations governing the formulation of forest plans require that roadless areas be inventoried, evaluated, and considered for recommendation as potential wilderness during the planning process.

Kisatchie National Forest has previously been inventoried for roadless areas. Three areas meeting roadless area criteria were identified on the Forest by the RARE II inventory in 1979: Kisatchie Hills for 9,120 acres; Cunningham Brake for 2,100 acres; and Saline Bayou for 6,479 acres.

During the Plan revision effort, the capabilities of geographical information systems were employed to re-inventory the Forest for potential roadless areas. This evaluation revealed that the Forest has no additional areas meeting the roadless area criteria as defined in *Forest Service Handbook 1909.12*, chapter 7.11b. This current roadless area inventory and evaluation is presented in Appendix C of this EIS.

The Kisatchie Hills roadless area was designated wilderness in 1980 by the Colorado Wilderness Act. The other two RARE II areas on the Forest, Saline Bayou and Cunningham Brake, were reevaluated in 1985 during formulation of the original Forest Plan. Both were recommended for nonwilderness uses.

Saline Bayou was designated a national wild & scenic river by Congress in 1986. Its 6,030-acre designated corridor varies in width but generally extends 1/4-mile on each side of the bayou. The corridor differs somewhat from the RARE II area because it includes more riparian habitat and less upland.

Saline Bayou no longer meets the inventory criteria for wilderness areas east of the 100th meridian. The stream is managed with the goal of non-degradation under the requirements of the National Wild & Scenic Rivers Act.

In 1990, 1,796.8 acres were designated as the Cunningham Brake Research Natural Area (RNA), 1,646 acres of which lies within the 2,100-acre Cunningham Brake RARE II area. Designated RNAs provide for non-manipulative research, observation, and study of undisturbed ecosystems typifying important forest types. Management emphasis in Cunningham Brake is to maintain the area in a natural condition by allowing physical and biological processes to operate without human intervention.

Although Cunningham Brake does meet the inventory criteria for roadless areas east of the 100th meridian, it is not recommended for wilderness designation. Most of it is designated as a RNA. Management activities with the potential of altering the area's roadless characteristics would not occur in the RNA. The area's natural untrammeled appearance would not likely be altered.

The 454 acres of the roadless area not within the RNA are classified as suitable for timber production in most alternatives and are available for other uses as well. It is likely these lands were initially included in the RARE II inventory simply for mapping convenience, as they are not an integral part of the "brake" ecosystem. If Cunningham Brake is ultimately proposed for wilderness designation it is unlikely these upland areas would be included within the boundary. Timber harvest, silvicultural practices, road construction, and other management activities that could occur on the these acres would potentially affect roadless characteristics and compliance with eligibility criteria. Site-specific effects to the roadless character would be analyzed and disclosed when and if project proposals are made within this area.

EFFECTS BY LANDTYPE ASSOCIATION (LTA)

The criteria that differentiate LTAs on the Kisatchie are geology, historical landscape vegetation, and land surface form. The Cunningham Brake area occurs predominantly within LTA 7. Small portions also occur within riparian areas in LTAs 3 and 4. The effects would not vary significantly between these LTAs. The effects described in the *general effects* section are expected to occur throughout the area.

EFFECTS BY ALTERNATIVE

The consequences of the alternatives on the roadless characteristics of the Cunningham Brake RARE II area acreage not included in the RNA would vary by alternative. Road construction, mineral extraction and timber harvest are the management activities that would have the greatest potential of adversely impacting the roadless characteristics of this area. None of the potential effects described below would be likely to have a significant bearing on the eligibility of Cunningham Brake for wilderness designation.

Implementation of Alternative C would result in the least potential impact to the roadless characteristics of the 454 acres outside of the RNA boundary. The land would be located within a proposed old-growth patch.

Alternative B would result in the most potential effects to the area's roadless characteristics. Because of this alternative's focus on commodity production and the allocation of forest products desired future conditions (DFCs), the likelihood of road construction, timber harvest and mineral extraction is greater than under the other alternatives.

Alternatives A, D, and Mod D,would result in potential consequences to roadless characteristics similar to Alternative B but to a reduced level. Under Alternatives D and Mod D, restoration of native species would be considered a positive effect to roadless character in the long term.

Under Alternatives C, E and F the potential for adverse consequences to roadless qualities and potential eligibility for future wilderness designation would be minimal. The DFC of "amenity values" is assigned to the area under Alternative C and the DFC of "hardwoods" under Alternatives E and F. Management activities that would have an appreciable negative effect on roadless characteristics are not anticipated under these DFCs.

RESEARCH NATURAL AREAS

GENERAL EFFECTS

Effects of fire management on research natural areas

Current direction allows the use of fire to preserve a vegetation type only when absolutely necessary and only with extreme caution. Because the Bayou Beouf and Cunningham Brake RNAs lie in floodplains, they would experience little natural fire, and would therefore be generally unaffected by fire suppression.

Effects of minerals management on research natural areas

The Forest allows no surface activities involving mineral extraction within RNA boundaries. Potential exists for impacts to RNAs from off-site mineral activities, but mitigation measures would minimize any impact.

Effects of recreation management on research natural areas

Off-road vehicle use could cause rutting within RNAs. Efforts to limit off-road vehicle impacts to RNAs would continue.

EFFECTS BY LANDTYPE ASSOCIATION (LTA)

The criteria that differentiate LTAs on the Kisatchie are geology, historical landscape vegetation, and land surface form. Because most RNAs occur at less than landscape scale, these criteria would be too broad to have any significant influence on the effects of proposed management practices on RNAs. Therefore, the effects described in the *general effects* section for this resource are expected to occur equally across the LTAs.

EFFECTS BY ALTERNATIVE

In all alternatives, the mitigation measures would permit very few activities to affect research natural areas (RNAs). Forest Service direction limits the types of activities that can occur in RNAs.

Forest-listed rare plants occur in several areas proposed for RNA designation, shown in table 4–23. The National Forest System provides for protection or conservation of these species and their habitats regardless of whether an area has a specific management area designation.

Because these types of areas also provide recreation opportunities, they affect the capability of the Forest to meet present and projected demand for various dispersed and developed recreation settings. The designation of special, restricted use areas also affects the capability of the Forest to provide other recreational opportunities and services.

Two RNAs currently exist under Alternative A: Cunningham Brake and Bayou Boeuf. The Keiffer Prairie area was once considered as a potential RNA; however, discussions with Forest Service RNA specialists, The Nature Conservancy, the State natural heritage program, and other experts and cooperators, have strongly suggested that RNA status at this time would be inappropriate. The Keiffer Prairies would need extensive management in order to restore and maintain the prairie condition needed by the Forest-listed rare plants that grow in the area. Based on this information, no additional RNAs would be designated under this alternative.

The lack of additional RNA designations could decrease the potential for recreation use and scientific study. The areas would also lack special protection from normal land management activities, unless they received some other special designation. Certain types of activities or developments adjacent to existing RNAs could result in disturbance to the specific values to be protected, studied, or enjoyed. In those areas not selected for RNA designation, future designation may be precluded by resource management activities such as timber harvest, road construction, or by natural events such as fire or flood.

The most significant effect upon potential RNAs would be whether the areas are preserved or not. For areas that receive designation, only incidental effects associated with recreation development, use, or natural processes would be anticipated. The non-designation of areas as RNAs and subsequent

TABLE 4–23, RESEARCH NATURAL AREA PROPOSALS BY ALTERNATIVE

Displayed In Acres*

	Alt. A	Alt. B	Alt. C	Alt. D	Mod D	Alt. E	Alt. F
Bayou Boeuf	Yes	Yes	Yes	Yes	Yes	Yes	Yes
existing	702	702	702	702	702	702	702
Cooter's Bog		***	Yes	***	***	***	Yes
			447				447
Cunningham Brake	Yes	Yes	Yes	Yes	Yes	Yes	Yes
existing	1,797	1,797	1,797	1,797	1,797	1,797	1,797
Drake's Creek			Yes	***	***	***	Yes
			146				146
Whiskey Chitto		***	Yes	***	***	***	Yes
			924				924
Fleming Glade			Yes				Yes
			105				105
Total acres	**2,499**	**2,499**	**4,225**	**2,449**	**2,449**	**2,449**	**4,225**

* Acreages shown are based upon GIS-computed acres, not declared acres.
*** Identifies areas proposed for SIA designation under an alternative. Details are presented in that section.

LAND USE AND IMPROVEMENTS

RESEARCH NATURAL AREAS

EFFECTS BY ALTERNATIVE

REGISTRY NATURAL AREAS

GENERAL EFFECTS

EFFECTS BY LANDTYPE ASSOCIATION (LTA)

alteration of their conditions over a period of time could result in an eventual loss of research potential.

No additional RNAs would be designated under Alternative B. The lack of additional RNA designations would fail to provide additional undisturbed control areas for scientific studies, but the areas under consideration may not benefit ecologically from RNA designation, which precludes the mechanical management of vegetation in many cases, even if that management improves the habitat for rare species.

In Alternatives C and F, the Cooters Bog, Drakes Creek, Whiskey Chitto, and Fleming Glade areas would be designated as RNAs. The larger acreage for the Whiskey Chitto area (924 acres rather than the 429 acres proposed as a SIA in Alternatives D, Mod D, and E) includes an area east of Whiskey Chitto Creek. The additional acreage would provide a larger area for research.

Designation of these areas as RNAs would discourage recreational use and set them aside for nonmanipulative research. They would be managed primarily with prescribed fire, and rarely with other methods. In most cases, the use of low-impact mechanical tools such as handsaws, chainsaws, bushhogs would be prohibited. The RNAs are generally designed for a hands-off approach to management and would be used for baseline or control areas in research, showing how the land would appear without the effects of management. Some uncertainty exists as to whether burning alone (the primary management tool for RNAs) would control the woody vegetation in these areas.

In Alternatives D, Mod D and E, no additional RNAs would be designated. The lack of RNA designation in these alternatives and the use of other special designations for most of these areas (see special interest area, or SIA, narrative in this section of Chapter 4 for proposed SIA designations) would serve to protect the unique character of these areas. At the same time, the lack of RNA designation would also allow a more flexible approach to management, by allowing the control of woody encroachment into bogs and natural grasslands using low-impact mechanical methods. Simply burning the bogs may not provide adequate long-term protection for the habitats.

REGISTRY NATURAL AREAS

GENERAL EFFECTS

Effects of fire management on registry natural areas

Wildfires could destroy vegetation in these areas. However, because wildfire is a natural process that would be expected to occur on occasion, it would not necessarily detract from the values of a registry natural area. Prescribed fire may also be appropriate in some of these areas.

Fire was a natural component of the uplands of the Kisatchie National Forest. Fire suppression has altered species composition in many areas by providing a competitive advantage to less fire-tolerant species. The relative rarity of some species may be a consequence of the rarity of habitats or may be a function of human-caused alterations. The use of prescribed fire in a controlled situation followed by monitoring would allow Forest managers to learn more about the effects of fire on rare plants.

Effects of recreation management on registry natural areas

The designation of registry natural areas could bring increased recreational traffic to these sites. This dispersed recreation could have a negative impact on the area from trampling of vegetation, soil compaction, increased erosion and sedimentation from trails, or from recreational plant collection or flower picking which could severely affect some rare species.

EFFECTS BY LANDTYPE ASSOCIATION (LTA)

The criteria that differentiate landtype associations (LTAs) on the Kisatchie are geology, historical landscape vegetation, and land surface form. Because most registry natural areas occur at less than the landscape scale, these criteria would be too broad to significantly influence the effects of proposed management practices. Therefore, the effects described in the *general effects* section for this resource are expected to occur regardless of the LTAs.

EFFECTS BY ALTERNATIVE

In addition to the existing registry natural areas (see Chapter 3, table 3-30), Alternative Modified D proposes to seek State designation of 4 additional areas — Black Creek (147 acres), Fleming Glade (105 acres), Brushy Creek/Magnolia Ridge (232 acres), and Bynogne Branch (134 acres). The other alternatives would not propose designation of any more registry natural areas. All registry natural areas would be unsuitable for timber production and mineral leases would require a *No Surface Occupancy* (NSO) stipulation if leasing would be allowed.

Forest-listed rare plants occur in areas proposed for registry natural area designation. The National Forest System provides for protection or conservation of these species and their habitats regardless of whether an area has a specific management area designation.

Under all alternatives registry natural areas would be managed essentially the same way, in conformance with the registry natural area standards and guidelines. Some registry natural areas have recommended management outlined by the Louisiana Natural Heritage Program.

Certain types of activities or developments adjacent to existing or within potential registry natural areas could result in disturbance to the specific values to be protected, studied, or enjoyed.

All of the areas proposed for registry natural area designation have been recognized as possessing unique or special characteristics. The protective management and public recognition that would result for registry natural area designation of each of these areas would be foregone if not designated.

TRANSPORTATION

GENERAL EFFECTS

Introduction

The transportation system on the Forest provides most of the motorized travel opportunities. This system includes federal and state highways, parish roads, and Forest development roads — those roads under the jurisdiction of the Forest Service. Travel on the Forest occurs on paved roads, gravel roads, and primitive woods roads.

The transportation system allows access to major portions of the Forest for administrative use, timber harvest, hunting, fishing, sightseeing, and numerous other activities. Management of resources and programs affects the existing transportation system and determines the need for further development (construction and reconstruction), maintenance, and use of roads.

Travel restrictions and prohibitions may occur on the transportation system within certain areas of the Forest to protect soil and water resources, reduce wildlife disturbance during certain seasons, and resolve user conflicts.

Effects of minerals management on transportation

Minerals management would directly and indirectly affect the existing road system and any new roads.

The use of Forest mineral deposits (sand, clay, gravel, and pit-run iron ore) as roadbed embankment and surfacing materials directly affect the transportation system. Use of these materials in road construction, reconstruction, and maintenance would affect the serviceability and economics of managing the transportation system. Similar to the transporting of logs, the hauling of Forest and non-Forest mineral deposits over the Forest transportation system would create wear on the road structure. This can lead to eventual failure of the roadbed, therefore creating the need to reconstruct roads.

Road surfacing breaks down over time and is lost through erosion. Collectively, sand, clay, gravel, or pit-run iron ore road surfacing material would need replacement at various intervals. The availability of Forest mineral sources would affect road surface replacement. Use of commercial surfacing material sources may be required if they are more cost-effective or if the use of Forest sources becomes limited.

Effects of recreation management on transportation

Recreation use on the Forest creates demand for roads for accommodating public travel. The type of recreation use causes different effects to the road system. Recreation traffic volumes create a demand for generally higher-standard roads — for example, double lane or wider single lane — accommodation of

LAND USE AND IMPROVEMENTS

TRANSPORTATION

GENERAL EFFECTS

higher travel speeds, smoother roadway surfaces, or greater visibility.

Driving for pleasure creates the highest recreation demand for roads open to public travel. This causes safety concerns and results in a need for higher-standard, well-maintained roads. Developed recreation also creates demand for higher-standard roads, both to and within developed recreation sites.

Hunting use increases traffic on the transportation system during a portion of the year and affects roads in various ways. Traffic during wet conditions could cause rutting of the roadbed, therefore increasing road structure maintenance costs. Public demand for a quality hunting experience could require that some roads be closed to motor vehicle travel during the hunting season.

Recreation on the Forest is projected to increase over time. Where demand for recreation increases while opportunity decreases, crowding and reduction in recreation experience quality could occur. As dispersed recreation increases, the potential for user conflicts and resource damage would become greater as well. Cumulatively, recreation needs — especially developed recreation — would require a certain number of roads to be constructed or reconstructed and maintained to a higher standard over time.

Effects of soil and water on transportation

Soil properties and topography directly affect transportation facilities. Road development including location, design, construction and reconstruction, and maintenance and operation are affected by Forest soil characteristics.

Road systems with stable soil subgrades seldom experience failures due to soil movement. Roads with less-stable soils fail more often and require more road maintenance. Soil movement could result in loss of roadbeds. Examples of less-stable soils include highly erodible *Kisatchie* soils, and clayey *Sacul* soils typical of the Winn rolling uplands landtype association. Both have high shrink-swell properties. Loss of roadbed because of soil movement restricts or prohibits access. Road reconstruction and maintenance are required more frequently and are more costly on such soils.

Through time, the cumulative effects of soils on roads are similar to direct and indirect effects. Soil movements would continue to occur on road locations as a result of a landscape's natural instability. Sometimes these movements would cumulatively require reconstruction or relocation of a road. Often, however, maintenance would be adequate over time in satisfying the need for a road facility.

Design and construction and reconstruction methods incorporating sound practices partially mitigate the effects of soil on roads. Slope and ditch stabilization, avoiding locations of poor suitability for road development, and surface stabilization measures are examples of mitigating measures currently in use on the Forest. Such measures would continue.

Effects of vegetation management on transportation

Timber harvest

Timber management would cause direct and indirect effects to the existing road system and to new roads.

Timber harvesting creates a demand for low-standard roads for gaining access to timber harvest sites and for hauling logs from these sites. Most road construction and reconstruction on the Forest would be carried out to meet timber harvest access needs.

Uneven-aged timber harvest schedules would require more miles of road development than would harvests associated with even-aged management. More miles of road maintenance would be required as well. However, timber volumes per unit length of haul road would be reduced, resulting in lessened road development and maintenance impacts.

Timber hauling produces direct, observable physical effects on roads that are used for this purpose. Repeated truck trips create wear on road structures including subgrade and surfacing, which can lead to eventual roadbed failure and create a need for road reconstruction.

Timber hauling also indirectly affects Forest roads. Greater timber haul quantities require collection of more cooperative road maintenance funds from timber purchasers who use Forest roads. Large haul volumes create more funds for road maintenance. This results in the maintenance of more road miles to required standards. Collecting fewer cooperative road maintenance funds would increase the need for appropriated funds —

if roads are to be maintained at historic levels. Reduced hauling over a road can reduce the need for maintenance if less maintenance funds are provided, and may result in limited access to some areas.

Vegetation manipulation

The type, species, and amount of vegetation present in a road right-of-way influences the treatments needed to maintain the overall safety and integrity of the corridor. Insufficient vegetation management reduces safety along roads, thus increasing maintenance costs and investment losses. Excessive manipulation of vegetation or improper timing of vegetative treatments could accelerate soil erosion along roadway slopes and ditches.

Visibility along roads is improved by managing right-of-way vegetation. Facility investments are maintained and transportation networks are kept open.

Over time, vegetation maintenance along road corridors would reduce woody vegetation and increase herbs, wildflowers, and grasses. Multiple treatments would help maintain road safety and integrity.

Effects of wildlife management on transportation

Management requirements for species, including the Red-cockaded Woodpecker, could directly affect the road system. Protection of some species may require prohibiting road construction and road reconstruction, and limiting of maintenance activities to certain seasons of the year.

Intense management to control the beaver population would directly affect the transportation system. Reducing the population would lessen the need for road reconstruction and maintenance to alleviate road flooding and for repair of undermining caused by beavers. A larger beaver population could increase damage to the transportation system, thus requiring more road reconstruction and maintenance.

Management needs for the National Red Dirt and Catahoula Wildlife Management Preserves could affect the open road density of the transportation system. Access in these areas could become more restricted to meet the desired future conditions of the preserves.

EFFECTS BY LANDTYPE ASSOCIATION (LTA)

Most road construction and reconstruction as well as most existing roads would occur in LTAs 1, 2, 5, and 6. These LTAs contain soils and topography with more stable subgrades and would be expected to require less maintenance than in other LTAs. Since most of the timber-suitable lands for all alternatives are within these LTAs, road construction needs would be primarily for timber haul and to a lesser degree, recreation, range, and minerals access.

EFFECTS BY ALTERNATIVE

Minerals management

Impacts to transportation facilities from increased road use for minerals development would include increased wear of road structures, and indirectly, increased costs for road maintenance and reconstruction. These effects would be highest in Alternative A as it has the most acreage available for leasing and would require the least restrictive lease stipulations. Impacts would be lowest in Alternative C which withdraws all Forest lands from leasing as existing leases expire (see Chapter 2, pages 2-17 through 2-35, and page 2-42 for a more detailed description of leasing differences by alternative).

Recreation management

Alternatives creating new developed recreation sites or refurbishing existing sites would generate higher volumes of traffic and safety concerns on associated roads. Additional construction or reconstruction of those roads to higher standards would become necessary.

Alternatives B, D, Mod D, and E create the highest amounts of dispersed recreation, part of which is associated with driving for pleasure (tables 4–16, 4–17, and 4–21). In Alternatives B, D, and Mod D driving would be seasonal since most recreational use is expected to be from hunters. In Alternative E, dispersed use would probably occur year round. The other alternatives would produce slightly lower demands for dispersed recreation, therefore creating fewer needs for safety, roads open to the public, or higher standards for construction, reconstruction, and maintenance.

LAND USE AND IMPROVEMENTS

TRANSPORTATION

EFFECTS BY ALTERNATIVE

All alternatives would propose some year-long or seasonal travel management restrictions for site-specific resource protection.

Soil and water protection

For all the alternatives, soil and water mitigation measures would provide adequate protection for transportation facilities. No alternative would have more effect than another.

Vegetation management

Timber management would have direct and indirect effects on the existing road system and on new roads in all alternatives.

Most road development (construction and reconstruction) on the Forest would be in response to timber harvest access needs; therefore Alternatives A, B, and D, which have the highest *allowable sale quantity* **(ASQ)**, would require the greatest number of miles of low standard road development (table 4–24).

Alternatives that support uneven-aged management harvest schedules generally require more miles of road development than those that support even-aged management schedules. Also, more miles of road maintenance are generally needed. Alternative C would propose the most widespread use of uneven-aged harvest cuts and Alternative A, the least amount. The other alternatives would propose from 50–70 percent of the uneven-aged acreage in Alternative C (table 4–8). However, timber volumes per length of haul road would be less under uneven-aged systems than under even-aged systems. This would create less impact on road development and maintenance per unit length of road. Since these two factors tend to offset each other, the differences between one system and the other were compared using volume of timber harvested Forestwide.

Table 4–24 uses timber output to determine road construction and reconstruction differences between the alternatives. Alternatives A, B, and D would be expected to need the most road development and Alternative C, the least. Alternative C, which produces the least timber harvest and haul volume, would also have the least need for an extensive and well-maintained road system. Over time, this alternative would have the effect of lowering the maintenance requirements, closing unused roads, keeping more roads at a minimum level maintenance category, and may result in more miles being removed from the transportation system than other alternatives.

Wildlife management

Alternatives with the most acreage allocated to wildlife *desired future conditions* **(DFCs)** would be expected to have the most road closures and the least road maintenance, to provide solitude for wildlife. For these reasons, Alternative F would be expected to have the least open roads and therefore the least need for maintenance work. Alternatives A, B, and E have the least area allocated to wildlife **DFCs** and therefore would leave more roads open, increasing the need for regular maintenance.

TABLE 4–24, EFFECTS OF ALTERNATIVES ON TRANSPORTATION MANAGEMENT FOR PERIOD 1

Displayed by Alternative and Indicator

Indicator	Alt A	Alt B	Alt C	Alt D	Mod D	Alt E	Alt F
Timber local road constr. (mi / period)	82	65	19	63	62	61	58
Timber local road reconstr. (mi / period)	1,591	1,259	374	1,215	1,205	1,182	1,113

LANDS

GENERAL EFFECTS

The mixed land ownership pattern within the Forest results in requests to use land for a variety of purposes, some of which could be outside the scope of the Forest Service mission. Net national forest lands within the proclamation boundary comprise 59 percent of gross acres. Intermingled ownership creates occasional conflicts concerning property boundaries, title claims, encroachments, and access. It also limits fulfilling the desired management potential of certain resources. Additional congressionally designated areas such as wild & scenic rivers could affect land acquisition priorities. Limited access within military use areas affects land uses in those areas.

The disposal of federal lands through exchange could cause some adverse effects, but these could be offset by new lands being acquired. Private land removed from the tax rolls sometimes is viewed adversely by the public, but returns from national forest receipts plus *payment in lieu of taxes* (PILT) usually more than offsets this loss of revenue.

Many private inholdings within designated areas, such as Saline Bayou National Scenic River and corridor, are purchased by private landowners for the sole purpose of trading or reselling to the government. The types of land use allowed within these designated areas would be limited. Each application must be evaluated to determine if the use, with specific mitigating measures, falls within the issuance criteria. The acquisition of private land within designated areas benefits use and management of the area. Acquisitions would be through land exchanges or willing-seller purchases.

Intensive military use areas have had little effect on landownership. There are few private inholdings in these areas and none within areas actively used for training. Opportunities for new land uses within intensive military use areas would be limited. Federal land located within a military intensive use area would not be disposed of except in interchange with another federal agency. The effects of additional Forest Service lands used for intensive military use — including impacts to adjoining private lands — would be disclosed in the environmental analysis for that proposed action.

New land uses within military intensive use areas would be coordinated with the military users. Only uses that are compatible — with or without mitigating measures — would be authorized. Owners of existing uses, such as pipeline rights-of-way, need access to their facilities for routine maintenance or occasional emergencies. This may cause concern to military users because of the potential conflicts with scheduled training activities.

Minerals exploration, development, and production would cause considerable concern and conflict within authorized military intensive use areas (IUAs). The Department of Defense desires complete control of the surface in intensively used areas, generally allowing only periodic and often unscheduled occupancy by others. This could create significant problems for oil and gas lessees wishing to exercise subsurface rights.

EFFECTS BY LANDTYPE ASSOCIATION (LTA)

The criteria that differentiate landtype associations (LTAs) on the Kisatchie are geology, historical landscape vegetation, and land surface form. These criteria would not have any significant influence on the effects of proposed management practices on this resource. Therefore, the effects described in the *general effects* section for this resource are expected to occur equally across the LTAs.

EFFECTS BY ALTERNATIVE

Land adjustment

In all alternatives, the mixed ownership pattern on the Forest would continue to provide opportunities for land adjustment through exchange, purchase, and donation. Budget limitations and congressional appropriations would continue to affect the land purchase program. The current trend towards a decrease in this funding is expected to severely limit the opportunities to acquire land with Land and Water Conservation Funds (L&WCF). There is no way to estimate the number of land donations that may occur in the future; however, based on historical data, very few are anticipated. Considering the expected future trends in purchase and donation, acquisition through exchanges would be the primary method of land acquisition. The number of land exchanges would be expected to be similar in all alternatives. These exchanges would be processed as opportunities arise and in accordance with priorities indicated in the Forest Plan's Forestwide standards and guidelines.

Land use authorizations

In all alternatives, requests for special use authorizations are not expected to change substantially. With ownerships of private land intermingled with federal land, numerous requests are received for road access, both public and private. Historically, the other major applicants have been the utility companies requesting rights-of-way. If increased oil and gas drilling activity occurs, there could be a significant increase in requests for pipeline rights-of-way. Part of these rights-of-way would be granted without charge because the use is authorized under a federal lease. Others would be processed and charged according to the language in the mineral servitude deed. In all cases the process would be similar, however, in that some type of site-level environmental analysis would be done and some type of documentation would be prepared. All land use applications are generated externally, so the number of proposals cannot be predicted with accuracy. Even though the volume of proposals cannot be projected, they are assumed to be the same for all alternatives and to have similar effects.

Property line management and encroachments

Landline location on the Forest is limited to land adjustment activities and lines lost through lack of maintenance. Because of the mixed ownership pattern, maintenance of existing lines is an important program. Maintenance of property lines adjacent to private land that is being developed continues to be a priority. Boundary maintenance is also the primary instrument for locating encroachments. However, the property line program and subsequent number of encroachments found would not vary substantially by alternative.

Road right-of-way acquisitions

Current public and Forest development roads meet most Forest access needs. However, a continued right-of-way acquisition program is needed because of timber sales and, to a lesser degree, recreational and other public use. Many roads still require a permanent easement. These are usually identified in the timber sale prescription process and are subsequently scheduled for acquisition. Alternative A would result in the greatest number of right-of-way needs because of the projected miles of timber related roads to be constructed. It is followed by Alternatives B, D, Mod D, E, and F, respectively, which predict a narrow range of miles of roads to be constructed. Alternative C would require the least anticipated road rights-of-way and therefore the least effects. See table 4–24.

EXPERIMENTAL FORESTS

GENERAL EFFECTS

Landscapes within the Palustris Experimental Forest are designated as unsuitable for timber production. Management activities would be focused on red-cockaded woodpecker habitat improvement, development and maintenance of demonstration areas, and treatments on research sites. Treatments may include thinning, and regeneration harvests of small areas, usually less than 15 acres. Occasionally research personnel may request to apply a general timber harvest or a prescribed burn on a portion of the experimental forest. The effects of these activities would be the same as those occurring in similar areas on the rest of the Kisatchie National Forest as disclosed in this chapter.

EFFECTS BY LANDTYPE ASSOCIATION (LTA)

The criteria that differentiate landtype associations (LTAs) on the Kisatchie are geology, historical landscape vegetation, and land surface form. These criteria would not have any significant influence on the effects of proposed management practices on this resource. Therefore, the effects described in the *general effects* section for this resource are expected to occur equally across the LTAs.

EFFECTS BY ALTERNATIVE

In all alternatives, future research studies are expected to focus on subject areas relating to sustaining forest ecosystems while emphasizing improved technology transfer. While there would be no sustained production of timber products in the Palustris Experimental Forest, management practices would be carried out for research purposes, stand health, regeneration, salvage purposes, and for red-cockaded woodpecker (RCW) management on that portion of the Experimental Forest within an RCW habitat management area. The impacts of these activities would be the same for all alternatives. Potential negative impacts to the Palustris Experimental Forest from minerals development would be slightly higher in Alternatives A, B, D, Mod D, E, and F. These alternatives have more acreage available for leasing and apply either a *No Surface Occupancy* (NSO) or *Controlled Surface Use* (CSU) lease stipulation, whereas, in Alternative C, all Forest lands would be withdrawn from leasing as existing leases expire (see Chapter 2, pages 2-17 through 2-35, and page 2-42 for a more detailed description of leasing differences by alternative).

HERITAGE RESOURCES

GENERAL EFFECTS

Introduction

Decisions about planned management undertakings on Kisatchie National Forest lands are preceded by heritage resource inventories of the proposed *area of potential effect* (APE), and consultation with the Louisiana state historic preservation officer (SHPO). If consultation indicates that protective or mitigative measures are necessary to conserve heritage resource values or properties, the Forest includes these measures in a project plan.

Even after a conscientious, intensive field survey of a proposed project area some sites may not be recorded — especially small or sparse properties. This discussion of direct, indirect, or cumulative effects is based on the assumption that although required inventories — including field surveys — are conducted, a previously unknown site or property could be revealed during or subsequent to project implementation.

The degree of cumulative effects to known properties from all management activities should be slight as inventory, assessment, protection, and mitigation measures would be implemented prior to initiation of management action. However, erosion, natural weathering, wildfire, or other ongoing natural processes, could contribute to site or artifact deterioration through time.

Cumulative effects from repetitious illegal activity, primarily archeological vandalism, may occur on certain sites or site types unless perpetrators are apprehended and prosecuted.

Prior to about 1977, no heritage resource inventories existed. No records pertinent to the potential resource data base were maintained. Thus, the cumulative effects of Forest-related projects occurring on that resource base prior to the late 1970s must be added to current measured effects.

When balanced against private lands, cumulative effects on national forest lands are comparatively fewer. This is because little or no resource base inventory is systematically conducted on private lands, and because currently, protective or mitigative measures are rare.

Direct effects could result from both natural and human-caused events, such as:

- Soil disturbance to varying depths
- Burning
- Soil compaction or rutting
- Alteration of a site's immediate or proximal setting (for example — intrusive visual or auditory components)
- Diminished jurisdiction, as in the case of land exchange

Indirect effects may include vandalism due to increased access, or erosion or siltation from an off-site project.

GIS coverage of the Kisatchie's site predictive model reveals differential percentages and acres of high, moderate (or indeterminate), and low probabilities for containing significant archeological or historical sites within each LTA. Overall, 15 percent of the Forest conforms to criteria for having a high probability of containing significant sites, 44 percent is predicted to have a moderate probability, and 41 percent to have low probability. Forestwide, between 86 percent and 91 percent of all significant or potentially significant sites would be expected to occur in areas of high predicted probability.

LAND USE AND IMPROVEMENTS

HERITAGE RESOURCES

GENERAL EFFECTS

Effects of fire management on heritage resources

High-temperature wildfire could damage surface or shallow archeological sites, standing structures, or cemetery markers. Sites of the historic period are most subject to damage because many of these properties would to some degree exhibit surface artifacts. Studies show that wildfire — and in some cases, hot prescribed burns — may alter the character and condition of surface artifacts such as melted glass, "crazed" ceramics, and burned wood.

Surface components of shallow prehistoric sites may also be damaged because surface temperatures may exceed that needed to further alter — or heat treat — chert or flint artifacts. This could skew laboratory analyses, distorting the percentages of prehistorically heat-treated vs non-heat-treated materials, thus reducing their value as indicators of measurable prehistoric activities represented at specific locales.

Prescribed fire could also damage surface or very shallow sites, but to a much lesser degree because of reduced temperatures at the surface . Wooden structures or cemetery markers could still be damaged, as could some lesser number of surface artifacts.

Firelines laid in using tractor-plow units would physically displace artifacts down to roughly 30 cm below ground surface (bgs). The nature of displacement is primarily lateral, as the plow folds soil and artifacts to each side of the fireline over a swath about 1 meter wide. When multiple parallel lines are used for wildfire control, it would be possible to disturb a large portion of a small site. Under normal conditions heritage surveys do not precede emergency fireline construction, thus there is high potential for damage to unknown properties during wildfire suppression.

Firelines established using a disc harrow would have less impact than those made with a tractor-plow. In these cases lateral soil displacement would be minimal, but some fragile surface or shallow (up to 15 cm bgs) artifacts may be broken.

Indirect effects may include erosion losses due to burned vegetation cover, or further deterioration of artifact or feature condition following damage by high temperatures. Cumulative effects may occur as a site or artifact is repeatedly burned in subsequent cycles of prescribed fire management.

Effects of lands management on heritage resources

Land adjustment

Exchange of federal land containing heritage resources to a non-federal agency or private ownership would be considered a total impact. This is because protection under federal law would no longer apply to the heritage resources contained within an exchanged tract.

Land use

Even though special-use permits involve decreased federal jurisdiction of an area, the potential impact would be low in most cases. This is partially due to the frequency of small acreages involved in special uses.

Effects of minerals management on heritage resources

Generally, exploring for minerals such as surface or buried gravels or clays minimally impacts sites within the exploration area. Extraction resulting from successful searches, however, may produce severe impacts as the overburden containing potential archeological or historical resources is removed.

Overall, permits for oil and gas exploration with connecting pipeline rights-of-way throughout the Forest involve small acreages. Even though ground disturbance within oil and gas permit areas would be severe, it is also localized. Records show that only 1 nonsignificant site has been identified in more than 100 surveys for oil and gas permit purposes between 1977 and 1995.

Effects of recreation management on heritage resources

In general, impacts from recreation and public use result from increasing human access to an area. Negative effects could be unplanned or inadvertent, such as soil compaction due to increased foot travel. Effects could also be beneficial, such as interpreting a site and its heritage values at a public recreation area.

Another indirect effect may be that increased access to a given locale could increase archeological site vandalism in that area. In at least one instance on the Forest, archeological vandalism may have resulted from increased access provided by a new user-created off-road vehicle trail.

Effects of structures management on heritage resources

Construction of new facilities could severely impact an unknown property. In most cases of concrete slab or footing construction, disturbance may extend into or below soil strata containing archeological deposits. Lighter facilities, such as boardwalks, piers, or structures on pier foundations, would present less potential for damage.

Effects of transportation management on heritage resources

New road construction may totally impact unknown sites, given variables specific to each portion of construction. Disturbance within a construction corridor may remove soil containing cultural deposits to depths exceeding a meter, depending on the local situation. In cases where fill is added, a site may be buried deeper. This may protect the site from compaction or rutting, while at the same time essentially precluding additional scientific study using conventional technology.

Maintenance or reconstruction of an existing road presents less potential for the disturbance of intact archeological sites. This is because the majority of damage to an unknown site probably occurred during the original construction.

Indirect effects may include erosion immediately after construction or due to severe weather. Also, artifact exposure during construction could encourage site vandalism.

Effects of vegetation management on heritage resources

Timber harvest

Projects where timber is harvested or manipulated comprise the largest source of potential impacts to the Forest's heritage resource base. Timber harvests may affect unknown resources as soil is disturbed by heavy machinery and vehicles, as trees are felled on historic ruins or cemeteries, as logs are skidded across sites, when erosion is caused by removal or disruption of vegetation cover, or due to increased surface soil exposure.

In general terms, an even-aged harvest may create moderate disturbance to surface or shallow (less than 20 cm bgs) properties, and disturbance may occur over most of the stand or area being harvested.

An uneven-aged harvest would similarly disturb the upper 15–20 cm of soil matrix, but disturbed areas would be dispersed within the harvest area.

With either management practice the skid trails, log landings, and other areas where vehicle use is concentrated would receive the greatest disturbance — to depths sometimes exceeding 20 cm.

Site preparation

Although compliance-related inventories or surveys would be conducted prior to harvest under either timber management regime, site preparation following even-aged harvest has more potential to adversely affect unknown heritage properties. Preparation using a heavy drum chopper may penetrate the surface to roughly 15–20 cm, and crush either surface or shallow cultural deposits. Shearing and windrowing would offer more potential for adverse effects than any site preparation method. This is because pushing stumps and slash into windrows for subsequent treatment displaces a substantial amount of soil, often exceeding 30–40 cm in depth.

Pine straw collection

Direct effects include displacement of surface artifacts and subsequent loss of their contextual integrity. Unauthorized collection of surface artifacts or excavation of subsurface material may occur as an indirect effect resulting from increased ground visibility after pine straw is removed.

Effects of wildlife management on heritage resources

Midstory removal for red-cockaded woodpecker management may cause minimal impacts to unknown sites. This would be reduced if removal is accomplished manually rather than using heavy equipment.

The construction of wildlife food plots may produce minimal impacts, similar to fireline discing. Construction of green-tree reservoirs may cause moderate-to-severe impacts resulting from construction of earth dams and site inundation.

LAND USE AND IMPROVEMENTS

HERITAGE RESOURCES

GENERAL EFFECTS

EFFECTS BY LANDTYPE ASSOCIATION (LTA)

EFFECTS BY ALTERNATIVE

To some extent, data currently indicates that areas protected for wildlife or sensitive species are also areas of high probability for containing important heritage resources. Therefore, protective management for wildlife purposes may benefit or complement, protection of heritage resources.

EFFECTS BY LANDTYPE ASSOCIATION (LTA)

LTAs 3 and 5 would have the greatest percentages of low probability area although by virtue of its size, LTA 1 would have a higher number of acres in low probability. LTAs 3 and 5, located primarily on the Winn Ranger District, are known to have a relatively low frequency of surface lithic (chert) occurrences, a necessary commodity to prehistoric populations, and this may partially account for the predicted low probability.

LTAs 4 and 7 would have the greatest percentages of high probability area largely due to their affiliation with water sources. As strictly defined by the predictive model, LTA 7 would have a much greater percentage of high probability acres since much of the LTA is situated between 0 and 70 feet above sea level. These areas flood frequently in modern times, and presumably did so in at least recent prehistoric times (roughly the last two thousand years). Therefore, LTA 7's attractiveness to prehistoric populations was likely less than that for LTA 4 and would be expected to have a lower probability for discovering unknown sites than in LTA 4.

Given that LTAs 4 and 7 are likely to have the least impacts associated with even-aged timber management and associated road construction or reconstruction, these LTAs can be expected to potentially receive fewer impacts to significant sites. On the other hand, because these two LTAs are largely composed of poorly drained soils, site damage from soil compaction and rutting associated with ground disturbing actions would most likely occur in LTAs 4 and 7.

LTAs 1, 2, 5, and 6 would be expected to have the greatest amount of ground disturbing vegetation manipulation and prescribed burning, but of these, only LTA 6 has a moderate percentage of high probability areas (22 percent), with LTAs 1, 2, and 5 characterized as the lowest percentages of high probability. Thus the potential risk for impact to unknown heritage resource from timber management and associated actions would be relatively low in LTAs 1, 2, and 5, and only moderate in LTA 6.

EFFECTS BY ALTERNATIVE

As discussed earlier in this chapter, compliance inventories are conducted in consultation with the Louisiana SHPO prior to decisions on projects that may affect heritage resources. Degree of effects to known properties under any alternative should be slight because inventory, assessment, protection, and mitigation measures are implemented prior to management action. Thus, discussion of projects by alternative is presented in terms of potential effects to a site discovered during or after project implementation (see table 4–25).

Five direct effects caused by forest management were noted earlier. Three comprise the majority of impact potential:

- Soil disturbance to varying depths
- Prescribed burning
- Soil compaction or rutting

Similarly, five project types that vary in magnitude (acres or miles) by alternative were determined to have the greatest potential for the above effects on heritage resources. These include prescribed burning, final harvest cuts, thinning, hardwood final harvest, and timber road construction. The impacts of other projects, such as landownership adjustment (exchange) or recreation improvements, would be similar among all alternatives.

The Kisatchie site predictive model indicates that most significant sites are located in or immediately adjacent to streamside or riparian area zones. Ground-disturbing management would be limited in these landscapes. For this reason, alternatives proposing a greater number of acres in streamside habitat protection zones (see table 4–25) would offer greater site protection and less potential impact.

Of all alternatives, A would pose the greatest potential to effect unknown heritage resources. The three program areas of final harvest (2,460 acres), thinning (22,866 acres), and road construction (8.2 miles) are greater than in other alternatives. Road construction, as a general rule, would be the most disturbing project, and Alternative A proposes more construction than all other alternatives. This alternative proposes the least amount of streamside protection areas, and therefore the least site protection.

Alternative B ranks second in potential effects to heritage resources. Final harvest (2,002 acres), thinning (18,148 acres) and road construction (6.5 miles) are slightly below that of Alternative A. Previous predictive modeling on the Forest indicates that the majority of unknown significant sites lie within mixed hardwood-pine or hardwood communities, most often situated in or immediately adjacent to streamside or riparian area zones. Alternative B offers the availability of the greatest amount (534 MCF / year) of hardwood final harvests — well above any other alternative — in this landscape, and therefore the greatest risk potential of any alternative for this project type. However, this is mitigated to some extent, in that Alternative B proposes more than twice the acreage under streamside habitat protection acres than Alternative A.

Alternative C would pose the least potential impacts on undiscovered heritage resources, in that it contains the fewest acres proposed for final harvest cuts (488 acres), thinning (5,468 acres), and road construction (1.9 miles). It does however, propose the greatest number of prescribed burning acres (100,345). Although this poses the greatest risk to unrecorded shallow or surface sites due to the number of acres involved, overall effects should be relatively minor. Alternative C, like D, Mod D, and E, proposes a midrange of streamside habitat protection acres.

Alternatives D, Mod D, E, and F fall in the midrange of potential impacts. While Alternative F has the second highest amount of hardwood final harvest proposed (266 MCF / year), the level is far below that proposed under Alternative B. Alternative F offers the highest number of streamside habitat protection areas, and therefore the greatest protection for sites in or near these zones.

TABLE 4–25, EFFECTS OF ALTERNATIVES THAT MAY POTENTIALLY DISTURB HERITAGE RESOURCES

Displayed by Alternative and Indicator

Indicator	Alt A	Alt B	Alt C	Alt D	Mod D	Alt E	Alt F
All prescribed burning (acres / year)	47,093	72,074	100,345	82,492	83,780	70,420	84,180
Final harvest cuts (acres / year)	2,460	2,002	488	1,772	1,576	1,336	1,165
Thinning (acres / year)	22,866	18,148	5,468	16,582	16,836	16,314	14,710
Hardwood final harvest cuts (MCF / year)	224	534	82	99	97	0	266
Timber local road construction (mi / year)	8.2	6.5	1.9	6.3	6.2	6.1	5.8
Streamside protection acres	79,248	172,152	183,182	182,284	173,594	181,338	189,104
Longleaf restoration (acres / year)	2,102	43	349	1,634	1,456	63	631
Pine-to-mixed restoration acres (acres / year)	73	47	458	166	178	730	445
All restoration acres	2,175	90	807	1,800	1,634	793	1,076

SOCIAL AND ECONOMIC ENVIRONMENT
GENERAL EFFECTS
EFFECTS BY LANDTYPE ASSOCIATION (LTA)
EFFECTS BY ALTERNATIVE

SOCIAL AND ECONOMIC ENVIRONMENT

GENERAL EFFECTS

Forest Service programs stimulate employment and income-related effects through direct expenditures on salaries and commodities and through the economic effects stemming from the production of resource outputs (***Draft RPA Program*, 1995**). Through its programs and activities the Kisatchie National Forest would have the greatest effect within the rural 11-parish region that comprises its impact area. Changes to Forest programs and activities would have impacts on employment and associated income, payments in lieu of taxes to the Parishes, population, and lifestyles. Direct, indirect, and cumulative effects to the economy would be most closely related to changes in timber harvest levels, recreation, wildlife, and fisheries use; and in minerals activity.

The Forest has the potential to affect the total number of jobs within its impact area as a result of the mix and level of goods and services it provides. Employment opportunities could impact those employed by the Forest Service, those under contract for the Forest Service, and those that do business with the agency. Fewer local opportunities could impact population levels of an area.

Reduction of Twenty-five Percent Funds to the Parishes would impact local funding for schools and roads. Lifestyles could be affected by opportunities the Forest could provide for recreation, hunting, fishing, and tourism. More specific impacts to the area's social and economic environment are disclosed for each alternative in subsequent sections of this chapter.

EFFECTS BY LANDTYPE ASSOCIATION (LTA)

The criteria that differentiate landtype associations (LTAs) on the Kisatchie are geology, historical landscape vegetation, and land surface form. These criteria would not have any significant influence on the effects of proposed management practices on this resource. Therefore, the effects described in the *general effects* section for this resource are expected to occur equally across the LTAs.

EFFECTS BY ALTERNATIVE

Several basic factors vary by alternative, with respect to their impact on the local (11-parish) socioeconomic environment:

- Jobs, which are heavily influenced by the amount of timber sold and subsequently harvested.
- Income, which is affected by dollar flows throughout the parishes.
- Payments to the parishes which affect parish funding, especially for schools and roads.
- Lifestyles, reflected in the amount of recreation opportunities, especially for dispersed hunting and concentrated use at recreational facilities.

The Forest has the potential to affect the total jobs and income within its influence area. Table 4–26 on the following page displays timber-associated and recreation-associated jobs and income estimated by alternative. These estimates were determined by using an input-output model called IMPLAN. The data base in IMPLAN represents 1993 parish information for 528 economic sectors. On the Forest, effects are based on changes in 4 major outputs: amount of timber volume and product type to be harvested; payments to parishes for schools and roads; Federal Government expenditures; and recreation use. For more detail regarding assumptions, methods of analysis, and alternative outputs, refer to the social and economic impact analysis in Appendix B.

Alternative A would provide more jobs and income to the local community than the other alternatives (see table 4–26). This is due primarily to the higher amount of timber harvested, the higher proportion of final harvest openings available for use by hunters, and the slightly larger road system anticipated. Alternatives B and D would provide slightly less: 6–10 percent less than Alternative A; and Alternatives C, Mod D, E, and F would provide the least amount: 16–23 percent less than Alternative A.

Payments to the parishes are 25 percent of receipts for uses of national forest land and resources that generate income for the Federal Government. By law, these funds are used only for public roads or highways and public schools. Historically, the majority of these payments have been derived from revenues collected for timber harvests.

As shown in table 4–26, Alternative A would provide the largest payments to parishes because it would produce the highest timber volume. Table 4–26 shows that Alternatives B, D, and Mod D would provide slightly less: 9–25 percent less than Alternative A; and Alternatives C, E, and F would provide the least: 31–58 percent less than Alternative A.

Federal expenditures for salary and non-salary needs would not vary significantly by alternative. Although management emphasis changes from one alternative to another, the Forest's budget levels are expected to remain at the current level. Typically, the Forest's annual budgets have been around $12 million, with 39 percent being spendable (two-thirds of 59% of total Forest expenditures) salary income and 41 percent being non-salary Forest expenditures. Using IMPLAN coefficients (see Appendix B) Federal Government expenditures would contribute approximately 184 jobs and $5.4 million to the local economy, for all alternatives.

Amounts and types of recreation use affect spending patterns of Forest users. In the 1990 RPA Program, the market clearing price for an RVD or *recreation visitor day* of camping, picnicking, and swimming is valued at $12.57 in 1995 dollars. The market clearing price for a WFUD or *wildlife and fish user day* of hunting is valued at $41.09 in 1995 dollars. Based on the expected proportions of recreation use on the Kisatchie, 1995 dollar values of $11.40 per RVD and $47.40 per WFUD was used to determine contributions to the local community. Because a WFUD is expected to provide more than 4 times more income than an RVD, alternatives providing the most WFUDs would influence community income the most.

Alternative B provides slightly more RVDs and WFUDs than the other alternatives, and therefore slightly more value to the local community. See tables 4–21 and 4–26.

All alternatives except C allow mineral leasing. Because of the highly speculative nature of oil and gas development, mineral receipts revenue is not shown in table 4–26. In 1994 and 1995, oil and gas receipts were about $770,000 annually. In 1997 receipts were about $1,500,000. If current trends continue, annual receipts of $1,500,000 to $7,500,000 may be seen through this decade. The receipts would generate 25 percent returns to the parishes. The returns could range from $375,000 to $1,875,000 annually (or from about $0.62 to $3.11 per national forest acre). They would be used for maintenance and improvement of local roads and schools, stimulating additional jobs and income to local communities.

Overall, no alternative would disproportionately affect minority or low-income Forest communities regarding environmental justice concerns or factors. While some lessening of forest products outputs, such as timber volumes, would occur under the alternatives, a sustainable mix of goods and services would continue in the long-term.

TABLE 4–26, EFFECTS OF ALTERNATIVES ON LOCAL SOCIAL AND ECONOMIC ENVIRONMENT

Displayed by Alternative and Indicator

Indicator	Alt A	Alt B	Alt C	Alt D	Mod D	Alt E	Alt F
Timber-associated income to community (M$ / year)	16,355	15,145	9,462	13,560	12,662	11,533	11,756
Timber-associated jobs to community (person-years)	482	444	270	396	369	336	339
25% timber receipts for roads and schools (M$ / year)	4,118	3,739	1,727	3,333	3,073	2,854	2,669
Recreation-associated income to community (M$ / year)	10,456	10,063	11,231	10,582	10,667	10,761	10,887
Recreation-associated jobs to community (person-years)	429	413	461	435	439	442	447

SOCIAL AND ECONOMIC ENVIRONMENT

EFFECTS BY ALTERNATIVE

Of any Forest area, minority or low-income communities could be most affected on the Caney District (Webster and Claiborne Parishes), simply because these two parishes have the highest percentage of minorities and low-income or unemployed families when compared with other parishes containing national forest land. In addition, under Alternative Modified D, 24% of the District's landbase would be allocated for old-growth management, which is the highest percentage, per District, on the Forest. However, this would be offset by the fact that much of the proposed old-growth areas on the Caney have current and future recreational and amenity values.

Native American access to resources, such as longleaf pine needles for traditional basketry, would be available under all alternatives.

Economic assistance for minority, Native American, and low-income communities affected by land management decisions is available, on a competitive grant basis, through the Forest's Rural Community Assistance program to help local communities diversify their economic base or initiate sustainable economic ventures. Typically, the funding varies each year according to congressional allocation, but they are not dependent on factors specific to any alternative. Under all alternatives, the Forest would continue to fund, as available, natural resource-based projects to diversify, stabilize, and enhance local economies.

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The timber resource is managed to provide a continuous flow of forest products and create a wide range of forest conditions — within the framework of sound silvicultural techniques. It is also the primary means of implementing many aspects of ecosystem management. The timber volume extracted from the Forest depends upon factors such as the suitable-timber land base, intensity of timber management, insect and disease activity, other multiple-use objectives, and the management requirements of the NFMA regulations (***36 CFR 219.27***).

Effects of fire management on timber

For nearly 30 years prescribed fire has been applied on the Forest, primarily to reduce wildfire risk, control vegetation, improve habitat for a wide range of wildlife species, and for range forage improvement. The general effect on timber could be positive or negative, depending upon fire frequency, burning intensity, and tree species.

By top-killing lower woody vegetation, more nutrients, water, and growing space are made available to the overstory, with a resulting increase in stand growth and vigor. Growing season burns would reduce more lower vegetation competition than dormant season burns, and would be a more effective tool for controlling a woody understory. While growing season burns may produce greater reductions in lower vegetation competition, they greatly increase the chance for green-crown scorch, which could result in reduced tree growth. Too frequent prescribed burning could affect overall stand vigor.

Fire applied to grass-stage longleaf would reduce brown-spot disease and hasten the initiation of height growth. Long term, this action would assure a continuous flow of forest products and the perpetuation of the longleaf ecosystem.

Effect of forest health management on timber

The effects of southern pine beetle infestations on timber resources depend on management intensity and beetle population dynamics. During endemic years mortality caused by beetles could be expected in overstocked stands, and in stands damaged due to root disease or other stress-related factors causing reduced stand growth and vigor. Rapid detection and prompt control of beetle spots would prevent buildup of beetle populations, reducing volume losses common to larger spots. Thinning overstocked stands and maintaining species and site integrity would be the primary mitigation practices for reducing the risk of beetle attacks. Loblolly and shortleaf pine are the most common hosts for southern pine beetle. Longleaf pine and slash pine would be less susceptible to significant resource loss.

During epidemic populations all pine stands would be susceptible to attack. During the 1985–86 epidemic, the Forest lost an estimated 490 MMBF of pine growing stock.

Sometime during each 10–15 year planning cycle, a 2–3 year southern pine beetle epidemic cycle could be expected (**Price, Dogget, Pye, and Holmes, 1992**).

Control practices for the southern pine beetle falls primarily into the categories of *cut-and-leave*, *cut-and-remove*, *cut-and-hand spray*, and *pile-and-burn*. The effects on timber would be somewhat varied. Regardless of control method used, insect and disease activity — the SPB in particular — could negatively affect allowable sale quantity, stocking levels, and the overall capacity of the land base to produce a continuous supply of forest products. In the short term, controlling SPB with cut-and-leave would generate no revenue whatsoever and would normally be the second choice for control. The same would be true of cut-and-spray, with the added negative effect of reducing the population of beneficial insects such as clerid beetles. Cut-and-remove would be the most effective method of SPB control, and would offer the added benefit of generating some revenue, albeit a reduced amount — which subsequently would reduce revenues returned to the parishes. A severe SPB outbreak would reduce the overall land base capacity to produce volumes and values over periods of 10, 20, or 30 years — or more.

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Integration of pest management into timber resource management would keep stands healthy and vigorous, with the added effect of increasing resistance to insect and disease attacks. The most effective risk reduction activity would be to thin stands in all age classes, especially young stands aged 20–30 years. Maintaining robust, well-spaced stands substantially reduces the risk of SPB infestation and limits damage when attacks occur. For stands consisting of off-site species such as slash or loblolly pine, conversion to longleaf pine would dramatically reduce the incidence of insect and disease. Integrated pest management would strengthen allowable sale quantity, assuring long-term flow of forest products.

Effects of lands management on timber

The general maintenance of corridors used for utilities, rights-of-way, and other special uses would have a minor effect on timber production. Some limited growth increase may be garnered by reducing competing vegetation through mechanical or chemical methods.

New construction of corridors, however, would reduce the acreage within the timber suitability land base, which would reduce the level of sustained yields. Year-to-year measurements would be difficult to determine, and there would be instances where corridors may be added back into the land base when their use is no longer appropriate.

Effects of range management on timber

Cattle grazing could damage lower vegetation, including young trees and the lower branches of older trees, but the amounts consumed would be minor. More damage would be caused by trampling and browsing of pine-hardwood seedlings. Young longleaf pine plantations have been historically fenced for several years following planting, but the effects on growth are inconclusive. In the long term, damage to young plantations would delay onset of height growth, especially in longleaf, and could negatively affect timber production.

Effects of vegetation management on timber

Timber harvest

Thinning treatments would be an integral part of timer production levels. They help maintain forest health and assist in producing the desired forest product within a reasonable time period. Thinnings maintain stand vigor, regulate composition, capture mortality, decrease future mortality, and concentrate growth. They are a function of silvicultural need as opposed to land allocation, therefore the suitable timber land base would remain unaffected.

The regeneration method selected and the overall management intensity would have an impact on the allowable sale quantity level and on long-term sustainable yield capacity (LTSYC). As with thinnings, the individual final harvest method selected and the suitable land base are independent of one another. Silvicultural examinations would be tailored to specific cultural needs and management objectives for a given area.

Comparisons between uneven-aged and even-aged management in terms of long- and short-term yields are limited. For many species and areas of mixed species, growth and yield data for uneven-aged stands are simply not available over a range of forest conditions and types.

Early studies, by R.R. Reynolds and others at the Crossett Experimental Forest, were based on wide application of herbicides and dealt with pine stands not fully stocked. Empirical studies suggested that allowable sale quantity in the short term would increase, whether by individual tree selection or group selection.

In production and financial comparisons of two even-aged (plantation and natural stands) and two uneven-aged (single-tree selection with high and low stocking) loblolly pine management systems, the even-aged systems produced the most cubic foot volume. Uneven-aged management with high stocking levels and even-aged plantation management produced the most sawlog volume (Baker, Cain, Guldin, Murphy, and Shelton, 1996). From a financial standpoint, even-aged natural stand management generally showed a distinct advantage over the other three management systems, surpassing them in net present value, benefit to cost ratio, and cost efficiency of cubic foot production.

Uneven-aged management with high stocking levels was the most cost efficient in terms of sawlog production (Baker, 1987).

Using a natural regeneration system, such as single-tree or group selection for uneven-aged stands, or seed-tree or shelterwood for even-aged stands, would preclude the use of genetically-improved planting stock. Any increase in yield due to faster growth, better form and increased disease resistance that is carried in the genes of superior trees would be unattainable. For restoration efforts, the artificial system would be more effective than a natural system. It would occupy the site more efficiently, reduce the potential for off-site species out-competing the species being restored, and use genetically improved seedlings.

Natural regeneration methods of stand establishment are less expensive when compared with artificial methods. Boyer (1979) found natural regeneration by the shelterwood system a reliable, low-cost alternative for existing longleaf pine forest. The system is well suited to the natural attributes and requirements of the species and it may be attractive to landowners wishing to retain a natural forest and avoid high costs of site preparation and planting.

Boyer (1993) also found that the potential impact of significant growth reductions should be taken into account when considering uneven-aged management methods of longleaf pine. In stands suited to longleaf restoration through a natural system, delays in establishing a new stand may be expected. Good longleaf seed crops are infrequent in Louisiana, and must occur over an adequately prepared seed bed. Once stocked, bringing the new stand into height growth is an exacting process. Uneven-aged systems, however, would produce high initial yields due to the breaking-up action on fully stocked, even-aged stands.

Longer rotations for even-aged stands would make fewer acres available for regeneration. For some species, such as loblolly or slash pine, longer rotations would increase their susceptibility to attack by insects and disease, thus increasing the potential for greater salvage volumes. Recovery of salvage volume would vary based on management objectives for an area, which could affect available salvage harvest volume.

Managing mixed stands or managing hardwood in pine stands would also affect allowable sale quantity — depending upon levels of stocking within each involved stand type. The level of hardwood within pine stands is generally established at regeneration. Allowing greater amounts of hardwood would decrease long-term allowable sale quantity. Within the National Red Dirt and Catahoula Wildlife Management Preserves, a major goal has been the establishment and management of mixed types. Little research data is available regarding mixed yields. The conversion from pine to mixed pine-hardwood would likely reduce the long-term total yield or utilizable yield.

The use of irregular seed-tree or shelterwood cuts, whether for wildlife, within RCW habitat management areas, or scenic resources, would decrease allowable sale quantity in the short term. Allowing overwood to stand for an indefinite period would result in some mortality loss.

Site preparation

The regeneration phase starts with some form of site preparation using mechanical, herbicides, manual, or prescribed fire treatment methods. This involves the removal of logging slash, competing vegetation, and overhead shade. Regardless of how a site is regenerated, either by planting, direct seeding or natural seed fall, site preparation treatments would enhance the establishment, survival, and growth of seedlings or the germination of seed. The intensity, amount, and treatment method in advance of reforestation could have both short-term and long-term indirect effects on allowable sale quantity.

Mechanical — These methods include mowing, chopping, shearing, scarifying, ripping, piling, raking, disking, and bedding. All are designed to reduce or control woody and herbaceous competition by permitting increased survival and growth of planted pines and hardwoods. Significant loblolly survival, height, and diameter growth responses have occurred with shearing, raking, and disking treatments. Disking also has been shown to improve survival and growth of planted hardwoods. However, growth losses could occur if nutrients are displaced (USDA, Forest Service, 1989). Growth response may also be increased by using mechanical means in tandem with other treatments. Care must be taken to prevent nutrient displacement and minimize soil movement, which could impact forest health and long-term yields.

Herbicide — Herbicide effectiveness depends upon the onsite vegetation type, selectivity of the substance used, method or pattern of application, and timing of the treatment. Herbicide site preparation, either by broadcast or by more selective methods, have produced increases in height and diameter growth of pines and hardwoods (**USDA, Forest Service, 1989**). Problems may be encountered when nontarget species are damaged, or when drift or movement away from target areas occurs. In comparison with other methods, soil movement is kept to a minimum, thereby maintaining productivity and forest health.

Manual — Vegetation can be injured or killed by manually girdling or severing woody stems. Available tools include chainsaws, axes, and other hand tools. These methods keep soil movement to a minimum, can be used year-round, with no risk for nontarget damage. Vigorous sprouts may overtop featured species, and repeated treatments may be required for adequate control. Timber production may be affected where no control is achieved.

Fire — Fire can change a young tree's growing environment by removing litter and reducing other woody species that compete with it for growing space, nutrients, and water. Fire alone may sometimes be inadequate for vegetation control. Quite often fire may supplement or augment other treatments. Growth responses from burning have been both positive and negative (**USDA, Forest Service, 1989**). Early growing season burns can control competition on longleaf pine sites, which could increase long-term timber production. However, growth losses could occur from excessive amounts of crown scorch.

Stand improvement

The tending phase includes timber stand improvement treatments, primarily precommercial thinning and release, which are implemented within young stands of trees to improve the growth rate, stem form, and overall health of a stand. The intensity, amount, and treatment method of managing vegetation through stand improvement would have both short-term and long-term effects on timber production. Failure to apply or untimely application of an appropriate timber stand improvement treatment may not adequately prepare stands for early commercial operations within a reasonable time. Inadequate vegetation control and / or poor stocking would reduce yields in the long term. Forest health would be maintained, reducing stress brought on by competition for water, nutrients, and growing space.

Available treatment methods fall into the following categories: mechanical, herbicide, manual, and prescribed fire. The effects of these treatments on timber production would be the same as those disclosed under site preparation.

Streamsides and wetlands, and old-growth forest

Streamsides and wetlands as well as old-growth forest patches would affect timber volumes available for short-term and long-term harvest, based upon their timber suitability designation. If designated as unsuitable for timber production, any harvest would be for purposes other than timber production, and the amount harvested would not contribute to the allowable sale quantity. In general, these areas tend to be highly productive sites with older high-value timber. More specific timber impacts to timber production from these designations are disclosed for each alternative in subsequent sections of this chapter.

Effects of wildlife management on timber

General wildlife

Beaver control — The effect of beaver control on timber, primarily bottomland hardwood, would be positive. Flood water from beaver dams has severely damaged many acres of bottomland hardwood. The loss of commercial value is less than the wildlife habitat loss.

Threatened and endangered species

Red-cockaded Woodpecker management — Management for the RCW would affect timber volumes available for short-term and long-term harvest. Within RCW HMAs timber harvest opportunities are impacted by:

- The amount of suitable timber land within RCW HMAs;
- The extension of rotation ages;
- Requirements to provide adequate foraging habitat;
- Limitations on harvest within cluster sites;
- Limitations on allowable harvest cutting methods;
- Limitations on regeneration opening sizes;
- Limitations on acreages within the 0–10 and 0–30 ages classes;
- And the protection of the oldest 1/3 of pine and pine-hardwood acres until they reach rotation age.

Establishment of foraging areas reduces overall the acreage available for regeneration — except for efforts to restore longleaf pine. Even then, restrictions are such that only a limited area would be available for regeneration. The same may be said for thinnings. Basal area limits, coupled with a minimum number and size of stems, combine to restrict the area, and the volume to be produced, that might otherwise be available for intermediate cutting. These limitations and the effects of past cutting practices that reduced pine basal area will restrict harvest opportunities, especially in the short-term.

These activities directly, indirectly, and cumulatively reduce per-acre values from timber and would affect the timing of future harvest treatments. Commodity production would vary by alternative. More specific impacts to timber are disclosed for each alternative in subsequent sections of this chapter.

Louisiana pearlshell mussel management — Impacts to timber production caused by the Louisiana pearlshell mussel would be the same as those disclosed under *streamsides and wetlands and old-growth forest*, in this section.

EFFECTS BY LANDTYPE ASSOCIATION (LTA)

In general, LTAs **4** and **7** have the highest per-acre potential for timber production and would have the highest site index for commercially important species. All of the other LTAs are also capable of producing commercial timber, but at a more moderate yield per acre. Although not capable of producing the largest yields per acre, suitable timber lands in LTAs **1, 2, 5,** and **6** would receive the most vegetative manipulation regardless of the alternative. For this reason these LTAs would produce the highest outputs of timber, followed by LTAs **3, 8,** and **9**. The least amount of planned timber outputs would occur in LTAs **4** and **7**.

The predominance of restoration prescriptions in all the alternatives, coupled with the predominance of longleaf pine as the historic vegetation on much of the Forest (LTAs **1, 2, 5,** and **6**), the supply of sawtimber-sized products would be expected to eventually change from mostly yellow pine to longleaf pine. Also, as mixed species management and uneven-aged management increase in LTAs **3, 8,** and **9**, outputs of hardwood and pine roundwood and hardwood sawtimber would be expected to slowly increase in time.

Because the timber market area includes all the LTAs and does not differentiate timber values by LTAs, effects to timber supply and demand would not vary by LTA.

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Fire management

The amount and type of prescribed fire varies by alternative, as shown in table 4–7. Alternative A, which closely emulates current burning practices, would burn the least amount of acres per year. Alternatives D and Mod D, which emphasize longleaf pine restoration, would burn the most acres per year, primarily for release, on timber-suitable lands. The rest of the alternatives vary between Alternatives A and D levels. Because Alternatives D and Mod D would burn the most acres on lands suitable for timber production, effects associated with top killing of lower woody vegetation, i.e. availability of nutrients, water, and growing space for the overstory, would be higher than in the other alternatives. The potential for crown scorch would also be

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highest in Alternatives D and Mod D and could affect overall stand vigor in some stands. The higher emphasis on prescribed burning in Alternatives D and Mod D would have the cumulative effect of relegating more of the forest acreage to fire-maintained overstory species such as longleaf pine.

Forest health management

Southern pine beetle (SPB) suppression methods would not vary by alternative. The risk of losing large amounts of timber to southern pine beetle varies by the stocking levels, overstory species, and predominant stand ages.

Stocking levels within stands would be controlled by thinnings. Alternatives A, B, D, and Mod D would thin more acres than the other alternatives (table 4–10) and therefore have a lower risk for catastrophic loss from SPB.

Overstory species like longleaf pine are more resistant to SPB attack than other species. Alternatives A, D, and Mod D would convert more loblolly pine and shortleaf pine stands to longleaf pine than the other alternatives (table 4-10). Alternatives B and E would convert only a small portion of the Forest to longleaf. Therefore Alternatives A, D, and Mod D would do the most to reduce risk for catastrophic loss from SPB and Alternatives B and E would do the least.

Younger stands are typically more resistant to SPB attack than older, less vigorous stands. Alternatives A, B, D, and Mod D would harvest more stands during the first period than the other alternatives. This would produce a lower average Forestwide age than for the other alternatives and therefore lessen risk for catastrophic loss from SPB. Alternative C would produce an older Forest over time and consequently increase risk for SPB losses.

Lands management

There is little variation in lands management practices between the alternatives. Effects to timber production would not vary significantly by alternative.

Range management

Table 4–6 shows that Alternative A provides the most opportunity for grazing and therefore would have the greatest effect on timber production. The magnitude of these effects would be insignificant if mitigation practices were employed. The level of grazing does not differ between the rest of the alternatives; the effects would be the same for Alternatives B, C, D, Mod D, E, and F.

Vegetation management

Because even-aged management is the principle method used in Alternative A, it would thin the most acres. Of the alternatives that use both even-aged and uneven-aged methods, Alternative B would thin the most acres and Alternative C would thin the least. Since thinning is practiced as part of even-aged management and typically only on timber-suitable lands, it is directly correlated to the amount of area allocated to the even-aged management system. This correlation can be seen by comparing acres thinned in table 4–10 with acres of even-aged management in table 4–8. All alternatives except Alternative C would use thinning extensively in even-aged stands to improve vigor, regulate composition, capture mortality, decrease future mortality, and concentrate growth.

As shown in table 4–27, Alternative A would provide the highest output of timber production. Alternatives B and D would provide slightly less, while Alternative C would provide the least. Allowable sale quantity (ASQ), long term sustained yield capacity, and stand average volume would increase as timber output for each alternative increases.

Timber product mix would primarily consist of sawtimber, veneer timber, and roundwood (pulpwood and chip-and-saw). In Alternatives A, D, and Mod D roundwood would comprise approximately 35 to 44 percent of the total, while in the other alternatives roundwood would comprise approximately 45 to 57 percent of the mix. This variation occurs because the objective is to maximize acres of longleaf restoration in Alternatives A, D, and Mod D instead of first period timber (Alternative B), intermediate harvests (Alternative C), pine-to-mixed restoration (Alternative E), or all restoration (Alternative F). The management area prescription for a restoration objective would typically cut loblolly pine stands using even-aged final harvest cutting methods. Because loblolly pine stands generally have larger diameters than similar aged longleaf, short-

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leaf, mixed, or hardwood stands, merchantable stems tend to be larger.

Alternatives A, D, and Mod D use site preparation and planting more than in the other alternatives (table 4-8). Alternative C uses these practices the least. Site preparation, using soil and water mitigation measures, would help control woody vegetation, improve seedling survival, and increase initial diameter and height growth most in Alternatives A and D and least in Alternative C.

Acres of chemical release would be highest in Alternative A and B and lowest in Alternative C (table 4-8). Alternative B proposes the most precommercial thinning. Alternative A proposes no precommercial thinning because its objective is primarily to convert existing off-site species to longleaf pine using artificial regeneration (planting). Planted stands of pine do not normally require precommercial thinning for release. Since more chemical release is proposed in Alternatives A and B, they would provide the best growth, stem form, and overall health, especially where natural regeneration methods are used.

Table 4-9 shows that Alternative F allocates the most acreage to streamside habitat protection. Alternative A allocates the least. This is due to application of different protection zone widths needed to meet the *desired future condition* (DFC) for the different management areas. Timber output from streamside habitat protection areas are not considered suitable for timber production, would not contribute to ASQ in the action alternatives, and would be expected to yield smaller volumes per acre than similar suitable sites. Treatments within streamside and riparian area protection zones would be limited to only those activities needed to improve wildlife habitat, plant community structure or composition, or other amenity value. Single-tree or group selection harvest cutting methods could be used to achieve the above mentioned values. Within designated old-growth patches, thinning and a variety of regeneration harvest cutting methods would be available to promote old-growth attributes, restore appropriate species within a patch, and mold overstory species composi-

TABLE 4–27, EFFECTS OF ALTERNATIVES ON TIMBER COMMODITY PRODUCTION

Displayed by Alternative and Indicator

Indicator	Alt A	Alt B	Alt C	Alt D	Mod D	Alt E	Alt F
All timber volume, MMCF / year	14.30	14.05	11.13	13.69	13.16	12.01	12.72
Timber volume from suitable lands,							
Period 1, MMCF / year (annual ASQ)	14.11	11.90	3.04	10.21	9.69	8.89	8.13
Period 2, MMCF / year (annual ASQ)	17.13	12.00	3.66	11.61	11.43	10.03	9.21
Periods 3–5, MMCF / year (annual ASQ)	17.44	12.00	3.66	11.61	11.43	10.03	9.21
Unscheduled timber volume from unsuitable lands, MMCF / year	0.19	2.15	8.09	3.48	3.47	3.11	4.59
Long-term sustained yield, all periods, MMCF / year	19.80	17.20	5.10	16.52	16.36	14.68	13.41
Stand average volume, all periods, MMCF / year	111.65	79.80	25.28	78.69	77.54	80.37	74.84
Inventory volume, MMCF / year	104.60	81.26	21.49	75.92	75.11	71.98	63.85
Sawtimber sold, MMCF / year	4.64	4.39	3.27	4.02	3.75	3.43	3.67
Veneer timber sold, MMCF / year	4.56	4.17	2.46	3.66	3.41	3.11	3.21
Roundwood sold, MMCF / year	4.96	5.49	5.40	6.00	5.99	5.47	5.84
Timber program expenses (M$ / year)	3,818	2,890	808	2,878	2,783	2,546	2,356
Timber direct and indirect revenues (M$ / year)	35,983	31,912	14,267	27,990	25,967	23,622	22,581
Fed. government receipts (M$ / year)	16,473	14,958	4,257	13,331	12,291	11,416	10,676
Present net value, 50-year cumulative (MM$)	1,360	1,141	868	1,151	1,109	1,058	1,039

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tion. For these reasons, streamside and old-growth forest protection practices in Alternative F would lower the suitable timber base acres and ASQ the most, whereas these practices in Alternative A would lower them the least.

In order to assess cumulative effects, an analysis of the total pine and hardwood pulpwood stumpage (principal raw material used in chipmills) severed during the last ten years within the 7 parishes containing national forest land and the entire 30-parish market area of the Forest was conducted using the Louisiana Timber and Pulpwood Production reports. See Table 4-28. These reports, published annually by the Louisiana Department of Agriculture and Forestry, Office of Forestry, contain the total forest products severed and tax receipts by parish and species, and estimated stumpage values.

Within the 7 parishes containing national forest land, an average of 1.51 million cords of pine and hardwood pulpwood per year was harvested from 1988 to 1997. The greatest amount, 1.66 million cords, was harvested in 1994. Harvest has declined every year since 1994. In 1997, 1.42 million cords were harvested. The same trend occurs within the Forest's 30-parish market area. For the last ten years an average of 4.43 million cords of pine and hardwood pulpwood per year has been harvested. Peak harvest occurred in 1994 (4.78 million cords). Harvest has declined every year since 1994, and in 1997, 4.31 million cords were harvested.

While half of all chipmills had start-up dates in the 90's, the harvest of the raw materials supplying chipmills has not increased. Overall, for the past ten years, harvest of the raw material that supplies chipmills has been stable to decreasing. The cumulative effects on forested lands from the Forest's proposed harvesting in all the alternatives, along with expected harvests on surrounding lands within the 7-parish area of national forest land and the 30-parish market area, would be minimal.

Wildlife management

There is no variation in beaver control practices between the alternatives. Effects to timber production would not vary significantly by alternative.

Management for RCW habitat would have an effect on the Forest's ability to produce timber products (see the maximum timber benchmark in Appendix B). However, because all alternatives comply with guidance contained in the *Record of Decision, FEIS For the Management of the Red-cockaded Woodpecker and its Habitat on National Forests in the Southern Region* (RCW FEIS), there would not be much variation between alternatives' management practices and their effects to timber output. All alternatives would have Habitat Management Areas (HMAs) of equal size and are allocated DFCs that are compatible with the direction contained in the RCW FEIS. Population objectives for RCW would be the same for all alternatives (Table 4–9).

Compared to areas outside HMAs, the area within HMAs in all alternatives would propose more thinnings to keep basal area suitable for RCW; more prescribed fire to maintain open longleaf pine communities; maintenance of foraging stands almost exclusively by thinning on about 42 percent of HMA acreage; more conversion of loblolly to longleaf to

TABLE 4–28, Pine and Hardwood Pulpwood Harvest 1988-1997 (Million standard cords)

Area	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
7 NF Parishes	1.51	1.60	1.46	1.47	1.50	1.49	1.66	1.54	1.44	1.42
23 Other Parishes	2.99	3.08	2.77	2.78	2.80	2.87	3.12	2.98	2.95	2.89
Total Market Area	4.50	4.68	4.23	4.25	4.30	4.36	4.78	4.52	4.39	4.31

regain overstory communities historically associated with RCW; older rotation ages for even-aged management species (mostly longleaf) after initial conversion to provide more potential nesting for the RCW; and more extensive use of uneven-aged management practices over time in order to reduce fragmentation of RCW habitat and promote the development of large-diameter snags.

Streamside and riparian area protection zones — habitat of the Louisiana pearlshell mussel — are unsuitable for timber production in all the action alternatives. Some non-production harvesting could occur within these areas, but would not contribute to allowable sale quantity. Treatments within streamside and riparian area protection zones would be limited to activities needed to improve wildlife habitat, plant community structure or composition, or other amenity values. Single-tree or group selection harvest cutting methods could be used to achieve the above-mentioned values.

The cumulative effects of applying only these limited prescriptions across 61 percent of the Forest would be to lower its timber output capability.

MINERALS

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Introduction

Management practices or administrative conditions that would withdraw lands from minerals activities or constrain exploration, access or development, would have the most significant effect on the development of minerals resources.

Effects of military use on minerals

Military use, past and present, could cause effects on minerals management. Although some areas of past use are designated *no entry*, oil and gas leasing could be allowed with a *no surface occupancy* stipulation. Exploration of surface minerals would generally be prohibited. Other areas with ongoing intensive military use could be leased for oil and gas subject to site-specific NSO and CSU lease stipulations. However, these areas are typically so intensively used by the military that access and surface occupancy is severely limited and therefore less desirable.

If exploration, development and production in the areas are restricted, there could be a net loss of income to the government from lease payments and royalties that might otherwise accrue from production.

Effects of transportation management on minerals

Road construction minimally affects oil and gas exploration and development. Road management could, however, affect these activities if road closures were sufficient to limit site ingress and egress. Salable or common variety minerals would be most impacted; road construction and reconstruction require large supplies of gravel, most of which is supplied from Forest pits. In 1994, 93,581 tons of gravel were removed from the Forest by State and local public agencies; 50,165 tons removed for Forest Service use; and 5,954 tons removed by commercial operators and special-use permittees.

There would be little effect on oil and gas exploration and development. Sand and gravel are available from nine active Forest Service pits for use in the construction and reconstruction of Forest development roads. Future needs by the government would be considered prior to authorizing additional commercial operations.

Effects of wildlife management on minerals

The protection and management of RCW could impact oil and gas exploration, development, and production. Restrictions on activities within cluster sites, replacement, and recruitment stands, and limitations on clearings for non-silvicultural purposes within 1/4 mile of clusters, could impact access to minerals in federal ownership. Permittees would be required to relocate exploration and development activities or access roads outside of clusters. This could result in increased cost to the permittee, especially if directional drilling for oil or gas was necessitated by the move (USDA, Forest Service, 1995).

Prohibiting development would have economic impacts on permittees as well as economic losses to the Federal Government, and subsequently, to the State, through lost royalties. However, as habitat conditions change, and RCW populations improve, exploration and development may become

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EFFECTS BY LANDTYPE ASSOCIATION (LTA)

possible. This would still cause economic losses to permittees and the government, but not to the extent that would occur if development were prohibited (USDA, Forest Service, 1995).

EFFECTS BY LANDTYPE ASSOCIATION (LTA)

Because of their geologic history, landtype associations (LTAs) vary as to the presence of minerals resources and therefore the economic potential for exploration and development.

Economically, LTA 1 would hold the most mineral development potential for common variety minerals. It would have a low potential for development for oil and gas unless the underlying Austin Chalk formation proves to be a larger producer. LTA 2 would have a low potential for the development of common variety minerals. The thermal imagery process has not been used on this LTA because it is not considered cost effective based on this low potential. This LTA would also have a low potential for oil and gas development.

LTA 3 would have a low potential for oil and gas and common variety minerals development. Economically, LTA 4 would have a very good potential for sand and gravel operations. With the value of sand and gravel expected to be in high demand, common variety minerals could be a valuable resource in this LTA.

LTA 5 is historically known for its oil and gas production and this trend would be expected to continue into the future. However, the majority of the wells are located where the mineral rights are privately owned. The type of common variety minerals in this LTA is chiefly "Winn Rock," composed of clay ironstone beds that weather into fragments which make excellent gravel for roads. However, the weathered beds are not extremely thick. This would limit their development for road use. The need for Winn Rock and clay binder material would be expected to continue into the future and therefore economically, this LTA would have potential for the development of common variety minerals.

No economic production of oil, gas or common variety minerals are predicted for LTA 6. LTA 7 would have a low potential for oil and gas development and there is no anticipated economic production of common variety or other minerals associated with this LTA.

LTA 8 would have a low potential for oil and gas development. There are some known iron ore deposits but because more economical iron ore is available elsewhere, there is no demand for the supply on national forest lands. LTA 9 is predicted to continue having a high potential for oil and gas production. There are known iron ore deposits in this LTA also, but because a more economi-

TABLE 4-29, LEASABLE ENERGY MINERALS

Oil and Gas, Variation by Stipulation

	Alt A	Alt B	Alt C	Alt D	Mod D	Alt E	Alt F
Total acres on Forest	603,700	603,700	603,700	603,700	603,700	603,700	603,700
Acres withdrawn from leasing	8,700	8,700	603,700	8,700	8,700	26,700	31,700
Acres requiring NSO stipulation[1]	40,069	22,036	0	25,364	25,364	17,486	16,823
Acres requiring CSU1 stipulation[2]	0	0	0	130,560	130,560	125,391	131,894
Acres requiring CSU2 stipulation[3]	5,511	182,565	0	70,959	70,959	63,575	59,826

[1] No surface occupancy.
[2] Highly restrictive controlled surface use stipulation.
[3] Moderately restrictive controlled surface use stipulation.

cal supply is available elsewhere, there is no demand for national forest sources.

EFFECTS BY ALTERNATIVE

Minerals activity would be allowed in most management areas under all alternatives except C in accordance with existing laws and regulations. The demand for minerals exploration and development is expected to be the same for all alternatives. As shown in table 4-29 the amount of land available for minerals leasing would vary by alternative. Alternative A would open up more of the Forest for leasing with the least restrictions, than in the other alternatives. Alternative C would withdraw all of the Forest from leasing of federally-owned minerals. Alternatives E and F would withdraw from leasing those lands allocated to an amenity-based management area prescription, i.e., management areas 2 and 4. All the alternatives except C would use *No Surface Occupancy* (**NSO**) and *Controlled Surface Use* (**CSU**) lease stipulations in different combinations to provide protection for other natural resources. Chapter 2, pages 2-17 through 2-35, and page 2-42, of this **EIS**, give more detail on how the alternatives differ in minerals management.

For federally-owned minerals, national and local lease stipulations may restrict ground-disturbing activities. These restrictions would vary by alternative according to the type of resource protection needed. A **NSO** stipulation on a lease prohibits any type of ground-disturbing activity. A **CSU** stipulation in a lease is used when fluid mineral occupancy and use are generally allowed on all or portions of the lease area year-round, but because of special values, or resource concerns, lease activities must be strictly controlled. Alternatives B, D, Modified D, E, and F all require **CSU** stipulations under the varying circumstances mentioned in Chapter 2, "Distinguishing Characteristics", pages 2-20 through 2-35. Two types of **CSU** stipulations are used in these alternatives — one that is highly restrictive of the types of activities that can occur (**CSU1**) and one that is moderately restrictive (**CSU2**). The **CSU1** stipulation would prohibit placement of mineral extraction equipment, buildings, roads, ponds, wellpads, and the clearing of pipeline rights-of-way vegetation. A **CSU2** stipulation would be similar to **CSU1** except that it would allow roads and clearing of rights-of-way vegetation to occur if a site-specific

TABLE 4–30, WELLSITE DISTURBANCE

Approximate Area Disturbed by Drilling

Ranger District	Level of Industry Activity for Oil / Gas Drilling Low	Medium	High
Caney	4 ac	18 ac	32 ac
Catahoula	2 ac	6 ac	12 ac
Evangeline Unit, Calcasieu	30 ac	120 ac	480 ac
Kisatchie	2 ac	12 ac	20 ac
Vernon Unit, Calcasieu	30 ac	90 ac	360 ac
Winn			
USA Minerals	4 ac	16 ac	28 ac
Outstanding	74 ac	158 ac	316 ac
Total wells projected	53	140	344
Total producers	18	65	177
Total dry holes	35	75	167
Total area for well pads	146 ac	420 ac	1,248 ac
Total area for roads	106 ac	280 ac	688 ac
Area for pipelines (producers)	63 ac	227 ac	619 ac
Total Area Disturbed	**315 ac**	**927 ac**	**2,555 ac**

TABLE 4–31, WELLSITE RECLAMATION

Approximate Area to be Reclaimed After Drilling Operations

Ranger District	Level of Industry Activity for Oil / Gas Drilling Low	Medium	High
Caney	1 ac	7 ac	13 ac
Catahoula	0 ac	2 ac	4 ac
Evangeline Unit, Calcasieu	16 ac	64 ac	256 ac
Kisatchie	0 ac	4 ac	7 ac
Vernon Unit, Calcasieu	8 ac	36 ac	192 ac
Winn	11 ac	27 ac	41 ac

Note: These projections are based on wells producing from the Austin Chalk, and each will require 1 to 3 acres depending on whether production and related facilities remain on site. Therefore, 2 acres will be used. All other formations require about 1 acre.

Note: In addition to the above acres, where drilling results in a dry hole, all of the wellsite area would be reclaimed. Road rights-of-way would also be reclaimed unless the road is accepted as part of the Forest's transportation system.

COMMODITY PRODUCTION

MINERALS

EFFECTS BY ALTERNATIVE

environmental analysis determines that the mitigated environmental effects would not be significant.

The available acreage for federally-owned minerals requiring a NSO and CSU stipulation vary per alternative according to the designated special interest areas, research natural areas, state registry natural areas, streamside habitat protection zones, riparian area protection zones, pearlshell mussel sub-watersheds, and allocation of amenity-emphasis management areas. In addition to the three national stipulations used, Regional Lease Notice No. 3 is required where there is the possible occurrence of threatened, endangered, or sensitive species within the leasehold; and, Regional Lease Notice No. 4 is required for all leases where wetlands, floodplain, or riparian areas exist. A site-specific environmental analysis for minerals development would identify the areas where occupancy would be denied or mitigation measures applied. See table 4–29.

Direct, indirect and cumulative surface disturbance to the Forest environment from minerals activity were determined based on the in-depth evaluation and assumptions contained within the *Minerals Supply and Demand Analysis*. An analysis of leasing exploration and predicted future impacts is also included in that document. This information is located in the Forest Plan revision process records.

The assumptions for this projection were reached by looking at the historic trends in the oil and gas industry, oil and gas operations in the State, and the Forest potential for oil and gas. Table 4-30 and 4-31 are projections of the approximate area which could be disturbed from drilling and production under a low, medium, and high activity level. The different activity levels could change on parts of the Forest due to a number of variables: successful drilling on adjacent lands or lands in close proximity of the Forest, a large increase in the price of oil and natural gas, and new technologies to make recovery of marginal oil and gas deposits economical. The cumulative acres could be divided by 10 to show the yearly expected disturbance during the first period of the Plan revision. This expected trend from minerals exploration and development would be the same for all alternatives.

The two tables presented here serve as a baseline from which to compare the different levels of activity. They do not take into account the effect that limitations, land withdrawals, or stipulations, may have on the projected number of wells and acres disturbed in the areas being considered. The tables are based solely on an unconstrained potential for oil and gas evaluated under different industry activity levels. These levels are determined by oil and gas prices based on national need, demand, and conservation efforts.

Each ranger district was evaluated under the scenarios in tables 4–30 and 4–31. Table 4–30 is the approximate area which could be disturbed from drilling, and table 4–31 is the approximate area which would be reclaimed after oil and gas drilling operations have ceased and the well is a producer. If the well is a dry hole, all the cleared area would be reclaimed. The following assumptions were made:

- The maximum area cleared per well using vertical drilling would be approximately 1.5 to 2.5 acres. For this projection, a 2-acre site was used. An exception would be for wells targeting the Austin Chalk formation, where horizontal drilling would be used; those wells would require a well pad of approximately 5 to 8 acres. For this projection a 6-acre well site was used in the calculations for the Evangeline and Vernon Units of the Calcasieu District.

- The average length of access road per well would be 0.5 miles, the maximum width of the access road would be 30 feet. The amount of acreage disturbed by road-building per well would be 2 acres.

- The average pipeline would be approximately 1.5 miles long. Where possible, the pipelines would be installed adjacent to roads or utility corridors. Using a width of 20 feet, the average disturbed area per producing well site would be approximately 3.5 acres.

Many of the wells drilled would be on federal surface land overlaying private minerals that are outstanding to a third party. Federal administration for these circumstances would be limited. The mineral owner / permittee has a right to access and a right to remove the minerals. It would be the Forest Service's responsibility to see that the concerns for the environment are addressed.

RANGE

GENERAL EFFECTS

Effects of fire management on range

Prescribed burning conducted to rejuvenate habitats, to slow vegetation succession, to control insects and diseases, and to restore native plant communities would increase forage productivity. The cumulative effects of fire management practices would be an improvement of forage production and forage quality in areas that are burned by prescription, thereby improving the range program.

Effects of recreation management on range

No developed recreation sites are located within cattle grazing allotments. Developed recreation therefore has no effect on the range program. Dispersed recreation contributes to human-livestock interactions. The location of trails and trailheads could impact range permittees with respect to damage to range fences or other range structures.

Effects of transportation management on range

Transportation management and the accompanying vehicular traffic could injure or kill livestock. As increasing numbers of persons gain access to the Forest, a corresponding increase in human-livestock interactions would occur.

The cumulative effects of transportation management practices to the range program would be negligible due to the Forest's relatively low road density. About 3.5 miles of road per square mile of forest land currently exists on the Kisatchie, with no detrimental effects to the range program. Transportation system effects on range would continue to subside because little new road construction is planned for the future and because the range program is declining.

Effects of vegetation management on range

Timber management activity can directly affect range productivity. The degree of impact depends on the number of acres in various forest types and the rotation age of timber on the area. Pine stand density for optimum timber growth is usually greater than the optimum for best forage production.

The cumulative effects of timber management practices would be beneficial to the range program. Overstories would be reduced, thereby increasing range forage production. Generally, forage production increases as overstory shading decreases.

Effects of wildlife management on range

Wildlife management practices such as prescribed burning generally enhance forage productivity. This would also benefit the livestock and the range program. Management activities conducted by the Forest to benefit the endangered RCW, such as prescribed burning, midstory removal, and foraging area timber thinnings, also contribute to increased forage production, which would bolster the range program.

EFFECTS BY LANDTYPE ASSOCIATION (LTA)

The allotments occur within *landtype associations* (LTAs) 1, 2, and 6. These LTAs all have longleaf pine as the historic landscape vegetation. Alternatives B–F would all emphasize open, frequently-burned longleaf landscapes which would provide improved range forage quality and quantity. Management for the RCW and the restoration and maintenance of longleaf landscapes may increase interest in forest grazing opportunities.

EFFECTS BY ALTERNATIVE

Under Alternative A, up to 140,000 acres are available for domestic livestock grazing on 3 ranger districts: Catahoula, Kisatchie, and Calcasieu (see figure 4–1). No grazing would occur on the Caney or Winn Districts. With current trends, use would continue far below capacity. The supply of range forage would exceed current demand for grazing permits. Structural improvements such as boundary and cross-fences on inactive allotments would continue to deteriorate and would pose conflicts, especially with dispersed recreation use and timber management activities on the Forest.

FIGURE 4–1, GRAZING UNDER ALTERNATIVE A

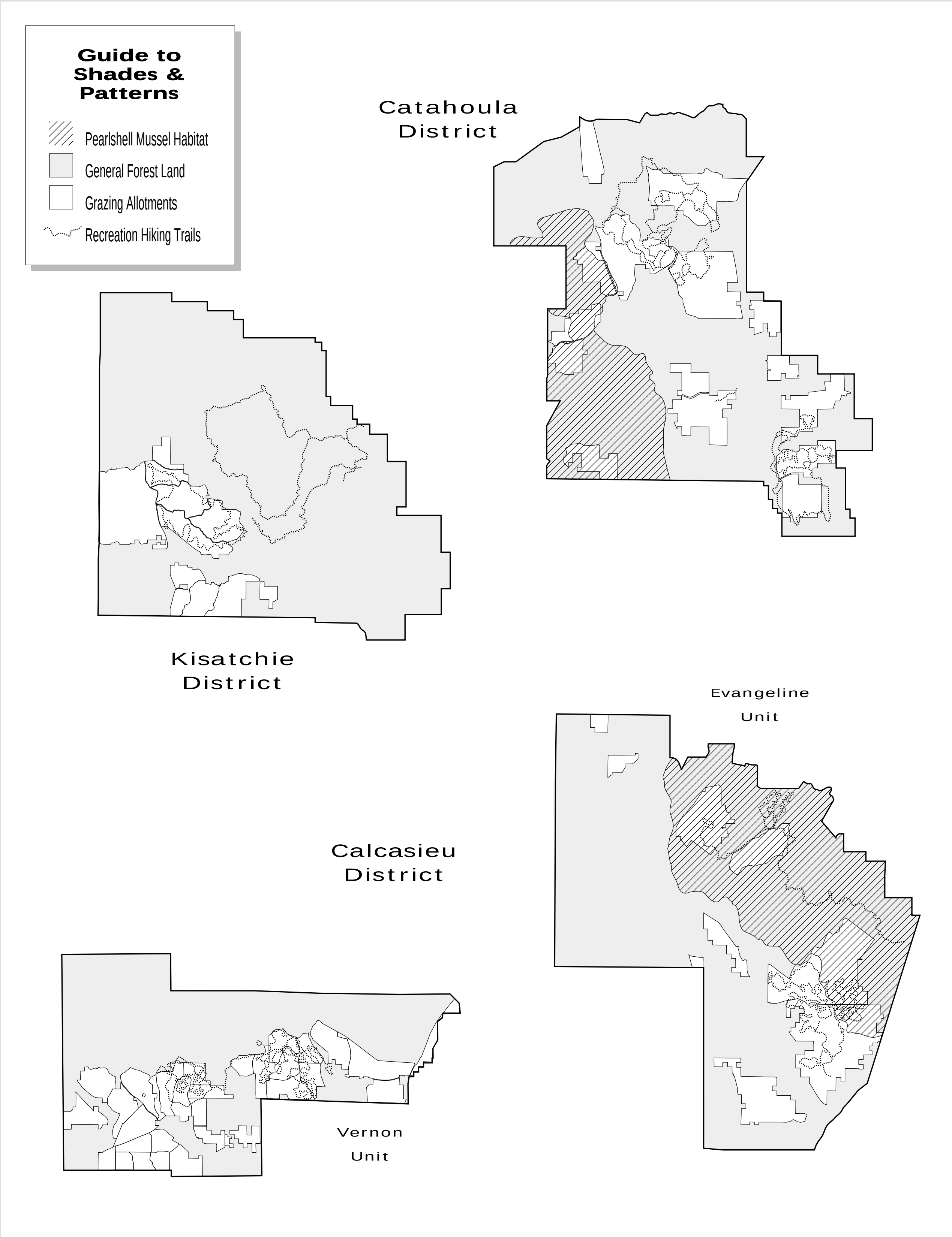
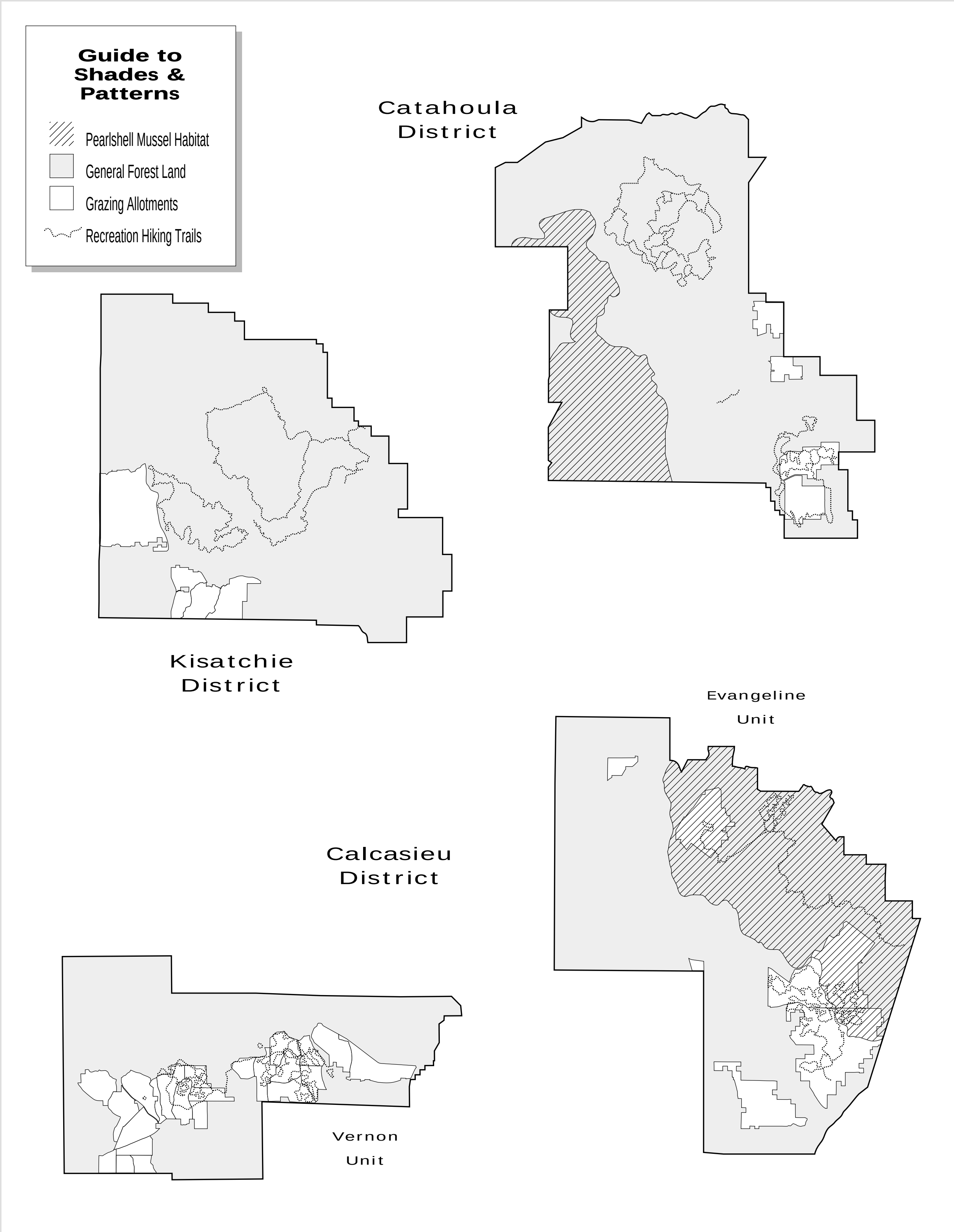


FIGURE 4–1, GRAZING UNDER ALTERNATIVES B–F



COMMODITY PRODUCTION

RANGE

EFFECTS BY ALTERNATIVE

Of 39 existing allotments, 14 are currently active. In this alternative, fourteen active allotments would occur within RCW HMAs. Vegetation management in these allotments would comply with the direction contained in the *Record of Decision and Final Environmental Impact Statement for Management of the RCW and its Habitat on National Forests in the Southern Region* (USDA, 1995). Prescribed burning, midstory removal, and timber thinning treatments to maintain RCW foraging requirements would generally increase range forage production in these allotments. Improved range forage quality and quantity may increase interest in forest grazing opportunities.

Of the two districts that have Louisiana pearlshell mussel populations, the Catahoula District populations all occur within inactive allotments. Unless the allotments are reactivated, the mussels should not be impacted by grazing. The Evangeline Unit of the Calcasieu District does have known pearlshell mussel populations within one active allotment. Cattle use streams for water and tend to create crossings. Should one of these crossings be at or immediately above a mussel bed, there could be adverse impacts resulting from increased sedimentation and organic input from the cattle. Mitigation measures that discourage grazing of riparian areas by attracting livestock away from areas by feeding, salting, and the use of prescribed fire should adequately protect the mussel and its habitat.

Risk of damage to sensitive plants and bog sites from cattle grazing would be greatest on the Kisatchie District and the Vernon Unit of the Calcasieu District which have numerous sensitive plants and bogs within active allotments. Placement of feed and salt away from these sensitive areas would reduce the impact. Risk of impacts would be least on the Evangeline Unit and Catahoula District, as there are no known sensitive plant species within active range allotments on these areas.

Potential impacts to grazing from dispersed recreation, especially multiple-use trails, would be highest on the Catahoula District, and Evangeline and Vernon Units, where trails are located within active range allotments. There would be no impact on the Kisatchie District as there are no multiple-use trails within active allotments. In Alternative A, three state scenic streams — Kisatchie Bayou on the Kisatchie District, and Whiskey Chitto and East Fork of Six Mile Creek on the Vernon Unit, are within range allotments. Kisatchie Bayou and East Fork of Six Mile Creek are within active allotments and could be impacted by grazing. Mitigation measures to discourage grazing of riparian areas by attracting livestock away from these areas by feeding, salting, and the use of prescribed fire should protect these scenic streams.

In all alternatives, trespass livestock — including cattle, horses, and hogs — could cause the same impacts to resources as shown for permitted cattle grazing. Monitoring of unauthorized livestock use and associated damage, and taking appropriate established procedures to deal with trespass livestock would reduce or remove the potential for adverse impacts.

Alternatives B–F would have up to approximately 86,000 acres in 17 allotments available for domestic livestock grazing on 3 Ranger Districts: Catahoula, Calcasieu, and Kisatchie (see figure 4–1). No grazing would occur on the Caney or Winn Districts. Approximately 54,000 acres in 22 allotments, either currently inactive or active but planned for closure when current permittees waive their term grazing permits, would be closed and dropped from the inventory of grazing allotments. The supply of range forage available in the 17 allotments would exceed current demand by about 50 percent for grazing permits. Over the implementation period of the Forest Plan, structural improvements on those allotments dropped from the range program would be removed as opportunities arise and funding allows, in order to reduce conflicts with other Forest management activities and use.

Fifteen of the 17 allotments would occur within RCW HMAs. As in Alternative A, vegetation management in these allotments would comply with the direction contained in the *ROD and FEIS for Management of the RCW and its Habitat on National Forests in the Southern Region* (USDA, 1995). Prescribed burning, midstory removal, and timber thinning treatments to maintain RCW foraging requirements would increase range forage production in these allotments.

In Alternatives B–F, no grazing allotments occur within Louisiana pearlshell mussel watersheds on the Catahoula District. The mussel populations on that district would therefore not be affected by livestock grazing. The Evangeline Unit would have mussel populations within one allotment. The impacts would be the same as Alternative A. Mitigation measures restricting placement of salt and mineral blocks and feeding troughs should ensure that cattle and cattle grazing would pose no threat to existing mussels or mussel beds.

Risk of damage to sensitive plants and bogs and potential impacts to grazing from dispersed recreation in Alternatives B–F would be the same as Alternative A. For Alternatives B–F, two state scenic streams, Kisatchie Bayou on the Kisatchie District, and East Fork of Six Mile Creek on the Vernon Unit, are within range allotments and both could be impacted by grazing. Mitigation measures to discourage grazing of riparian areas by attracting livestock away from these areas by feeding, salting, and the use of prescribed fire should protect scenic streams.

SUMMARY OF CUMULATIVE EFFECTS OF THE ALTERNATIVES

GENERAL

There are approximately 420,000 acres of non-Forest land within the Forest proclamation boundary. The management of these lands will contribute to the cumulative effects on all Forest resources. Most of these lands have either been cut over, or are at a relatively young age (20-50 years old). Changes on that portion of lands owned by non-industrial landowners are generally based on economic return (farming or timber) or residential property needs, rather than non-declining even-flow. Those lands owned by timber companies are generally more intensively managed, with management based upon a profitable economic return with mitigation for some amenity values.

Across most of the Forest, the amount of non-Forest land inholdings is a small percentage, so effects can be balanced by the management of National Forest land. In some areas, however, Forest management activities will be influenced by vegetative conditions or activities occurring on private lands.

VEGETATION

All alternatives meet the standards and guidelines that provide direction for habitat needs for TES wildlife and plant species, including percent cutover, size, and dispersion of openings, reforestation, and rotation ages. All alternatives use even-aged and uneven-aged silvicultural systems to a large extent and consequently determine the pattern of successional stages that would be expected to develop over time. Under all alternatives, national forest timber would not be removed at a more rapid rate than growth could occur. Although not expected to be a significant factor, growth and removal of Forest vegetation will be offset somewhat by growth and removals occurring on non-Forest lands.

Under all alternatives, the average age of Forest overstory vegetation is expected to increase, i.e., the Forest as a whole will become older than current. Alternative C allocates the most acreage for streamside protection, amenity emphasis, and old growth management (timber-unsuitable lands) and the longest rotation ages (timber-suitable lands) and would therefore be expected to increase the average age of the Forest more than in the other alternatives. Alternative A (current management direction) would prescribe the least amount of acreage for non-timber allocations and prescribe the shortest rotation ages. Therefore, it would maintain the current average age of the Forest. The Forest age for the other alternatives would vary between that of Alternative A and Alternative C in the following order (youngest to oldest): B, D, Mod D, E, and F. Table 4-8 compares the expected acreage of age classes at the midpoint of the first and fifth Plan periods (first 50 years).

Under the Modified D Alternative (the Forest Service preferred), restoration of landscape vegetation communities similar to those that may have occurred during presettlement times would be expected over a large portion of the Forest within 150 years. Under all alternatives except C, the diversity of forest vegetation is expected to increase. The portion of the Forest in no-harvest (wilderness, RNAs) and low-harvest (streamside areas, designated old growth, amenity emphasis areas, special use areas, state registry areas, special interest areas, wild and scenic river corridors, recreation areas) would remain, or gradually grow into an old growth

SUMMARY OF CUMULATIVE EFFECTS OF THE ALTERNATIVES

VEGETATION

WILDLIFE AND WILDLIFE HABITAT

SOIL, WATER, AND AIR

successional stage — barring natural disturbances such as fire, disease, and windthrow. Private lands adjacent to National Forest are not expected to be managed beyond the small sawtimber stage.

Lands allocated to no-harvest and low-harvests are expected to naturally succeed, i.e., natural opening will occur as disturbances kill or injure vegetation and open up the forest canopy to light and existing forest floor regeneration. Prescribed fire, used to mimic natural fires, would occur if needed to maintain a species composition similar to those that occurred historically.

WILDLIFE AND WILDLIFE HABITAT

In all the alternatives, protection of special and unique habitats would reduce the risk of adverse cumulative impacts to those wildlife populations that require them. All alternatives will provide a continuance of nesting and foraging habitat for the endangered red cockaded woodpecker (RCW) and protection for the Louisiana pearlshell mussel watersheds.

As a whole, the Forest is expected to provide older stages of habitat than current in all alternatives except A. Managed patches of old growth habitat and even-aged stands with longer rotations are planned in all the other alternatives. Alternatives C, F, E, Mod D, D, and B, respectively, would have decreasingly higher probabilities of providing the habitat diversity needed for recovery of wildlife species that prefer older, contiguous stands of vegetation. Table 4-9 shows expected acres and stages of management indicator habitat in 5 and 45 years.

SOIL, WATER, AND AIR

The potential cumulative effects of past, present, and reasonably foreseeable practices on all land ownership within the Forest boundaries were considered in the development of the standards and guidelines that limit how much of an area could be impacted and specify the amount and types of measures needed to minimize cumulative impacts. In most situations, minimizing cumulative impacts through mitigative measures is the most effective and feasible way of ensuring long-term protection of these resources. For this reason, mitigation measures are used in all the alternatives to minimize direct, indirect, and cumulative impacts. Mitigating measures can range from structural erosion/sediment control measures to streamside habitat protection zones to watershed restoration.

Although cumulative impacts of management actions can adequately be mitigated, the potential impacts to soil, water, and air can be comparatively assessed to a minor degree. Those alternatives that plan the most soil and water-disturbing activities, especially mechanical site preparation and road construction, would be expected to have the highest risk of producing significant negative impacts. Alternatives A, D, Mod D, B, E, F, and C, respectively, would have decreasingly lower probabilities of producing significant impacts to soil and water. See also table 4-6.

Those alternatives that plan the most prescribed burning would similarly be expected to have the highest risk of producing unacceptable cumulative levels of particulate emissions. Alternatives C, Mod D, F, D, B, E, and A, respectively, would have decreasingly lower probabilities of producing significant impacts to air quality. See also table 4-3.

Conversely, alternatives that plan the least disturbance to soil, water, and air would be expected to have the lowest risk of potential cumulative impacts.

UNAVOIDABLE ADVERSE EFFECTS

Implementation of any alternative would result in some adverse environmental effects which cannot be avoided. The application of the management prescriptions, standards and guidelines (S&Gs), best management practices (BMPs), and monitoring and evaluation are intended to limit the extent, severity, and duration of these effects. Mitigation is reflected in the management prescriptions, and mitigation measures are discussed within each section in Chapter 4 of this document. Although the formulation of the alternatives included avoidance of potential adverse environmental effects, some adverse impacts to the environment which cannot be completely mitigated are expected to occur.

Some adverse effects are of a transitory type. For example, air quality would diminish on a recurring though temporary basis, due to the use of prescribed fire. Most significant impacts would be from burning of slash produced by timber harvests. Even though S&Gs require prescribed burning to be scheduled for times when weather conditions would provide for smoke dispersion, the presence of smoke and haze over or adjacent to the Forest would detract from people's expectation of clean air. Timber hauling and recreation traffic on untreated roads, and the operation of internal combustion engines, would have localized and temporary adverse effects on air quality where these activities occur.

The natural landscape would appear altered by timber harvest, particularly where logging activity is highly visible from travel routes. Burning of harvest units and their blackened appearance would also be apparent. These adverse effects would eventually be reduced by growth of vegetation. Other impacts on the natural appearance of the landscape include roads and structures which are highly visible despite efforts to blend them with land forms and mitigate the effect by landscaping.

In unroaded areas, development activities such as timber harvesting, and road construction associated with harvests, recreation, or other purposes would have an adverse effect on the potential future management of these areas as designated wilderness, as research natural areas, or for other purposes requiring natural characteristics.

Disturbance, displacement, or loss of fish and wildlife may occur as a consequence of habitat loss and increased human activity in project areas. Roads and their associated use impact fish and wildlife due to human activities associated with new access into areas previously unroaded. Improved access into areas that previously had low-standard roads would have similar effects.

Both the amount and distribution of mature stands would be changed through implementation of any alternative. The rate and severity of adverse impacts varies by alternative. Since some wildlife species rely on habitat conditions provided by mature stands, a reduction in the populations of some wildlife species can be expected. As mature timber stands are converted to young plantations, the capability of the Forest to provide optimal cover for deer would be changed.

Although S&Gs, BMPs, and monitoring plans are designed to prevent significant impacts to soil and water, the potential for impacts does exist. Sediment production would exceed natural rates as long as roads are being built, timber is harvested, and slash is burned. Sediment would result from surface erosion, channel erosion, and mass movement.

Ground-disturbing activities would temporarily increase silt loads in some streams. This could displace fish, reduce resident fish reproductive success, and alter aquatic invertebrate populations. In addition, a loss of fish habitat would occur at road crossings of streams. The portion of a stream bed occupied by a culvert or other structures would be lost as fish habitat.

Mineral and energy development could have unavoidable adverse effects on other resources. The scope of these impacts depends upon the location and type of activity proposed by industry. The approving of operating plans for locatable minerals and requiring surface stipulations for leasable minerals would assist in the management and mitigation of these activities.

Fire hazard and resistance to control would increase subsequent to timber harvest and thinning operations, as a result of increased accumulation of forest residues. The potential for these adverse impacts increases relative to the emphasis on timber production in the alternatives being considered. Wildfire risk would increase where access results in more people using an area during and after management activities. Some of this risk would be mitigated by early detection, suppression, and prevention programs. Long-

UNAVOIDABLE ADVERSE EFFECTS

UNAVOIDABLE ADVERSE EFFECTS

RELATIONSHIP OF SHORT-TERM USE AND LONG-TERM PRODUCTIVITY

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

term increases in fuel hazard would be mitigated through fuels management activities that are responsive to resource management objectives.

Adverse effects would result from increasing recreation use and intensive forest management activities such as timber harvest, road construction and maintenance, developed recreation, and development of other facilities. These adverse effects include disturbance to native vegetation, soil compaction, reduced water quality, increases in noise levels, disturbance to wildlife populations and their habitats, air pollution from campfire smoke, prescribed fire, vehicle exhaust, and increased potential for human conflict.

RELATIONSHIP OF SHORT-TERM USE AND LONG-TERM PRODUCTIVITY

The relationship between the *short-term* uses of man's environment and the maintenance and enhancement of *long-term* productivity is complex. Short-term uses are those that generally occur annually on some part of the Forest, such as livestock grazing and timber harvest.

Long-term refers to longer than a 10-year period, and productivity is the capability of the land to provide market and amenity outputs and values for future generations. Soil and water are the primary factors of productivity and represent the relationship between short-term uses and long-term productivity. The quality of life for future generations would be determined by the capability of the land to maintain its productivity. By law, the Forest Service must ensure that land allocations and permitted activities do not significantly impair the long-term productivity of the land.

The alternatives considered in detail, including the preferred alternative, incorporate the concept of sustained yield of resource outputs while maintaining the productivity of all resources. The specific direction and mitigation measures included in the Forestwide management requirements ensure that long-term productivity would not be impaired by the application of short-term management practices.

Each alternative Forest Plan was analyzed using the ***FORPLAN*** linear programming model (see Appendix B) to ensure that the minimum standards and guidelines could be met. The alternative was changed if some aspect did not meet any of the minimum standards or guidelines. Through this analysis, long-term productivity of the Forest's ecosystems is assured for all alternatives.

Alternatives A, B, D, and Mod D have the highest level of short-term uses, as reflected by the acres of vegetation treatment, and they therefore result in higher levels of short-term consequences such as visual impact, fire hazard, and increased sedimentation. In a decreasing order of short-term uses, Alternatives A, B, and D are followed by Mod D, E, F, and C. Alternative C has the lowest level of short-term uses and therefore the lowest level of short-term consequences.

As stated earlier, the effects of short-term or long-term uses are extremely complex and depend on management objectives and the resources to be emphasized. No alternative would be detrimental to the long-range productivity of the Kisatchie National Forest.

The management prescriptions and the effects of implementing the revised Forest Plan would be monitored to provide data that ensures satisfying standards for long-term productivity. Monitoring requirements and standards would apply to all alternatives and are included in Chapter 5 of the revised Forest Plan.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

An *irreversible commitment of resources* results from a decision to use or modify resources that are renewable only over a long period of time, such as soil productivity; or nonrenewable resources, such as cultural resources or minerals. The revised Forest Plan and the alternatives examined were all based on the principles of multiple use and long-term productivity for all resources. Measures to protect natural resources that could be irreversibly affected by timber management practices were incorporated into Forestwide standards and guidelines (see Chapter 2 of the revised Forest Plan).

The extraction of gravel and rock used for road construction and reconstruction is considered an irreversible action. Alternative A has the greatest irreversible commitment of this resource, based on associated road construction and reconstruction, and on outservice gravel permits. Alternatives B, D, Mod

D, E, F, and C follow in decreasing order of commitment level. The production of oil and gas is also an irreversible resource commitment. The role of the Forest Service is to manage the surface resource in ways that would minimize adverse environmental impacts while providing for exploration and development. The rate of production of energy minerals is about the same for all alternatives except C, which withdraws the entire Forest from minerals leasing.

Irretrievable commitment of resources is the production of renewable resources lost because of allocation decisions that forego the production or use of renewable resources. Allocation decisions that forego the production or use of most renewable resources for relatively long periods of time include those that establish wilderness and scenic areas, research natural areas, recreation sites, and the construction of new roads. The total number of acres committed to these uses remains essentially the same for all alternatives, although the types of allocated uses vary. By contrast, nonwilderness allocation for areas is considered an irretrievable loss of increased wilderness opportunities. Tradeoffs between wilderness and other uses are discussed in Appendix C.

Under a given alternative, differences between output levels and the higher levels that otherwise could be produced also represent irretrievable commitment of resources. For example, a low level of forage use for livestock grazing or a low level of timber yield could be increased in the future, based on different management prescriptions, but the outputs between now and then would be "lost" or not available for use. The production thus lost would be irretrievable, but the action is not irreversible. Chapter 2 and Chapter 4 of this document reflect the outputs under management strategies set forth in the range of examined alternatives.

Archeological resources are part of an absolutely nonrenewable and irreplaceable resource base. Once disturbed, for whatever reason, the impacted portion of a property cannot be replaced or repaired, even though controlled data recording techniques may recover part of the information contained in the damaged site.

Archeological surveys and evaluations routinely use small (30 CM diameter) shovel tests or larger (1X1 M or greater) excavations to address research designs or potential. In and of themselves, these excavations represent the controlled destruction of a portion of an archeological site. The results of such excavations are an irreversible effect. This is balanced by using conventional, accepted archeological techniques and methods with a commitment to high standards.

Any other resource management action or result, whether planned or inadvertent, that diminishes the character or integrity of a heritage property, has irreversibly committed a portion of that site's value.

OTHER LEGAL DISCLOSURES

EFFECTS ON WETLANDS AND FLOODPLAINS

No significant adverse impacts on wetlands or floodplains are anticipated. Floodplains and wetlands would be protected under all alternatives. Under the requirements of Executive Order 11990, wetland protection would be provided by ensuring that new construction of roads and other facilities would not have an adverse effect on sensitive aquatic habitat. In addition, wetland evaluation would be required before issuing special-use permits in areas where conflicts with wetland ecosystems may occur.

Mitigation measures have been designed to conserve riparian areas and protect floodplains, as required by Executive Order 11988. Protective measures for riparian areas include the delineation of riparian area protection zones which are either designated as unsuitable for timber production (Alternatives B-F), or are protected from specific types of activities (Alternative A). Any vegetation manipulation in these areas would be for the enhancement of riparian-dependent resources. Floodplains would be managed by locating critical facilities away from floodplains or by using structural mitigation measures.

OTHER LEGAL DISCLOSURES

INCOMPLETE OR UNAVAILABLE INFORMATION

INCOMPLETE OR UNAVAILABLE INFORMATION

The Kisatchie National Forest has used the most current scientific information available and state-of-the-art analytical tools to evaluate management activities and to estimate their environmental effects.

However, gaps exist in our knowledge. The Council on Environmental Quality regulations discuss the process for evaluating incomplete and unavailable information (***40 CFR 1502.22 (a) and (b)***). Incomplete or unavailable information is noted in this chapter for each resource, where applicable.

Forest Plan monitoring is designed to evaluate assumptions and predicted effects. Should new information become available the need to change management direction or amend the Forest Plan would be addressed through the monitoring and evaluation process.

List of Preparers

The following list of interdisciplinary planning team members includes education and experience qualifications, and describes roles in the preparation of planning documents.

FOREST SUPERVISOR

Lynn C. Neff
Forest Supervisor

Education
B.S. in Forestry
Purdue University

Team Assignment
Provided overall direction to the Interdisciplinary Planning Team and the Forest Management Team.

Experience
Thirty-one years in public land management with assignments in recreation, wildlife, timber, lands, minerals and special uses programs at the District, Forest, Regional and National levels. Served as District Ranger in Arizona and New Mexico, and as Forest Supervisor in Arkansas and Louisiana for the past twelve years.

TEAM LEADERS

Cynthia A. Dancak
Planning, Recreation, Heritage Resources Team Leader
Forest Plan Interdisciplinary Team Leader

Education
B.S. in Natural Resource Conservation
University of Connecticut

Experience
Twenty years with the Forest Service, as silviculturist; timber management assistant; district ranger; and planning, environmental coordination, and recreation staff officer in South Carolina, Arkansas, Georgia, and Louisiana.

Team Assignment
Provided coordination with the Interdisciplinary Planning Team and the Forest Management Team; coordinated planning and recreation input.

Carl J. Brevelle
Resource Planner
Core Planning Team Leader

Education
B.S. in Forestry & Wildlife
Louisiana State University

Team Assignment
Coordinated the input of the Interdisciplinary Planning Team and developed the FORPLAN model for the revision.

Experience
Twenty-two years with the Forest Service. Positions in the Southern Forest Experiment Station's southern pine beetle research project; silvicultural forester and prescriptionist on the Winn and Catahoula Ranger Districts of Kisatchie National Forest; and resource planner / analyst and environmental analysis coordinator in the Kisatchie National Forest Supervisor's Office.

EDITING, DESIGN, & LAYOUT

CORE TEAM MEMBERS

EDITING, DESIGN, & LAYOUT

Ron Couch
Public Affairs / Fire & Aviation Team Leader

Experience
Twenty-five years of Forest Service experience. Assistant timber sale planner and wilderness / dispersed recreation forester, McKenzie Ranger District, Willamette National Forest; other resource assistant, Caney Ranger District, Kisatchie National Forest. Managed the Kisatchie National Forest's public affairs program since 1980.

Education
B.S. in Forestry
Louisiana Tech University

Team Assignment
Provided full support to the planning team for editing, design, layout, graphics, and all electronic production required in the Forest Plan revision effort. This includes all other related documents, published materials, exhibitry, and visual aids. Also provided additional support and advice in public contact and participation work.

CORE TEAM MEMBERS

Lisa Lewis
Recreation Planner

Experience
Thirteen years experience; two years industry forester, six years with Forest Service. Positions with the Forest Service include forester, other resource assistant, core planning team recreation specialist.

Education
B.S. and M.S. in Forestry
Louisiana Tech University

Team Assignment
Assisted with scenery mapping; wild and scenic river eligibility evaluations and suitability study; recreation opportunity spectrum (ROS) mapping, and roadless area evaluations.

Ken Rago
Forester

Experience
Twenty-one years with Forest Service, serving on districts as timber management assistant, silvicultural assistant, and other resource assistant; and in the supervisor's office as core planning team member.

Education
B.S. in Forestry
University of Massachusetts

Team Assignment
Provided timber and silvicultural input.

Al Williamson
Wildlife Biologist

Experience
Sixteen years with the Forest Service as a wildlife biologist and technician. Core planning team wildlife biologist.

Education
B.S. in Wildlife and Fisheries Management / Biology
South Dakota State University

Team Assignment
Provided information, analysis and documentation of the ecological classification system, old-growth designation and biological diversity. Assisted in compiling and analyzing wildlife, fisheries and range data.

TEAM MEMBERS

Mitchel L. Barton
GIS Systems Analyst

Education
B.S. in Mathematical Computing
Louisiana College

Experience
Six years with the Forest Service as a GIS analyst and systems developer. Nine years with Forest Health Protection in design and implementation of computer databases.

Team Assignment
Designed and provided GIS analysis for the ecological classification system, old-growth designations, scenery managment system, recreation opportunity spectrum analysis, roadless area evaluations, and RCW habitat management areas. Assisted in the development of GIS rule based analysis, design of GIS databases, outputs for graphic productions, and in generating GIS maps.

James L. Burton
District Ranger

Education
B.S. in Agriculture — Forest Management
McNeese State University

Experience
Twenty-one years experience with the Forest Service. Positions in silviculture, timber management, recreation, and as district ranger in Texas, Arkansas, Kentucky, and Louisiana.

Team Assignment
Provided resource management expertise and application analysis for Forest Plan implementation.

David C. Byrd
Forest Fisheries Biologist

Education
B.S. in Range Management
Abilene Christian University
M.S. in Fisheries
Louisiana State University

Experience
Over seven years experience with Fish and Wildlife Associates and the Louisiana Department of Wildlife and Fisheries.

Team Assignment
Provided fish and aquatic management indicators input.

Kenneth D. Dancak
Forest Wildlife Biologist

Experience
Eleven years wildlife research with universities. Eight years with Forest Service as wildlife biologist.

Team Assignment
Assisted in providing wildlife, fisheries, and range input.

Education
B.S. in Biology
Southwest Texas State University
M.S. in Wildlife Management
Ph.D. in Wildlife and Fisheries Science
Louisiana State University
Certified Wildlife Biologist
The Wildlife Society

TEAM MEMBERS

Michael G. Dawson
Forester / Timber Sales Specialist

Experience
Twenty-eight years with the Forest Service; two national forests and four ranger districts. Specializing in timber sales and silviculture.

Education
B.S. in Forest Management
University of Arkansas

Team Assignment
Provided timber sales input.

Alan Dorian
Forest Archeologist

Experience
Twenty years with the Forest Service as district archeologist and forest archeologist. Also Forest Interpretive Services Coordinator and Tribal Government Program Coordinator.

Education
B.S. in Anthropology and postgraduate studies in Southeastern Archeology
Florida State University

Team Assignment
Provided analysis of heritage resources issues and interpretation, rural community assistance, environmental justice, and tribal government.

Jim Dukes
Forester / Fire Management Officer

Experience
Thirty-nine years with the Forest Service as forest inventory forester, Pacific Southwest Region; recreation management assistant, timber sales forester, public information specialist, and fire management officer, Southern Region.

Education
B.S. Forest Land Management
Auburn University

Team Assignment
Provided fire input.

Finis L. Harris
Forest Silviculturist

Experience
Thirty years with Forest Service as timber management assistant and silviculturist in Alabama, Arkansas, Louisiana, Missouri, and Virginia.

Education
B.S. in Forest Management
University of Missouri

Team Assignment
Assisted in the analysis and documentation of the vegetation portion of the plan revision. Participated as a member of the old-growth and riparian area teams developing options for protecting and managing these resources.

TEAM MEMBERS

Nolan J. Hess
Plant Pathologist

Experience
Seventeen years with the National Forest System as timber management assistant, silvicultural prescriptionist, and human resource coordinator; ten years with Forest Health Protection branch of USFS, providing technical assistance, technology development, and evaluation of forest diseases.

Education
B.A. in Biology
Shorter College
M.F. in Forestry
Steven F. Austin State University

Team Assignment
Provided Forest Health evaluation and impact assessment of forest insect and disease interactions.

Philip E. Hyatt
Forest Botanist / Ecologist

Experience
Eight years in the Forest Service as a botanist / ecologist in Arkansas, South Carolina, and Louisiana; six years teaching from preschool, elementary, to college level; carpenter by trade.

Education
M.S. in Botany
B.S. in Zoology
University of Arkansas, Fayetteville

Team Assignment
Assisted with analysis and documentation of information pertaining to ecosystem management and community ecology, special emphasis areas, and management of threatened, endangered, and sensitive plants.

Michael Miller
Forest Landscape Architect

Education
Bachelor of Landscape Architecture
Louisiana State University

Experience
Twenty-seven years experience in public and private practice, twenty-two with the Forest Service as landscape architect, recreation planner and assistant recreation staff officer.

Team Assignment
Assisted in the preparation of the recreation and related components, including: the scenery management system, recreation opportunity spectrum analysis , roadless area review, national river review, recreation demand analysis, wilderness analysis and management direction, national scenic river management direction, scenic byway management direction, and national recreation trail management direction.

John Novosad
Forest Hydrologist / Soil Scientist

Experience
Two years with the Soil Conservation Service as soil scientist in Missouri; nine years with the Bureau of Land Management as physical scientist and environmental specialist in New Mexico; ten years with the Forest Service as soil scientist on the Kisatchie National Forest.

Education
B.S. in Zoology
University of Rhode Island
M.S. in Natural and Environmental Resources — University of New Hampshire.

Team Assignment
Assisted in the development of land type associations. Participated as a member of the riparian area work group. Provided the evaluation of soils and air quality.

TEAM MEMBERS

James C. Pace
Transportation Engineer

Experience
Twenty-four years with the Forest Service as transportation system design engineer and transportation system development engineer.

Education
B.S. in Agricultural Engineering
Arkansas State University
Registered Professional Engineer
Civil Engineering, States of Louisiana and Kentucky

Team Assignment
Assisted in the analysis of transportation system data and documentation.

David W. Peterson, Jr.
Forest Fisheries Biologist

Experience
Ten years with the Forest Service as Forest fisheries biologist. Four years with the U.S. Fish & Wildlife Service as a wildlife biologist. One year with Caesar Kleberg Wildlife Research Institute as a research associate. One year with the Rhode Island Division Fish & Wildlife Department as a wildlife technician.

Education
B.S. in Zoology
Western Montana College
M.S. in Biology
Texas A&I University
Postgraduate studies in soils & aquatics
Stephen F. Austin State University

Team Assignment
Provided fish and aquatic organisms input.

Lynn Schoelerman
Forest Watershed Manager / GIS Coordinator

Experience
Twenty-one years with Forest Service as soil scientist, other resource assistant, forest watershed manager / GIS coordinator.

Education
B.S. in Botany / Zoology with Honors
M.S.in Wildlife Biology
Post graduate studies in soil science
East Texas State University.

Team Assignment
Provided overview of soil, water, air and GIS analysis inputs to the plan.

Bobby J. Sebastian
District Ranger

Experience
Two years with the Peace Corps as regional silviculturist in Liberia. Twenty-two years with the Forest Service as silviculture forester, timber sales forester, district silviculturist, timber management / silviculturist assistant ranger, and district ranger.

Education
B.S.F. in Forest Management
Stephen F. Austin State University
Post graduate studies in silviculture (certified silviculturist) and lands / special uses
Colorado State University

Team Assignment
Provided resource management expertise and application analysis for Forest Plan implementation.

Lula Fields Smith
GIS Editor / Computer Assistant

Experience
Fifteen years of experience as a cartographic technician with the U.S. Forest Service and the Soil Conservation Service. Five years experience as a GIS Editor/Computer Assistant with the U.S. Forest Service.

Education
Graduate of Peabody Magnet School
Undergraduate studies
Grambling and Louisiana College

Team Assignment
Assisted in developing and implementing the GIS system for the Kisatchie National Forest. Assisted in development of the database, graphic production, and computer maps for use in the Forest Plan.

Thomas M. (Marq) Webb, Jr.
Resources Team Leader

Experience
Twenty-eight years with the Forest Service as a timber management assistant, other resource assistant, YACC work program administrator, silviculturist, district ranger, and timber / range / wildlife staff officer in Mississippi, North Carolina, Arkansas, Texas, and Louisiana.

Education
B.S. in Forestry
Mississippi State University

Team Assignment
Coordinated timber, range and wildlife input.

FORMER I.D. TEAM MEMBERS

Danny W. Britt
Forest Supervisor

Experience
Thirty-seven years with the Forest Service in timber management, regional timber substaff, deputy forest supervisor and forest supervisor.

Education
B.S. in Forestry
Mississippi State University

Team Assignment
Provided overall direction to the Interdisciplinary Planning Team and the Forest Management Team.

Susan Carr
Forest Botanist / Ecologist

Experience
Five years with the Forest Service as a forest botanist / ecologist.

Education
B.S. in Botany
University of Florida

Team Assignment
Assisted with analysis and documentation of information pertaining to community ecology, special emphasis areas, and threatened, endangered and sensitive plants.

FORMER TEAM MEMBERS

Carl F. Davis
Earth Science / Realty / Engineering Team Leader

Experience
Thirty-two years with Forest Service as staff engineer, National Forests in Mississippi and Florida; Blanchard Springs Cavern project coordinator, Ozark-St. Francis National Forest; Southern Region transportation system operations and energy conservation coordinator, Atlanta, Georgia. Managed the Kisatchie National Forest's engineering, soil, water and air program since 1980.

Education
B.S. in Geological Engineering
M.S. in Engineering Science
University of Mississippi.

Team Assignment
Coordinated soil, water, and air input.

William M. Lackey
Operations and Budget Engineer

Experience
Twenty-six years with the Forest Service as pre-construction, construction, facilities, operations, and budget engineer.

Education
B.S. in Civil Engineering
Virginia Military Institute

Team Assignment
Provided facilities and roads information.

Bruce A. Prud'homme
Forest Hydrologist

Experience
Twelve years experience in water resource management, flood modeling, and forest hydrology — four of which were in the Forest Service. Experience in mining industry, urban flood plain management, and wildland hydrology.

Education
B.S. in Forestry
Louisiana State University
M.S. in Forest Hydrology
University of Idaho

Team Assignment
Evaluated the management effects on water resources.

Joyce Slayter
Realty Specialist

Experience
More than twenty-five years in Forest Service lands / minerals management. Specialized education and experience in real estate appraising. State-certified real estate appraiser.

Education
Undergraduate studies with accounting major at Louisiana College and Louisiana State University at Alexandria

Team Assignment
Provided lands, minerals and special uses input.

FORMER TEAM MEMBERS

FOREST MANAGEMENT TEAM

M. Earl Stewart
Wildlife Biologist

Education
B.S. in Wildlife Ecology
Oklahoma State University

Team Assignment
Assisted in providing wildlife input.

Experience
Six years with the Forest Service as wildlife biologist, fire management officer, and military liaison. Six years with the Oklahoma Department of Wildlife Conservation as area manager and wildlife biologist. Two years as a research technician with the Cooperative Fish and Wildlife Research Unit at Oklahoma State University.

Juan F. Vissepo
Transportation Planning and Operations Engineer

Team Assignment
Provided Forest transportation network data and mapping. Assisted in analysis of transportation network data and documentation.

Education
B.S. in Civil Engineering.

Experience
Fourteen years with the Forest Service as a civil engineer. Experience in transportation planning; road location, survey, and design; road construction, maintenance, and operations.

FOREST MANAGEMENT TEAM

Lynn C. Neff
Forest Supervisor

James L. Burton
District Ranger
Calcasieu Ranger District

James R. Caldwell
Public Affairs

Mary Jane Close
Financial Management

Cynthia A. Dancak
Planning / Recreation /
Heritage / Soil, Water, Air / GIS Team Leader

Thomas J. Fair
District Ranger
Kisatchie Ranger District

Bobby J. Sebastian
District Ranger
Catahoula Ranger District

Vacant
Aministration / Engineering Team Leader

Vacant
Fire / Lands / Minerals Team Leader

Thomas M. (Marq) Webb
Resources Team Leader

Alvin Womack
District Ranger
Caney Ranger District

Frank Yerby
District Ranger
Winn Ranger District

Forest Plan Revision Mailing List

INTRODUCTION

The draft environmental impact statement for the proposed Forest Plan revision was distributed to agencies, organizations, and individuals as required by National Environmental Policy Act regulations (***40 CFR 1502.19***). The following list is not intended to be complete, but it gives an indication of the distribution of the Forest planning documents. The complete mailing list is on file at the headquarters office of the Kisatchie National Forest, 2500 Shreveport Highway, Pineville, LA 71360.

FEDERAL OFFICIALS AND AGENCIES

AGENCIES

- Animal & Plant Health Insp. Service
- Barksdale Air Force Base
- Bureau of Land Management
- Capital RC&D Council, Inc.
- Catahoula National Wildlife Refuge
- Environmental Safety &
- Occupational Health
- Federal Aviation Administration
- Federal Crop Insurance Corp.
- Environmental Protection Agency
- Federal Highway Administration
- Farm Services Agency
- Federal Correctional Institute
- Federal Detention Center
- Federal Energy Regulatory Commission
- Federal Programs Director
- Forest Health, USFS
- Lake Ophelia & Grand Cote
- National Park Service
- Natural Resources Conservation Service
- Naval Reserve Facility
- Office of Equal Opportunity
- Office of General Council
- Office of the Inspector General
- Rural Development Office
- Social Security Administration
- Southern Research Station
- U.S. Army
- U.S. Army Corps of Engineers
- U.S. Army Reserve
- U.S. Bankruptcy Court
- U.S. Department of Interior
- U.S. Fish & Wildlife Service
- U.S. Marshal's Service
- U.S. Postal Service
- U.S. Probation Office
- Veterans Affairs Medical Center

REPRESENTATIVES

- Richard Baker
- John B. Cooksey
- Jimmy Hayes
- William Jefferson
- Robert Livingston
- James McCrery
- W.J. Tauzin

SENATORS

- John B. Breaux
- Mary Landrieu

NATIVE AMERICAN TRIBES

- Jena Band of Choctaw
- Tribe of Apache-Choctaw
- Tribe of Caddo Adai Indians of La.
- Tribe of Chitimacha
- Tribe of Clifton-Choctaw
- Tribe of Coushatta
- Tribe of Tunica-Biloxi
- Tribe of United Houma Nation

STATE OFFICIALS AND AGENCIES

AGENCIES

- Commission on Indian Affairs
- Coordinating & Development Council of Northwest Louisiana
- La. Air Control Commission
- La. Army National Guard
- La. Cooperative Extension Service

STATE OFFICIALS AND AGENCIES

LOCAL OFFICIALS AND AGENCIES

- La. Dept. of Culture, Recreation, & Tourism
- La. Dept. of Environmental Quality
- La. Dept. of Labor
- La. Dept. of Natural Resources
- La. Dept. of Transportation & Development
- La. Dept. of Wildlife & Fisheries
- La. Division of Outdoor Recreation
- La. Natural Heritage Program
- La. Office of Employment Security
- La. Office of Forestry
- La. Office of Water Resources
- La. State Planning Office
- La. State Police
- Oil Spill Coordination Office
- Red River Board of Commissioners
- Red River Port Authority
- Saline Soil & Water Conservation District
- State Foresters:
  - Alabama
  - Arkansas
  - Florida
  - Louisiana
  - North Carolina
  - Puerto Rico
  - South Carolina
  - Tennessee
  - Virginia

EDUCATION

- School Board, Parishes of:
  - Beauregard
  - Claiborne
  - Grant
  - Natchitoches
  - Rapides
  - Vernon
  - Webster
  - Winn

OTHER

- Blanco, Kathleen, Lt. Governor
- Foster, Honorable Mike, Governor
- Odom, Bob, Commissioner of Agriculture

REPRESENTATIVES

- Alexander, Honorable Rodney
- Curtis, Honorable Israel B.
- Deville, Honorable Dirk
- Dewitt, Honorable Charles
- Iles, Honorable Kay
- Long, Honorable Jimmy D.
- Riddle, Honorable Charles
- Smith, Honorable John
- Wiggins, Honorable Randy
- Wilkerson, Honorable Pinkie
- Wright, Honorable Tommy

SENATORS

- Barham, Honorable Robert J.
- Cain, Honorable James David
- Campbell, Honorable Foster L.
- Dyess, Honorable B.G.
- Ellington, Honorable Noble
- Ewing, Honorable Randy L.
- Hines, Honorable Don
- Smith, Honorable Mike

LOCAL OFFICIALS AND AGENCIES

Mayors

- Baden, Fred — Pineville
- Bernard, David — Georgetown
- Broadway, Mary Frances — Provencal
- Butler II, David C. — Woodworth
- Carpenter, Bob — Calvin
- Clark, Q.A. — McNary
- Doyle, Tyrone — Glenmora
- Gunn, Steve — Montgomery
- Hall, Johnny B. — Rosepine
- Hamilton, Pearlie — Natchez
- Hawkins, Ruby — Cheneyville
- Hebron, Roy — Ball
- Johnson, Gerald — DeRidder
- Landry, John — Dry Prong
- Ludley, Richard — Grambling
- Martin, C. Jerry — Dry Prong
- Mayeaux, Eugene — Pollock
- McIntosh, Clifton — Bernice
- Parker, Joe — Simpson
- Patrick Jr., Julius — Boyce
- Phillips, William — Clarence
- Piro, Joe, — Anacoco
- Pullig, Clovis H. — Ashland
- Randolph, Ned — Alexandria
- Roberts, Sherman — LeCompte
- Robertson, Bill — Minden
- Robinson, Tom — Homer
- Sampite, Joseph — Natchitoches
- Shapkoff Jr., Jim — Leesville
- Smith, Vic — New Llano
- Stewart, Margie Jo — Goldonna
- Thornton, Deno — Winnfield
- Teal, Ray — Atlanta
- Wendt, A.J. — Dodson
- Young, Marcia — Forest Hill
- Youngblood, Connie — Colfax

OTHER

- Assessor — Rapides Parish
- Assessor — Winn Parish
- Chamber of Commerce — Alexandria
- Chamber of Commerce — Leesville
- Chamber of Commerce — Natchitoches
- Chamber of Commerce — Winnfield
- City of Alexandria Housing Authority
- Clerk of Court, Natchitoches Parish
- Coroner — Rapides Parish
- Councilman — City of Leesville
- District Attorney — Grant Parish
- District Attorney — Rapides Parish
- District Attorney — Winn Parish
- England Industrial Airpark and Community
- Grant Parish Highway Department
- Houma-Terrebone Tourist Commission
- Job Training Partnership Act
- Kisatchie Delta
- Natchitoches Parish Port Commission
- Natchitoches Parish Area Planning Commission
- Pine Belt Community Action Agency
- Rapides Parish Area Planning Commission
- Rapides Soil & Water
- Red River Atchafalya Commission
- Vernon Parish Tourist Commission
- Winn Parish Development Corporation

LAW ENFORCEMENT

- Chief of Police — Ball
- Chief of Police — Boyce
- Chief of Police — Forest Hill
- Chief of Police — Glenmora
- Chief of Police — LeCompte
- Chief of Police — Natchitoches
- Chief of Police — Winnfield
- Chief of Police — Woodworth
- Chief of Police — Cheneyville
- Chief of Police — McNary
- Sheriff — Claiborne Parish
- Sheriff — Grant Parish
- Sheriff — Natchitoches Parish
- Sheriff — Rapides Parish
- Sheriff — Vernon Parish
- Sheriff — Webster Parish
- Sheriff — Winn Parish

POLICE JURIES

- Beauregard Parish
- Claiborne Parish
- Grant Parish
- Natchitoches Parish
- Rapides Parish
- Vernon Parish
- Webster Parish
- Winn Parish

LIBRARIES, UNIVERSITIES, AND COLLEGES

- Arnold Ledoux Library, LSU-E
- Centenary College
- Dupre Library, USL
- Eugene P. Watson Memorial Library, NSU
- Fred Schmidt Library, Colorado State University
- James C. Bolton Library, LSU-A
- Linus A. Sims Memorial Library, SELU
- La. State University
- La. State University — Shreveport
- La. Tech University
- Northeast La. University
- Northwestern State University, Ilinois
- Northwestern State University, Louisiana
- Tulane University

ORGANIZATIONS

Parentheses indicate the number of persons on our mailing list affiliated with an organization.

- Acadiana Dirt Riders (5)
- Alexandria Regional OCS
- Alexandria-Pineville Tourist Bureau
- American Association of Retired Persons
- American Forest & Paper Assoc.
- American Motorcycle Association
- American Pulpwood Association, Inc.
- American Whitewater Affiliation
- Antioch Hunting Club
- Assoc. of La. Bass Clubs
- Attakapas Boy Scouts of America
- Audubon Society — Orleans
- Baton Rouge Mountain Bike
- Biodiversity Legal Foundation
- Bonnet Carre Rod & Gun
- Bossier City Rough Rider
- Breezy Hill Enduro Club
- Caroline Dorman Nature Preserve
- Cenla Pride
- Cenla Riding Club President
- Cenla Trail Riders
- Center For Marine Conservation
- Central La. Quail Hunters Association
- Chesapeake Operations Inc.
- Coalition To Restore Coastal Louisiana
- Country Cowboy’s Riding Association
- D’Arbonne Valley Canoe Club

ORGANIZATIONS

- Dirty Wheels Motorcycle Group
- Ducks Unlimited
- Dusty Wheels Motorcycle Club
- Eastern Native Plant Society
- 4-Seasons ATV Club
- Girl Scouts of Central La.
- Horizon Environmental Services
- Historic Preservation of Shreveport
- Keep Kisatchie Coalition
- Kisatchie Delta Regional Planning & Development
- Kiwanis Club
- League of Women Voters
- Lions Club
- La. Audubon Council
- La. Deerhunters Association
- La. Federated Garden Clubs
- La. Federated Womens Club
- La. Forestry Association (109)
- La. Handicapped Hunters Association
- La. Native Plant Society
- La. Nature Conservancy
- La. Pine Straw Assoc.
- La. Trail Riders Assoc.
- La. Travel Promotion Assoc.
- La. Wild Turkey Federation
- La. Wildlife Biologists Assoc.
- La. Wildlife Federation
- La./Ms. Society of Range Management
- National Audubon Society
- National Council of Paper Industry
- National Wild Turkey Federation
- National Wildlife Federation (9)
- Nature Study Center
- Outdoors with Don Dubuc
- Ozark Society
- Ozark Society Bulletin
- Pack & Paddle
- Public Awareness Committee Inc.
- Quail Unlimited
- RRR Riding Club
- Sabine State Bank
- Sierra Club (18)
- Sierra Club — Delta Chapter
- Sierra Club Legal Defense Fund
- Society of American Foresters
- South Vernon Sportsman Association
- Southern Timber Purchasers' Council
- Sport Fishing Institute
- Trout Unlimited
- Wilderness Society
- Wilderness Watch
- Wildlife Management Institute
- Wildlife Society
- Winn Hunt & Fish Club
- Winn Jaycees
- YMCA

TIMBER INDUSTRY

- Almond Bros. Lumber Co.
- Anthony Forest Products
- Anthony Timberlands
- Ark-La-Tex Timber Co.
- Boise Cascade
- Burns Forest Products
- Cade Wood Inc.
- Carroll Lumber Co.
- Cason Timber Co. Inc.
- Cavenham Forest Industries
- Cenla Forestry Service
- Central Forest Products
- Choate Timber Co.
- Colfax Creosote
- Conroe Creosoting Co.
- Crowell Land And Mineral Co.
- Curtis Land Co.
- D&M Chipping
- Ewing Timber Co.
- Foote Lumber Co.
- Forest Consultant & Appraisers
- Forestry Services
- Forestry South Inc.
- Greer Logging
- Hunt Plywood Co.
- International Paper Co.
- L.L. Brewton Lumber Co.
- LaCamp Forest Products
- La. Forest Industries
- Louisiana-Pacific Corporation
- Leesville Lumber Co.
- Loyd Murrell Logging
- Martin Forest Products
- Martin Pulpwood Co. Inc.
- Northeast Land & Timber Co.
- National Forest Products Association
- PBS Lumber Mfg. Inc.
- Riverwood International USA
- Roy O. Martin Lumber Co.
- SE Lumber Manufacturing
- Southern Advance Bag and Paper Co.
- Stone Container Corporation
- Temple-Inland Forest Products
- Texas Electric Cooperative
- Timber Data Co.
- T.L. James Construction
- Timber Mart Southwest
- Trans South Industries
- Walsh Timber Co.
- Weaver Bros. Land & Timber Co.
- Western Forest Ind Association
- Willamette Industries

MEDIA

NEWSPAPERS

- Alexandria Daily Town Talk
- Beauregard News
- Daily Leader
- Eldorado News Times
- Lake Charles American Press
- Leesville Leader
- Natchitoches Times
- Press Herald
- Shreveport Times
- State Times
- The Advertiser
- The Chronicle
- The Daily Word
- The Guardian Journal
- The Journal
- The Morning Advocate
- The News Star
- Times Picayune
- Winn Parish Enterprise

RADIO

- KALB / KZMZ
- KBCE
- KICR
- KLSA
- KRRV
- KSYL/KQID/KEZP
- KVCL

TV

- KALB
- KLAX
- KLFY
- KLPB
- KMSS
- KPLC
- KTAL
- KTBS
- KVHP
- KOWL
- KLSA
- WDSI
- WGNO
- WLAE
- WNOL
- WVUE
- WWL
- WYES

INDIVIDUALS

- Adams, Mr & Mrs F. Lee
- Allen, Charles M.
- Andrews, Ricky L.
- Arnold, Gil
- Atherton, Jay
- Averitt, Richard
- Bailey, Bill
- Bailey, L.B.
- Bailes, Richard W.
- Bakay, Sharon
- Barnett, Gerald
- Bass, Leonard
- Beal, A.P.
- Benson, Harvey
- Boucher, Carla
- Brazeale, Jr., Dr. Archie
- Broussard, Ronney and Sue
- Brown, Aubrey
- Bowie, Albert
- Caire, Dr. & Mrs. Michael
- Campbell, John
- Carr, Susan
- Carter, Dr. J.H. III
- Comeaux, Bruce
- Cooke, Herbert
- Craft, Mac
- Crowley, Charlie
- Davidson, W.D.
- Dehuff, Gil
- Deblieux, Robert B.
- Dubois, Bramblett R.
- Dunn, John
- Dupree, Roy S.
- Edwards, J.W.
- Evans, Timothy
- Ferguson, Richard
- Fife, Ricky
- Finison, Frank
- Foreman, Dwight
- Foret, Jim & Paula
- Foster, Lelia
- Fryling Jr., Charles
- Futrell, George
- Gassiott, Cecil
- Gilbert, Sidney
- Gist III, Howard B.
- Gillard, John
- Haas, Wilbur J. Jr.
- Hanson, Robert A.
- Hardy, Dr. Lawrence
- Harper, Ricky
- Harris, Jim
- Harris, Thomas R.
- Harris III, Frank
- Heard, Richard

INDIVIDUALS

- Hearn, Vernon
- Hemming, Tommy
- Heyen, Curtis
- Hightower Jr., Fred S.
- Hill, Ronald
- Hoenke, C.E.
- Hobdy, David J.
- Hogan, Joe
- Hollier, Mona H.
- Hornosky, David
- Horton, Jan
- Hough, Marshall J.
- Howell, Janet
- Jackson, Jerome
- James, Stewart
- Jameson, Thomas
- Jeane, R. Kenneth
- Johnson, Jr., Walter F.
- Jones, Roland & Verna
- Kanton, Wayne & Opal
- Kinsey, Richard
- Kleinschmidt, Linda
- Knox, Clyde
- Knox, Nelson
- Knight, Lacey
- Laird, James
- Lambeth, Ron
- Lassiter, David L.
- Lewis, R.D.
- Lebert, Paul
- Lohrey, Richard
- Lord, Steve
- Luttrell, Charles & Nelda
- Lyons, Chuck
- MacRoberts, Michael & Barbara
- Mannchen, Brandt
- Mathies, Steve
- Maxey, Harold
- Mayeaux, Jadwin
- McDonald, Malcomb L.
- McLelland, Richard
- McMahon, Steve
- Meyer, Janet
- Miller, James
- Miller, Jerry
- Monju, Mr. & Mrs. Paul
- Moore, Charlie
- Parker, W.D.
- Phillips, Earl
- Phillips, Eloise & Lamar
- Porter, Gerard C.
- Presley, Carroll
- Ratcliff, Herman
- Reily, Peggy
- Roberts, A.J.
- Rusbar, Stephen J.
- Russell, Bradford J.
- Sautner, Don
- Simpson, Dwayne H.
- Smith, James
- Spillers, G.W.
- Speairs, Dr. Richard
- Stoer, U.H.
- Strawn, Thomas
- Templin, Steve
- Taylor, H.C.
- Taylor, Steven
- Terracina, Louise Humble
- Theus, Caroline G.
- Thibodeaux, Chad & Kirk
- Thibodeaux, Todd
- Thomas, Tris H.
- Thompson, Billy C.
- Till, Charles
- Trammel, W.C.
- Villarrubia, Charles R.
- Waddell, John
- Waltman, Earl
- Wiener Jr., Bill
- Wilhelm, Carl
- Wilmore, Don
- Wilson, Kenneth A.
- Wilson, Richard
- Wright Jr., Howard
- Wroten, Emmett
- Young, Richard

Glossary of Terms, Commonly Used Acronyms, and Abbreviations

Chapter 7

AC .... Acres
ADA .... Americans with Disabilities Act
AMS .... Analysis of the management situation
APD .... Application for permit to drill
ASQ .... Allowable sale quantity
ATV .... All-terrain vehicle
AU .... Animal unit
AUM .... Animal unit month
BA .... Basal area
BE .... Biological evaluation
BF .... Board foot
BGS .... Below ground surface
BLM .... Bureau of Land Management
BMP .... Best management practices
BTU .... British thermal unit
CCC .... Civilian Conservation Corps
CCF .... Hundred cubic feet
CEQ .... Council on Environmental Quality
CF .... Cubic feet
CFR .... Code of Federal Regulations
CISC .... Continuous inventory of stand conditions
CMAI .... Culmination of mean annual increment
COR .... Contracting officer representative
CSU .... Controlled surface use
DBH .... Diameter at breast height
DEIS .... Draft environmental impact statement
DFC .... Desired future condition
EA .... Environmental assessment
EAM .... Even-aged (silvicultural) management
ECS .... Ecological classification system
EIS .... Environmental impact statement
EPA .... Environmental Protection Agency
FDR .... Forest development roads
FEIS .... Final environmental impact statement
FIA .... Forest inventory analysis
FMAP .... Fire management action plan
FORPLAN .... Forest planning model
FS .... Forest Service
FSH .... Forest Service Handbook
FSM .... Forest Service Manual
FY .... Fiscal year
GIS .... Geographic information system
GNP .... Gross national product
HABCAP ..... Habitat capability model
HMA .... Habitat management areas for RCW
HUC .... Hydrologic unit code
ID .... Interdisciplinary
IDT .... Interdisciplinary team
IMPLAN ...... Economic input / output model
IPM .... Integrated pest management
KHW .... Kisatchie Hills Wilderness
KNF .... Kisatchie National Forest
KV .... Knutson-Vandenberg (Act)
LAC .... Limits of acceptable change
LANG .... Louisiana Army National Guard
LDEQ .... Louisiana Department of Environmental Quality
LDOTD .... Louisiana Department of Transportation and Development
LDWF .... Louisiana Department of Wildlife and Fisheries
LNHP .... Louisiana Natural Heritage Program
LORP .... Louisiana Outdoor Recreation Plan
LTA .... Landtype associations
LTSY .... Long-term sustained yield
M .... Thousand
MA .... Management area
MAUM .... Thousand animal unit month
MBF .... Thousand board feet
MCF .... Thousand cubic feet
MHL .... Mixed hardwood-loblolly pine
MI .... Management indicator
MIL .... Management intensity level
MIS .... Management indicator species
MM$ .... Million dollars
MMBF .... Million board feet
MMCF .... Million cubic feet
MOA .... Memorandum of agreement
MOU .... Memorandum of understanding

ACRONYMS & ABBREVIATIONS

MRVD .... Thousand recreation visitor days
MWFUD ..... Thousand wildlife / fish user days
NDF .... Nondeclining flow
NEPA .... National Environmental Policy Act
NFMA .... National Forest Management Act
NFMAS .... National Fire Management System
NHPA .... National Historic Preservation Act
NFS .... National Forest System
NOI .... Notice of intent
NPB .... Net public benefits
NRCS .... National Resource Conservation Service
NRHP .... National Register of Historic Places
NRI .... Nationwide Rivers Inventory
NSO .... No surface occupancy
NTMB .... Neotropical migratory birds
NWMP .... National wildlife management preserve
NWR .... National wildlife refuge
OGC .... Office of General Counsel
ORV .... Off-road vehicle
PAOT .... Persons at one time
PETS .... Proposed, endangered, threatened, sensitive species
PA .... Programmatic agreement
PL .... Public law
PNV .... Present net value
R-8 .... Region 8 (Southern Region, USDA Forest Service)
RAPZ .... Riparian area protection zone
RARE .... Roadless Area Review and Evaluation
RARE II .... Second Roadless Area Review and Evaluation
RCA .... Rural community assistance
RCW .... Red-cockaded Woodpecker
RD .... Ranger district
RIM .... Recreation information management
RM .... Roaded modified
RN .... Roaded natural
RNA .... Research natural area
ROD .... Record of decision
ROR .... Reserved and outstanding rights
ROS .... Recreation opportunity spectrum
ROW .... Right-of-way
RPA .... Forest & Rangeland Renewable Resources Planning Act
RVD .... Recreation visitor day
S&G .... Standards and guidelines
SAF .... Society of American Foresters
SCO .... Scenic condition objective
SCORP .... Statewide Comprehensive Outdoor Recreation Plan
SHPO .... State Historic Preservation Office
SHPZ .... Streamside habitat protection zone
SIA .... Special interest area
SIO .... Scenic integrity objective
SMA .... Sub-management area
SMS .... Scenery management system
SMZ .... Streamside management zone
SOH .... Shortleaf pine / oak-hickory
SPB .... Southern pine beetle
SPM .... Semiprimitive, motorized
SPNM .... Semiprimitive, nonmotorized
SRI .... Soil resource inventory
SRS .... Southern Research Station
T&E .... Threatened and endangered
TEA .... Transaction evidence appraisal
TES .... Threatened, endangered, and sensitive
TMDL .... Total maximum daily load
TSI .... Timber stand improvement
TSL .... Traffic service level
TSPIRS .... Timber Sale Program Information Reporting System
UEAM .... Uneven-aged (silvicultural) management
USDA .... United States Department of Agriculture
USDI .... United States Department of Interior
USFWS .... United States Fish & Wildlife Service
USGS .... United States Geological Survey
VM .... Vegetation management
VQO .... Visual quality objective
YACC .... Young adult conservation corps
WFUD .... Wildlife and fish user day
WMAs .... Wildlife management areas
WSR .... Wild & scenic river

COMMONLY USED TERMS

A,B,C

A

Abiotic. *a*. The nonliving (as opposed to conceptual) material components of the environment such as air, rocks, soil, water, coal, peat, plant litter; *b*. Nonliving components of an ecosystem; basic elements and compounds of the environment.

Adaptation. A genetically determined characteristic that enhances an organism's chances for survival and reproduction.

Adaptive management. Implementing policy decisions as an ongoing process that requires monitoring the results. It applies scientific principles and methods to improve resource management activities incrementally as the managers and scientists learn from experience and new scientific findings and adapt to social changes and demands.

Advance regeneration (syn: *reproduction*). Advance growth seedlings or saplings that develop or are present in the forest understory.

Age class (cohort). A distinct aggregation of trees originating from a single natural disturbance or regeneration cutting.

Aquatic ecosystem. *a*. A water-based ecosystem; *b*. A system of water interacting with aquatic plants and animals. Also see *ecosystem*.

Areas of critical environmental concern. A designation coined by the Bureau of Land Management, where special management attention is required to protect and prevent irreparable damage to important values, including fish and wildlife resources or other natural systems or processes.

Artificial regeneration (syn: *reproduction*). Creation of a new age class by renewal of a tree crop by direct seeding, or by planting seedlings or cuttings.

All-terrain vehicle (ATV). Any motorized, off-highway vehicle 50 inches or less in width, having a maximum dry weight of 800 pounds, travels on 3 or more low-pressure tires, and has a seat designed to be straddled by the operator. Low-pressure tires are at least 6 inches in width and designed for use on wheel rim diameters of 12 inches or less, utilizing an operating pressure of 10 pounds per square inch (PSI) or less, as recommended by the vehicle manufacturer.

Autecology. Study of the ecology of a single species, its requirements, tolerances, and responses.

B

Biodiversity. *a*. Variety of life and its ecological processes; *b*. The variety of organisms considered at all levels, from genetic variants belonging to the same species, through arrays of genera, families, and still higher taxonomic levels. Includes the variety of ecosystems which comprise both the communities of organisms within particular habitats and the physical conditions under which they live.

Biomass. The total quantity (weight) of plants and / or animals per unit area.

Biome. A major biotic unit consisting of plant and animal communities having similarities in form and environmental conditions, but not including the abiotic portion of the environment.

Bioregion. A territory defined by a combination of biological, social, and geographic utilization, and planned management of living organisms and their vital processes to prevent their depletion, exploitation, destruction, or waste.

C

Clearcutting. An even-aged regeneration method used on stands to develop a new age class in a fully-exposed microclimate by removal in a single harvest of all trees in the previous stand. Regeneration is from natural seeding, direct seeding, planted seedlings, and / or advance reproduction. Harvesting may be done in groups or patches (group or patch clearcutting), or in strips (strip clearcutting).

Clearcutting with reserves. A two-aged regeneration method similar to clearcutting except that varying numbers of reserve trees are not harvested to attain goals other than regeneration.

COMMONLY USED TERMS

C, D

Codominant. Crown class of trees whose crowns form the general level of the main canopy in even-aged stands. They receive full light from above and comparatively little from the sides. Also see *dominant*.

Coppice methods. Methods of regenerating a stand in which the majority of regeneration is from stump sprouts or root suckers.

Coppice. An even-aged regeneration method used on stands in which all trees in the previous stand are harvested and the majority of regeneration develops from sprouts or root suckers.

Coppice with reserves. A two-aged regeneration method similar to coppice except that reserve trees are retained for goals other than regeneration. The number of reserve trees retained is sufficient to create a two-aged stand.

Corridor. *a*. A route permitting species to spread from one ecoregion or province to another; *b*. A linear strip of land offering ecological, technical, economic, social, or similar advantages over other areas for location of transportation or utility rights-of-way within its boundaries.

Corridors, landscape. A dissimilar matrix or aggregation of landscape elements serving to connect similar patches.

Crop tree. Any tree selected to become a component of a future final harvest.

Crown. The part of a tree or woody plant bearing live branches and foliage.

Crown class. A class of tree based on crown position relative to the crowns of adjacent trees.

Cumulative effects analysis. An analysis of the effects on the environment resulting from the incremental impacts of a proposed action when added to other past, present, and reasonably foreseeable future actions — regardless of what agency (federal or non-federal), or person undertakes such other actions.

Crown cover. The ground area covered by the crowns of trees or woody vegetation as delimited by the vertical projection of crown perimeters and commonly expressed as a percent of total ground area Also called canopy cover.

Crown density. The amount, compactness, or depth of foliage of the crowns of trees and / or shrubs.

Cutting cycle. The planned interval between partial harvests in a managed uneven-aged stand. Also see *thinning interval*.

D

Desired future condition. A portrayal of the land or resource conditions which are expected to result if goals and objectives are fully achieved.

Desired future vegetation. The composition and structural characteristics of the plant community on a site or an ecological unit which meets forest plan or other management objectives.

Disturbance. A discrete event, either natural or human induced, causing change in the condition of an ecological system.

Diversity. *a*. The condition of being different; *b*. the distribution and abundance of plant and animal species and communities in an area (***26 CFR 219***); *c*. The distribution and abundance of different plants and animal communities within an area.

Diversity, compositional. Variation in types of landscape elements or vegetation types, their relative proportions within the landscape, or their degree of rarity or commonness.

Diversity, process. Relates to the variety of landscape flows, functions, and processes present on a given area.

Diversity, structural (syn: *heterogeneity*). Variation in sizes and shapes of landscape elements, as well as diversity of pattern.

Dominant. Crown class of trees with crowns extending above the general level of the main canopy of even-aged stands. They receive full light from above and partial light from the sides.

COMMONLY USED TERMS

E

Ecological approach. Natural resource planning and management activities that assure consideration of the relationship between all organisms (including humans) and their environment.

Ecological classification. A multifactor approach to categorizing and delineating, at different levels of resolution, areas of land and water having similar characteristic combinations of the *physical environment* — such as climate, geomorphic processes, and hydrologic functions of geology and soils; *biological communities* — such as plants, animals, microorganisms, and potential natural communities; and the *human dimension* — such as social, economic, cultural, and infrastructure.

Ecological process. The actions or events that link organisms (including humans) and their environment, such as disturbance, successional development, nutrient cycling, carbon sequestration, productivity, and decay.

Ecological site. A specific location on the land, representative of an ecological type.

Ecological status. The degree of similarity between the existing vegetation (all components and their characteristics) and existing soil conditions compared to the potential natural community and the desired soil condition of a site.

Ecological type. A category of land having a unique combination of potential natural community, soil, landscape features, climate, and differing from other ecological types in its ability to produce vegetation and respond to management.

Ecological unit. A mapped landscape unit designed to meet management objectives, comprised of one or more ecological types.

Ecology. From Greek *oikos*, meaning "house" or "place to live"; literally, the study of organisms at home. The science of the interrelationships or organisms or group of organisms with their environment.

Ecoregion. A continuous geographic area over which the macroclimate is sufficiently uniform to permit development of similar ecosystems on sites with similar properties. Ecoregions contain multiple landscapes with differing ecosystem spatial patterns.

Ecosystem. The system formed by the interaction of a group of organisms and their environment.
a. Formal: "Any unit including all of the organisms (for example, the "community"), in a given area interacting with the physical environment so that a flow of energy leads to a clearly defined trophic structure, biotic diversity, and material cycles within the system" (**E.P. Odum, 1971**); *b*. Regional: Large land areas that encompass many biological communities and land management regimes and are identifiable by climate, landform, soils, and landscape patterns; *c*. The natural complex of plant and animal populations and the particular sets of physical conditions under which they exist; *d*. The organisms of a particular habitat together with the physical environment in which they live; a dynamic complex of plant and animal communities and their associated nonliving environment; *e*. Humans as a part of, not apart from, a life support system composed of the atmosphere, water, minerals, soils, plants, animals, and microorganism that function together to keep the whole viable.

Ecosystem management. *a*. The use of an ecological approach that blends social, physical, economic and biological needs and values to assure productive, healthy, sustainable ecosystems; *b*. Using a careful and skillful ecological approach to achieve the multiple-use management of national forests and grasslands by blending the needs of people and environmental values in such a way that national forests and grasslands represent diverse, healthy, productive, and sustainable ecosystems; *c*. The skillful use of ecological, economic, social, and managerial principles in managing ecosystems to produce, restore, or sustain ecosystem integrity and conditions, uses, products, values, and services over the long term.

COMMONLY USED TERMS

E, F

Ecosystem functions (syn: *processes*). The major processes of ecosystems that regulate or influence structure, composition, and pattern. These include nutrient cycles, energy flows, food chains, diversity patterns in time / space development and evolution, hydrologic cycles, and weathering processes.

Ecosystem composition. The specific elements that make up an interacting system, i.e., plant and animal species, microorganisms, soil type, landform, and climate regimes.

Ecosystem structure. The physical arrangement of the various components. Also, trophic structure; measured in standing crop or energy fixed per unit area per unit time. May be pyramids of numbers, biomass, or energy flows.

Ecosystem pattern. The structure that results from the distribution of organisms in, and their interaction with their environment. Includes zonation, stratification, activity or periodicity, food-webs, reproductive, social and stochastic.

Ecotone. *a*. A transition between two or more biotic communities or ecotones; *b*. A transition area between two communities, having characteristics of both kinds of neighboring vegetation as well as characteristics of its own. Varies in width, depending on site and climatic factors.

Ecotype. A locally adapted population of a species which has a distinctive limit of tolerance to environmental factors; a genetically uniform population of a species resulting from natural selection by the special conditions of a particular habitat.

Edaphic. Pertaining to the soil and its ecological relationships resulting from or influenced by factors inherent in the soil or other substrate, rather than by climatic factors.

Endemic (n. endemism). Restricted to a specified region or locality.

Environment. *a*. The complex of climatic, soil and biotic factors that act upon an organism or ecological community and ultimately determine its form and survival; *b*. The sum of all external conditions that affect an organism or community to influence its development or existence.

Environmentally acceptable commodity production. The management and production of desired yields of natural resources while meeting standards for protection of environmental values, including guidelines for management practices and aesthetic conditions.

Even-aged stand. A stand of trees containing a single age class in which the range of tree ages is usually less than 20 percent of the rotation length. Also see *rotation*.

Even-aged silvicultural system. A planned sequence of treatments designed to maintain and regenerate a stand with one age class. The range of tree ages is usually less than 20 percent of the rotation. (Also, see *clearcutting*, *seed-tree*, *shelterwood*, *coppice*).

Exotic species. Species which occur in a given place, area, or region as the result of direct or indirect, deliberate or accidental introduction of the species by humans, and for which introduction has permitted the species to cross a natural barrier to dispersal.

Ex situ. A conservation method that entails the removal of germplasm resources (seed, pollen, sperm, individual organisms) from their original habitat or natural environment.

Extinct. No longer existing.

Extirpate. To remove all individuals in a population completely.

F

Food web. The interlocking pattern of food chains in an ecosystem. A food chain is a transfer of food energy from plants through a series of animals.

Forest canopy. The cover of branches and foliage formed collectively by tree crowns.

Forest health. A condition wherein a forest has the capacity across the landscape for renewal, for recovery from a wide range of disturbances, and for retention of its ecological resiliency while meeting current and future needs of people for desired levels of values, uses, products, and services.

Forest management. The practical application of scientific, economic, and social principals to the administration and working of a forest for specified objectives.

Forest type. A category or class of forest defined by its vegetation (species composition) and / or by its locality.

Fragmentation. Breaking up of contiguous areas into progressively smaller patches of increasing degrees of isolation.

G

Gap analysis. Process to determine distribution and status of biological diversity and assess adequacy of existing management areas to protect biological diversity.

Gap phase succession. Progressive changes in community structure, composition, and diversity following small-scale forest disturbances.

Genotype. The genetic constitution of an organism as distinguished from its physical appearance, called phenotype, which is the result of both heredity and environment. Also see *phenotype*.

Goods and services. Various outputs produced by forest and rangeland renewable resources, the tangible and intangible values of which are expressed in market and nonmarket terms.

Group selection. An uneven-aged regeneration method used on stands in which trees are removed, and new age classes are established, in small groups. The maximum width of groups is approximately twice the height of the mature trees, with small openings providing microenvironments suitable for tolerant regeneration and the larger openings providing conditions suitable for more intolerant regeneration. In the group selection system, the management unit or stand in which regeneration, growth, and yield are regulated consists of a landscape containing an aggregation of groups (Also, see *clearcutting*).

Guild. A group of organisms sharing a common food resource.

H

Habitat. The place within the environment in which an organism lives.

Habitat type. The collective land area which one association occupies, or will come to occupy, as succession advances.

Habitat connections. A network of habitat patches linked by areas of similar habitat. For example, the linkages connect habitat areas within a watershed to each other and to areas outside the watershed. These connections include riparian areas, midslopes, and ridges. In the case of old-growth forest habitat connections, each connection is planned to be sufficiently wide (at least 1,000 feet) to retain interior old-growth associated species.

Harvesting method. A cutting method by which a stand is harvested. Emphasis is on meeting logging requirements rather than silvicultural objectives. Also see *regeneration method*.

Healthy ecosystem. An ecosystem in which structure and functions allow the maintenance of biological diversity, biotic integrity, and ecological processes over time.

Home range. The geographic area within which an animal restricts its activities.

Human dimension. An integral component of ecosystem management that recognizes people as a vital part of ecosystems: their pursuits of past, present, and future desires, needs and values — including perceptions, beliefs, attitudes and behaviors — have and will continue to influence ecosystems; and that ecosystem management must include consideration of the physical, emotional, mental, spiritual, social, cultural and economic well-being of people and communities.

COMMONLY USED TERMS

I, L, M

I

Improvement cutting. A cutting made in a stand past the sapling stage primarily to improve composition and quality by removing less desirable trees of any species.

Ingrowth. Trees that during a specified period have grown past an arbitrary lower limit of (usually) diameter or height. Ingrowth is usually measured as basal area or volume per unit area.

In situ. A conservation method that attempts to preserve the genetic integrity of biotic responses by conserving them in their original habitat or natural environment.

Integrated pest management. A pest management philosophy based on an understanding of forest growth and development, forest pest-host dynamics, and the interaction of the two — which provides the resource manager with information for making decisions.

Integrated resources management. The simultaneous consideration of ecological, physical, economic, and social aspects of lands, waters, and resources in developing and carrying multiple-use, sustained-yield management.

Intermediate. Crown class of trees whose crowns extend into the lower portion of the main canopy of even-aged stands, but shorter in height than the codominants. They receive little direct light from above and none from the sides. Also see *dominant*.

Intermediate treatments (syn: *tending*). A collective term for any treatment designed to enhance growth, quality, vigor, and composition of the stand after establishment of regeneration and prior to final harvest. Also see *tending* and *stand improvement*.

Irregular planting. Planting of seedlings in areas as allowed by existing physical conditions, rather than rows with regular spacing between seedlings.

L

Landscape. An area composed of interacting ecosystems that are repeated because of geology, land form, soils, climate, biota and human influences throughout the area. Landscapes are generally of a size, shape and pattern which is determined by interacting ecosystems.

Landscape; *scenery*. A more or less extensive view of, or prospect of scenery, such as may be comprehended within the scope or vision from a single point of view. Also a watershed, basin, or other physiographic feature viewed from a point.

Landtype association (LTA). An ecological unit ranging in size from about 25,000 acres to as much as 500,000 acres. An LTA is fairly uniform in land-surface form, subsurface geology, soil patterns, and historical vegetation.

Linkages. Routes permitting movement of individual plants (by dispersal) and animals from a landscape unit or habitat type to another similar landscape unit or habitat type.

M

Management direction. A statement of multiple-use goals, other goals and objectives, management prescriptions, and the associated standards and guidelines for attaining these.

Management indicator species. *a*. Any species, or species habitat element selected to focus management attention for the purpose of resource production, population recovery, maintenance of population viability, or ecosystem diversity. *b*. A species whose condition can be used to assess the impacts of management actions on a particular area. *c*. A species whose welfare is presumed to indicate the welfare of other species using the same habitat.

Management type. A forest vegetation type that has been selected as the species that will best achieve desired future conditions and meet the goals and objectives of the Forest Plan.

Mast. Hard mast is the fruit or nuts of oaks, beech, walnuts, chinquapins, and hickories. Soft mast includes the fruits and berries of dogwood, viburnums, elderberry, huckleberry, crataegus, grape, raspberry, and blackberry.

Mature forest. Generally used in an economic sense to indicate that a forest has attained harvest age.

Microsite. A rock outcrop, snag, seep, stream pool, or other environmental feature, small in scale but unique in character.

Monitoring. To watch, observe, or check, especially for a specific purpose, such as to keep track of, regulate, or control.

Mosaic. Variable patterns created by vegetation communities on the landscape.

Multiple use. The management of lands and their various resource values for use combinations best meeting present and future public needs.

Mixed stand. A stand in which there is a mixture of tree species.

N

Natural conditions. Plant and animal communities where people have not directly impacted either those communities or their soils by such activities as logging, grazing, or cultivation. Indirect activities, such as fire suppression and air quality are part of the current environment and part of natural succession.

Natural regeneration. An age class created from natural seeding, sprouting, suckering, or layering.

New Perspectives. A Forest Service project to bring about new thinking, new technologies, and new alliances to improve ecological management of the National Forest System. Managing ecosystems to sustain diversity and productivity for future resource uses, values, products, and services. This project was a precursor to the concept of ecosystem management. See also *ecosystem management*.

Nurse tree (syn: *nurse crop*). A tree, group or crop of trees, shrubs, or other plants, either naturally occurring or introduced, used to nurture or improve the form of a more important tree or crop during youth by protecting it from frost, insolation, or wind.

O

Off-road vehicle (ORV). Any motorized vehicle designed for or capable of cross-country travel on or immediately over land, water, snow, ice, marsh, swampland, or other natural terrain. It includes but is not limited to four-wheel drive or low-pressure-tired vehicles, motorcycles and related two-wheeled vehicles, amphibious machines, ground-effect or air-cushion vehicles, and any other means of transportation deriving power from any source other than muscle or wind; except that such term shall exclude any registered motorboat; any military, fire, or law enforcement vehicle; any farm-type tractor and other self-propelled agricultural equipment used exclusively for agricultural purposes; any self-propelled equipment for harvesting and transporting forest products, or for earth moving or construction while being used for these purposes on the work site (and self-propelled lawnmowers, snowblowers, garden or lawn tractors, or golf carts while being used for their designed purpose).

Old-growth forests. An ecosystem distinguished by old trees and related structural attributes. Old growth encompasses the later stages of stand development that typically differ from earlier stages in a variety of characteristics including tree size, accumulation of large dead woody material, number of canopy layers, species composition, and ecosystem function. Old growth is not necessarily virgin or primeval. It can develop over time following human disturbances, just as it does following natural disturbances. Old growth encompasses both older forests dominated by early seral species and forests in later successional stages dominated by shade tolerant species.

COMMONLY USED TERMS

O,P,R,S

Overstory removal. The cutting of trees comprising an upper canopy layer in order to release trees or other vegetation in an understory.

Overtopped (syn: *suppressed*). Crown class of trees with varying levels of vigor whose crowns are completely covered by crowns of one or more neighboring trees.

P

Precommercial thinning. A thinning that yields no trees of commercial value, usually designed to improve crop spacing.

Plant association. *a*. A potential natural plant community of definite floristic composition and uniform appearance; *b*. A basic unit of vegetation classification based on the climax plant community; a distinctive combination of vascular plants at climax; *c*. Stands of vegetation with similar combinations of species united into abstract types; a basic unit in plant community classification; *d*. An arbitrary grouping of plant communities into a type within environmental gradients and the distribution of populations along the gradients; *e*. An association is a subdivision of *formation*, the highest level of plant community classification. It is divided into three more lower units. The lowest, *location*, is the basic unit in plant community classification.

Population. A group of individuals with common ancestry that are much more likely to mate with one another than with individuals from another such group.

Potential natural community. The biotic community that would be established if all successional sequences of its ecosystem were completed without additional human-caused disturbances under present environmental conditions. Grazing by native fauna, natural disturbances such as drought, floods, wildfire, insects, and disease, are inherent in the development of potential natural communities which may include naturalized nonnative species.

Province. A continuous geographic area wherein species composition, both plant and animal, is more homogeneous than between adjacent areas.

Pure stand. A stand composed of essentially a single tree species.

R

Riparian areas. Geographically delineable areas with distinctive resource value and characteristics that are comprised of the aquatic and riparian ecosystem.

Riparian-associated resources. The plant and animal habitats and mesic sideslope communities that are found within or adjacent to riparian areas or scour channels.

Riparian area protection zone (RAPZ). An area that may extend beyond the SHPZ to at least the extent of the flat, level area or alluvial floodplain landform. This area is provided to protect or enhance those distinctive resource values and characteristics that comprise the aquatic and riparian ecosystems.

Range of variability (syns: *natural variability*, *historic variability*). The spectrum of conditions possible in ecosystem composition, structure, and function considering both temporal and spatial factors.

Regeneration (syn: *reproduction*) method. A cutting method by which a new age class is created. The major methods are clearcutting, seed-tree, shelterwood, selection, and coppice.

Release. A treatment designed to free young trees from competitive, usually overtopping, vegetation.

S

Scour channel. A definable channel of flow where water converges showing signs of soil movement.

Seed-tree. An even-aged regeneration method in which a new age class develops from seedlings that germinate in fully exposed microenvironments after removal of all the previous stand except a small number of trees left to provide seed. Seed trees are removed after regeneration is established.

Seed-tree with reserves. A two-aged seed-tree method in which some or all of the seed trees are retained after regeneration has become established, to attain goals other than regeneration.

Shelterwood. An even-aged regeneration method used on stands in order to develop new age classes beneath the partially shaped microenvironment provided by residual trees. The sequence of treatments can include three distinct types of cuttings:
1. Optional preparatory harvest to enhance conditions for seed production.
2. Establishment harvest to prepare the seed bed and to create a new age class.
3. Removal harvest to release established regeneration from competition with the overwood. Harvesting may be done uniformly throughout the stand — uniform shelterwood, in groups or patches — group shelterwood, or in strips — strip shelterwood.

Shelterwood with reserves. A two-aged regeneration method similar to a shelterwood, except that some or all shelter trees are retained well beyond the normal period of retention for goals other than regeneration. The resulting stand may be two-aged or tend towards an uneven-aged condition as a consequence of both an extended period of regeneration establishment and the retention of reserve trees that may represent one or more age classes.

Single-tree selection. An uneven-aged method of creating new age classes in uneven-aged stands throughout which individual trees of all size classes are removed more or less uniformly to achieve desired stand structure.

Silviculture. The science of controlling the establishment, growth, composition, health, and quality of forests and woodlands. Silviculture entails the manipulation of forest and woodland vegetation in stands and on landscapes to meet the diverse needs and values of society on a sustainable basis.

Silvicultural system. A planned process whereby a stand is tended, harvested, and reestablished. The system name is based on the number of age classes, and / or the regeneration method used. See also *even-aged*, *two-aged*, *uneven-aged*, *clearcutting*, *seed-tree*, *shelterwood*, *single-tree selection*, *coppice*.

Site. *a*. Classification of land area based on its climate, physiographic (physical geography), edaphic (soil), and biotic factors that determine its suitability and productivity for particular species and silvicultural alternatives; *b*. In ecology, an area described or defined by biotic, climatic, and soil conditions related to its capacity to produce vegetation; an area sufficiently uniform in biotic, climatic, and soil conditions to produce a particular climax vegetation.

Site class. A classification of site quality, usually expressed in terms of ranges of dominant tree height at a given age or potential mean annual increment at culmination.

Site preparation. A treatment designed to condition the soil and remove competing vegetation to enhance the survival and growth of seedlings or seeds.

Site quality (syn: *productivity*). The productive capacity of a site, usually expressed as volume production of a given species.

Size classes. Tree sizes recognized by distinct ranges, usually of diameter or height.

Species. A population or series of populations of organisms that are capable of interbreeding freely with each other but not with members of other species.

Stand. A contiguous group of trees sufficiently uniform in age class distribution, composition, and structure, and growing on a site of sufficiently uniform quality, to be a distinguishable unit.

Stratified mixture. A stand in which different tree species occupy different strata of the total crown canopy.

Stand composition. The representation of tree species in a forest stand, expressed by some measure of dominance such as percent of volume, number, basal area, cover.

COMMONLY USED TERMS

S, T

Stand density. A quantitative, absolute measure of tree occupancy per unit of land area in such terms as numbers of trees, basal area, or volume.

Stand improvement. A term comprising all intermediate cuttings made to improve the composition, structure, condition, health, and growth of even-aged, two-aged, or uneven-aged stands.

Stewardship. *a*. Caring for land and associated resources and passing healthy ecosystems to future generations. *b*. The management of someone else's property — for example, the Forest Service's management of the American people's National Forest System.

Stocking. An indication of growing-space occupancy relative to a preestablished standard. Common indices of stocking are based on percent occupancy, basal area, relative density, and crown competition factor.

Stratum (canopy layer). A distinct layer of vegetation within a forest community.

Streamside habitat protection zone (SHPZ). An area adjacent to a stream scour channel provided to protect or enhance riparian-associated resource values and characteristics.

Stressors. Physical or biotic factors that stress individual organisms / communities.

Succession. Over time, *a*. an orderly process of biotic community development involving changes in species, structure and community processes. It is reasonably directional and therefore predictable; *b*. The succession or progression of plant communities on a site that previously contained a plant community removed by disturbance such as fire or logging; *c*. In an ecological sense, a process of community development involving changes in species structure and community processes.

Successional stage. One in a series of usually transitory communities or developmental stages that occur on a particular site or area over a period of time.

Suitability. The appropriateness of applying certain resource management practices to a particular area of land, as determined by an analysis of the economic and environmental consequences and the alternative uses foregone.

Sustainability. The ability of an ecosystem to maintain ecological processes and functions, biological diversity, and productivity over time.

Sustainability; *ecosystem*. *a*. The ability to sustain diversity, productivity, resilience to stress, health, renewability, and / or yields of desired values, resource uses, products, or services from an ecosystem while maintaining the integrity of the ecosystem over time; *b*. Management of ecosystems so that the desired mix of values and resources are tempered to ensure that their capabilities and suitabilities are not compromised for future generations.

T

Tending. See *intermediate treatments*.

Terrestrial ecosystem. A land based ecosystem (see *ecosystem*). An interacting system of soil, geology, and topography with plant and animal communities.

Thinning. Tree cutting to reduce stand density — primarily to improve growth, enhance forest health, or to recover potential mortality. Four commonly used types are:

***Crown thinning* (*thinning from above*, *high thinning*).** The removal of trees from the dominant and codominant crown classes in even-aged stands, or in even-aged groups within uneven-aged stands, in order to favor the best trees of those same crown classes.

***Free thinning*.** The removal of trees in even-aged, two-aged, or uneven-aged stands to control stand spacing and favor desired trees using a combination of thinning criteria without regard to crown position.

***Low thinning*.** The removal of trees from the lower crown classes to favor those in the upper crown classes.

***Mechanical thinning* (*geometric thinning*).** The thinning of trees in either even-aged or two-aged stands, or in even-aged groups within uneven-aged stands, in the dominant crown class in order to favor the lower crown classes.

Thinning interval. The period of time between successive thinning entries, usually used in connection with even-aged stands. Also see *cutting cycle*.

Two-aged stand. A stand composed of two distinct age classes, separated in age by more than 20 percent of the rotation length.

Two-aged silvicultural system. A planned sequence of treatments designed to maintain and regenerate a stand with two age classes. Also see *shelterwood with reserves*, *coppice with reserves*.

Two-aged methods. Methods designed to maintain and regenerate a stand with two age classes.

U

Uneven-aged (selection) methods. Methods of regenerating a forest stand and maintaining an uneven-aged structure by removing some trees in all size classes — singly, in small groups, or in strips.

Undercutting (syn: *root pruning*). The root pruning of seedlings in a nursery bed.

Uneven-aged stand. A stand of trees of three or more distinct age classes, either intimately mixed or in small groups.

Uneven-aged silvicultural system. A planned sequence of treatments designed to maintain and regenerate a stand with three or more age classes. Also see *single-tree selection* and *group selection*.

Unsuitable forest land. Forest land that is not managed for timber production because a) the land has been withdrawn by Congress, the Secretary, or the Chief; b) the land is not producing or not capable of producing crops of industrial wood; c) technology is not available to prevent irreversible damage to soils, productivity, or watershed conditions; d) there is no reasonable assurance that lands can be adequately restocked within five years after final harvest, based on existing technology and knowledge, as reflected in current research and experience; e) there is at present a lack of adequate information in response to timber management activities; or f) timber management is inconsistent with or not cost efficient in meeting the management requirements and multiple-use objectives specified in the Forest Plan.

V

Vascular plants. Plants with well-developed vascular systems that transport water, minerals, sugars, and other nutrients throughout the plant body. This excludes the bryophytes: mosses, hornworts, and liverworts.

Viability. The likelihood of continued existence in an area for some specified period of time.

W

Watershed. An area of land with a characteristic drainage network that contributes surface or ground water to the flow at that point; a drainage basin or a major subdivision of a drainage basin.

Weeding. A release treatment in stands not past the sapling stage, which eliminates or suppresses undesirable vegetation regardless of crown position.

Wrenching. The disturbance of seedling roots in a nursery bed — for example, using a tractor-drawn blade — with the objective of stimulating development of a fibrous root system.

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Issues, Concerns, and Opportunities

INTRODUCTION

The purpose of Appendix A is to describe the process that the Kisatchie National Forest used to identify public issues, management concerns, and opportunities. Public participation and consultation with other agencies, groups, and Native American tribes for the Forest Plan revision is also described.

Appendix A is divided into four sections. The first section describes the public involvement process used to identify public issues, management concerns, and opportunities (ICOs). The second section addresses how issues were developed. Section three lists the significant issues that were identified, along with their associated facets. The last section describes the outreach efforts made to consult with other agencies, groups, and Native American tribes. This outreach was in addition to general public involvement activities.

Appendix K of the Final EIS (bound separately) describes the public involvement process used during the public comment period of the Draft documents. It also contains copies of the comment letters received during the review period and the Forest Service response to them.

PUBLIC INVOLVEMENT IN ISSUE IDENTIFICATION

An initial step in the planning process is the determination of issues and concerns. The Kisatchie National Forest identified preliminary issues and concerns through:

- The findings of the 5-Year Review of the 1985 Forest Plan;
- Reviewing the appeal of the 1985 Forest Plan;
- Continued monitoring and evaluation of implementation of the 1985 Forest Plan;
- Ranger District issue identification meetings for district personnel; and
- Supervisor's Office issue identification meetings with National Forest System, State & Private, and Research personnel.

This internal scoping effort resulted in the identification of 12 preliminary issues and planning questions that were developed in response to the need to change the 1985 Forest Plan.

Public issue identification began with the publication, in the Federal Register on August 4, 1993, of the Notice of Intent (NOI) to revise the Forest Plan. The preliminary issues identified during internal scoping were published in the NOI. A 60 day comment period on the NOI was provided.

In addition to the NOI publication, the Forest mailed out approximately 1,300 copies of the *Planner*, the Forest's planning newsletter. Copies of the newsletter were available at each ranger district office and at the Supervisor's Office for walk-in visitors. The newsletter introduced the revision process, described what decisions would be made in a forest plan revision, why changes needed to be made to the 1985 Forest Plan, what range of alternatives as a minimum would be developed, and how the public could assist in the revision process. A self-addressed response form was provided in the *Planner* to assist those who wished to mail in comments. An open house schedule was also published in the newsletter. A 60-day comment period was provided in the newsletter for the public to send in their issues and concerns regarding the revision.

Major news articles announcing the revision appeared in the Alexandria, Baton Rouge, and Shreveport newspapers. During the period of August 16–25, 1993 the Forest's public affairs personnel conducted a statewide print and electronic media tour. They visited all major Louisiana population centers and distributed copies of the *Planner* to the media.

Locally, both television stations produced stories on the revision. One station produced a two-part series on the revision. The core planning team was interviewed in both occasions.

PUBLIC INVOLVEMENT IN ISSUE IDENTIFICATION

Six open houses were held at ranger district offices during the period of September 15–24, 1993 to discuss the preliminary issues as well as provide additional opportunity to participate in the Forest's planning process. The core planning team members, as well as district rangers and staff were present to meet and discuss issues and concerns with the public. The Evangeline Unit of the Calcasieu District open house was held on September 15, 1993, and was attended by 19 persons. The Catahoula District open house was held on September 16, 1993, and was attended by 11 persons. The Winn District open house was held on September 17, 1993, and was attended by 15 persons. The Vernon Unit of the Calcasieu District open house was held on September 21, 1993, and was attended by 5 persons. The Caney District open house was held on September 22, 1993, and was attended by 3 persons. The Kisatchie District open house was held on September 24, 1993, and was attended by 14 persons.

ISSUE DEVELOPMENT

ISSUE DEVELOPMENT

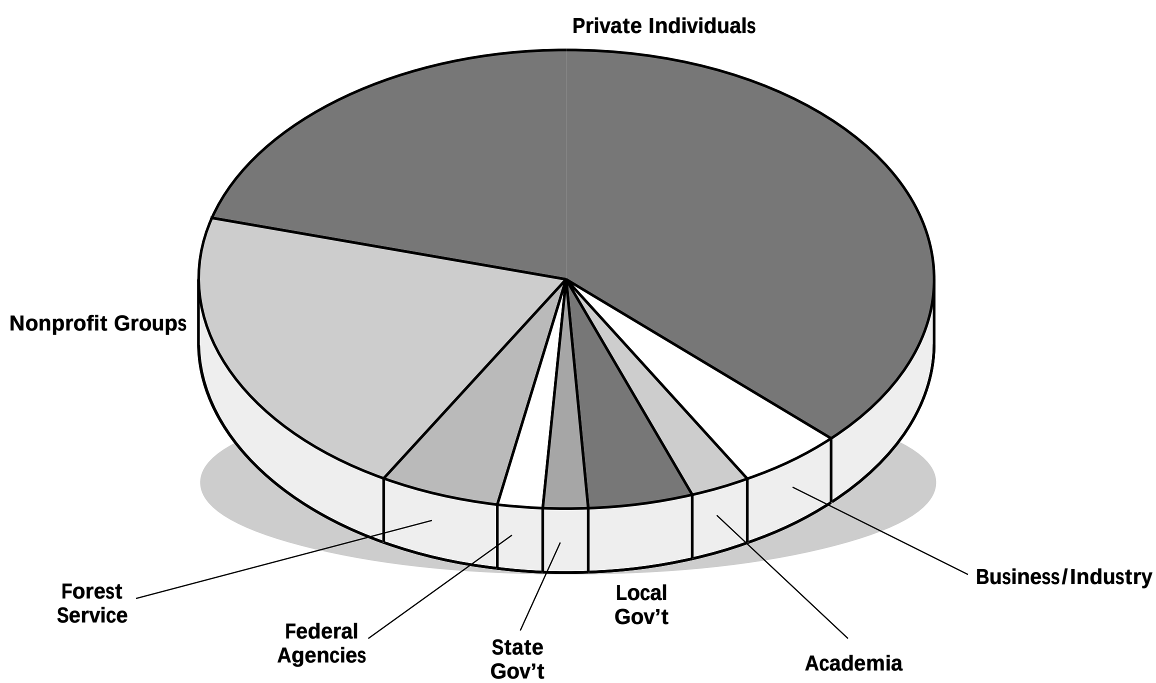
During the 60-day comment periods for the NOI and the *Planner*, which ran concurrently, the Forest received a total of 156 responses in the form of letters, telephone calls, and response forms. Those who responded to the invitation to comment are broken down into 8 response categories:

- Local government
- State agencies
- Federal agencies
- Nonprofit interest groups
- Business or industry
- Academic institutions
- Private individuals
- Forest Service employees

Private individuals represented a majority of the responses — 58 percent of the total. Nonprofit interest groups came in second highest at 21 percent. This is illustrated in Figure A-1 below.

FIGURE A–1, SCOPING RESPONSES

THE 156 RESPONDENTS DISPLAYED BY RESPONDENT CATEGORY



ISSUE DEVELOPMENT

The Forest used *content summary analysis* (CSA) to summarize, organize, and document the public responses. In CSA, opinions and supportive reasons are captured together, which provides an organized summary of public responses for evaluation, and allows the agency to be responsive to the public. The intent was to capture the sentence or sets of sentences (opinion and reasons) in the person's own words.

Each response was carefully read and all issues and concerns were identified and coded for tracking and grouping purposes. The Forest used a customized database for organizing and summarizing public responses. The complete CSA process is documented in the process records.

From the content of the 156 responses, 737 issues and concerns were identified. Among these, 167 issues and concerns were determined to be beyond the scope of what a forest plan revision can accomplish. These were grouped in the following categories:

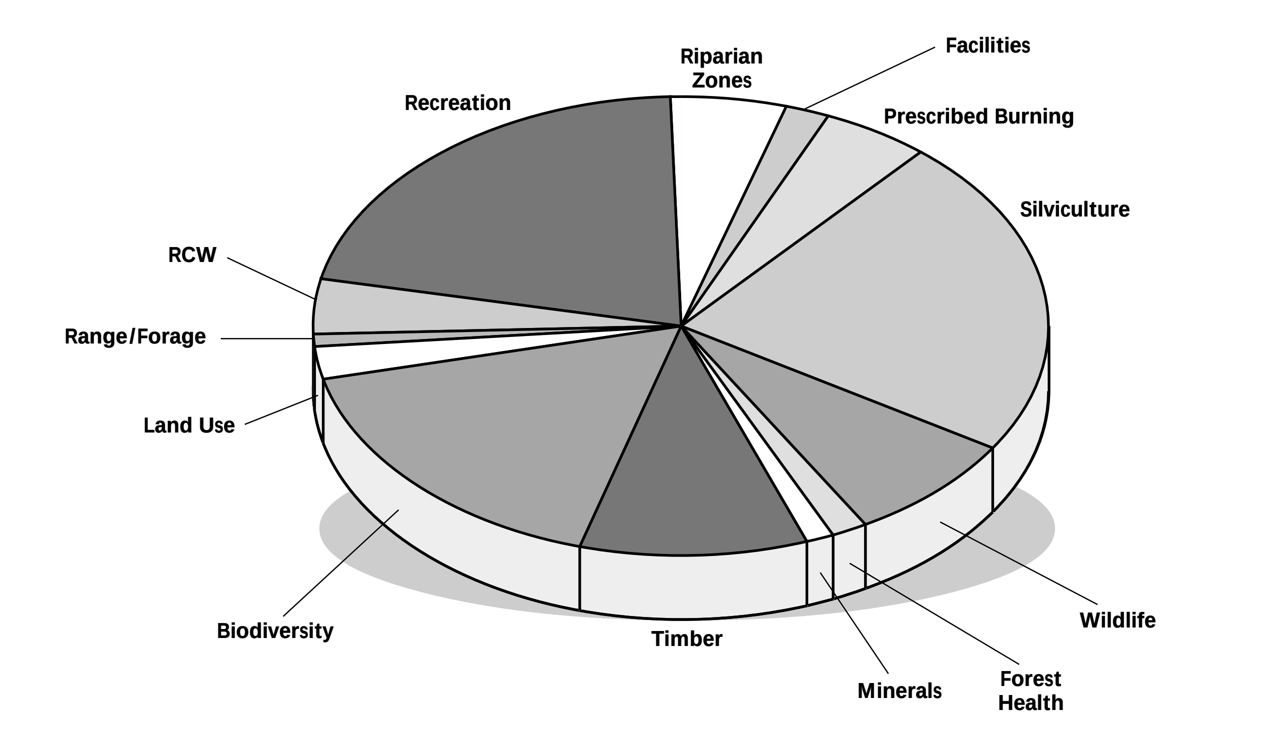
- Beyond forest authority
- Handled by other government agencies
- Can be handled administratively
- Not feasible to resolve in the Forest Plan
- No opportunity to resolve during the planning process
- No issues identified
- The comment deals with the adequacy of the planning process

Although these issues and concerns would not be directly addressed in the plan revision EIS, they were not ignored. They were forwarded to appropriate officials for review.

The remaining 570 issues and concerns, and those identified through internal scoping, were placed in 13 issue groups. See Figure A-2. Most groups contained one or more facets further clarifying the issue and focusing on its major aspects. All original responses, marked and coded copies of each response, as well as a complete listing of all comments grouped by each issue and facet, are filed in the revision process records.

FIGURE A–2, ISSUES & CONCERNS

THE 570 ISSUES & CONCERNS DISPLAYED BY SIGNIFICANT ISSUE GROUP



ISSUE DEVELOPMENT

LIST OF SIGNIFICANT ISSUES

The 13 significant issues to be addressed by the Kisatchie National Forest in it's Forest Plan revision were submitted to the Regional Forester in Atlanta, Georgia for approval on November 23, 1993. The issues were approved on December 1, 1993.

LIST OF SIGNIFICANT ISSUES

The following is a list of the 13 significant issues and related facets:

ISSUE #1: TIMBER SUPPLY

How will the needs for other resources affect timber harvest levels on the Forest and how will the change in allowable sale quantity (ASQ) affect local economies?

A. What will be the Forest's ASQ and how will it be affected due to coordination with other resource activities — for example, Red-cockaded Woodpecker (RCW) management, streamside management zones (SMZs), southern pine beetle (SPB) infestations, unsuitable lands, old growth, mussels, and other factors?

B. What lands should not be designated as suitable for timber production — for example, lakesides, trails, recreation areas and other sensitive areas?

C. How will changes in timber harvest levels affect the local economy, especially jobs and income?

ISSUE #2: BIOLOGICAL DIVERSITY

What forest management direction and standards and guidelines should be implemented to maintain or improve biological diversity?

A. What management direction and standards and guidelines should be implemented to conserve and maintain rare or sensitive plant and animal communities — for example, bogs, registry areas, barrens, prairies? What research is required to properly manage these areas? What, if any, recreation uses should be permitted in these areas?

B. What management direction and standards and guidelines can be implemented to maintain research natural areas (RNAs)? What criteria should be used to select additional RNAs? What, if any, recreation uses should be allowed in RNAs?

C. What management direction and standards and guidelines should be implemented to recover, restore and conserve the threatened, endangered, sensitive, and conservation species occurring on the Kisatchie National Forest? What, if any, forest management practices or activities are necessary to aid recovery of the Louisiana black bear?

D. To what extent should longleaf pine, cypress, and the other naturally occurring forested landscapes and natural communities of central Louisiana be restored?

E. What measures should be implemented to identify, protect and maintain a forest component possessing old-growth characteristics?

F. What are the effects of pine straw raking and harvest; and to what extent should this practice be permitted to occur?

G. Are pre-European settlement conditions a valid biodiversity benchmark? If so, how much, if any, of the Forest should be managed for pre-European settlement conditions. Can it be done? How long will it take? How much will it cost?

H. To what extent should desirable nonnative vegetation be introduced or allowed on the forest?

I. What measures should be taken to maintain, protect, and improve biological diversity?

ISSUE #3:
LAND USE

What are appropriate uses of National Forest System lands with respect to special uses, military training, landfills, large land exchanges and acquisitions, and easements?

A. What priority level should be given to acquiring land tracts involving wetlands, rare or sensitive natural communities or species including Red-cockaded Woodpecker habitat linkages?

B. Should the management direction for former military Camps Livingston and Claiborne be different than the general forest area?

C. How can the Forest minimize the effects of special-use easements on other resource management goals?

D. How much of the Vernon Unit of the Calcasieu District's military limited use land should be used for more intensive military ground and air training activities by the Department of the Army?

ISSUE #4:
MINERALS DEVELOPMENT

To what extent should the Forest provide opportunities for mineral development? Should the forest modify its direction on oil, gas, and common variety minerals, including Forest Service use?

ISSUE #5:
RANGE / GRAZING

How much of the Forest should be allocated and managed for livestock forage in light of declining use trends?

A. What impact would the elimination of the range management program have on current and future range permittees, other resources and forest programs?

B. How much of the Forest should be allocated to range development?

C. What impacts will livestock use have on plant and animal communities?

ISSUE #6:
RED-COCKADED WOODPECKER

Consistent with the regional direction, how should the Red-cockaded Woodpecker (RCW) and its habitat be managed to provide for long-term viable RCW populations on the Forest?

A. How much of the Kisatchie National Forest's lands should be allocated to RCW management?

B. What direct habitat improvements and management practices will best meet the needs of the RCW?

C. How are the RCW clusters / habitat within the wilderness to be managed?

D. What SPB suppression activities should be allowed within RCW habitat — for example, should cavity trees and foraging areas be protected?

ISSUE #7:
RECREATION

What variety of outdoor recreation experiences should the Forest provide and how will they affect other forest resources and the local economy?

A. How should off-road vehicles (ORVs) be managed on the Forest to provide recreation opportunities and protect other resources?

B. Should additional recreation opportunities be offered at scattered locations across the Forest — for example, outdoor and cultural resource interpretation facilities; hiking, horseback, mountain bike and all terrain vehicles (ATV) trails; watchable wildlife projects, hunter camps, public shooting ranges, additional walk-in hunting areas, and rental cabins? What kinds of facilities and experiences should be provided at the Forests' campgrounds? How and where are we going to provide for the physically challenged recreationist?

C. What type of management direction is needed along trails to protect their visual corridors?

LIST OF SIGNIFICANT ISSUES

D. Should Cunningham Brake roadless area be recommended for wilderness study? How will designation affect use of other resources?

E. Should Castor Creek, Drakes Creek, Kisatchie Bayou, Whiskey Chitto Creek, East Fork Sixmile Creek, and West Fork Sixmile Creek be recommended for designation as national wild & scenic rivers? How will designation affect the use of other resources?

F. How will the availability of recreational activities, especially hunting, affect the local economy?

ISSUE #8: RIPARIAN

What measures are needed to designate and protect riparian / wetland areas and streamside management zone resources?

A. How wide should riparian management zones be to protect riparian dependent resources on perennial, intermittent, and ephemeral streams?

B. How will resource values associated with riparian areas be protected? What additional measures are needed to minimize the impact of upland management activities on streams?

C. What, if any, special consideration should be given to those streams wholly or partially on national forest lands that are designated as State natural and scenic streams?

D. How will water quality and aquatic habitat be maintained to protect the Louisiana pearlshell mussel?

ISSUE #9: FOREST ROADS

How should the Forest's road system be managed to meet resource needs and provide adequate public access?

A. What minimum density of local roads is required to provide permanent, effective access to national forest lands for all resource management needs? Of this amount, what portion should be managed as "open for motor vehicle use" (continuous or seasonal) for dispersed recreation? What monitoring is required?

B. What effects will road construction and reconstruction have on other resources?

ISSUE #10: PRESCRIBED BURNING

What will be the role of prescribed fire in achieving forest management goals and objectives?

A. To what extent, at what time of year, and at what frequencies will prescribed fire be used to manipulate forest conditions — for example, habitat management areas (HMAs) vs. preserves vs. general forest? How many acres and what size blocks can or will be burned during the growing season?

B. What should be the future direction for prescribed burning on sensitive Kisatchie soils?

C. Should prescribed fire be used to manage the Kisatchie Hills Wilderness?

D. How will plants and animals be affected by prescribed burning, especially growing season burning?

E. To what extent should plow lines be used? How will they affect the use or protection of resources?

ISSUE #11:
SILVICULTURE

How will the application of various silvicultural systems and management practices affect the condition of other forest resources and sustainability of overall forest health?

A. How will the use of the two-aged and uneven-aged silvicultural systems affect timber and non-timber resources; and how well does this system duplicate natural processes?

B. How will the mix of rotation ages and harvest cutting methods for even-aged and two-aged management affect habitat and visual diversity, timber productivity, and duplication of natural processes?

C. How do current tree harvest and site preparation methods affect the long-term sustenance of forest resources and overall forest health?

D. What management direction should guide ecosystem management and the use of landscape ecology principles?

E. What cutting methods and practices are silviculturally and socially acceptable in bottomland hardwood forest types?

F. What is the future role of herbicide use in forest management?

G. How should we manage hardwoods within pine stands and to what extent should mixtures of pines be managed?

ISSUE #12:
WILDLIFE AND FISH

How much and what kinds of wildlife and fish habitats should the forest provide for a diverse wildlife program?

A. What should be the future management direction for the two national wildlife management preserves? Should it be consistent between the two preserves?

B. What wildlife and / or fisheries programs and management activities need to be expanded upon, reduced or otherwise modified to provide adequate habitat for native wildlife and fish? What should be the future hunting and fishing opportunities offered on the forest? Should we reexamine the need for wildlife food plots, openings and linear strips? What is the future of the featured species concept? Should greater emphasis be placed on neotropical migratory birds (**NTMBs**) and other nongame wildlife species?

C. How should upland hardwood species be managed to adequately meet the needs of wildlife?

D. What array of management and ecological indicators are appropriate to effectively monitor habitat health and response to management?

ISSUE #13:
FOREST HEALTH

What forest management practices are necessary to maintain or improve forest health, especially protection from insects and diseases?

CONSULTATION WITH OTHERS

FEDERAL AGENCIES

LOUISIANA STATE GOVERNMENT AGENCIES

PARISH GOVERNMENTS

CONSULTATION WITH OTHERS

Consultation with other agencies, local and state government, local Native American tribes, organizations, and individuals has occurred throughout the planning process. The Forest's mailing list continues to expand, now containing over 1,500 names, with individuals being the largest component of the list. The following is a list of some of those Federal, State, and local government agencies; Native American tribes; and groups that were given the opportunity to participate in the development of the Forest Plan revision.

Chapter 6 of this document provides more information on the distribution of the EIS and Forest Plan.

FEDERAL AGENCIES

- Army Corps of Engineers
- Bureau of Land Management
- Farm Services Agency (ASCS)
- U.S. Army-Fort Polk
- Environmental Protection Agency
- Natural Resource Conservation Service (NRCS)
- U.S. Fish and Wildlife Service

LOUISIANA STATE GOVERNMENT AGENCIES

- Cooperative Extension Service
- Department of Environmental Quality
- Department of Transportation and Development
- Department of Wildlife and Fisheries
- Natural Heritage Program
- Department of Agriculture and Forestry
- Department of Natural Resources
- Department of Recreation, Culture, and Tourism

PARISH GOVERNMENTS

CLAIBORNE PARISH

- Police Jury
- School Board
- Sheriff

GRANT PARISH

- Police Jury
- School Board
- Sheriff

NATCHITOCHES PARISH

- Police Jury
- School Board
- Sheriff

RAPIDES PARISH

- Planning Commission
- Police Jury
- School Board
- Sheriff

VERNON PARISH

- Police Jury
- School Board
- Sheriff

WEBSTER PARISH

- Police Jury
- School Board
- Sheriff

WINN PARISH

- Police Jury
- School Board
- Sheriff

LOCAL GOVERNMENTS

- Mayor of Alexandria
- Mayor of Ashland
- Mayor of Ball
- Mayor of Bernice
- Mayor of Boyce
- Mayor of Calvin
- Mayor of Clarence
- Mayor of Colfax
- Mayor of Dodson
- Mayor of Dry Prong
- Mayor of Georgetown
- Mayor of Glenmora
- Mayor of Goldonna
- Mayor of Grambling
- Mayor of Haynesville
- Mayor of Homer
- Mayor of Leesville
- Mayor of Minden
- Mayor of Montgomery
- Mayor of Natchez
- Mayor of Natchitoches
- Mayor of Pineville
- Mayor of Pollock
- Mayor of Provencal
- Mayor of Rosepine
- Mayor of Winnfield
- Mayor of Woodworth

FEDERALLY RECOGNIZED NATIVE AMERICAN TRIBES

- Jena Band of Choctaw
- Tribe of Chitimacha
- Tribe of Coushatta
- Tribe of Tunica-Biloxi

GROUPS

- Acadiana Dirt Riders
- American Association of Retired Persons
- American Forest and Paper Association
- American Motorcycle Association
- American Whitewater Affiliation
- Bayou Chapter of Ozark Society
- Country Cowboy's Riding Association
- D'Arbonne Valley Canoe Club
- Ducks Unlimited
- Dusty Wheels Motorcycle Club
- Louisiana Audubon Society
- Louisiana Deer Hunters Association
- Louisiana Forestry Association
- Louisiana Native Plant Society
- Louisiana Nature Conservancy
- Louisiana Quail Unlimited
- Louisiana Society of American Foresters
- Louisiana Trail Riders Association
- Louisiana Wildlife Biologist Association
- Louisiana Wildlife Association
- Louisiana Wild Turkey Federation
- National Audubon Society
- Sierra Club
- Sport Fishing Institute
- South Vernon Sportsman Association
- Southern Timber Purchasers' Council
- Trout Unlimited
- Wildlife Federation — Louisiana Chapter

The Analysis Process

THE ANALYSIS PROCESS AND GOALS

THE 10–STEP PLANNING PROCESS

INTRODUCTION

Appendix B presents a technical discussion of the analysis process and computer models used in the revision planning effort. The appendix focuses on the quantitative methods used to perform the analysis and documents how the analysis was done.

The Forest's major planning goal is to provide enough information to help decision makers and the public determine which combinations of goods, services, and land allocations will maximize *net public benefits* (NPB). The regulations (***36 CFR 219***) developed under the National Forest Management Act (NFMA) provide the analytical framework within which these decisions are made.

The NFMA and its regulations also state that the requirements of the National Environmental Policy Act (NEPA) and its regulations (***40 CFR 1500–1508***) must be applied in the analytical process. The NEPA regulations require that the environmental effects of a proposed action, and alternatives to that proposed action, must be disclosed in an *environmental impact statement* (EIS).

Information presented in this chapter supplements the broader and less technical descriptions included in the body of the EIS. This discussion includes basic assumptions, modeling components and inputs, rules, methods, and constraints. Additional information and documents used in the analysis process are contained in the planning records. The planning record in its entirety is incorporated here by reference.

The results from the modeling process are estimates of what can be expected if alternatives are implemented and facilitate the comparison of alternatives.

THE 10–STEP PLANNING PROCESS

Land and resource management planning requires that processes formally used to make individual resource decisions be combined into integrated management decisions. It also requires that mathematical modeling techniques be used to identify the most economically efficient solution to meet the goals and objectives of any alternative.

The 10–step process defined in the NFMA regulations was followed. This appendix is concerned with describing the analysis phase of this process which are steps 2, 3, 4, 5, and 6. Steps 1, 7, and 8 are described in Chapters 1 and 2 and Appendix A of this EIS. Plan implementation and monitoring, steps 9 and 10, are discussed in the revised Forest Plan. A brief discussion of the 10-step process follows.

STEP 1, Identification of purpose and need: issues, concerns, and opportunities — The Forest interdisciplinary team assessed changes in public issues, management concerns and resource use and developmental opportunities (ICOS) since the Forest Plan was initially developed and subsequently amended. Appendix A of this EIS documents this step.

STEP 2, Planning criteria — Criteria are designed to guide the collection and use of inventory data and information; the analysis of the management situation; and the design, formulation, and evaluation of alternatives. This step establishes guidelines for accomplishing the next five steps. The work plan and other process records document this step.

STEP 3, Inventory data and information collection — The kind of data and information needed is determined in Step 2 based on the issues, concerns, and opportunities identified and the resulting assessment of the management situation and determination

THE 10–STEP PLANNING PROCESS

of what needs to change. Data collection is part of normal forest operations. Existing data is used whenever possible and supplemented with new data, when practicable, if new data will contribute to more responsive analysis. Data accuracy is continually evaluated. Much of this data and background documentation is part of the planning process records on file in the Supervisor's Office.

STEP 4, Analysis of the management situation — This step consists of assessing the existing situation on the forest and determining opportunities for resolving issues and concerns. This information provides the basis for formulating an appropriate range of reasonable alternatives.

This analysis brings existing information together, puts it into a total forest perspective, and examines the range of possible situations to resolve issues. It examines supply potentials and market assessments for goods and services, and determines suitability and feasibility for meeting needs. Other objectives of the analysis of the management situation are:

- Assessing current direction, including a schedule of the goods and services that are most likely to be provided if current direction is continued.
- Assessing the demand for goods and services from national forest lands.
- Determining if there is a need to change current management direction.

STEP 5, Formulation of alternatives — A reasonable range of alternatives is formulated according to NEPA procedures. Alternatives are formulated to assist in identifying one that comes nearest to maximizing NPB. They provide for the resolution of significant issues and concerns identified in Step 1. The alternatives reflect a range of resource management programs. Each identified significant issue and management concern is addressed in different ways in the alternatives. The programs and land allocations in each alternative represent the most cost–efficient way of attaining the goals and objectives for that alternative. Both priced and non–priced goods and services (outputs) are considered in formulating each alternative.

STEP 6, Estimated effects of alternatives — The physical, biological, economical, and social effects of implementing each alternative are considered in detail, responding to the issues and need for change.

The FORPLAN model estimates some, but not all, of the economic and physical effects. Other effects examined outside the model include ecological and social considerations. The effects of the alternatives are displayed in Chapter 2 and 4 of this EIS.

STEP 7, Evaluation of alternatives — Significant physical, biological, economical, and social effects of implementing alternatives are used to evaluate each alternative and compare them with each other. Typically, each alternative can be judged on how it addresses the significant issues identified in Chapter 1 of the EIS. Chapter 2 of the EIS summarizes the comparisons of the alternatives with regard to the issues.

STEP 8, Preferred alternative — The Forest Supervisor reviews the interdisciplinary team's evaluation of each alternative and the public issues and concerns. The Forest Supervisor then recommends a preferred alternative to the Regional Forester, who in turn either selects the recommendation, another alternative, or modifies the recommended alternative. That alternative is described as the *preferred alternative* in the Draft EIS and is displayed as the *proposed revised Forest Plan*. Public comments are then solicited and considered in finalizing a revised Forest Plan and Final EIS.

STEP 9, Plan approval and implementation — After the interdisciplinary team has reviewed public comments and incorporated any necessary changes into the Draft EIS or proposed Forest Plan, the Regional Forester reviews and approves the revised Forest Plan and final environmental impact statement. A *record of decision* (ROD) documents this step.

STEP 10, Monitoring and evaluation — The revised Forest Plan establishes a system of measuring, on a sample basis, actual activities and their effects, and compares these results with projections contained in the revised Forest Plan. Monitoring and evaluation comprise an essential feedback mechanism to ensure the revised Forest Plan is dynamic and responsive to change. Chapter 5 of the revised Forest Plan displays the monitoring and evaluation program.

PLANNING CRITERIA (STEP 2)

The NFMA regulations require planning criteria be developed to guide each step in the planning process. Process criteria are standard rules and tests to guide and measure the effectiveness of the planning process. They apply to collection and use of inventory data and information; analysis of the management situation; and the design, formulation, and evaluation of alternatives.

Planning criteria are based on:

- Laws, executive orders, regulations and agency policy as set forth in the *Forest Service Manual*
- Goals and objectives in the RPA Program and regional guides
- Recommendations and assumptions developed from public issues, management concerns, and resource use and development opportunities
- The plans and programs of other federal agencies, state and local governments, and Indian tribes
- Ecological, technical, and economic factors
- The resource integration and management requirements in ***36 CFR 219.13*** through ***219.27***
- Alternatives that are technically possible to implement
- Alternatives that meet management requirements or standards
- Various levels of multiple–use objectives and outputs achieved

INVENTORY DATA AND INFORMATION COLLECTION (STEP 3)

DATABASE DEVELOPMENT

The ICOS in Appendix A were an important basis for determining what data needed to be updated or collected and which effects would be evaluated. Existing data and new information were used in revising the Forest Plan. Much data were entered into the Southern Region CISC database or into GIS.

Table B–1 (following pages) was developed by the interdisciplinary team to identify inventory and data needs for the Kisatchie National Forest revision process. The table is organized so that the data requirement responds to an issue or concern, or to a FSM, NFMA, or executive order requirement.

Two key types of information were needed to facilitate the analysis and development of alternatives. The first consisted of information related to the classification of land into categories with unique properties. This classification was based on attributes significant to the planning issues. This type of information was tied directly to the map base. In the case of the Forest, this map base was its GIS and CISC databases.

The second type of information is not directly tied to a map base but has more to do with the estimation of how land will respond to certain management activities within a given alternative. This can be viewed as the goods and services discussed in the EIS, Chapters 2 and 4. In linear programming, these are called production coefficients. This type of information came from many sources: regional procedural handbooks, professional research studies, master's theses, etc. The most up-to-date and verifiable information was utilized.

GIS DATA LAYERS

In 1991 a computerized *geographic information system* (GIS) was completed Forestwide. GIS links natural resource data with spatial (map) information. This linkage enabled valuable spatial analysis and rapid display of resource information for Forest planning. The Southern Region's Continuous Inventory of Stand Conditions (CISC) database was also used.

Inventories were continually updated to reflect current conditions and verification of

TABLE B–1, DATA REQUIREMENTS AND MEASURES

	DATA NEED RESPONDS TO:		
Data Requirement	**Issue(s)**	**CFR Reg(s)**	**Covered In**
All volume, suitable and unsuitable	timber supply		FORPLAN A / O (Table B–16)
Suitable timber lands volume, 1st period	timber supply		FORPLAN A / O (Table B–16)
Suitable timber lands volume	timber supply		FORPLAN A / O (Table B–16)
Suitable timber lands acres	timber supply	219.14	FORPLAN A / O (Table B–16)
Timber-associated income to community	timber supply	219.12g(3)	IMPLAN / FORPLAN A / O (Table B–16)
Timber-associated jobs to community	timber supply	219.12g(3)	IMPLAN / FORPLAN A / O (Table B–16)
Long-term sustained-yield volume	timber supply	219.16	FORPLAN A / O (Table B–16)
Special interest area acres	biological diversity		text / table in Chapter 4 of FEIS
Research natural area acres	biological diversity		text / table in Chapter 4 of FEIS
Restoration acres	biological diversity		FORPLAN A / O (Table B–16)
Old-growth acres	biological diversity		text / table in Chapter 4 of FEIS
Pine straw harvest acres	biological diversity		text in Chapter 2 of Forest Plan
LTAs within submanagement areas	biological diversity / silviculture		table / map in Chapter 2 of FEIS
Prescribed burn acres	biological diversity		FORPLAN A / O (Table B–16)
Prescribed burn frequency	biological diversity		text in Chapters 2 & 3 of Forest Plan
Land acquisition priority level areas	land use		text in Chapters 2 of Forest Plan
Military land use areas	land use		text / map in Chapter 3 of FEIS
Mineral exploration and development area within management areas	minerals development		text in Chapters 2 & 3 of Forest Plan
Range development acres	range / grazing	219.20	text / map in Chapter 4 of FEIS
HMA allocation area	RCW		text / map in Chapter 3 of FEIS
RCW cluster site areas	RCW		text / table in Chapter 3 of FEIS
RCW management in wilderness	RCW		text in Chapter 3 of Forest Plan
Longleaf pine restoration acres	RCW / forest health		FORPLAN A / O (Table B–16)
ORV open / closed areas	recreation		text / table in Chapter 4 of FEIS
Wild & scenic stream designated areas	recreation		text in Chapter 3 of FEIS
Recreation-associated income to community	recreation		IMPLAN / FORPLAN A / O (Table B–16)
Recreation-associated jobs to community	recreation		IMPLAN / FORPLAN A / O (Table B–16)
ROS-designated areas	recreation		text / table in Chapter 4 of FEIS
Road open / closed areas	recreation / forest roads		text in Chapter 3 of FEIS
Riparian area protection zone acres	riparian	219.23	text / table in Chapter 4 of FEIS
Streamside habitat protection zone acres	riparian	219.19	text / table in Chapter 4 of FEIS
All streamside management acres	riparian		FORPLAN A / O (Table B–16)
Road construction soil loss amount	forest roads		FORPLAN A / O (Table B–16)
Prescribed burn for release / restoration acres	prescribed burning		FORPLAN A / O (Table B–16)
Prescribed burn for site preparation acres	prescribed burning		FORPLAN A / O (Table B–16)
Prescribed burn in wilderness acres	prescribed burning		Text in Chapter 3 of Forest Plan
Prescribed burning soil loss amount	prescribed burning		FORPLAN A / O (Table B–16)
Uneven-aged management on timber suitable acres	silviculture	219.19 / 219.14	FORPLAN A / O (Table B–16)
Uneven-aged management techniques on timber unsuitable acres	silviculture	219.19 / 219.14	FORPLAN A / O (Table B–16)
Even-aged management on timber suitable acres	silviculture	219.19 / 219.14	FORPLAN A / O (Table B–16)
Even-aged management techniques on timber unsuitable acres	silviculture	219.19 / 219.14	FORPLAN A / O (Table B–16)
Mechanical site preparation soil loss amount	silviculture		FORPLAN A / O (Table B–16)

TABLE B–1, DATA REQUIREMENTS AND MEASURES

Data Requirement	DATA NEED RESPONDS TO: Issue(s)	CFR Reg(s)	Covered In
Chemical site preparation soil loss amount	silviculture		FORPLAN A / O (Table B–16)
Herbicide use acres	silviculture		FORPLAN A / O (Table B–16)
Pine-to-mixed forest type acres	silviculture	219.19	FORPLAN A / O (Table B–16)
Uneven-aged management in wildlife management preserve acres	wildlife & fish		FORPLAN A / O (Table B–16)
Even-aged management in wildlife management preserve acres	wildlife & fish		FORPLAN A / O (Table B–16)
Hardwood management emphasis acres	wildlife & fish		FORPLAN A / O (Table B–16)
Quality habitat for deer	wildlife & fish		FORPLAN A / O (Table B–16)
Quality habitat for turkey	wildlife & fish		FORPLAN A / O (Table B–16)
Quality habitat for quail	wildlife & fish		FORPLAN A / O (Table B–16)
Quality habitat for fox squirrel	wildlife & fish		FORPLAN A / O (Table B–16)
Quality habitat for gray squirrel	wildlife & fish		FORPLAN A / O (Table B–16)
High-hazard SPB cut acres	forest health		FORPLAN A / O (Table B–16)
Longleaf pine habitat, all stages		219.19a	FORPLAN A / O (Table B–16)
Shortleaf / oak-hickory habitat, early stages		219.19a	FORPLAN A / O (Table B–16)
Shortleaf / oak-hickory habitat, mid-late stages		219.19a	FORPLAN A / O (Table B–16)
Mixed hardwood-loblolly habitat, early stages		219.19a	FORPLAN A / O (Table B–16)
Mixed hardwood-loblolly habitat, mid-late stages		219.19a	FORPLAN A / O (Table B–16)
Riparian habitat, small streams		219.19a	FORPLAN A / O (Table B–16)
Riparian habitat, large streams		219.19a	FORPLAN A / O (Table B–16)
Water areas		219.23	text / table in Chapter 3 of FEIS
Water yield		219.23	text in Chapter 3 of FEIS
Wetland areas		219.23	text in Chapter 3 of FEIS
Outstanding minerals areas		219.22	text in Chapter 3 of FEIS
Reserved minerals areas		219.22	text in Chapter 3 of FEIS
Locatable minerals occurrence areas		219.24	text in Chapter 3 of FEIS
Leaseable minerals occurrence areas		219.24	text in Chapter 3 of FEIS
Common variety minerals occurrence areas		219.24	text in Chapter 3 of FEIS
Minerals future development areas		219.24	text in Chapter 3 of FEIS
Stand regeneration acres		219.19	FORPLAN A / O (Table B–16)
Stand age class distribution acres		219.19	text / table in Chapter 3 of FEIS
Even-aged management rotation age acres		219.19	text in Chapter 3 of Forest Plan
Range forage capacity amount		219.20	text in Chapter 3 of FEIS
Range forage use amount		219.20	text in Chapter 3 of FEIS
Present net value, commodity-based		219.12g	Table B–7
Present net value, commodity and noncommodity-based		219.12g	Table B–7
Total receipts to Federal Government		219.12g	FORPLAN A / O (Table B–16)
Contributions from 25% funds, timber only		219.12g	FORPLAN A / O (Table B–16)
Timber program costs		219.14b	FORPLAN A / O (Table B–16)
Timber program revenues		219.14b	FORPLAN A / O (Table B–16)
Acres not cost-efficient (low-level management)		219.14c	FORPLAN A / O (Table B–16)
Wildlife / fish user days		219.21	text / table in Chapter 4 of FEIS
Recreation visitor days		219.21	text / table in Chapter 4 of FEIS

INVENTORY DATA AND INFORMATION COLLECTION (STEP 3)

GIS DATA LAYERS

TABLE B–2, GIS DATA USED

GIS DATA LAYER NAME	COMMON NAME		
Standard GIS Inventory Layers			
Landline	National Forest boundaries		
Musstr	Louisiana pearlshell mussel watershed		
RCW	Active and inactive red-cockaded woodpecker stands		
RCW_zone	1/4, 1/2, and 3/4 mile zones around red-cockaded woodpecker stands		
RCWcruit	Tentative recruitment stands for red-cockaded woodpecker		
Riparian	Riparian areas (floodplain soils)		
Soil	Soil type map		
Stand	Stand location and attributes from the CISC II database		
Stream	All stream channels		
Fence	Active and inactive range allotments		
Special GIS Layers Created for Plan Revision Analysis			
dfc_cpvt	DFC / LTAs planning areas	Catahoula Ranger District	
dfc_epvt		Evangeline Ranger District	
dfc_kpvt		Kisatchie Ranger District	
dfc_wpvt		Winn Ranger District	
dfc_vpvt		Vernon Ranger District	
dfc_ypvt		Caney Ranger District	
old-grow/cat	Old-growth allocations	Catahoula Ranger District	
old-grow/evn		Evangeline Ranger District	
old-grow/kis		Kisatchie Ranger District	
old-grow/win		Winn Ranger District	
old-grow/vrn		Vernon Ranger District	
old-grow/can		Caney Ranger District	
ssz_c_a	Streamside zones	Catahoula Ranger District	Alternative C
ssz_c_c			Alternative B
ssz_c_r			Alternative D
ssz_c_h			Alternative E
ssz_c_w			Alternative F
ssz_e_a	Streamside zones	Evangeline Ranger District	Alternative C
ssz_e_c			Alternative B
ssz_e_r			Alternative D
ssz_e_h			Alternative E
ssz_e_w			Alternative F
ssz_k_a	Streamside zones	Kisatchie Ranger District	Alternative C
ssz_k_c			Alternative B
ssz_k_r			Alternative D
ssz_k_h			Alternative E
ssz_k_w			Alternative F
ssz_v_a	Streamside zones	Vernon Ranger District	Alternative C
ssz_v_c			Alternative B
ssz_v_r			Alternative D
ssz_v_h			Alternative E
ssz_v_w			Alternative F
ssz_w_a	Streamside zones	Winn Ranger District	Alternative C
ssz_w_c			Alternative B
ssz_w_r			Alternative D
ssz_w_h			Alternative E
ssz_w_w			Alternative F
ssz_y_a	Streamside zones	Caney Ranger District	Alternative C
ssz_y_c			Alternative B
ssz_y_r			Alternative D
ssz_y_h			Alternative E
ssz_y_w			Alternative F
ueam/cat	Uneven-age patch allocations	Catahoula Ranger District	
ueam/evn		Evangeline Ranger District	
ueam/kis		Kisatchie Ranger District	
ueam/win		Winn Ranger District	
ueam/vrn		Vernon Ranger District	
ueam/can		Caney Ranger District	

existing information was an ongoing effort.

Many different physical, biological, or administrative layers or resource–related information are contained in the Forest's GIS mapping system. The compilation of the various inventories into GIS resulted in more than 58 layers of land attribute and management opportunity delineations. These layers formed the basis for the resource data used for programmatic analysis. Table B–2 shows the data, stored in GIS, that were used in the formulation and the effects analysis of the alternatives.

For a detailed report on the source and the data of these layers, consult the *Forest Resources Information Management Data Dictionary*. These layers provided all of the information necessary to develop additional layers and analyze the alternatives.

ANALYSIS OF THE MANAGEMENT SITUATION (STEP 4)

In addition to the emerging issues, the need for change was identified through an analysis of the management situation. This analysis considers results of monitoring, other policy and direction since 1986, the 5–Year Review, the current condition of the resources, and supply and demand factors to determine the need for change in management direction, as well as the ability of the planning area covered by the Forest Plan to supply goods and services. It provides a basis for formulating a broad range of reasonable alternatives. A summary of the major findings of this analysis follows.

RESULTS OF 5-YEAR REVIEW

In 1990 forest managers compiled the first four years of monitoring data for all resources. In 1991, monitoring data were evaluated and compared with results anticipated by the Forest Plan. From this, the *5-Year Review Report* and *Highlights* revealed a need to revise the Forest Plan, based on these major factors:

- Reduced land available for timber production due to natural events and changing direction during the first plan period.
- Updated stand selection, predicting timber sales for 1991–95.
- Effects of the 1985–86 southern pine beetle epidemic.
- Existing and proposed red-cockaded woodpecker management direction.
- Effects of Forest Plan amendments.
- Need to add, delete, clarify, or amend Forest Plan standards and guidelines.
- Need to evaluate additional management areas.

Since the 5-Year Review such issues as *maintenance or restoration of biodiversity*, *old-growth forests*, *ecosystem management*, and *restoration of deteriorated ecosystems* have emerged locally, regionally, and nationally. These reinforce the need to reexamine the current Forest Plan.

DETERMINATION OF DEMAND ESTIMATES

Abstracts of the supply and demand relationships for recreation and wildlife, range, timber, and minerals are provided below. This information is taken from the summaries contained in Chapter 3 of this FEIS and from the documents comprising the Kisatchie AMS which are located in the planning records.

RECREATION AND WILDLIFE

The Kisatchie National Forest is the second largest supplier of public recreation lands within the Forest's 32-parish recreation and wildlife market area. More than 561,000 acres are open for dispersed recreation activities. The Louisiana Department of Wildlife and Fisheries manages the bulk of the lands available for public recreation in the market area, with 24 wildlife management areas (WMAs) totaling 608,539 acres.

Approximately 40,000 acres of the 109,855-acre Fort Polk WMA are national forest. These lands are not counted in the 561,000 acres of the Kisatchie open for dispersed recreation.

In the recent past, private landowners and timber companies provided large amounts of forested acreage for public outdoor recreation. However, as more private lands are being leased by private clubs, the amount of acreage available for public recreation is decreasing, thereby increasing demands on public lands for outdoor recreation activities, not only for hunting, but for camping, off-road riding, and other recreational uses.

The Kisatchie's developed recreation role within the market area is less significant than

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for dispersed recreation. The Forest manages 274 developed camping units or 5.5 percent of the total offered within the market area. The Forest also manages 14 boat ramps or 4.3 percent, 5 swim sites or 7.8 percent, 10 group shelters or 42.8 percent, and 218 family picnic tables or 5.5 percent of the total number of units within the market area. Although the Kisatchie's developed recreation opportunities seem less significant than dispersed recreation, the Forest is unique as one of few places in the state offering developed recreation sites within large undeveloped areas that are available for dispersed recreation.

The Forest provides a wide variety of outdoor recreation opportunities and experiences. Historically hunting, camping, driving for pleasure, swimming, and fishing have been the five most popular outdoor recreation activities.

National forests are expected to receive increased participation in all recreational activities. Non-consumptive uses and recreational fishing are expected to increase at the greatest rates over the planning period (**Flather and Hoekstra, 1990**). Flather and Hoekstra also state that comparison of relative rates of participation for national forest with those across all ownerships shows that national forests are expected to become relatively more significant in providing opportunities to hunt big game and small game species.

According to estimates (**English, et. al, 1993; Flather and Hoekstra, 1990**), demand for bicycling, fishing, hiking / walking, sailing, horseback riding, developed camping, and driving for pleasure opportunities will increase most on the Kisatchie during the next 50-year period. The Forest is capable of providing such recreation activities through improvements to existing facilities and the development of new areas.

National forest lands are expected to become more important in the management of wildlife and fish habitats, and in providing for quality wildlife and fish recreational opportunities (**Flather and Hoekstra, 1989**). Although the regional demand for big and small game hunting is expected to stay relatively constant or increase slightly, hunting pressure on public lands in Louisiana is expected to increase significantly. This increased hunting pressure can be attributed to the increase in leasing large tracts of private lands to a relatively small number of hunters.

Demand for off-road vehicle (**ORV**) riding opportunities is another activity that is expected to increase slightly over the next 50 years. However, like hunting, as more private lands are leased, public lands will be one of the few remaining areas where **ORV** enthusiasts will be able to pursue their sport. Most dispersed recreation activities will be impacted to some extent by the increased amount of private lands being leased. This could ultimately increase the importance of public lands for all types of dispersed recreation opportunities.

RANGE

Rapides, Grant, Natchitoches, Winn, and Vernon Parishes define the market area or competitive zone within which the Kisatchie National Forest participates in the supply of livestock forage. Range allotment programs are active only on the Calcasieu, Catahoula, and Kisatchie Districts. The Winn District has issued no grazing permits since 1985. The Caney District is considered to offer no manageable range resource.

Within the market area, the forage available for livestock consumption predominantly occurs in three settings — forestland, pasture, and cropland. On the Kisatchie, livestock forage is produced exclusively in forested settings; either under relatively open pine canopies or in large canopy openings — usually regeneration areas. Traditionally, Forest cattle grazing has been confined primarily to longleaf and slash pine stands regularly thinned and burned by prescription. Native bluestem grasses are the Kisatchie's dominant forage species.

Forage production is only one component of providing forage for livestock consumption. The other aspect requires adequate structural improvements (fences, stock watering facilities, etc.) to facilitate herd management and resource protection. Regulated grazing allotments were established on the Forest in 1967. Earlier, domestic livestock were grazed on all districts except the Caney on an open range basis.

Between 1967 and 1981, dozens of allotments became vacant and were eventually closed to grazing. The large decrease in permitted use and the number of active allotments during this period generally resulted from stock reductions on overgrazed allotments, local livestock ordinances, and strict grazing permit requirements. By 1981, 54 allotments containing approximately 240,000 acres were established across the Forest, except on the Caney District, to provide forage for livestock grazing. This number of grazing allotments was recognized in the 1985 Forest Plan.

Many of the 54 allotments have seen no grazing for many years. Structural improvements on a majority of allotments, inactive for extended periods, have fallen into disrepair. The quantity and quality of livestock forage available may vary considerably from allotment to allotment due to prescribed fire frequency and timber management practices over the past several years. Therefore the forage production and the livestock carrying capacity on those allotments managed for loblolly or shortleaf pine or mixed pine-hardwood stands have declined, while production and capacity on those managed for longleaf or slash pine have remained relatively high.

The total number of permitted livestock grazing on the Kisatchie has declined 90 percent since regulated grazing allotments were established. Today, 16 livestock owners hold grazing permits allowing 853 cattle to graze on 14 allotments covering 78,000 acres. This represents approximately one-third of the acres allocated to livestock grazing in all 54 allotments. Clearly, the current permitted livestock use on the Forest is well below its capacity.

The market area trend outside the Forest has been to graze cattle more on improved pastures, especially within the Red River floodplain; less on grazable woodlands. Although the Kisatchie can supply considerable forage, less than two percent of livestock producers in the market area utilize the Forest. Consequently, the Kisatchie's supply of beef cattle within the market area is less than two percent as well.

TIMBER

Information on the ownership, growth, removals, and productivity of timberland in the Kisatchie's timber market area was derived principally from the 1991 Forest Inventory and Analysis (FIA) survey in Louisiana. This is the most recent FIA survey for the state.

The Kisatchie provides timber products to a 30-parish market area within central and northern Louisiana. Within that area, national forest timber supply competes with timber from private ownerships.

Land classed as forest occupies 9.6 million acres, or 62 percent, of the 30-parish market area's 15.3 million-acre total land base. Private landowners hold 88.5 percent of all the timberland in the Kisatchie's market area. Nonindustrial private timberland owners hold the largest share — 51 percent, or 4.9 million acres. Public ownership accounts for 11 percent of all timberland. Slightly more than half of all publicly owned acreage is represented by the Kisatchie. In 1991 the Forest accounted for 5.9 percent of all timberland acreage, 7.6 percent of all softwood acreage, and 4.6 percent of all hardwood acreage in the market area.

The majority of softwood forest types in 1991 were on forest industry lands, accounting for 47 percent of all softwood acreage in the market area, or about 2 million acres. Nonindustrial private lands held roughly 59 percent, or 3.1 million acres, of all hardwood acreage in 1991. Forest industry lands accounted for 29 percent, or 1.5 million acres, of all hardwoods.

In 1991 the volume of growing stock in the market area was 12,327.3 million cubic feet. Softwoods represented 61.2 percent of this total; hardwoods 38.8 percent. The Kisatchie accounted for 8.3 percent of all growing stock and 9.7 percent of softwoods. Other public lands accounted for 5.8 percent of all growing stock. Forest industry lands accounted for 32.3 percent of all growing stock and 35.9 percent of all softwoods; while nonindustrial private forest land accounted for 53.5 percent of all growing stock and 50.9 percent of all softwoods.

The Kisatchie contributes a small percentage to the total timber supply produced in the market area. In 1982, a low harvest year, timber from the Forest accounted for 3.0 percent of the market area's total timber production. In 1986, when total timber harvest from the Forest was at an all-time high (**42.0 MMCF**) , this represented a 6.76 percent of the total market area production. From 1978 to 1997 the Forest averaged 5.0 percent of all sawtimber in the market area. From 1978 to 1997 in the pulpwood market, the Forest accounted for 3.2 percent of market area production.

Since World War II demand for wood products in central Louisiana and the South has risen steadily. Current demand for wood substantially exceeds supplies, as indicated by stumpage prices and the number of

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bidders for most timber sales. Second-growth pine stands provided sufficient supply until the beginning of the 1990s. At this writing, the majority of second-growth is on national forest, while private holdings are primarily plantation wood.

A combination of milling facilities, relatively low logging costs, fiber growth capacity, and access to growing Texas and southeastern markets have produced strong, consistent demand for all wood products from the Forest. Nationwide timber supply and demand projections indicate an increasing role for nonindustrial timberlands as supplies from national forests decrease.

MINERALS

While providing for the conservation and protection of surface resources, the Forest encourages, facilitates, and administers the exploration, development, and production of mineral resources.

Locatable minerals include gold, silver, platinum, copper, and other minerals having unique and special values. No known deposits of locatable minerals lie within the Forest.

Leasable minerals include fossil fuels — primarily coal, oil, natural gas, oil shale — and geothermal resources. The Kisatchie has a long history of oil and gas exploration, development, and production. In recent years the acreage leased for oil and gas development has steadily increased and income from this commodity has increased concurrently. In fiscal year 1995 revenues from production and oil and gas leases totaled approximately $726,500 for the Forest. The 1996 receipts were about $2,522,000. Approximately 40 percent of those receipts were bonus bids paid for leases which included the potentially productive Austin Chalk formation.

The United States claims ownership of all mineral rights on approximately 469,500 acres of the Forest, and mineral rights are outstanding in third parties on 113,800 acres. Since 1987 the Forest has shown a steady increase in acreage leased for oil and gas development. In 1992 approximately 187,000 acres were under lease for oil and gas. Currently, approximately 341,000 acres are leased for oil and gas exploration and development.

The largest increase in acreage occurred in 1991. This is attributed to the speculation that the Austin Chalk formation, a known producer, extends into central Louisiana — underlying the Vernon and Evangeline Units of the Calcasieu District, and the southern part of the Kisatchie District. There are a total of 37 producing wells: the Caney with 7, the Winn with 10, and 20 on the Vernon Unit. Recent leasing of the Vernon and Evangeline Units of the Calcasieu District, and the Kisatchie District, indicates continued interest in the Austin Chalk.

As crude oil prices rise because of increased demands for petroleum-based products, development may again increase. However, oil production in the United States should decline as oil imports increase. These converse developments are attributed to higher-profit non-domestic sources. The decline of domestic development also results from diminished acreage available for exploration; many areas are being withdrawn from availability.

The production outlook for domestic natural gas is considerably better than that of domestic crude oil. Gas production and prices should increase gradually for the decade as electric utilities prefer gas to generate electric power. Another factor influencing future oil and gas development is economic growth. Using the reference case presented in the *1992 Annual Energy Outlook* as a mid-level growth rate, total energy demand increases at a 2.2 percent annual rate. Measured by changes in gross national product, increases in the growth rate reflect rising energy demand.

Salable minerals — also called minerals materials — are common varieties of stone, gravel, sand, and clay, as defined by the Minerals Act of 1947 and Public Law 167 of July 23, 1955. Common-variety minerals known to exist on the Forest are sand, gravel, low-grade iron ore, clay, and salt. Although sand and gravel deposits exist on the Vernon and Evangeline Units of the Calcasieu District, and the Catahoula District, the Forest's gravel reserves are limited.

While extensive iron ore deposits lie in Webster and Claiborne Parishes, only smaller scattered deposits are located on the Caney District. Because of its high phosphorus content, iron ore in the larger deposits has not been historically competitive with other iron ore sources. High-phosphorus iron ore produces brittle steel. Although technology is available to remove phosphorus, it is not considered cost-effective.

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DEVELOPMENT OF LAND ALLOCATION MODEL (FORPLAN)

Clay and salt deposits are also located within the Forest. They have historically not been commercially operable because abundant reserves exist in other areas. In 1998 the Forest administered a total of 20 permits for the removal of common-variety minerals.

DEVELOPMENT OF LAND ALLOCATION MODEL (FORPLAN)

Land management planning is the major mechanism for making large-scale and long-term forest land allocations and resource management decisions. Planning consists largely of exploring a national forest's productive potential and experimenting with various allocation choices. A forest model is the primary planning tool because it permits studying the consequences of choices without actually committing valuable resources to experimentation or having to wait many years to observe an outcome.

Decisions about structuring land allocations, choosing and pursuing trade-offs, and accepting one result instead of another are made by people, not the model. The model is a device for organizing elements of the decision problem and discovering possible choices. Making decisions is a human act.

Version II of the FORPLAN model was used in the analysis to simulate different management actions on Forest resources and environmental conditions. This model is also designed to find the optimum solution to a problem posed by the potentials and limitations of land and resources, the effect of costs, budgets, and resource prices, and the desired objectives of resource yields and environmental conditions.

COMPONENTS

The four basic components of the model are outputs, prescriptions, capability areas, and coefficients. This section describes these components and shows which were used in the development of the FORPLAN model.

Outputs and activities

Management of a national forest yields a variety of public goods and services, including consumable and nonconsumable products (recreation opportunities, for example, are nonconsumable). Environmental settings and maintaining or protecting long-term biological productivity of forested lands are also public goods created through forest management. In the FORPLAN model, these familiar goods and services are regarded as the *outputs* of the Forest.

Management of national forests also incurs costs for *activities* needed to produce outputs of goods and services. In the model both objectives and constraints are expressed by the production level assigned to an output variable. Since costs of management prescriptions limit the production of goods and services, activities are also modelled. Tables B–3 and B–4 (next page) show activity and output variables used in the Kisatchie's FORPLAN model, and their assigned unit costs and priced benefits.

Management prescriptions

The array of potential land treatments applied to a forest area are represented in the model by sets of actions known as *management prescriptions*. Generally, a management prescription refers to a set of treatments or practices designed to develop or protect some combination of resources on a particular land type. Table B–5 shows the management prescriptions used in the Kisatchie's FORPLAN model.

Capability areas

Capability areas are defined as contiguous units of land having similar geological, climatic, and resource characteristics. Responses to treatment are expected to be relatively the same throughout an area. Treatment costs are also expected to be relatively uniform.

The Kisatchie used a combination of *geographic information system* (GIS) data layers to construct its capability areas. Initially, a polygon layer of stand information from the *continuous inventory of stand conditions* (CISC) was intersected with layers of streamside protection area polygons, sub-management area polygons, old growth patch polygons, and uneven-aged patch polygons. Since each layer except the CISC layer varied by the pre-allocated sub-management areas, each alternative had a unique layer of polygons associated with it. These final layers of polygons and respective attributes were the highest resolution layer used for assessing land capability on the Forest. The number of polygons created for the alternatives ranged from 67,482 in Alternative A to 98,165 in Alternative D.

ANALYSIS OF THE MANAGEMENT SITUATION (STEP 4)

DEVELOPMENT OF LAND ALLOCATION MODEL (FORPLAN)

TABLE B–3, ACTIVITIES AND THEIR ASSOCIATED COSTS AS MODELED IN FORPLAN

FORPLAN A / O Code	Activity Description	Unit of Measure	Range of Costs per Unit in the Model
PLNT	Plant on prepared site	acres	$125–$263
SEED	Seed on prepared site	acres	$13-$150
RPLN	Replant on prepared site	acres	$95
SP / A	Site preparation for planting	acres	$110
SP / N	Site preparation for natural regeneration	acres	$110
SPBR	Site preparation burn	acres	$30
OGBR	Old-growth burn	acres	$9
AMBR	Amenity DFC burn	acres	$9
SP / C	Site preparation by chemical	acres	$60
RL / C	Release by chemical	acres	$60
RLBR	Release burn	acres	$5
PCOM	Precommercial thinning	acres	$110
TFSX	Timber stewardship expense	MCF	$124
TPUX	Timber personal use expense	MCF	$232
PURC	Purchaser local road construction	miles	$34,800
PURR	Purchaser local road reconstruction	miles	$16,200
RDMN	Non-timber local road maintenance	dollars / acre / year	0.69
LLOC	Landline location	dollars / acre / period	0.00116
RECX	Recreation program cost	dollars / RVD / year	0.538
WLFX	Hunt / fish program cost	dollars / WFUD / year	4.33

TABLE B–4, OUTPUTS AND THEIR ASSOCIATED BENEFIT VALUES AS MODELED IN FORPLAN

FORPLAN A / O Code	Activity Description	Unit of Measure	Range of Value per Unit in the Model
SOFT	Even-aged softwood volume	MCF	$200–$1,700
HARD	Even-aged hardwood volume	MCF	$100–$165
GS1V	Group selection single species volume	MCF	$100–$1,200
OLGV	Old-growth volume	MCF	$100–$165
STRV	Streamside volume	MCF	$400–$1,200
MILV	Military volume	MCF	$1,200
AMNV	Amenity volume	MCF	$600–$800
RVDS	Recreation visitor days used	RVD	$11.40
WFUD	Wildlife / fish user days	WFUD	$47.40
TINC	Timber-associated income – sawtimber sales	MCF	$113.40
TINC	Timber-associated income – veneer sales	MCF	$138.60
TINC	Timber-associated income – roundwood sales	MCF	$10.60
TINC	Timber-associated income – 25% returns	MCF	$1.05
RINC	Recreation-associated income – recreation use	RVD	$19.10
RINC	Recreation-associated income – wildlife / fish use	WFUD	$5.50
25%$	25 percent road / school income	dollars	$0.25

TABLE B–5, MANAGEMENT AREA PRESCRIPTIONS

Management Emphasis	Management Intensity	FORPLAN Code	Description
Restoration inside HMA	RCW foraging maintenance	FG	Maintain RCW foraging stands
Uneven-aged management (UEAM)	UEAM by group selection	GS	Use uneven-aged regeneration system by group selection
Forest products	Convert to YP at rotation	1Y	Convert to yellow pine at rotation
Hardwoods	Convert to MX at rotation	7M	Convert to mixed forest type at rotation
Restoration inside HMA	CTX9, FH / CTX9, FH	59	Thin existing and regenerated stand 9 times. Harvest to feature MA5 DFCs.
Restoration outside HMA	CTX4, FH / CTX4, FH	34	Thin existing and regenerated stand 4 times. Harvest to feature MA3 DFCs.
Restoration outside HMA	CTX7, FH / CTX7, FH	37	Thin existing and regenerated stand 7 times. Harvest to feature MA3 DFCs.
Wildlife habitat inside HMA	Convert to MX at rotation	6M	Convert to mixed forest type at rotation age 120
Wildlife management preserves	Convert to MX at rotation	PM	Convert to mixed forest type at rotation age 100
Forest products	CTX5, FH / CTX5, FH	15	Thin existing and regenerated stand 5 times. Harvest to feature MA1 DFCs.
Forest products	Convert SL to YP ASAP	1>	Convert existing stands of slash pine to yellow pine as soon as possible
Hardwoods	Convert to MX at rotation	7M	Convert to mixed forest type at rotation
Restoration inside HMA	Restore to LL ASAP	5L	Restore off-site species to longleaf pine as soon as possible
Restoration inside HMA	Restore to MX ASAP	5M	Restore off-site species to shortleaf pine / oak as soon as possible
Restoration outside HMA	Restore to LL ASAP	3L	Restore off-site species to longleaf pine as soon as possible
Restoration outside HMA	Restore to MX ASAP	3M	Restore off-site species to shortleaf pine / oak as soon as possible
Wildlife habitat inside HMA	Convert to LL at rotation	6L	Convert off-site species to longleaf pine at rotation
Wildlife habitat inside HMA	Convert to MX at rotation	6M	Convert off-site species to mixed forest type at rotation
Forest products	CTX1, FH / CTX1, FH	11	Thin existing and regenerated stand 1 time. Harvest to feature MA1 DFCs.
Hardwoods	CTX1, FH / CTX1, FH	71	Thin existing and regenerated stand 1 time. Harvest to feature MA7 DFCs.
Restoration inside HMA	CTX1, FH / CTX1, FH	51	Thin existing and regenerated stand 1 time. Harvest to feature MA5 DFCs.
Restoration outside HMA	CTX1, FH / CTX1, FH	31	Thin existing and regenerated stand 1 time. Harvest to feature MA3 DFCs.
Wildlife habitat inside HMA	CTX1, FH / CTX1, FH	61	Thin existing and regenerated stand 1 time. Harvest to feature MA6 DFCs.
Wildlife management preserves	CTX1, FH / CTX1, FH	P1	Thin existing and regenerated stand 1 time. Harvest to feature MA11 DFCs.
Hardwoods	CTX4, FH / CTX4, FH	74	Thin existing and regenerated stand 4 times. Harvest to feature MA7 DFCs.
Restoration inside HMA	CTX5, FH / CTX5, FH	55	Thin existing and regenerated stand 5 times. Harvest to feature MA5 DFCs.
Wildlife habitat inside HMA	CTX5, FH / CTX5, FH	65	Thin existing and regenerated stand 5 times. Harvest to feature MA6 DFCs.
Wildlife management preserves	CTX4, FH / CTX4, FH	P4	Thin existing and regenerated stand 4 times. Harvest to feature MA11 DFCs.
Wildlife management preserves	CTX5, FH / CTX5, FH	P5	Thin existing and regenerated stand 5 times. Harvest to feature MA11 DFCs.
Old growth	OG maintenance / improvement	XM	Maintain old-growth characteristics through intermediate cutting
Old growth	Remove off-site species	XR	Restore old-growth communities through removal of off-site species
Streamside management	Streamside maint / improv	SS	Use intermediate cuttings as needed to maintain / improve streamside areas
Military intensive use	Limited by military use	MI	Use even-aged regeneration system when access is allowed
Amenity values outside HMA	Periodic burns on amenity DFC	PB	Use timber harvesting only for amenity improvement in fire-maintained community type
Amenity values outside HMA	No burns on amenity DFC	NB	Use timber harvesting only for amenity improvement
Wild & scenic river	No harvests for timber	WS	Use timber harvesting only to enhance or protect wild and scenic quality
Experimental forest	No harvests for timber	XF	Allow use by research as needed
Wilderness	No harvests for timber	WI	Protect wilderness attributes only
Minimum protection / maintenance	No harvests for timber	ML	Provide minimum maintenance and protection

TABLE B–6, ANALYSIS AREA IDENTIFIERS

FORPLAN CODE	CODING STRUCTURE	DESCRIPTION
LEVEL 1		MGMT AREA – PRE-ALLOCATED
1A	011	FOREST PROD / MAX
IB	012	FOREST PROD / MOD
1C	013	FOREST PROD / MIN
2A	021	AMENITY VAL / MAX
2B	022	AMENITY VAL / MOD
3B	032	COMMUNITY REST / MOD
3C	033	COMMUNITY REST / MIN
4A	041	RCW / AMEN / MAX
5C	053	RCW / RESTOR / MIN
6A	061	RCW / WL MAX
6B	062	RCW / WL / MOD
7A	071	HARDWOOD / MAX
7B	072	HARDWOOD / MOD
7C	073	HARDWOOD / MIN
8A	081	WILDLIFE / MAX
8B	082	WILDLIFE / MOD
8C	083	WILDLIFE / MIN
9D	094	MILITARY INTENSIVE USE IN HMA
9E	095	MILITARY INTENSIVE USE OUTSIDE
SD	104	SALINE BAYOU W&S RIVER IN HMA
SE	105	SALINE BAYOU W&S RIVER OUTSIDE HMA
PD	114	WILDLIFE MGT PRES IN HMA
PE	115	WILDLIFE MGT PRES OUTSIDE HMA
XF	EXF	PALUSTRIS EXPT. FOREST
WD	KHW	KISAT. HILLS WILDERNESS
OG	OLG	OLD GROWTH PATCH COMPONENT
SS	SST	STREAMSIDE AREA ADJACENT TO SUIT. MA
US	UST	STREAMSIDE AREA ADJACENT TO UNSUIT. MA
MI	MIL	MILITARY ALLOCATION
AP	APB	AMENITY ALLOCATION – BURN COMMUNITIES
AN	ANB	AMENITY ALLOCATION – NON BURN COMMUNITIES
AW	AWS	AMENITY ALLOCATION – 1/2 BURN, 1/2 NON BURN
UN	UNL	TMBR UNSUIT. LC WITHIN SUIT. MGT. AREA
LEVEL 2		LAND SUITABILITY
SE	SEAM	SUITABLE TMB. EVEN-AGED
SU	SUEAM	SUITABLE TMB. UNEVEN-AGED
UE	UNSEAM	UNSUIT. TMB. EVEN-AGED
UU	UNSUEA	UNSUIT. TMB. UNEVEN-AGED
NF	NONFOR	NON-FORESTED LAND
WN	WILDNS	WILDERNESS AREA AND INCLUDED RNA'S
RE	RESRCH	EXPERIMENTAL FOREST AND RNA'S
UP	UNPROD	UNPRODUCTIVE OR CAN'T RESTOCK IN 5 YRS (INCL KT soils)
PU	PHYSUN	PHYSICALLY UNSUITABLE FOR TMBR PROD
DV	DEVREC	DEVELOPED RECREATION SITES
OG	OLDGRO	DESIGNATED OLD GROWTH AREAS, UNSUIT FOR TMBR PROD
AM	ACTMIL	MILITARY INTENSIVE USE LANDS, UNSUIT FOR TMBR PROD
WS	W&S	SALINE BAYOU W&S, UNSUIT FOR TMBR PROD
SR	STREG	STATE REGISTRY AREA (EXIST. & PROPOSED)
C0	CMUNT0	NON-SPECIFIC HISTORIC PLANT COMMUNITY
C1	CMUNT1	HISTORICALLY LONGLEAF PINE PLANT COMMUNITY

Coefficients

A *coefficient* describes the relationship between a prescription applied to an analysis area and the resulting output. Most coefficients used in a linear programming model (like FORPLAN) represent the number of units per acre of the output variable. It is analogous to a point on a production function curve, and serves as an index of expected output.

The resource yield tables in FORPLAN contain the per-acre yield coefficients for the scheduled outputs. These tables are accessed by management area prescriptions as they are allocated to the analysis areas. As the land allocation and schedule changes between alternatives, yields also change.

The independent resource variables (master codes) used in the FORPLAN yield file and their per-acre yields were developed in the following ways:

OLGV — This output is used to estimate timber volume likely to occur from unscheduled improvement harvests inside old-growth patches for restoration or maintenance of native species' communities. Because these lands are not considered suitable for timber production, this volume does not contribute to the ASQ. Output is themed to all prescriptions having the level 7 identifier ***OG** — old growth* and is associated with all **AAs** that have the level 1 identifier ***OG** — old growth patch component*. Coefficient values are based on the average yield per acre for an even-aged system regeneration cut when an old-growth restoration cut (treatment type "O") is used and on an average yield per acre for an even-aged system intermediate cut when an old-growth maintenance thinning (treatment type "M") is used. Outputs are planned so that restoration cuts all occur in the first period when only 10 percent of the old growth patch contains off-site overstory species; or occur over two periods when more than 10 percent of the patch contains off-site overstory. Patches receiving restoration cuts do not get maintenance thinnings until the fifth period. Once patches begin to get maintenance thinnings, they are modelled as an average flow of volume through the end of the planning horizon. Although the flow occurs every period in the model, actual maintenance thinnings are expected to occur once every 20 years, treating only half of the area every period. Riparian old growth has no predicted timber outputs.

STRV — This output is used to estimate timber volume likely to occur from periodic unscheduled harvests within streamside habitat protection zones and riparian area protection zones. Because these lands are not considered suitable for timber production in alternatives B–F, this volume does not contribute to the ASQ in these alternatives. Alternative A, *no action*, considers these lands suitable for timber production and the volume contributes to the ASQ. Output is themed to all prescriptions that have the level 7 identifier *ST* — *streamside WL / S&W protection* and is associated with all AAs that have the level 1 aggregate identifier *s** — *streamside areas*. For planning purposes, the estimated volumes from these lands for the first decade will also be used as estimates for future decades. Outputs are expected to occur using intermediate cutting methods and concurrent with timber harvesting operations on adjacent, suitable timber lands. Coefficient values are based on an average 0.09 MCF/acre (0.5 MBF / acre). Streamside areas adjacent to unsuitable timber lands are not predicted to contribute timber volume in the model.

MILV — This output is used to estimate timber volume likely to occur from periodic unscheduled harvests within military intensive use areas. Because these lands are not classified as suitable for timber production, the volume does not contribute to ASQ. Output is themed to all prescriptions that have the level 7 identifier *MI* — *military intensive use* and is associated with all AAs that have the level 1 identifier *MI* — *military allocation*. For planning purposes, the estimated volumes from these lands for the first decade will also be used as estimates for future decades. Outputs are expected to occur using even-aged system cutting methods and coefficient values based on an average inventory of 2.9 MCF / acre, an average rotation of 120 years, and with access limited to 2 out of 9 months per year (2.9 * 0.083 * 0.222 = 0.054 MCF/acre).

AMNV — This output is used to estimate timber volume likely to occur from periodic unscheduled harvests within management areas allocated to an amenity desired future condition (management areas 2, 4, and 10). Because these lands are not classified as suitable for timber production, the volume does not contribute to ASQ. Output is themed to all

TABLE B–6, continued

FORPLAN CODE	CODING STRUCTURE	DESCRIPTION
C2	CMUNT2	HISTORICALLY SHORTLEAF–OAK PLANT COMMUNITY
C3	CMUNT3	HISTORICALLY MIXED HWD/LOB PLANT COMMUNITY
LEVEL 3		HMA CLASS
NN	NHMA	NOT FORAGING, NOT IN HMA
1N	HMA1N	CAT HMA, NOT FORAGING
1F	HMA1F	CAT HMA, FORAGING
2N	HMA2N	EVANG HMA, NOT FORAGING
2F	HMA2F	EVANG HMA, FORAGING
3N	HMA3N	KISAT HMA, NOT FORAGING
3F	HMA3F	KISAT HMA, FORAGING
4N	HMA4N	WINN HMA, NOT FORAGING
4F	HMA4F	WINN HMA, FORAGING
5N	HMA5N	VERNON HMA, NOT FORAGING
5F	HMA5F	VERNON HMA, FORAGING
LEVEL 4		WKG GRP FTYPE
YP	YPINE	YELLOW PINE (LB, SH, SL)
MX	MIXFT	MIXED FOR / COMM. TYPE (HP, LH, PH, SO)
HW	HDWD	HARDWOOD FORTYPE (BH, UH)
LL	LLEAF	LONGLEAF FOR / COMM. TYPE (LL)
RP	RIPAR	RIPARIAN SPECIES
LEVEL 5		AGE CLASS
00	REGEN	IN REGENERATION
10	1–10	AGES 1 TO 10 (>=1985)
20	11–20	AGES 11 TO 20 (>=1975 & <=1984)
30	21–30	AGES 21 TO 30 (>=1965 & <=1974)
40	31–40	AGES 31 TO 40 (>=1955 & <=1964)
50	41–50	AGES 41 TO 50 (>=1945 & <=1954)
60	51–60	AGES 51 TO 60 (>=1935 & <=1944)
70	61–70	AGES 61 TO 70 (>=1925 & <=1934)
80	71–80	AGES 71 TO 80 (>=1915 & <=1924)
90	81–90	AGES 81 TO 90 (>=1905 & <=1914)
C0	91–100	AGES 91 TO 100 (>=1895 & <=1904)
C1	101–110	AGES 101 TO 110 (>=1885 & <=1894)
C2	111–120	AGES 111 TO 120 (>=1875 & <=1884)
C3	121+	AGES 121+ (<1875 & >1800)
( )	NONSTK	NONSTOCKED
–S	SPARST	SPARSE ST
–P	SPARPT	SPARSE PT
OM	OVERMAT	(20+YRS PAST ROTATION)
RG	REGENCL	REGEN CLASS FOR M2
XX	OG–NONE	OG–NONE OFFSITE
X1	OG–10%	OG–10% OFFSITE
X2	OG–20%	OG–20% OFFSITE
X3	OG–30%	OG–30% OFFSITE
X4	OG–40%	OG–40% OFFSITE
X5	OG–50%	OG–50% OFFSITE
X6	OG–60%	OG–60% OFFSITE
X7	OG–70%	OG–70% OFFSITE
LEVEL 6		(NOT USED)

ANALYSIS OF THE MANAGEMENT SITUATION (STEP 4)

DEVELOPMENT OF LAND ALLOCATION MODEL (FORPLAN)

prescriptions that have the level 7 identifiers *AM — amenity values* or *MN — minimum level management* and is associated with all AAs that have the level 1 aggregate identifier *A* — amenity allocations*. For planning purposes, the estimated volumes from these lands for the first decade will also be used as estimates for future decades. Outputs are expected to occur using uneven-aged system cutting methods with coefficient values based on half the group patch cut volume expected on suitable uneven-aged areas in longleaf community types and one-fourth the group patch cut volume expected on suitable uneven-aged areas in non-longleaf community types.

GS1V — This output is used to estimate timber volume likely to occur from scheduled uneven-aged system cutting on areas classified as suitable for timber production and having a single species forest type. The volume contributes to the ASQ. Output is themed to all prescriptions that have the level 7 aggregate identifier *SU — suitable for timber production* and is associated with all AAs that have the level 2 identifier *SU — suitable timber uneven-aged* and the level 4 aggregate identifier *1S — single species forest type*. Prescription timing based on age is used to predict output occurrences. Coefficient values are developed from even-aged system FORPLAN yield tables that have been modified to allow uneven-aged harvests beginning at a predetermined minimum age. Maturity age is used to determine what proportion of an area needs to be cut each period. This proportion is applied to expected yields for similar even-aged stands and then used to estimate yields expected from uneven-aged system group (or patch) cuts. Thinning in the even-aged portion of the residual stand will occur, however, this additional volume is assumed to be offset by the lower volumes per acre expected under an uneven-aged silvicultural system.

SOFT — This output is used to estimate timber volume likely to occur from scheduled even-aged system cutting on areas classified as suitable for timber production and having a pine forest type. The volume contributes to the ASQ. Output is themed to all prescriptions that have the level 7 aggregate identifier *SU — suitable for timber production* and is associated with all AAs that have the level 2 identifier *SE — suitable timber even-aged* and the level 4 aggregate identifier *PI — all pine types*. Prescription timing based on age is used to predict output occurrences. Coefficient values are developed from growth-and-yield simulation models (YIELD, YIELD-PLUS, AND SRGYS) and then adjusted to more closely match outputs and thinning opportunities characteristic of the Kisatchie. More information about how yields were developed can be found in planning and process records on file at the Kisatchie National Forest Supervisor's Office.

MXAG — This output is used to estimate multiple-product (hardwood and softwood) timber volume likely to occur from scheduled even- and uneven-aged system cutting on areas classified as suitable for timber production and having a mixed species forest type. The volume contributes to the ASQ. Output is themed to all prescriptions that have the level 7 aggregate identifier *SU — suitable for timber production* and is associated with all AAs that have the level 2 aggregate identifier *ST — suitable timber lands* and the level 4 identifier *MX — mixed forest / community type*. Prescription timing based on age is used to predict output occurrences. Coefficient values are developed from the same even-aged hardwood and loblolly pine yield tables that were used in the original Forest Plan FORPLAN model. The original yields were computed from growth and yield simulation models and then adjusted to match historical data taken from similar harvests on the Kisatchie. More information about how yields were developed can be found in planning and process records on file at the Kisatchie National Forest Supervisor's Office.

HARD — This output is used to estimate timber volume likely to occur from scheduled even-aged system cutting on areas classified as suitable for timber production and having a hardwood forest type. The volume contributes to the ASQ. Output is themed to all prescriptions that have the level 7 aggregate identifier *SU — suitable for timber production* and are associated with all AAs that have the level 2 aggregate identifier *ST — suitable timber lands* and the level 4 identifier *HW — hardwood forest type*. Prescription timing based on age is used to predict output occurrences. Coefficient values are developed from the same even-aged hardwood yield tables that were used in the original Forest Plan FORPLAN model. The original yields were computed from growth and yield simulation models and then adjusted to match historical data taken from similar harvests on the Kisatchie. More information about how yields were developed can be found in planning and process records on file at the Kisatchie National Forest Supervisor's Office.

LLOC — This output is used to assign costs for landline location and to show costs for minimum level management prescriptions when computing present net value (PNV). Output is themed to all prescriptions that have the level 8 identifier *MN — no harvests for timber production* and is associated with all AAs.

RDMN — This output is used to assign costs for road maintenance and like LLOC, is used to show costs for minimum level management prescriptions when computing PNV. Output is themed to all prescriptions that have the level 8 identifier *MN — no harvest for timber production* and is associated with all AAs.

The coefficients for all other outputs (costs, benefits, and environmental effects) depend on the output levels of the above independent outputs. Coefficients for the dependant outputs were developed outside of the FORPLAN model using the best available information and are a part of the process file for this document.

ORGANIZATION

Based upon information needed to address issues and concerns, capability areas were combined into analysis areas (AAs). Analysis areas are defined as areas of land, not necessarily contiguous, which can be considered to be homogenous with respect to responses to treatment in terms of yields, costs of treatments and values received for resource outputs. After aggregation, the Forest was stratified into 519 AAs for Alternative A, 639 AAs for Alternative B, 294 AAs for Alternative C, 683 AAs for Alternative D, 688 AAs for Alternative Modified D, 654 AAs for Alternative E, and 691 AAs for Alternative F. Table B–6 (two panels) shows the five levels of identifiers used to create the analysis areas.

The process used to stratify the AAs for each alternative used a hierarchical prioritization method. In order to avoid assigning more than one prescription to the same unit of land, or counting the same area twice, priority towards one AA classification or another had to be given. The order of priority used was based on the amount of flexibility available for an AA's choice of management prescriptions. Those AAs with the most restrictive management options were given highest priority. Stratification priorities are as follows (from least management options to most):

- Water area and other non-forested lands
- Wilderness
- Active and replacement RCW cluster sites
- SHPZs and RAPZs
  - zones adjacent to unsuitable timber lands
  - zones adjacent to suitable timber lands
- Stage I timber unsuitable lands (RNAs, experimental forest, unproductive)
- Old-growth patch allocations
  - patches not containing off-site species
  - patches containing off-site species
- Wild and scenic river corridor
  - lands within HMAs
  - lands outside HMAs
- Intensive military use lands
  - lands within HMAs
  - lands outside HMAs
- Amenity DFC management area allocations
  - lands within HMAs
  - lands outside HMAs
- Other timber unsuitable lands within timber suitable management areas
- Lands suitable for timber production
  - uneven-aged tagged RCW foraging stands
  - even-aged tagged RCW foraging stands
  - uneven-aged patches inside the wildlife management preserves (WMPs) and inside the HMAs
  - even-aged stands inside the WMPs and inside the HMAs
  - uneven-aged patches within HMAs only
  - even-aged stands within HMAs only
  - uneven-aged patches within WMPs only
  - even-aged stands within WMPs only
  - uneven-aged patches outside WMPs and HMAs
  - even-aged lands outside WMPs and HMAs

ANALYSIS OF THE MANAGEMENT SITUATION (STEP 4)

DEVELOPMENT OF LAND ALLOCATION MODEL (FORPLAN)

ANALYSIS OF THE MANAGEMENT SITUATION (STEP 4)

BENCHMARKS

BENCHMARKS

Benchmarks approximate maximum economic and biological resource production opportunities, are useful in evaluating the compatibilities and conflicts between individual resource objectives, and help define the range within which integrated alternatives can be developed. The following benchmarks were developed:

CUR — CURRENT LEVEL BENCHMARK

This benchmark provides for management using the current plan, adjusted to incorporate changes necessary to meet current management direction. The benchmark estimates the capability of the planning areas to provide for a wide range of goods, services, and other uses from the present land allocation. This benchmark was the same as Alternative A. This benchmark meets all requirements specified in the regulations (***36 CFR, Part 219***).

TIM — MAXIMUM TIMBER BENCHMARK

This benchmark was used to define the maximum timber output possible for the first decade, subject to these specifications:

- The objective function maximizes timber in the first decade, with a rollover to maximize timber for 15 decades.
- Apply management requirements.
- Apply nondeclining yield.
- Includes all tentatively suitable land.

MKT – MAXIMUM PRESENT NET VALUE WITH MARKET VALUES ONLY BENCHMARK

The purpose of this benchmark was to estimate the mix of resource uses and determine a schedule of outputs and costs that would maximize the present net value (PNV) of those outputs that have an established market price. This output includes market prices for timber. The following specifications were applied:

- The objective function maximizes PNV where only market outputs are valued.
- Apply management requirements.
- Apply nondeclining yield.
- Includes all tentatively suitable land.

PNV – MAXIMUM PRESENT NET VALUE WITH ASSIGNED VALUES BENCHMARK

This benchmark was established to estimate the mix of resource uses and a schedule of outputs and costs that would maximize the PNV of outputs assigned a monetary value. The following specifications were applied:

- The objective function maximizes PNV where both market and nonmarket outputs were valued.
- Apply management requirements.
- Apply nondeclining yield.
- Includes all tentatively suitable land.

MIN – MINIMUM LEVEL MANAGEMENT BENCHMARK

This benchmark represents the minimum level of management needed to maintain and protect the unit as part of the National Forest system. The following specifications were applied:

- The objective function minimizes cost where market (timber) and nonmarket (recreation) outputs were valued.
- Apply management requirements.
- Apply nondeclining yield.
- Includes all national forest land.

Table B–7 displays some of the distinctive outputs and effects for each benchmark.

LANDS SUITABLE FOR TIMBER PRODUCTION

TABLE B–7, TRADEOFFS AMONG BENCHMARKS

Average Annual for Period 1

	CUR	TIM	MKT	PNV	MIN
Present net value (MMS – 50 years)	1,360	1,500	1,584	1,633	285
Average cost (MMS / year)	6.3	5.2	4.4	5.4	1.3
Average revenue (MMS / year)	61.4	75.9	80.7	83.0	14.1
Timber volume (MMCF / year)	14.3	20.7	20.5	20.5	1.3
Timber stage III suitable land (MACRES)	505	505	415	489	102
Dispersed recreation use (MRVDS / year)	497.0	497.0	437.0	500.0	226.4
Total quality habitat (MACRES)	971	850	811	848	517

LANDS SUITABLE FOR TIMBER PRODUCTION

During forest planning, the Forest Service is required to identify lands unsuited for timber production (*16 USC 1604(k); 36 CFR 219.14*). This identification process involves three stages of analysis. *Stage 1* analysis identifies lands tentatively suitable for timber production. *Stage 2* analysis is designed to explore the financial attractiveness of varying intensities of timber management on lands identified as tentatively suitable for timber production. *Stage 3* analysis identifies lands as unsuited for timber production under the alternative selected as the revised Forest Plan.

STAGE 1: PHYSICAL SUITABILITY

The first stage of the timber suitability analysis identified lands in these categories:

- Those lands that do not meet the definition of forest land.
- Those lands that have been withdrawn from timber production by an act of Congress, the Secretary of Agriculture, or the Chief of the Forest Service.
- Those forest lands incapable of producing industrial wood.
- Those lands where technology is not available to ensure timber production from the land without irreversible soil and water resource damage.
- Those lands where there is no reasonable assurance of adequate restocking.
- Those lands where there is inadequate response information.

Table B–8, line 6, displays the determination of those lands on the Kisatchie National Forest tentatively suitable for timber production.

STAGE 2: FINANCIAL ANALYSIS

The second stage of analysis did not identify any lands as unsuitable for timber production. The costs and benefits associated with each management intensity that may be used in the production of timber were assessed. Costs exceeded revenues on an insignificant number of acres. Overall, the benefits gained by other resources from timber management outweighed the costs. Documentation of these results can be found in the process records (FORPLAN reports) for the Plan revision alternatives. The following stage 3 analysis considered these results in making the final determination of lands suited for timber production.

STAGE 3: IDENTIFICATION OF SUITABLE ACRES

Stage 3 analysis was accomplished during the formulation of alternatives. Three criteria were used during this stage to identify lands as not suited for timber production:

- Based upon a consideration of multiple-use objectives for the alternative, the land is proposed for resource uses that preclude timber production, such as old growth.

ANALYSIS OF THE MANAGEMENT SITUATION (STEP 4)

LANDS SUITABLE FOR TIMBER PRODUCTION

TABLE B–8, DETERMINATION OF LANDS SUITABLE FOR TIMBER PRODUCTION[1]

Displayed by Land Class and Alternative

	Land Classification	Alt A	Alt B	Alt C	Alt D	Mod D	Alt E	Alt F
1	Non-Forest land (includes water)	11,477	11,477	11,477	11,477	11,477	11,477	11,477
2	Forest land	595,268	595,268	595,268	595,268	595,268	595,268	595,268
3	Forest land withdrawn from timber production	11,428	11,428	11,428	11,428	11,428	11,428	11,428
4	Forest land with inadequate information or not capable of producing crops of industrial wood [2]	4,680	4,680	4,680	4,680	4,680	4,680	4,680
5	Forest land physically unsuitable: irreversible damage likely to occur, not restockable within 5 years	2,000	2,000	2,000	2,000	2,000	2,000	2,000
6	Tentatively suitable forest land (item 2 minus items 3, 4, and 5)	577,160	577,160	577,160	577,160	577,160	577,160	577,160
7	Forest land not appropriate for timber production [3]	71,900	232,443	476,985	264,997	268,271	260,741	299,520
8	Unsuitable forest land (items 3, 4, 5, and 7)	90,008	250,551	495,093	283,105	286,379	278,849	317,628
9	Total suitable forest land (item 2 minus item 8)	505,260	344,717	100,175	312,163	308,889	316,419	277,640
10	Total national forest land [4] (items 1 and 2)	606,745	606,745	606,745	606,745	606,745	606,745	606,745

1/ Lands that can be managed for the purpose of growing, tending, harvesting, and regeneration of regulated crops of trees.

2/ Lands for which current information is inadequate to project responses to timber management. Usually applies to low-site lands.

3/ Lands identified as not appropriate for timber production due to: A assignment to other resource uses to meet Forest Plan objectives; B management requirements; and C not being cost-efficient in meeting Forest Plan objectives over the planning horizon.

4/ Acres are computed from GIS database layers. These numbers are slightly higher than official land status inventory acres (603,700 acres).

- Other management objectives for the alternative limit timber production activities to the point where management requirements set forth in ***36 CFR 219.27*** cannot be met.
- The lands are not cost efficient, over the planning horizon, in meeting Forest objectives, which include timber production.

Table B–8, line 9, displays lands classified on the Kisatchie National Forest as suitable for timber production for all the alternatives.

FORMULATION OF ALTERNATIVES (STEP 5)

OVERVIEW OF PROCESS

Alternative development began with analysis of the 13 significant issues raised during the planning process. These issues are described in Chapter 1 and Appendix A of this final environmental impact statement (FEIS). The issues were characterized as to their potential impact on alternative development. Three types of issues were recognized:

- Driving issues containing a great amount of variability or conflict, around which an alternative theme could be developed.
- Modifying issues, which could be used to further refine the emphasis of an alternative theme.
- Additional issues of limited extent or influence, which could apply equally to all alternatives.

Driving issues, such as commodity production, amenity values, or wildlife habitats, served as the core for development of an alternative theme. Modifying issues such as the amount of old-growth forest, the extent of uneven-aged management, or the amount and variety of recreational experiences contributed to the overall emphasis of an alternative theme.

The combination of a driving issue with those modifying issues considered to be compatible in terms of resource emphasis, conditions, and eventual outcomes became the basis for developing a desired future condition (DFC).

A DFC statement is a narrative description of the land and resource conditions which are expected to occur when goals and objectives for an area are fully achieved. It includes information on the forest appearance, landscape alterations, associated wildlife, and the potential for human experience.

A set of DFC statements were developed which could conceivably resolve all issues raised during the planning process. These DFCs essentially describe *what* people wanted.

The next step was to build a set of management alternatives that responded in various ways to *how much* people wanted of each DFC, and *where* it should occur on the Forest. This was done by allocating the full range of DFCs in varying proportions to the entire Forest area, for each alternative theme.

At the landtype association (LTA) level, the National Hierarchical Framework of Ecological Units (national hierarchy) guided on-the-ground allocation of DFCs. The LTAs provided critical information about the potential capability of an area to eventually meet that DFC in terms of ecological feasibility and economic efficiency. For a more complete discussion of the Kisatchie's use of the national hierarchy and LTAs, see Chapter 3.

The DFCs were allocated at the landscape scale. The proportion of land allocated to each DFC and the placement of the DFCs on the Forest varied to fit the theme associated with each management alternative. Thus, alternatives were based upon the mix and extent of DFCs within them; and DFCs were based upon all significant issues raised during the planning process.

A DFC not only describes *what* is wanted, but also provides insights into *how* to achieve it. Each narrative description serves as an integrated template for generating more specific technical resource management direction. The combination of the area allocated to a DFC and the resource management direction required to achieve it becomes a management area.

A standard FORPLAN model shell was developed to ease the task of developing the individual models used to analyze alternatives. The shell model has a standard set of identifier, qualifiers, treatment types, activities, outputs, cost data, objective function, and yield data. A standard set of prescriptions also exists for all alternatives except Alternative A which has additional prescriptions for harvesting streamside timber classified as suitable for production. In order to customize the shell model into an alternative model, the analysis areas and constraints unique to the alternatives were added.

CONSTRAINTS COMMON TO ALL ALTERNATIVES

Constraints identified as "management requirements" (*36 CFR 219.27*) were applied to all alternatives. Additional constraints common to all alternatives were applied to insure an implementable solution. These common constraints fall into four categories: 1) constraints which assign congressionally and administratively designated areas to specific prescriptions, 2) constraints which ensure

FORMULATION OF ALTERNATIVES (STEP 5)

CONSTRAINTS COMMON TO ALL ALTERNATIVES

that the management requirements are met in each alternative, 3) timber scheduling constraints, and 4) operational constraints which constrain timber harvest to a realistic solution.

ADMINISTRATIVELY OR CONGRESSIONALLY REMOVED AREAS

All forested lands not classified suitable for timber production were assigned to a minimum level prescription in all alternatives so that timber harvest would never be scheduled on them. These areas include the Kisatchie Hills Wilderness, RNAs, Palustris Experimental Forest, forest land not capable of producing crops of industrial wood, forest land with inadequate response information, and forest land where irreversible damage is likely to occur. Acreage for these are displayed in Table B–8 of this appendix.

MANAGEMENT REQUIREMENT CONSTRAINTS

The following requirements, or constraints, were applied to all FORPLAN model alternatives:

- The *long-term sustained yield* (LTSY) constraint is used to ensure that the harvest of timber in the last decade is not greater that the long-term timber production capacity of the Forest. Long-term sustained yield capacity is computed using the acreage scheduled to each regeneration prescription applied in the model.

- The perpetual timber harvest constraint is used to ensure that the remaining timber inventory will allow achievement of nondeclining harvest levels beyond the modeling horizon. To achieve this condition the constraint requires that the Forest contain as much timber inventory volume at the end of the last period as the Forest would have, on the average, under the management intensities selected in the analysis. Without this constraint the FORPLAN model would have no reason to leave enough inventory at the end of 150 years to sustain timber harvest levels into perpetuity.

- The nondeclining yield constraint is used to ensure that the harvest of timber in a decade is greater than or equal to the harvest of timber in the previous period. This constraint indirectly limits the model to a lower present net value and reduced flow of timber in the early decades but also provides community economic and social stability through the controlled flow of timber.

- Timber harvests on lands classified as suitable for timber production are not scheduled for regeneration before the *culmination of mean annual increment* (CMAI). This constraint, indirectly applied through the harvest timing options allowed, ensures that relatively large sawtimber will be produced and ensures that smaller trees are not harvested before the site is completely utilized.

- Within 1/4 mile of RCW clusters (active, replacement, or recruitment stands needed to meet population objective), no regeneration harvests are scheduled. Thinning for habitat improvement is allowed.

- Within 1.5 miles of an active RCW cluster, all capability areas that are within the HMA, are equal to or greater than 30 years old, have a pine or pine-hardwood forest type, are not classified as a riparian area protection zone (RAPZ) or a streamside habitat protection zone (SHPZ), and are within a distance of 1,320 feet (radius of 125-acre circle), are tagged as foraging stands. Tagged foraging stands have no scheduled regeneration harvests within the 150-year planning period, however, thinnings are allowed between the ages of 30 and 60. The average number of acres per cluster that is tagged as foraging is 118. It is assumed that these tagged stands will provide a minimum of 6,350 pine stems greater than 10 inches DBH and 8,490 square feet of pine basal area per RCW cluster for foraging. Although these tagged stands are maintained through the entire 150-year planning horizon in the model, actual locations of these stands may change as project level actions occur; however, the approximate acreage needed to supply foraging is expected to remain constant.

- Beyond 1.5 miles of an active RCW cluster, all capability areas that are within the HMA, are equal to or greater than 30 years old, have a pine or pine-hardwood forest type, are not classified as a RAPZ or a SHPZ, and are within a distance of 985 feet (radius of 70-

acre circle), are tagged as foraging stands. Tagged foraging stands have no scheduled regeneration harvests within the 150-year planning period, however, thinnings are allowed between the ages of 30 and 60. The average number of acres per cluster that is tagged as foraging is 83. It is assumed that these tagged stands will provide a minimum of 3,175 pine stems greater than 10 inches DBH and 4,245 square feet of pine basal area per RCW cluster for foraging. Although these tagged stands are maintained through the entire 150-year planning horizon in the model, actual locations of these stands may change as project level actions occur. Also, as recruitment stands become active over time, the acreage needed to supply foraging will probably increase. The model does not try to anticipate this increase because of uncertainty in making this assumption.

- For even-aged stands suitable for timber production inside the HMA that are not tagged as foraging, no more than 15 percent of the management type acreage is allowed in the 0–10 year age class (includes existing acres in the 0–10 class) and no more than 40 percent of the management type acreage is allowed in the 0–30 year age class during the first two periods. After the first two periods, the 120-year rotation harvest schedule is expected to maintain approximately 8.3 percent of the management type acreage in the 0–10 age class. Also, because the model has a nondeclining yield harvesting constraint in addition to the HMA harvesting limitations, high timber outputs in the first two periods followed by low outputs in later periods, is not expected. See *estimated effects of alternatives* section, in this appendix, for results and discussion of sensitivity analysis done to test this expectation.

- The alternative models have no explicit constraint to limit regeneration cutting in the oldest 1/3 of the pine forest type acres within the HMA. Because 42 percent of the HMA acreage is tagged and modeled as foraging or nesting habitat and is not scheduled for any regeneration harvests, maintaining the oldest 1/3 is not expected to be binding. Site-specific analyses are expected to conform to this requirement when project-level decisions are made.

- Dispersion constraints are established to provide a more realistic estimation of even-aged system regeneration cutting treatments expected during the first two decades. The absolute constraints used in the model alternatives were derived by first running the model without these constraints, assessing the spatial arrangement of the FORPLAN solution to determine if changes are needed and determining a change coefficient, or dispersion factor. This dispersion factor was used to estimate the acres of regeneration cutting. The model was then re-run with these constraints applied to the output for even-aged final harvest acres (FHAR). The dispersion factors used are 0.57 for the first period and 0.71 for the second period and are based upon an actual spatial assessment of the areas initially chosen by the FORPLAN model for final harvest cutting during the first two periods. Documentation of these results can be found in the process records (GIS project files) for the Plan revision.

DEVELOPMENT OF ALTERNATIVES

Seven alternatives are considered in detail, including no action, which would continue management under the 1985 Forest Plan as amended. Six action alternatives were developed in response to issues and concerns identified during the planning process. The process used to create the alternative themes and assign landscape allocations is described earlier in this appendix under the heading *formulation of the alternatives*. Each alternative combines land allocations, management practices, and activity schedules which, when implemented, would result in a unique set of resource outputs and environmental consequences. Each alternative was designed to be fully implementable and achievable.

The interdisciplinary team (IDT) developed management prescriptions based on internal and external issues and concerns as well as the landscape DFC that they allocated to each sub-management area. A sub-management area prescription matrix was developed and used to assign prescriptions in the FORPLAN model and to describe parameters for harvest source, timing, rotations, and regeneration system. The sub-management area prescription matrix is on file in the process records in the Supervisor's Office.

FORMULATION OF ALTERNATIVES (STEP 5)

DEVELOPMENT OF ALTERNATIVES

ALTERNATIVE A (NO ACTION, AS AMENDED)

Alternative A is the no action alternative and represents implementation of the Forest's 1985 Forest Plan, as amended, with an emphasis on the restoration of longleaf, shortleaf, or other desirable native pine species within tentative RCW HMAs. Under this alternative, the Forest is intensively managed to provide a moderate output of commodity resources and a moderately high output of non-commodity benefits. A detailed description of this alternative's distinguishing features and land allocation can be found in Chapter 2 of this document.

AA stratification

Table B–9 shows how the AAs were stratified for the FORPLAN model of Alternative A. Total acres shown are based on GIS computed analysis area acres. This number varies slightly between alternatives because each alternative GIS layer consisted of a different arrangement of thousands of polygons ranging in size from several hundred acres to less than 0.01 acre. Small "sliver" analysis areas totalling less than one acre were not included in the FORPLAN analysis.

Unique constraints

In addition to the constraints that are common to all alternatives, Alternative A includes the following:

- This alternative model does not prohibit scheduled harvesting within SHPZs and RAPZs. Unlike the other alternatives, these acres are considered suitable timber land. The streamside AAs are handled separately from the upland areas, however, since lower timber yields per acre are expected.
- This alternative model does not allow even-aged system harvests of longleaf pine inside the HMA. Even-aged system regeneration is only allowed when the stand is not needed for foraging and the prescription calls for restoration from yellow pine to longleaf pine.

Objective functions

The FORPLAN model's objective function maximizes restoration (output RSTA) for the first period, performs a rollover, and then maximizes PNV for 15 periods (150 years).

TABLE B–9, ANALYSIS AREA STRATIFICATION

Alternative A

AA Name(s)	Description	Acres
SST	Streamside area adjacent to suitable timber land (suitable for timber)	68,051
UST	Streamside area adjacent to unsuitable timber land (not suitable for timber)	11,197
ULC	Unsuitable inclusions within suitable timber lands	39,524
WIL	Wilderness	8,809
EXP	Experimental forest	6,983
SAL	Saline Bayou National Scenic River corridor	3,896
MIL	Military intensive use area	31,630
1–512	All other lands (suitable for timber)	437,209
Total		**607,299**

ALTERNATIVE B

Alternative B emphasizes the production of forest products. Less emphasis is placed on nonmarket values. The allocation of compatible DFCs to this alternative theme focuses on providing relatively high lvels of timber harvest while minimizing costs. A detailed description of this alternative's distinguishing features and land allocation can be found in Chapter 2 of this document.

AA stratification

Table B–10 shows how the AAs were stratified for the FORPLAN model of Alternative B. Total acres shown are based on GIS computed analysis area acres. This number varies slightly between alternatives because each alternative GIS layer consisted of a different arrangement of thousands of polygons ranging in size from several hundred acres to less than 0.01 acre. Small "sliver" analysis areas totalling less than one acre were not included in the FORPLAN analysis.

Unique constraints

This alternative model does not allow scheduled harvesting within SHPZs and RAPZs. These acres were removed from the suitable timber land base during the initial stratification of capability areas. The streamside acres are modeled as separate analysis areas only to account for timber output from occasional cuttings, for wildlife habitat improvement, or other riparian resource protection.

Objective functions

The FORPLAN model's objective function maximizes timber output (TMBR) for the first period, performs a rollover, and then maximizes PNV for 15 periods.

TABLE B–10, ANALYSIS AREA STRATIFICATION

Alternative B

AA Name(s)	Description	Acres
LL0	Longleaf old growth patch(es), no acres contain off-site species	9,522
LL1	Longleaf old growth patch(es), 10% of acres contain off-site species	1,392
LL2	Longleaf old growth patch(es), 20% of acres contain off-site species	1,447
RP0	Riparian old growth patch(es), no acres contain off-site species	838
SO0	Shortleaf-oak old growth patch(es), no acres contain off-site species	434
SO1	Shortleaf-oak old growth patch(es), 10% acres contain off-site species	1,287
SO2	Shortleaf-oak old growth patch(es), 20% acres contain off-site species	551
SST	Streamside area adjacent to suitable timber land	144,966
UST	Streamside area adjacent to unsuitable timber land	27,186
ULC	Unsuitable inclusions within suitable timber lands	24,844
WIL	Wilderness	8,783
EXP	Experimental forest	6,866
AM0	Amenity land allocation, non-specific community type	4,464
AM2	Amenity land allocation, shortleaf-oak community type	2,878
SAL	Saline Bayou National Scenic River corridor	1,261
MIL	Military intensive use area	25,868
1–623	All other lands (suitable for timber)	344,717
Total		**607,304**

FORMULATION OF ALTERNATIVES (STEP 5)

DEVELOPMENT OF ALTERNATIVES

ALTERNATIVE C

Alternative C emphasizes the enhancement of non-commodity or amenity values, such as recreation, visual quality, and plant and wildlife habitats. Timber outputs are produced, but at a relatively low level. A detailed description of this alternative's distinguishing features and land allocation can be found in Chapter 2 of this document.

AA stratification

Table B–11 shows how the AAs were stratified for the FORPLAN model of Alternative C. Total acres shown are based on GIS computed analysis area acres. This number varies slightly between alternatives because each alternative GIS layer consisted of a different arrangement of thousands of polygons ranging in size from several hundred acres to less than 0.01 acre. Small "sliver" analysis areas totalling less than one acre were not included in the FORPLAN analysis.

Unique constraints

This alternative model does not allow scheduled harvesting within SHPZs and RAPZs. These acres were removed from the suitable timber land base during the initial stratification of the capability areas. The streamside acres are modeled as separate analysis areas only to account for timber output from occasional cuttings for wildlife habitat improvement or other riparian resource protection.

Objective functions

The FORPLAN model's objective function maximizes volume from partial cuts like thinnings and uneven-aged harvests (output EASY) for the first period, performs a rollover, and then maximizes PNV for 15 periods.

TABLE B–11, ANALYSIS AREA STRATIFICATION

Alternative C

AA Name(s)	Description	Acres
LL0	Longleaf old growth patch(es), no acres contain off-site species	39,981
LL1	Longleaf old growth patch(es), 10% of acres contain off-site species	17,345
LL2	Longleaf old growth patch(es), 20% of acres contain off-site species	5,947
LL3	Longleaf old growth patch(es), 30% of acres contain off-site species	607
LL4	Longleaf old growth patch(es), 40% of acres contain off-site species	963
RP0	Riparian old growth patch(es), no acres contain off-site species	9,806
SO0	Shortleaf-oak old growth patch(es), no acres contain off-site species	9,506
SO1	Shortleaf-oak old growth patch(es), 10% acres contain off-site species	14,334
SO2	Shortleaf-oak old growth patch(es), 20% acres contain off-site species	8,576
SO3	Shortleaf-oak old growth patch(es), 30% acres contain off-site species	238
SO6	Shortleaf-oak old growth patch(es), 60% acres contain off-site species	1,314
SO7	Shortleaf-oak old growth patch(es), 70% acres contain off-site species	433
SST	Streamside area adjacent to suitable timber land	47,619
UST	Streamside area adjacent to unsuitable timber land	135,563
ULC	Unsuitable inclusions within suitable timber lands	5,151
WIL	Wilderness	8,783
EXP	Experimental forest	6,866
AM0	Amenity land allocation, non-specific community type	52,139
AM1	Amenity land allocation, longleaf community type	108,551
AM2	Amenity land allocation, shortleaf-oak community type	14,828
AM3	Amenity land allocation, hardwood-loblolly community type	4,914
SAL	Saline Bayou National Scenic River corridor	21
MIL	Military intensive use area	13,400
1–271	All other lands (suitable for timber)	100,175
Total		**607,060**

ALTERNATIVE D (DRAFT PREFERRED)

Alternative D emphasizes restoration of natural plant communities to sites they occupied prior to European settlement. Commodity and amenity resource outputs from actions such as off-site stand conversion, prescribed burning, and frequent stand improvement practices are relatively high under this alternative. A detailed description of this alternative's distinguishing features and land allocation can be found in Chapter 2 of this document.

AA stratification

Table B–12 shows how the AAs were stratified for the FORPLAN model of Alternative D. Total acres shown are based on GIS computed analysis area acres. This number varies slightly between alternatives because each alternative GIS layer consisted of a different arrangement of thousands of polygons ranging in size from several hundred acres to less than 0.01 acre. Small "sliver" analysis areas totalling less than one acre were not included in the FORPLAN analysis.

Unique constraints

This alternative model does not allow scheduled harvesting within SHPZs and RAPZs. These acres were removed from the suitable timber land base during the initial stratification of the capability areas. The streamside acres are modeled as separate analysis areas only to account for timber output from occasional cuttings for wildlife habitat improvement or other riparian resource protection.

Objective functions

The FORPLAN model's objective function maximizes restoration (output RSTA) for the first period, performs a rollover, and then maximizes PNV for 15 periods.

TABLE B–12, ANALYSIS AREA STRATIFICATION

Alternative D

AA Name(s)	Description	Acres
LL0	Longleaf old growth patch(es), no acres contain off-site species	16,818
LL1	Longleaf old growth patch(es), 10% of acres contain off-site species	12,426
LL2	Longleaf old growth patch(es), 20% of acres contain off-site species	1,447
RP0	Riparian old growth patch(es), no acres contain off-site species	3,180
SO0	Shortleaf-oak old growth patch(es), no acres contain off-site species	3,198
SO1	Shortleaf-oak old growth patch(es), 10% acres contain off-site species	5,401
SO2	Shortleaf-oak old growth patch(es), 20% acres contain off-site species	546
SO6	Shortleaf-oak old growth patch(es), 60% acres contain off-site species	717
SST	Streamside area adjacent to suitable timber land	156,633
UST	Streamside area adjacent to unsuitable timber land	25,651
ULC	Unsuitable inclusions within suitable timber lands	19,351
WIL	Wilderness	8,783
EXP	Experimental forest	6,866
AM1	Amenity land allocation, longleaf community type	4,853
AM2	Amenity land allocation, shortleaf-oak community type	5,688
SAL	Saline Bayou National Scenic River corridor	1,257
MIL	Military intensive use area	22,409
1–666	All other lands (suitable for timber)	312,163
Total		**607,387**

FORMULATION OF ALTERNATIVES (STEP 5)

DEVELOPMENT OF ALTERNATIVES

ALTERNATIVE MODIFIED D
(FINAL PREFERRED)

Alternative Modified D also emphasizes restoration of natural plant communities to sites they occupied prior to European settlement. Commodity and amenity resource outputs from actions such as off-site stand conversion, prescribed burning, and frequent stand improvement practices are relatively high under this alternative. A detailed description of this alternative's distinguishing features and land allocation can be found in Chapter 2 of this document.

AA stratification

Table B–13 shows how the AAs were stratified for the FORPLAN model of Alternative Modified D. Total acres shown are based on GIS computed analysis area acres. This number varies slightly between alternatives because each alternative GIS layer consisted of a different arrangement of thousands of polygons ranging in size from several hundred acres to less than 0.01 acre. Small "sliver" analysis areas totalling less than one acre were not included in the FORPLAN analysis.

Unique constraints

As in the original Alternative D, this alternative model does not allow scheduled harvesting within SHPZs and RAPZs. These acres were removed from the suitable timber land base during the initial stratification of the capability areas. The streamside acres are modeled as separate analysis areas only to account for timber output from occasional cuttings for wildlife habitat improvement or other riparian resource protection.

Objective functions

The FORPLAN model's objective function maximizes restoration (output RSTA) for the first period, performs a rollover, and then maximizes PNV for 15 periods.

TABLE B–13, ANALYSIS AREA STRATIFICATION

Alternative Modified D

AA Name(s)	Description	Acres
LL0	Longleaf old growth patch(es), no acres contain off-site species	21,441
LL1	Longleaf old growth patch(es), 10% of acres contain off-site species	11,907
LL2	Longleaf old growth patch(es), 20% of acres contain off-site species	1,299
RP0	Riparian old growth patch(es), no acres contain off-site species	3,251
SO0	Shortleaf-oak old growth patch(es), no acres contain off-site species	4,060
SO1	Shortleaf-oak old growth patch(es), 10% acres contain off-site species	6,509
SO2	Shortleaf-oak old growth patch(es), 20% acres contain off-site species	588
SO6	Shortleaf-oak old growth patch(es), 60% acres contain off-site species	717
SST	Streamside area adjacent to suitable timber land	144,455
UST	Streamside area adjacent to unsuitable timber land	29,139
ULC	Unsuitable inclusions within suitable timber lands	14,874
WIL	Wilderness	8,783
RNA	Research Natural Areas	2,566
REC	Developed Recreation Areas	6,654
SUA	Special Use Area	38
SIA	Special Interest Area	4,488
EXP	Experimental forest	6,866
AM1	Amenity land allocation, longleaf community type	3,984
AM2	Amenity land allocation, shortleaf-oak community type	3,647
SAL	Saline Bayou National Scenic River corridor	3,005
SRA	State Registry Area	1,090
MIL	Military intensive use area	19,559
1–666	All other lands (suitable for timber)	308,889
Total		**607,809**

ALTERNATIVE E

Alternative E emphasizes the management of hardwoods and mixed stands of hardwoods and pines. It focuses on increasing the number of hardwood stands and hardwoods within pine stands in order to provide for visual quality enhancement, hard mast production, and wildlife habitat improvement. Commodity outputs are produced at moderate levels. A detailed description of this alternative's distinguishing features and land allocation can be found in Chapter 2 of this document.

AA Stratification

Table B–14 shows how the AAs were stratified for the FORPLAN model of Alternative E. Total acres shown are based on GIS computed analysis area acres. This number varies slightly between alternatives because each alternative GIS layer consisted of a different arrangement of thousands of polygons ranging in size from several hundred acres to less than 0.01 acre. Small "sliver" analysis areas totalling less than one acre were not included in the FORPLAN analysis.

Unique constraints

This alternative model does not allow scheduled harvesting within SHPZs and RAPZs. These acres were removed from the suitable timber land base during the initial stratification of the capability areas. The streamside acres are modeled as separate analysis areas only to account for timber output from occasional cuttings for wildlife habitat improvement or other riparian resource protection.

Objective functions

The FORPLAN model's objective function maximizes pine to mixed restoration (output P>MX) for the first period, performs a rollover, minimizes hardwood volume (output HARD) for the first period, performs another rollover, and then maximizes PNV for 15 periods.

TABLE B–14, ANALYSIS AREA STRATIFICATION

Alternative E

AA Name(s)	Description	Acres
LL0	Longleaf old growth patch(es), no acres contain off-site species	11,053
LL1	Longleaf old growth patch(es), 10% of acres contain off-site species	1,367
LL2	Longleaf old growth patch(es), 20% of acres contain off-site species	1,447
RP0	Riparian old growth patch(es), no acres contain off-site species	4,191
SO0	Shortleaf-oak old growth patch(es), no acres contain off-site species	3,912
SO1	Shortleaf-oak old growth patch(es), 10% acres contain off-site species	9,490
SO2	Shortleaf-oak old growth patch(es), 20% acres contain off-site species	2,874
SO3	Shortleaf-oak old growth patch(es), 30% acres contain off-site species	238
SO6	Shortleaf-oak old growth patch(es), 60% acres contain off-site species	1,314
SO7	Shortleaf-oak old growth patch(es), 70% acres contain off-site species	433
SST	Streamside area adjacent to suitable timber land	154,230
UST	Streamside area adjacent to unsuitable timber land	22,771
ULC	Unsuitable inclusions within suitable timber lands	24,844
WIL	Wilderness	8,783
EXP	Experimental forest	6,866
AM0	Amenity land allocation, non-specific community type	10,094
AM2	Amenity land allocation, shortleaf-oak community type	2,878
SAL	Saline Bayou National Scenic River corridor	1,256
MIL	Military intensive use area	24,078
1–635	All other lands (suitable for timber)	316,419
Total		**607,924**

FORMULATION OF ALTERNATIVES (STEP 5)

DEVELOPMENT OF ALTERNATIVES

ALTERNATIVE F

Alternative F emphasizes the establishment or improvement of wildlife habitats for a full range of native species. It focuses on providing habitat conditions and attributes necessary to maintain viable populations of all native game and nongame species. Commodity and amenity resource outputs occur at moderate levels through the creation and maintenance of landscape habitats. A detailed description of this alternative's distinguishing features and land allocation can be found in Chapter 2 of this document.

AA Stratification

Table B–15 shows how the AAs were stratified for the FORPLAN model of Alternative F. Total acres shown are based on GIS computed analysis area acres. This number varies slightly between alternatives because each alternative GIS layer consisted of a different arrangement of thousands of polygons ranging in size from several hundred acres to less than 0.01 acre. Small "sliver" analysis areas totalling less than one acre were not included in the FORPLAN analysis.

Unique constraints

This alternative model does not allow scheduled harvesting within SHPZs and RAPZs. These acres were removed from the suitable timber land base during the initial stratification of the capability areas. The streamside acres are modeled as separate analysis areas only to account for timber output from occasional cuttings for wildlife habitat improvement or other riparian resource protection.

Objective functions

The FORPLAN model's objective function maximizes restoration of longleaf and mixed community types (outputs P>MX and R>LL) for the first period, performs a rollover, maximizes RCW foraging outside of tagged stands (output RCWF), and then maximizes PNV for 15 periods.

TABLE B–15, ANALYSIS AREA STRATIFICATION

Alternative F

AA Name(s)	Description	Acres
LL0	Longleaf old growth patch(es), no acres contain off-site species	24,335
LL1	Longleaf old growth patch(es), 10% of acres contain off-site species	13,774
LL2	Longleaf old growth patch(es), 20% of acres contain off-site species	3,713
LL3	Longleaf old growth patch(es), 30% of acres contain off-site species	606
LL4	Longleaf old growth patch(es), 40% of acres contain off-site species	693
RP0	Riparian old growth patch(es), no acres contain off-site species	3,749
SO0	Shortleaf-oak old growth patch(es), no acres contain off-site species	3,436
SO1	Shortleaf-oak old growth patch(es), 10% acres contain off-site species	9,762
SO2	Shortleaf-oak old growth patch(es), 20% acres contain off-site species	2,273
SO6	Shortleaf-oak old growth patch(es), 60% acres contain off-site species	715
SST	Streamside area adjacent to suitable timber land	156,569
UST	Streamside area adjacent to unsuitable timber land	32,535
ULC	Unsuitable inclusions within suitable timber lands	17,062
WIL	Wilderness	8,783
EXP	Experimental forest	6,866
AM1	Amenity land allocation, longleaf community type	11,660
AM2	Amenity land allocation, shortleaf-oak community type	8,994
AM3	Amenity land allocation, hardwood-loblolly community type	1,214
SAL	Saline Bayou National Scenic River corridor	1,256
MIL	Military intensive use area	21,492
1–671	All other lands (suitable for timber)	277,640
Total		**607,127**

ESTIMATED EFFECTS OF ALTERNATIVES (STEP 6)

RESOURCE OUTPUT LEVELS

Table B–16 displays the levels of outputs calculated by the FORPLAN alternative models. During construction of the alternative models, several trial runs were made to test the effects of allocations, prescriptions, and constraints on the model outputs. The outcome from some of these runs are as follows:

- **ALTDTEST @ 8.3** — The run modified the final harvest constraints established in Alternative D's model. Instead of basing each HMA constraint on a maximum allowable acreage of final harvest treatments in the 0–10 age class and 0–30 age class for the first 2 periods, each HMA constraint was based on allowing a maximum of 8.3 percent of the suitable even-aged acres to receive final harvest treatments. Existing 0–10 stands are not considered in the HMA constraints. Total Forestwide timber output from the FORPLAN model was 13.7 MMCF / year, with 10.2 MMCF / year occurring on suitable timber lands (ASQ). Alternative D, before modification, showed a total of 13.6 MMCF / year, with 10.1 MMCF / year occurring on suitable timber lands (ASQ).

- **ALTDTEST @ 15** — The run also modified the final harvest constraints established in Alternative D's model. Instead of basing each HMA constraint on a maximum allowable acreage of final harvest treatments in the 0–10 age class and 0–30 age class for the first 2 periods, each HMA constraint was based on allowing a maximum of 15 percent of the suitable even-aged acres to receive final harvest treatments. Existing 0–10 stands are not considered in the HMA constraints. Total Forestwide timber output from the FORPLAN model was 13.7 MMCF / year, with 10.2 MMCF / year occurring on suitable timber lands (ASQ). These are the same results as those produced by the ALTDTEST @ 8.3 run. Alternative D, before modification, showed a total of 13.6 MMCF / year, with 10.1 MMCF / year occurring on suitable timber lands (ASQ).

- **TIMTEST 1** — The run modified the original TIM benchmark to allow the maximum acres of final harvest treatments within the HMAs to be 15 percent of the suitable even-aged acres, similar to the ALTDTEST @ 15 run. Total forestwide timber outputs from the FORPLAN model was 20.6 MMCF / year, with 20.4 MMCF / year occurring on suitable timber lands (ASQ). The TIM benchmark, before modification, showed a total of 20.7 MMCF / year, with 20.5 MMCF / year occurring on suitable timber lands.

- **TIMTEST 2** — The run also modified the original TIM benchmark. However, in this run all tagged RCW foraging stands were given a choice of a restoration prescription instead of only a foraging (thinning only) prescription. The RCW cluster stands needed to meet the population objective remained in the unsuitable category. Constraints on maximum acres of final harvest treatments were also kept in the model. Total forestwide timber outputs from the FORPLAN model was 26.6 MMCF / year, with 26.4 MMCF / year occurring on suitable timber lands (ASQ). The TIM benchmark, before modification, show a total of 20.7 MMCF / year, with 20.5 MMCF / year occurring on suitable timber lands.

- **TIMTEST 3** — This run was similar to TIMTEST 2, except that constraints on the maximum acres of final harvest treatments were also removed. Total Forestwide timber outputs from the FORPLAN model was 26.6 MMCF / year, with 26.4 MMCF / year occurring on suitable timber lands (ASQ). The original TIM benchmark showed a total of 20.7 MMCF / year, with 20.5 MMCF / year occurring on suitable timber lands.

- **ALT_MOD-DC** — This run was performed between the DEIS and the FEIS in order to test the effect of constraining the model at the current (FY99) budget level. A maximum budget level was added to the constraints section of the model and the resulting FORPLAN run had no effect on the level of outputs. Upon review of the solution files, it was noticed that the budget was not a binding constraint. Instead, the model was bound by the absolute constraints **SP1** and **SP2**. These constraints place a limit on the acres of clearcut (openings) that could be created, based

ESTIMATED EFFECTS OF ALTERNATIVES (STEP 6)

RESOURCE OUTPUT LEVELS

TABLE B–16, FIRST PERIOD FORPLAN OUTPUTS

Resource Outputs	Code	Units	Time	Alt A	Alt B	Alt C	Alt D	Mod D	Alt E	Alt F
All volume (suit+unsuit)	VOL	MCF	year	14,299	14,054	11,130	13,686	13,158	12,006	12,721
Suit. tmbr. lands volume (ASQ)	SUT	MCF	year	14,109	11,901	3,041	10,206	9,687	8,892	8,133
Suit. tmbr lands acres	TMBA	ACRES	period	505,260	344,717	100,175	312,163	308,889	316,419	277,640
Tmbr-assoc. income to community	TINC	M$	year	16,355	15,145	9,462	13,560	12,662	11,533	11,756
Tmbr-assoc. jobs to community	TJOB	PERSONS	year	482	444	270	396	369	336	339
Long-term sustained yield volume	LTSY	MCF	year	19,797	17,195	5,097	16,519	16,360	14,677	13,406
Restoration acres	RSTA	ACRES	period	21,757	897	8,070	18,002	16,340	7,932	10,762
Pres. burn acres	BURN	ACRES	period	470,929	720,236	1,003,452	824,925	837,798	704,196	841,803
Longleaf pine restoration acres	R>LL	ACRES	period	21,023	428	3,490	16,339	14,557	632	6,311
Recr-assoc. income to community	RINC	M$	year	10,456	10,063	11,231	10,582	10,667	10,761	10,887
Recr-assoc. jobs to community	RJOB	PERSONS	year	429	413	461	435	439	442	447
All streamside mgmt acres	STRA	ACRES	period	79,248	172,152	183,182	182,284	173,594	181,338	189,104
Road construction soil loss amount	CNSL	TONS	year	11,766	9,336	2,780	9,025	8,946	8,823	8,261
P.Burn for release/restoration acres	RLBR	ACRES	period	449,171	660,127	669,119	731,060	738,613	633,480	714,285
P.Burn for site preparation acres	SPBR	ACRES	period	21,757	26,868	6,018	15,936	14,199	18,164	10,241
P.Burning soil loss amount	PBSL	TONS	year	175,098	260,068	271,931	289,834	293,290	251,834	284,075
Unevenaged mgmt. on tmbr. suit. acres	UEAS	ACRES	period	37,219	20,643	7,805	31,984	29,324	34,002	40,576
Unevenaged mgmt. on tmbr. unsuit. acres	UEAU	ACRES	period	70,409	236,719	493,485	272,815	279,361	267,427	307,995
Evenaged mgmt. on tmbr. suit. acres	EAMS	ACRES	period	467,987	304,514	91,828	280,179	279,565	270,038	235,064
Evenaged mgmt. on tmbr. unsuit. acres	EAMU	ACRES	period	31,630	25,868	13,400	22,409	19,559	24,078	21,492
Mechanical site prep. soil loss amount	MSSL	TONS	year	27,849	11,587	2,584	20,184	17,996	10,188	10,274
Herbicide use acres	HERB	ACRES	period	14,581	14,538	3,315	10,949	9,770	10,588	6,851
Pine to mixed forest type acres	P>MX	ACRES	period	734	469	4,580	1,663	1,783	7,300	4,451
Unevenaged mgmt. acres in WMP	PUEA	ACRES	period	4,453	11,540	7,382	14,255	13,871	19,012	20,398
Evenaged mgmt. acres in WMP	PEAM	ACRES	period	48,461	29,323	16,207	18,239	17,401	10,319	8,402
Hardwood mgmt. emphasis acres	HWDE	ACRES	period	136,058	187,272	197,884	201,590	192,240	274,873	212,736
Longleaf pine, all stages habitat	LLPH	M-ACRES	period	134	113	141	117	121	112	121
Shortleaf / oak-hickory, early stages habitat	SOHE	M-ACRES	period	1	1	0	0	0	0	0
Shortleaf / oak-hickory, late stages habitat	SOHL	M-ACRES	period	17	12	27	15	16	19	17
Mixed hardwood-loblolly, early stages habitat	MHLE	M-ACRES	period	56	46	21	43	42	42	40
Mixed hardwood-loblolly, late stages habitat	MHLL	M-ACRES	period	320	262	225	247	252	250	237
Riparian, small-stream habitat	RIPS	M-ACRES	period	39	79	92	89	85	89	96
Riparian, large-stream habitat	RIPL	M-ACRES	period	40	94	101	96	92	97	96
Quality habitat for deer	QHDR	M-ACRES	period	225	225	242	273	266	242	254
Quality habitat for turkey	QHTK	M-ACRES	period	328	308	335	387	385	338	352
Quality habitat for quail	QHQL	M-ACRES	period	182	112	143	152	157	118	141
Quality habitat for fox squirrel	QHFS	M-ACRES	period	153	210	236	228	224	227	238
Quality habitat for grey squirrel	QHGS	M-ACRES	period	83	174	193	187	181	187	194
Hi-hazard SPB acres cut	HHAZ	ACRES	period	35,668	41,726	9,499	10,792	10,705	13,111	9,200
Stand regeneration acres (EAM)	FHAR	ACRES	period	24,602	20,022	4,879	17,720	15,765	13,359	11,652
Total receipts to Federal Govt.	FED$	M$	period	164,730	149,577	42,568	133,308	122,911	114,156	106,759
Contributions from 25% funds (timber only)	25%$	M$	year	4,118	3,739	1,727	3,333	3,073	2,854	2,669
Timber program costs	TBRX	M$	year	3,818	2,890	808	2,878	2,783	2,545	2,356
Nonmarket program costs	NMKX	M$	year	2,405	2,631	3,754	2,916	2,827	2,690	3,068
Other costs	OTHX	M$	year	70	195	350	204	206	210	229
Timber D&I revenues	TPG$	M$	year	35,983	31,912	14,267	27,990	25,967	23,622	22,581
Recreation / wildlife D&I revenues	RPG$	M$	year	25,368	30,500	30,015	26,978	26,048	27,271	27,895
Acres not cost efficient (low level mgmt)	LOW	ACRES	year	0	19,560	542	0	0	12,379	2,000
Managed old growth (net)	OLGA	ACRES	period	0	15,471	109,050	43,733	49,772	36,319	63,056

on sample implementation trials that showed approximately 57% of the acres selected by the model for final harvest cuts could actually take place under planned mitigation for visual resource protection.

As can be seen in the results of these sensitivity analyses, there is little difference in effect between using the 8.3 percent or the 15 percent harvesting constraints in Alternative D or in the TIM benchmark. This occurs because such a large portion (42 percent) of the HMA's acres are preassigned to a foraging prescription — no final harvests during the planning horizon. In TIMTEST 2 and TIMTEST 3, however, where tagged foraging stands are given a choice of regular timber management prescription, timber outputs increase approximately 6 MMCF / year across the Forest.

PRESENT NET VALUE

The 1982 National Forest Management Act **(NFMA)** implementing regulations (***36 CFR 219.1***) state that forest plans must "…provide for multiple-use and sustained yield of goods and services from the National Forest System in a way that maximizes long-term net public benefits in an environmentally sound manner." Net public benefits is defined as the overall value to the Nation of all outputs and positive effects (benefits) less all associated inputs and negative effects (costs) whether they can be quantitatively valued or not.

Present net value (PNV) is one of the criteria used to determine net public benefits (NPB) in benchmarks and alternatives. It is the difference between the discounted value of all outputs which were assigned a price in the revision and all Forest Service management and investment costs over the analysis period. The PNV converts all costs and benefits over the 150-year planning period to a common point in time.

Other benefits of public land management cannot be measured using dollar values. These non-priced benefits are another criteria used to determine NPB.

Each alternative was determined and analyzed to achieve its goals and objectives in a manner that produced the greatest PNV while meeting all specified costs and objectives for non-priced benefits. Thus, the PNV of each alternative estimated the highest value of priced benefits while accounting for the costs of producing priced benefits, non-priced benefits, and meeting management requirements. The PNV of each alternative can then be compared directly, even though

ESTIMATED EFFECTS OF ALTERNATIVES (STEP 6)

RESOURCE OUTPUT LEVELS

PRESENT NET VALUE

TABLE B–17, PNV FOR BENCHMARKS AND ALTERNATIVES

Present Value Analysis of Alternatives
(millions of dollars – 4% discount rate
cumulative to midpoint of 5th period)

Alternative	PNV	Total Present Value		Present Value Costs[1]			Present Value Benefits[1]	
		Costs	Benefits	Timber	Rec / Wildlife	Other	Timber	Rec / Wildlife
PNV	1,633	116	1,749	63	52	1	1,194	555
MKT	1,584	102	1,686	53	46	3	1,199	487
TIM	1,500	112	1,612	58	52	2	1,060	552
CUR[2]	1,360	130	1,490	76	52	2	938	552
D	1,151	131	1,282	64	62	5	696	586
B	1,141	125	1,266	64	57	4	589	677
MOD D	1,109	128	1,237	63	61	4	671	566
E	1,058	121	1,179	58	58	5	587	592
F	1,039	124	1,163	54	65	5	558	605
C	868	107	975	20	79	8	325	650
MIN	285	28	313	3	17	8	50	263

[1] Does not include minerals costs / receipts. See Chapter 4 for discussion of expected mineral trends.
[2] Same as Alternative A.

ESTIMATED EFFECTS OF ALTERNATIVES (STEP 6)

PRESENT NET VALUE

SOCIOECONOMIC EFFECTS

the actual costs and benefits occur at different times.

Two parameters used in PNV analysis:

- *Base year dollars* — All monetary values entered into FORPLAN were in 1996 dollars.
- *Discount rate* — A four percent discount rate was used. It approximates the return on long-range investments above the rate of inflation. All costs and benefits were discounted from the midpoint of each decade.

The PNVs for the benchmarks and alternatives are displayed in table B–17 of this appendix.

SOCIOECONOMIC EFFECTS

The Forest has the potential to affect the total number of jobs and income within its area of influence. Table B–18 displays the timber-associated and recreation-associated jobs and income estimated by alternative. These estimates were determined by using an input-output model called IMPLAN. The database in IMPLAN represents 1993 parish information for 528 economic sectors. On the Forest, effects are based on changes in 4 major outputs: the amount of timber volume and type of product to be harvested, payments to parishes for schools and roads, federal government expenditures, and recreation use.

For purposes of estimating the socioeconomic impact, parishes that are immediately adjacent to national forest lands, or contain forest processing mills that receive products from national forest lands, were selected as the impact area. The 11 parishes making up the impact area for the Kisatchie include Claiborne, Grant, Natchitoches, Rapides, Vernon, Webster, Winn, Bienville, Jackson, Lincoln, and Red River. Of these, only the parishes that have national forest land within their boundaries were used to determine the 25 percent fund and recreation impacts.

The input / output analysis is based on the interdependencies of the production and consumption elements of the economy within the impact area. Industries purchase from primary sources (raw materials) and other industries (manufactured goods) for use in their production process. These outputs are sold either to other industries for use in their production process or to final consumers. The structure of interdependencies between the individual sectors of the economy forms the basis of the input/output model. The flow of industrial inputs can be traced through the input/output accounts to show the linkages in the impact area economy. This allows the determination of estimated economic effects (in terms of employment and income).

Response coefficients for various Forest Service activities are shown in table B–19, on the following page. These coefficients were multiplied by resource outputs by alternative to estimate employment and income effects in the FORPLAN model.

TABLE B–18, EFFECTS OF ALTERNATIVES ON LOCAL SOCIAL AND ECONOMIC ENVIRONMENT

Displayed by Alternative and Indicator

Indicator	Alt A	Alt B	Alt C	Alt D	Mod D	Alt E	Alt F
Timber-associated income to community (M$ / year)	16,355	15,145	9,462	13,560	12,662	11,533	11,756
Timber-associated jobs to community (person-years)	482	444	270	396	369	336	339
25% timber receipts for roads and schools (M$ / year)	4,118	3,739	1,727	3,333	3,073	2,854	2,669
Recreation-associated income to community (M$ / year)	10,456	10,063	11,231	10,582	10,667	10,761	10,887
Recreation-associated jobs to community (person-years)	429	413	461	435	439	442	447

TABLE B–19, IMPLAN RESPONSE COEFFICIENTS

Scenario	Description (activity)	Sector(s)[1]	#Jobs	Income	LPC[2]	Units	FORPLAN Output
SAWT1	Sale of sawtimber to sawmills	133	7.44	0.2671	Y	/MMCF	
SAWT2	Sale of processed lumber	134	24.45	0.8669	Y	/MMCF	
							SAWT
VNER1	Sale of timber to veneer mills	133	6.15	0.2209	Y	/MMCF	
VNER2	Sale of processed plywood	139	28.64	1.1646	Y	/MMCF	
							VNER
RWOD	Sale of processed paper to industries outside impact area	163	1.79	0.1062	Y	/MMCF	
							RWOD
SCHOOLS	25% funds to local schools	522	64.86	1.5794	N	/MM$	
ROADS	25% funds to local roads	51	16.50	0.5307	Y	/MM$	
							25%$
HUNTF	Hunt / fish consumer expenditures	multiple	0.19	0.0055	N	/MRVD	
							WFUD
DISPOTH	Dispersed recreation — other consumer expenditures	multiple	1.37	0.0313	N	/MRVD	
DEVWAT	Developed water recreation — consumer expenditures	multiple	0.68	0.0163	N	/MRVD	
DEVOTH	Developed recreation — other expenditures	multiple	0.34	0.0096	N	/MRVD	
							RVDS
KPCE	Kisatchie employee salary personal consumer expenditures	multiple	30.72	0.8789	N	/MM$	
KBOC	Kisatchie non-salary budget object code expenditures	multiple	8.32	0.2618	Y	/MM$	

[1] Multiple sectors for recreation events come from 1988 PARV data (R8WEST activity database). Multiple sectors for Kisatchie personal expenditures are based on 66% of salary expenditures (spendable income) for a medium income; non-salary expenditures are based on Kisatchie 1995 expenditures.

[2] LPC = local purchase coefficient. A "N" assumes that 100% of the activity takes place locally; a "Y" assumes that regional purchase coefficients are used, indicating that only a certain proportion of the activity takes place in the model region.

Roadless Area Evaluations

Appendix C

INTRODUCTION

This appendix presents a detailed description and effects analysis of unroaded and essentially undeveloped Kisatchie National Forest areas, for potential wilderness. Federal regulations require that roadless areas be evaluated and considered for recommendations as potential wilderness areas during the forest planning process (***36 CFR 219.17***). Kisatchie National Forest roadless areas reviewed in this appendix include original RARE II (explained below) roadless areas, as well as areas contiguous to existing wilderness or roadless areas, meeting inventory criteria [**set forth in Chapter 7.11b, *Forest Service Handbook* (*FSH*) *1909.12***] for roadless areas east of the 100th meridian.

Using the forest geographical information system (GIS), screening criteria were developed. They are based on road densities, nonnative vegetation, and past harvest patterns, and helped determine whether the Kisatchie National Forest contained areas that might have roadless characteristics. Areas contiguous to Kisatchie Hills Wilderness, Cunningham Brake, and Saline Bayou RARE II areas were evaluated for potential roadless characteristics based upon these criteria. In addition to these areas, each district on the forest was evaluated for roadless area potential, using the same screening criteria. These evaluations indicated that the Forest has no additional areas meeting the inventory criteria (**as outlined in Chapter 7.11b, *FSH 1909.12***).

BACKGROUND

The Forest Service initiated the Roadless Area Review and Evaluation program (RARE) soon after the Wilderness Act of 1964. This effort identified areas best suited as candidates for inclusion in the National Wilderness System. The evaluation criteria used for RARE were designed essentially for national forest lands in western states. Conditions occurring on the national forests and grasslands in eastern states, generally defined as east of the 100th meridian, received little attention.

Many criticisms were leveled at the roadless area inventory, particularly the RARE process. Some groups quickly seized upon the omissions and shortcomings of RARE. They believed that the original RARE listing excluded worthy roadless areas — most notably in the East.

As a result of various concerns associated with the RARE analysis, the Forest Service undertook a new inventory and evaluation of roadless and undeveloped areas in the National Forest and Grassland System. This new inventory became known as RARE II (**Hendee, et. al; 1990**).

Three Kisatchie National Forest areas were in the 1979 final RARE II inventory. These are Kisatchie Hills at 9,120 acres; Cunningham Brake at 2,100 acres; and Saline Bayou at 6,479 acres.

In June 1979, the State of California filed a lawsuit concerning RARE II wilderness and non-wilderness allocation in California. The U.S. Court of Appeals for the Ninth Circuit found that the environmental impact statement (EIS) for RARE II was inadequate under the National Environmental Policy Act. As a result of this ruling the assistant secretary of agriculture for national resources and environment directed the Forest Service to re-evaluate all RARE II recommendations. This was planned for each national forest as part of its land and resource management plan (Plan; Forest Plan).

Before the completion of the first forest plan for the Kisatchie National Forest, Congress designated approximately 8,679 acres of the Kisatchie Hills RARE II area as wilderness. In December 1980, President Carter signed the Colorado Wilderness Act which proclaimed Kisatchie Hills as the third designated wilderness in Louisiana. Please see table C–1. The relatively steep slopes, rock outcrops, and mesas contributed to the designation.

The remaining RARE II areas of the Kisatchie National Forest — Saline Bayou and

BACKGROUND

INVENTORY CRITERIA

Cunningham Brake — were reevaluated in 1985 as part of the Kisatchie's Forest Plan, which recommended both areas for non-wilderness uses.

In October 1986, Saline Bayou was designated by Congress as part of the National Wild & Scenic River System. The designated corridor was of variable width, generally 1/4 mile on each side of the bayou, from the Bienville Parish line to Saline Lake. The corridor boundary encompassed approximately 6,030 acres: 5,150 acres of national forest and 880 acres of private land.

The designated Saline Bayou National Scenic River corridor differs from the Saline Bayou RARE II boundary. Although wilderness designation is not precluded by designation as a national scenic river, each river is managed with the goal of non-degradation and enhancement of values that contributed to its establishment.

In 1990, approximately 1,646 acres of the 2,100-acre Cunningham Brake RARE II area were designated as the Cunningham Brake Research Natural Area (RNA). Research natural areas provide for non-manipulative research, observation, and study of undisturbed ecosystems typifying important forest types. The management emphasis in Cunningham Brake maintains the area in a natural condition by allowing physical and biological processes to operate without human intervention.

INVENTORY CRITERIA

Most eastern national forest lands were acquired from private owners, and showed evidence of past human activities and modifications. From Chapter 7.11b, *FSH 1909.12*, the following are the minimum qualification criteria for national forest roadless areas east of the 100th meridian:

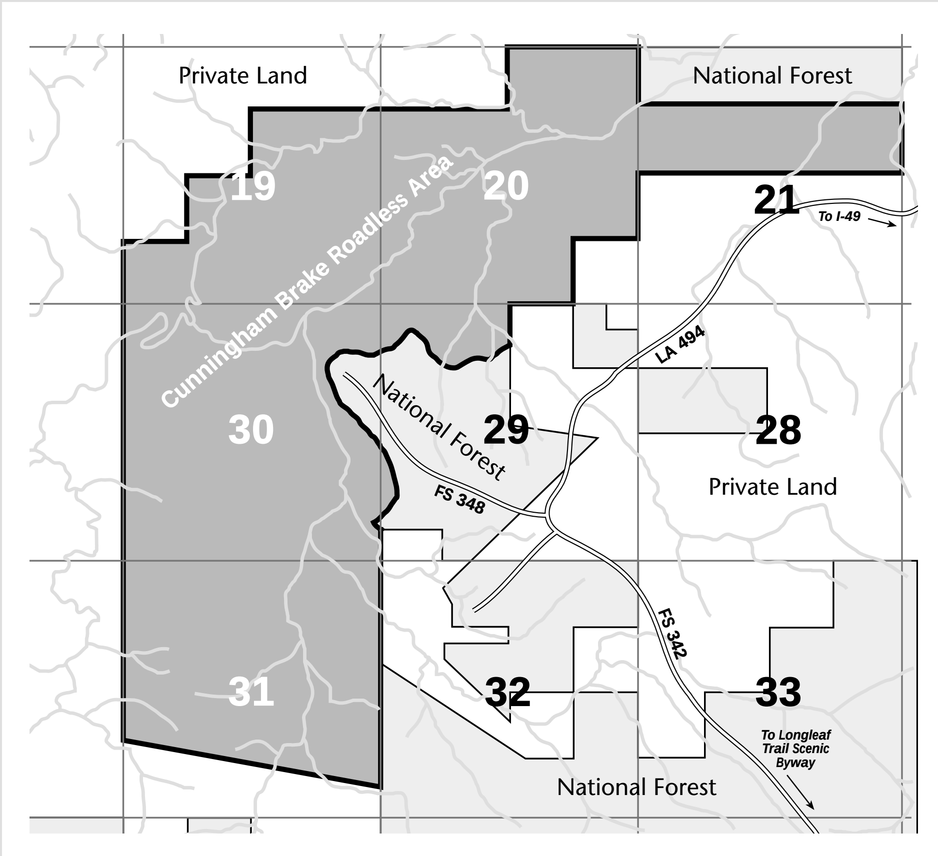
- Although once developed or disturbed, the land is regaining a natural, untrammeled appearance.
- Improvements may exist, but are being affected by the forces of nature rather than humans — and are disappearing or muted.
- The area has existing or attainable National Forest System ownership patterns, both surface and subsurface, that could ensure perpetuation of identified wilderness values.
- The location of the area is conducive to the perpetuation of wilderness values considering the relationship of the area to sources of noise, air, and water pollution, as well as unsightly conditions that would affect the wilderness experience. The amount and pattern of federal ownership is also an influencing factor.
- The area contains no more than 1/2-mile of improved road (better than service level D) for each 1,000 acres, and the road is under Forest Service jurisdiction.
- No more than 15 percent of the area is in nonnative vegetation.
- No more than 20 percent of the area has been harvested within the past 10 years.
- The area contains only a few dwellings on private lands and the location of these dwellings and their access needs insulate their effects on the natural conditions of federal lands.

TABLE C–1, DESIGNATED WILDERNESS

Existing Wilderness in Louisiana

Name of Admin. Unit	Agency	Area	Year Estab.	Acres
Kisatchie NF	USFS	Kisatchie Hills	1980	8,679
Breton NWR	USFWS	Breton	1975	5,000
Lacassine NWR	USFWS	Lacassine	1976	3,346
State total				**17,025**

FIGURE C–1, CUNNINGHAM BRAKE ROADLESS AREA



EVALUATION CRITERIA

In accordance with *36 CFR 219.12*, roadless areas meeting inventory criteria (**outlined in Chapter 7.11b, *FSH 1909.12***) will be evaluated by tests of *capability*, *availability*, and *need*. The *capability* of a potential wilderness describes the degree to which its basic characteristics make it suitable for designation — without regard to its availability for wilderness or the need for wilderness. Determination of *availability* is conditioned by value of and need for a wilderness resource, compared to the value of and need for other resources. The *need* for an area to be designated as wilderness should clearly indicate current or future public need for additional wilderness.

CURRENT SITUATION

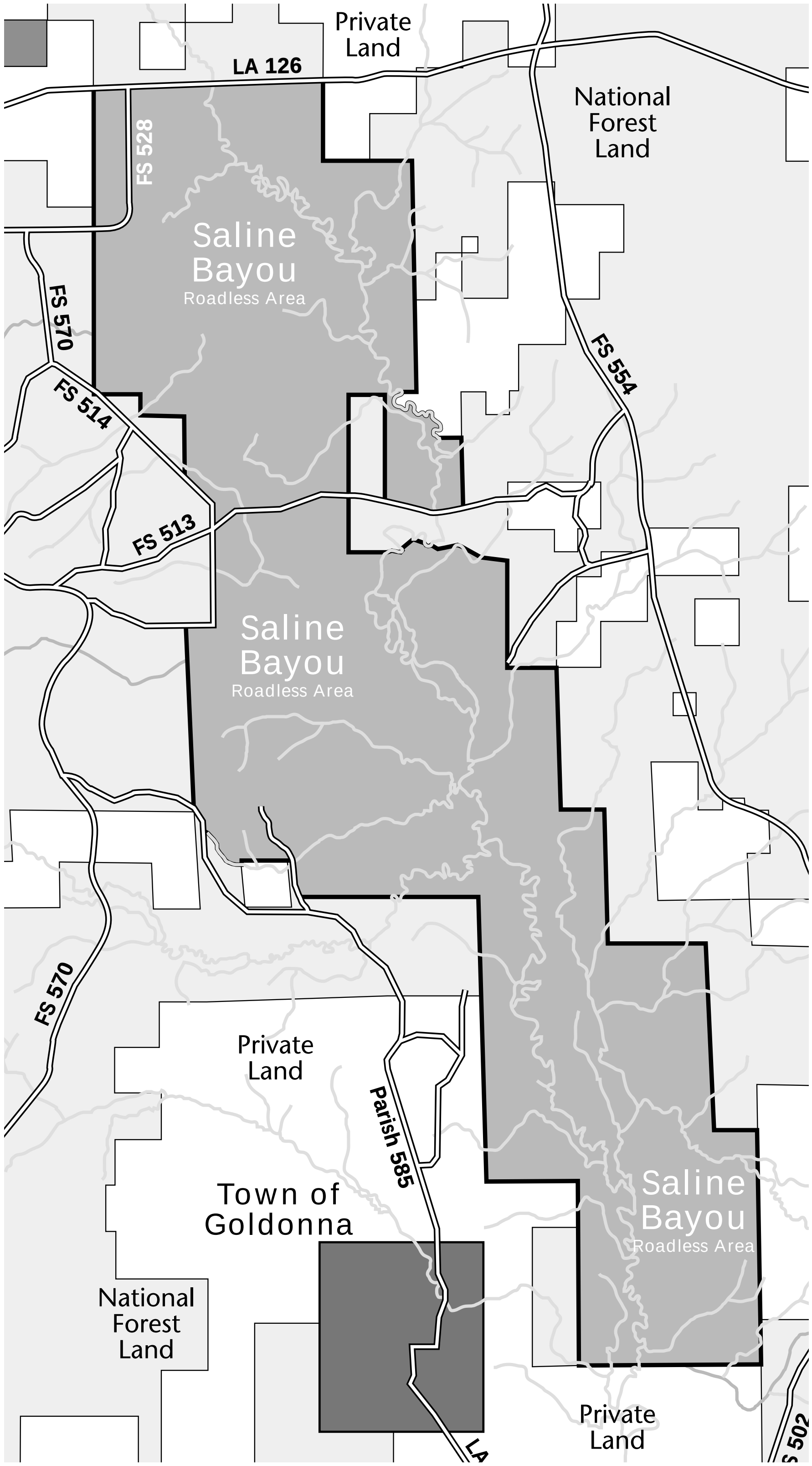
Since no new potential roadless areas were identified from a forestwide GIS analysis or during the public scoping process, the Kisatchie National Forest is reevaluating Saline Bayou and Cunningham Brake RARE II areas for potential wilderness. Please see figures C–1 and C–2. If these areas still meet the inventory criteria, they will be further evaluated for their ability to meet the test of capability, availability, and need. If either of the areas are determined not to meet the inventory criteria, they will be dropped from the roadless area inventory.

Evaluation of roadless areas east of the 100th meridian as part of the forest planning process yields one of the two following decisions:

- Manage the area for multiple uses other than wilderness.
- Recommend the area to Congress as a wilderness study area. For discussion purposes, these areas are referred to as roadless areas, although they may contain roads as permitted in the FSH.

CURRENT SITUATION

FIGURE C–2, SALINE BAYOU ROADLESS AREA



ROADLESS AREA CHARACTERISTICS AND FEATURES OF WILDERNESS

CUNNINGHAM BRAKE ROADLESS AREA

(RARE II code: 8120)

DESCRIPTION

- **Location and vicinity** — Cunningham Brake roadless area is located about 4 miles south of Flora, Louisiana in Natchitoches Parish. It lies in all or portions of the area legally described as T7N, R7W; sections 19, 20, 21, 29, 30, and 31.

- **Acres**
  Forest Service 2,222
  Private 0
  Total 2,222*

  ** GIS-generated acres differ from original RARE II acreage as listed in the final RARE II inventory in 1979.*

- **Access roads and trails** — Only Forest Service Road 348 provides access to Cunningham Brake roadless area. Roads inside the area total slightly less than 1/2 mile. Kisatchie Bayou offers canoe access.

- **General geography** — Many drainages dissect Cunningham Brake. Red River terraces and backswamps dominate the landscape. The water remains generally clear, but in some areas may resemble blackwater streams due to organic matter from acidic swamp drainage. Annual winter and spring floods generally overflow most of the floodplain for extended periods.

- **General topography** — Most of Cunningham Brake is an almost level landform, with slopes varying from 0 to 1 percent. Local relief generally ranges from 0 to 10 feet per square mile. Elevation is near-uniform at about 100 feet above mean sea level (MSL).

- **General vegetation and ecosystem type** — Most of Cunningham Brake roadless area lies within the Lower Mississippi Riverine Forest Province. Cunningham Brake roadless area is in the Red River Alluvial Plain landtype association, which occurs in the Red River floodplain of central Louisiana (*Bailey's Ecoregions of the United States*, 1993).

  Approximately 1,786 acres of bottomland hardwood forest types make up the majority of vegetation within the Cunningham Brake roadless area. The primary forest types are: white oak-red oak-hickory; swamp chestnut-cherrybark oak; sweetgum-Nuttall oak-willow; Laurel oak-willow oak; and baldcypress-water tupelo. Yellow pine forest types account for about 410 acres.

- **Current uses** — Approximately 1,646 acres of this area are included in the Cunningham Brake RNA, established in 1990 and used now for scientific study. Hunting, fishing, and canoeing are popular uses. Another 575.8 acres of this area are suitable for timber production under the 1985 Forest Plan.

- **Appearance** — In addition to its relative flatness, most the area consists of bottomland hardwoods. It is flooded for about 9 months annually.

- **Surroundings** — Private land borders all of the Cunningham Brake roadless area, except for the east boundary in T7N, R7W; sections 21, 29, 30, and 31. These areas are contiguous with national forest. Most adjacent lands are forested.

- **Scenic landmarks and sensitive wildlife** — Kisatchie Bayou flows through the area. It is designated as a Louisiana natural and scenic stream and is under evaluation in a national wild and scenic river suitability study. *Polanisia erosa* (clammy weed) and *Triphora trianthophora* (nodding pogonia), are conservation plant species that occur here. Several Forest Service sensitive or conservation wildlife species may also occur, including southern red-backed salamander, Cooper's hawk, big south fork crayfish, javelin crayfish, and hispid pocket mouse.

INVENTORY CRITERIA

Human Influence

- **Effects of activity** — *If an area's ecological processes and / or natural appearance have been altered by past or present human activity, is the land regaining a natural, untrammeled appearance?* Although some

ROADLESS AREA CHARACTERISTICS AND FEATURES OF WILDERNESS

CUNNINGHAM BRAKE ROADLESS AREA

DESCRIPTION

INVENTORY CRITERIA

ROADLESS AREA CHARACTERISTICS AND FEATURES OF WILDERNESS

CUNNINGHAM BRAKE ROADLESS AREA

INVENTORY CRITERIA

FINDINGS AND RECOMMENDATIONS

human activity occurred in this area it appears largely natural and untrammeled. Evidence of late prehistoric use exists in archeological records, but this has no effect on the area's current appearance. A 50-foot pipeline right-of-way (ROW) traversing the southwestern corner is apparent to forest visitors. Vegetation treatment required to maintain the ROW precludes the possibility that this corner will regain a natural appearance.

▶ **Ownership patterns** — *Does the existing or attainable National Forest System ownership pattern, both surface and subsurface, ensure perpetuation of identified wilderness values?*

• *Subsurface minerals?* Part of Cunningham Brake RNA is currently under a lease; however, it is leased with a *no surface occupancy* stipulation.

• *Isolated tracts of private land?* None

• *Could private lands be excluded by boundary change?* No private land is within the boundary.

▶ **Nonnative vegetation** — *Is more than 15 percent of the area in nonnative vegetation?* No. Planted slash pine grows on about 20 acres within Cunningham Brake roadless area. It is an off-site species for the Forest, with a natural range east of the Mississippi River.

▶ **Perpetuation of wilderness values** — *Is the area location conducive to perpetuation of wilderness values, relative to:*

• *Noise, air, and water pollution?* In some locations, noises associated with I-49 may be heard approximately four miles northeast of the northern boundary. Low-flying military aircraft in training at nearby Peason Ridge frequent the area. This could detract from the wilderness experience.

The area is identified as a *general forest Class II air quality management area*. Class II areas have air quality exceeding national ambient air quality standards, and are designated for moderate protection from future air quality degradation.

The Forest Service cannot control point or non-point source pollution of Kisatchie Bayou before it enters national forest land; or drainage into the bayou from private property acreage located within the national forest proclamation boundary.

• *Unsightly conditions?* Unsightly conditions sometimes result from illegal trash dumping and upstream debris floating down Kisatchie Bayou.

• *Amount / pattern of federal ownership?* All lands within the area are national forest.

▶ **Improved roads** — *Does the area contain no more than 1/2 mile of improved road (better than service level D) for each 1,000 acres? If so, is the road under Forest Service jurisdiction?* No. However, Cunningham Brake roadless area contains 2 level D roads totaling slightly less than 1/2 mile.

▶ **Timber regeneration** — *Has more than 20 percent of the area been regenerated within the past 10 years? If more has been regenerated, could a boundary change exclude the regeneration area?* About 3 percent of the total — 67 acres — have been regenerated within the last 10 years.

▶ **Private lands / dwellings** — *Are there private dwellings on private lands inside the proposed roadless area? If so, indicate how many and give a brief description. Does their location and their access needs insulate their effects on the natural conditions of federal lands?* No

▶ **Forces of nature** — *Are improvements in the area being affected by the forces of nature rather than humans, and are they disappearing or muted?* The natural gas pipeline traversing the southwest corner is presently maintained.

FINDINGS AND RECOMMENDATIONS

To be recommended as suitable for wilderness, an area must first meet requirements set forth in Chapter 7.11b, FSH 1909.12. *If requirements are met, it then must be evaluated for ability to meet the tests of capability, availability, and need.*

Cunningham Brake roadless area meets the inventory criteria for wilderness areas east of the 100th meridian. The next section evaluates the area's ability to meet the tests of capability, availability, and need.

ROADLESS AREA CHARACTERISTICS AND FEATURES OF WILDERNESS

CUNNINGHAM BRAKE ROADLESS AREA

EVALUATION

EVALUATION

An area recommended as suitable for wilderness must meet the test of capability, availability, and need. In addition to the inherent wilderness quality it possesses, an area must provide opportunities and experiences that are dependent upon or enhanced by a wilderness environment.

Capability

Does the area contain the basic characteristics that make it suitable for wilderness designation without regard to its availability for wilderness or the need for it? Consider the following characteristics in analyzing the quality of the wilderness resource. If these characteristics are determined to be important, describe and refer to them.

- **Natural integrity of the area** — *To what degree have past and present human activities affected natural ecological processes and conditions?* The overall influence of human activities to the natural integrity of the area is minimal. The few roads and the pipeline corridor in the southwest corner of the area are the only noticeable disturbances.

- **Natural appearance** — *Does the area appear natural, and free from disturbance? To what degree is its natural appearance appropriate and valuable for wilderness?* Yes, the area appears mostly natural and free from disturbance. Unimproved roads are dim, but the pipeline corridor in the southwestern corner remains visible. Noises associated with I-49 and low-flying military aircraft may present disturbance.

- **Experiential benefits** — *Does the area provide the opportunity for solitude, serenity, self-reliance, adventurous and challenging experiences, and primitive recreation?* The opportunities for solitude and serenity may be limited because of the small size of the area and noise associated with traffic from I-49 and low-flying aircraft. However, the area offers good opportunities for self-reliance. There are natural hazards from animal species associated with the swamp-like environment as well as natural terrain which offers adventurous and challenging experiences.

- **Recreation** — *What is the area's capability for providing primitive and unconfined recreation opportunities:*

  • *Camping.* Limited because of the large amounts of swamp and wetlands.

  • *Hunting.* Hunting is good here.

  • *Fishing.* Kisatchie Bayou offers good fishing, but access to the creek in this area is somewhat limited.

  • *Canoeing.* Cunningham Brake is difficult to canoe due to many inlets, which makes it easy to get lost in the brake.

  • *Boating.* The area contains no watercourses large enough to support boating.

  • *River rafting.* The area contains no watercourses large enough to support river rafting.

  • *Backpacking.* Limited because no developed trails exist. Extensive swamp and wetlands hinder overland travel.

  • *Hiking.* Limited because no developed trails exist. Extensive swamp and wetlands hinder overland travel.

  • *Riding.* Limited because there are no trails. Extensive swamp and wetlands hinder overland travel.

  • *Photography.* A good place for photography, but access to the area is limited.

- **Special features**
  What is the capability of the area to provide ecological, geological, scientific, educational, or historical values? Faculty and students from nearby Northwestern State University use the area for studying plant and animal species associated with this type of ecosystem.

  Describe rare and endangered plant and animal species along with other wildlife species. Two conservation plant species occur in the Cunningham Brake area: *Triphora trianthophora* (nodding pogonia) is found mainly in undisturbed areas. However, *Polonisa erosa* (clammy weed) probably requires thinning and prescribed burning for perpetuation.

  Several Forest Service sensitive or con-

ROADLESS AREA CHARACTERISTICS AND FEATURES OF WILDERNESS

CUNNINGHAM BRAKE ROADLESS AREA

EVALUATION

servation species have the potential to occur here: southern red-backed salamander, Cooper's hawk, big south fork crayfish, javelin crayfish, and hispid pocket mouse. The primary demand wildlife species here include: white-tailed deer, fox squirrel, gray squirrel, and wild turkey.

Manageability

What are the characteristics of the surrounding area including ROS *classification, adopted* VQO*, and present and / or planned uses (*ROS & VQO *defined below)?* Amendment #8 to the 1985 Forest Plan added Cunningham Brake RNA to management area 3. Under applicable standards and guidelines the visual quality objective (VQO) is *preservation* and the recreational opportunity spectrum (ROS) class is *semi-primitive, non-motorized*. The 576 acres outside the RNA boundary have been managed as general forest with an assigned VQO of *maximum modification*, and a ROS class of *roaded natural*.

Do boundary locations conflict with important existing or potential public uses outside the boundary that might result in demands to allow nonconforming structures and / or activities in the wilderness? The pipeline ROW transecting the southwest corner would be considered a nonconforming use.

Is it possible to readily and accurately describe, establish, and recognize boundaries on the ground? National forest boundaries delineate most of the area. Establishing a special boundary would be necessary where it joins adjacent national forest lands.

Do boundaries, where possible, conform with terrain or other features that constitute a barrier to prohibited use? The swamp-like conditions of the northern and southern boundaries prevent easy access to the area from these directions.

Do boundaries, to the extent practicable, act as a shield to protect the wilderness environment inside the boundary from the sights and sounds of civilization? No. Relatively flat terrain in this small area provides no effective shielding from the sights and sounds of civilization.

Do boundaries provide adequate opportunity for access and traveler transfer facilities? Forest Service Road 348 provides access to the area.

Nonconforming uses and structures

National forests east of the 100th meridian may contain limited nonconforming uses and / or nonconforming structures and improvements, while retaining capability for wilderness designation.

Are nonconforming uses of such a nature that they can be effectively mitigated or terminated?

• *Logging.* Yes

• *Special-use facilities.* Tennessee Gas Pipeline Co. has a 50-foot gas pipeline ROW in T7N, R7W; sections 30, 31, and 39. This facility can not be effectively mitigated and the cost of relocating it outside the boundary would be prohibitive.

• *Vegetation treatment.* The only vegetation treatment in the area would be associated with pipeline ROW maintenance. Vegetation treatment would need to be continued in order to ensure the integrity of the pipeline.

• *Fences.* None

• *Log or frame cabins or corrals.* None

Are nonconforming structures and improvements generally lacking? If they are present, are they rapidly disappearing through natural processes, or would it be practical to remove them and permit the site to return to a near-natural condition?

• *Buildings.* None

• *Pipelines.* Removing or rerouting the above-described Tennessee Gas Pipeline ROW outside the proposed area would be impractical.

• *Dams.* None

• *Borrow pits.* None

• *Lower standard roads (Level D).* The area contains less than 1/2 mile of such roads.

• *Can extant nonconforming uses be effectively mitigated or terminated through removal or rapid natural deterioration?* Low-standard roads could easily be mitigated. The pipeline could not.

Availability

The determination of availability is conditioned by the value of and need for wilderness resources compared to the value of and need for other resources. To be available for wilderness, the values of the wilderness resource, both tangible and intangible, should offset the value of resources that formal wilderness designation would forego.

▶ **Non-wilderness uses** — *Describe other current uses, outputs, trends, and potential uses for land or outputs for the following:*

• *Recreation, including tourism.* Hunting is the largest recreation attraction for this area. Cunningham Brake RNA also attracts visitors for both scientific and hobby nature study.

• *Information on wildlife species* (including TES), *population, and management needs.* Cunningham Brake provides diverse wildlife habitat. Since all species are not inventoried, populations are estimated. Game species include wild turkey, white-tailed deer, squirrel, rabbits, and wood ducks. Game populations are moderate.

Threatened and *endangered* species historically inhabiting the area include the Louisiana black bear and southern bald eagle. They are thought to be extirpated here. Populations of the Forest Service *sensitive* or *conservation* species — described earlier — are low at best.

• *Water availability and use.* None known.

• *Livestock operations.* None. No active grazing allotments exist in the area.

• *Timber.* Nearly 70 acres of 575.8 acres formerly considered suitable for timber production have been harvested and regenerated within the last 10 years.

• *Minerals.* Part of the Cunningham Brake RARE II area is currently under lease. All lands within Cunningham Brake RNA could be leased with a *no surface occupancy* stipulation.

• *Heritage resources.* Approximately 174 acres, or 5 percent, of the area has been archaeologically surveyed. Although 2 of 4 known archeological sites may be eligible for listing on the National Register of Historic Places, they have not yet been fully evaluated. The discovery of additional important sites is likely.

• *Authorized / potential land uses.* Tennessee Gas Co. has a permit for an interstate natural gas pipeline allowing a 50-foot-wide ROW in the southwest corner. Need for this use is expected to continue.

• *Management considerations include:*

Fire — The Cunningham Brake uplands have been burned regularly. However, the bottomland is generally too wet to burn.

Insects and diseases — There has been SPB activity in the pine stands. However, historically SPB have not been a major problem in this area.

Non-federal lands —There are no private lands within the proposed boundary. The private lands bordering Cunningham Brake roadless area can be accessed without crossing the area.

▶ **Effects to adjacent lands** — *What effect will wilderness designation have on adjacent lands?* Wilderness designation would restrict management activities outside the current RNA boundary. This could increase the potential loss from insects and disease infestations and wildfires. Wilderness designation would also make controlling insect or disease infestations and wildfires more complex, thus increasing chances that they may spread to other national forest lands or adjacent private lands.

▶ **Effects to transportation** — *What effect will designation have on transportation systems outside the wilderness?* None. There are no roads in the proposed area, and no new roads will be needed for area access.

▶ **Support access needed** — *What additional access, (roads and / or trails), and facilities will be needed to support the wilderness?* No new roads will need to be built to access the area. However, parking, trail head facilities, and a hiking trail may be needed to properly access the area.

ROADLESS AREA CHARACTERISTICS AND FEATURES OF WILDERNESS

CUNNINGHAM BRAKE ROADLESS AREA

EVALUATION

Are the lands generally unavailable for wilderness? Would they be better suited for resources other than wilderness? Depending on the seriousness of the resource needs, these lands may be considered unavailable for wilderness.

- **Water production or storage** — *Is the area located such that the need for increased water production and / or additional on-site storage is so vital that installation or maintenance or improvements is an obvious and inevitable public necessity?* No

- **Effects to wildlife management** — *Would wilderness designation seriously restrict or prevent the application of wildlife management measures of considerable magnitude and importance?* No, none known

- **Effects to mineral production** — *Is it a highly mineralized area of such strategic or economic importance and extent that restrictions or controls due to wilderness designation would not be in the public interest?* There are no producing wells or pending applications to drill on national forest lands. In addition, there are no known producing wells on private land that are proximal to the proposed area.

- **Public access** — *Does the area contain natural phenomena of such unique or outstanding nature that general public access and special development to facilitate public enjoyment should be available?* No.

- **Demands** — *Is the land needed to meet clearly documented resource demands such as for timber, mineral production, or developed recreation?* No.

- **Prior commitments** — *Is the land committed through contractual agreements for use, purposes, or activities not in concert with wilderness requirements of the Wilderness Act of 1964?* No, none known.

Need

There should be clear evidence of current or future public need for additional designated wilderness in the general area under consideration.

- **Other wildernesses**

• **Distance to wilderness** — *How far is it to the closest existing wilderness?* The 8,700-acre Kisatchie Hills Wilderness is located about 10 miles southeast of Cunningham Brake roadless area.

• **Use in nearby wilderness** — *What level of use currently exists in nearby existing wilderness? What trends exist in the use of these areas?* In 1996 an estimated 6,200 recreational visitor days (RVDs) were recorded in the Kisatchie Hills Wilderness. Reported figures for RVDs in the Wilderness have slowly increased over the last few years. This gradual trend is expected to continue as the public becomes aware of wilderness values.

• **Demographics** — *Is the population in and around this area increasing or decreasing? How quickly is it increasing or decreasing?* The 1990 population of Natchitoches Parish was 36,689. It has remained relatively constant over the last 40 years, and is expected to change little.

• **Uniqueness** — *Are there other ecosystems like this area presently in the National Wilderness System?* Currently, there is one existing wilderness: Big Lake Wilderness in northeast Arkansas, found in the Lower Mississippi Riverine Forest Province, as derived from Bailey 1992 [adapted from *Ecoregions of the United States* (Bailey, 1990) and *Ecoregions of the Continents* (Bailey, 1989)]. Big Lake Wilderness is administered by the U.S. Fish and Wildlife Service.

- **Non-wilderness lands**

• **Recreation opportunities** — *Are there opportunities for unconfined and primitive recreation experiences on non-wilderness areas in the vicinity? If so, where?* There are many opportunities for dispersed recreation activities in the Kisatchie National Forest. However, the forest has no areas meeting the criteria for classification as primitive under the recreation opportunity spectrum, as defined by the ROS users guide. The Kisatchie Hills Wilderness is managed as semi-primitive, non-motorized. The majority of land within the forest is managed as roaded natural.

Habitat

- **Competition for space** — *Are there any biotic species in the area that are directly competing with increasing public use and development?* No.

- **Alternatives to designation** — *Could these needs be provided for through means other than wilderness designation?* N/A.

- **Providing sanctuary** — *Is there a need to provide a sanctuary for biotic species that cannot survive in less-than-primitive surroundings?* Nodding pogonia (*Triphora trianthophora*) may have specific requirements associated with primitive surroundings, but does not require primitive surroundings in order to survive. However, for perpetuation, *Poliansa erosa* probably requires management associated with thinning and prescribed burning.

FINDINGS AND RECOMMENDED CLASSIFICATION

In order to be recommended as suitable for wilderness, an area must first meet requirements as set forth in Chapter 7.11b, *FSH 1909.12*. If an area meets the requirements for wilderness, it then must be evaluated for its ability to meet the tests of capability, availability, and need.

Cunningham Brake Roadless Area meets the inventory criteria for potential wilderness areas east of the 100th meridian. The area was then evaluated for its ability to meet the test of capability, availability, and need. Based on a lack of demonstrated demand or need for wilderness designation of Cunningham Brake RNA, the potential limitations on research opportunities associated with wilderness designation, and the fact that management under RNA designation would insure all roadless characteristics are protected — the area is not recommended for wilderness designation.

ROADLESS AREA CHARACTERISTICS AND FEATURES OF WILDERNESS

SALINE BAYOU ROADLESS AREA

DESCRIPTION

SALINE BAYOU ROADLESS AREA

(RARE II code: 8121)

DESCRIPTION

- **Location and vicinity** — Saline Bayou roadless area is located about 2 miles northeast of Goldonna, Louisiana in Natchitoches and Winn Parishes. It lies in all or portions of T13N, R6W, sections 13 and 24; T13N, R5W, sections 17, 18, 19, 20, 29, 30, 31 and 32; and T12N, R5W, sections 4, 5, 6, 8, 9, and 16.

- **Acres**
  Forest Service 6,390
  Private 0
  Total 6,390*

  ** GIS-generated acres differ from original RARE II acreage as listed in the final RARE II inventory in 1979.*

- **Access roads and trails** — Louisiana (LA) Highway 126 borders the area on the north. Forest Service Roads 528, 513, and 507 provide access. The Bayou Hiking Trail traverses the area, connecting the Pearfield Boat Launch with Cloud Crossing Recreation Area. Three boat launches provide canoe or boat access to Saline Bayou National Scenic River.

- **General geography** — Many drainages dissect the Saline Bayou area, and Holocene river terraces dominate the landscape. Annual winter and spring floods generally overflow into most of the floodplain, producing many scattered temporary ponds.

- **General topography** — Land surface form over the majority of this area is characterized as nearly level, with a slope range of 0–3 percent. The majority of Saline Bayou roadless area ranges from 100' to 120' above MSL. However, an area on the area's western boundary reaches an elevation of 220' above MSL.

- **General vegetation and ecosystem type** — The majority of Saline Bayou roadless area lies within the Outer Coastal Plain Mixed Forest Province, according to *Ecoregions of the United States* (Bailey, R.G., 1993). The Saline Bayou area is found in the Alluvial Floodplains and Stream Terraces landtype association, which is associated primarily with Prairie Terrace deposits in central Louisiana. The primary forest types found within the boundary include loblolly and shortleaf pine, mixed pine-hardwood, baldcypress, tupelo gum, sweetgum-Nuttall oak-willow, and laurel oak-willow oak.

- **Current uses** — Approximately 3,225 acres of the Saline Bayou RARE II area are designated within the Saline Bayou National Scenic River corridor. The designated scenic corridor is of variable width, generally 1/4-mile on each side of the bayou from the Bienville Parish line to Saline Lake, and encompasses approximately 6,030 acres.

  Recreation use centers on hunting, fishing, hiking, boating, and canoeing. Cloud Crossing is adjacent to the roadless area; however, the Louisiana Highway 126 and Pearfield Boat Launches lie within the area. These boat launches provide access to Saline Bayou for canoes and small boats. Bayou Trail links Cloud Crossing Recreation Area to the Pearfield Boat Launch.

- **Appearance** — Human activities are apparent in the area: timber cutting, improved and unimproved roads, bridges, and mineral activities. Cloud Crossing, a developed recreation area, is located adjacent to the roadless area; however, the Pearfield hand boat launch facility is located within the boundary. Bottomland hardwood areas along Saline Bayou are the most natural-appearing and untrammeled by humans.

- **Surroundings** — Forested land surrounds the Saline Bayou roadless area. About 6.25 miles of the 23.5-mile boundary adjoins private land. Since evaluating the area for RARE II, the Forest Service has acquired approximately 120 adjacent acres in T13N, R5W, sections 19 and 30.

- **Scenic landmarks and sensitive wildlife** — Saline Bayou is the only river in Louisiana designated in the National Wild and Scenic River System. Congress designated Saline Bayou as a national scenic river in October 1986. In 1987, the Forest Service issued a decision notice classifying Saline Bayou as *scenic* and designating the river corridor — generally 1/4-mile

ROADLESS AREA CHARACTERISTICS AND FEATURES OF WILDERNESS

SALINE BAYOU ROADLESS AREA

DESCRIPTION

either side of the ordinary high water mark — as the boundary.

The Saline Bayou Sandy Woodland natural area is also located within the Saline Bayou roadless area. Sandy Woodland was placed on the Louisiana Registry of Natural Areas in May 1989 because of the old growth, sandy woodland, bottomland hardwoods, and cypress forests found in the area. It is considered a diverse area of relatively undisturbed natural habitats which, combined with adjacent Saline Bayou, make an ideal environment for most species native to the region. Forest Service sensitive or conservation wildlife species that may occur in the area include: southern red-backed salamander, Cooper's hawk, big south fork crayfish, javelin crayfish, and hispid pocket mouse.

INVENTORY CRITERIA

Human Influence

Effects of activity — *If the area's ecological processes and / or natural appearance have been altered by past or present human activity, is the land regaining a natural, untrammeled appearance?* Human activity has altered the natural appearance of the area. Approximately 194 acres have been regenerated within the last 10 years. The area contains approximately 16 miles of unimproved roads, several of which have been closed to automobile travel, however, they remain open to off-road vehicles (ORVs). About 3.38 miles of improved roads also exist within the area.

Ownership patterns — *Does the existing or attainable National Forest System ownership pattern, both surface and subsurface, ensure perpetuation of identified wilderness value?*

• *Subsurface minerals?* Approximately 70 percent or 4,459 acres, within the Saline Bayou RARE II boundary have mineral rights outstanding for perpetuity. The United States owns mineral rights on only 1,931 acres, or 30 percent, of the Saline Bayou RARE II area.

• *Isolated tracts of private lands?* None.

• *Could private lands be excluded by boundary change?* N/A.

Nonnative vegetation — *Is more than 15 percent of the area in nonnative vegetation?* There are no acres in nonnative vegetation.

Perpetuation of wilderness values — *Is the location of the area conducive to the perpetuation of wilderness values, in relationship to:*

• *Noise, air, and water pollution?* Noises associated with Louisiana Highways 126, 1233, and 479 may detract from the wilderness experience.

The area is identified as a general forest Class II air quality management area. This is a geographic area with air quality exceeding the national ambient air quality standards, and are designated for a moderate degree of protection from future air quality degradation.

The Forest Service has no direct control on point or non-point source pollution from any off-national forest stream whose flow might influence water quality of Saline Bayou, even if it is within the national forest proclamation boundary. Only when a stream enters national forest land does the Forest Service have the authority to control water quality.

• *Unsightly conditions?* Unsightly conditions sometimes occur as a result of illegal trash dumping and debris that floats down Saline Bayou from upstream.

• *Amount and pattern of Federal ownership?* All of the lands within the area are national forest.

Improved roads — *Does the area contain no more than 1/2-mile of improved road (better than service level D) for each 1,000 acres? If so is the road under Forest Service jurisdiction?* Yes, there are 3.38 miles of improved road in the 6,390 area which yields 0.53 miles of improved road for each 1,000 acres. Approximately 2.18 miles are under Forest Service jurisdiction, and 1.2 miles are under state jurisdiction, Louisiana Highway 126. This exceeds the criteria for 0.5 miles of improved road for each 1,000 acres, as set forth in Chapter 7.11b, *FSH 1909.12*.

ROADLESS AREA CHARACTERISTICS AND FEATURES OF WILDERNESS

SALINE BAYOU ROADLESS AREA

INVENTORY CRITERIA

FINDINGS AND RECOMMENDED CLASSIFICATION

- **Timber regeneration** — *Has more than 20 percent of the area been regenerated within the past 10 years? If more than 20 percent has been regenerated, could the regeneration area be excluded by a boundary change?* No. Only 194 acres, or 3 percent, of the area has been regenerated during the last 10 years.

- **Private lands / dwellings** — *Are there any private dwellings on private lands inside the proposed roadless area? If so, indicate how many and give a brief description; and does the location of these dwellings and their access needs insulate their effects on the natural conditions of Federal lands?* No.

- **Forces of nature** — *Are improvements in the area being affected by the forces of nature rather than humans, and are they disappearing or muted?* Cloud Crossing recreation area is located adjacent to the boundary of the Saline Bayou roadless area. Cloud Crossing Recreation Area has 17 developed camp units, 5 family picnic units, 1 group shelter, and 1 trailer boat launch. There is a bridge on Forest Service Road 513 that crosses Saline Bayou, giving access to Cloud Crossing. There are also 2 hand boat launches, Louisiana Highway 126 Launch and Pearfield Launch, located within the roadless area. The Bayou Trail links Cloud Crossing with the Pearfield Launch. These areas will continue to be maintained to provide access to Saline Bayou.

FINDINGS AND RECOMMENDED CLASSIFICATION

In order to be recommended as suitable for wilderness, an area must first meet the requirements as set forth in Chapter 7.11b, FSH 1909.12. *If an area meets the requirements for wilderness, it then must be evaluated for its ability to meet the test of capability, availability, and need.*

Saline Bayou roadless area does not meet the inventory criteria for wilderness areas east of the 100th meridian as set forth in Chapter 7.11b, *FSH 1909.12*. Saline Bayou RARE II area is determined to be ineligible for potential wilderness because the perpetuation of wilderness values can not be ensured due to the excessive acreage with outstanding mineral rights and the amount of improved roads within the area. Approximately 70 percent, or 4,459 acres, of the area within the boundary have outstanding mineral rights for perpetuity. The United States owns mineral rights on only 1,931 acres, or approximately 30 percent, of the area. Also, 19.38 miles of roads traverse the Saline Bayou RARE II area. Improved roads represent 3.38 miles of the total, yielding just over 1/2 mile (0.53) of improved road per 1,000 acres. This exceeds the criteria of no more than 1/2 mile of improved roads for each 1,000 acres.

Since its designation as a RARE II area, approximately 3,225 acres within the roadless area have been designated as a portion of the Saline Bayou National Scenic River corridor. Although designation as a national scenic river does not preclude wilderness designation, Saline Bayou and its corridor are managed with the goal of non-degradation and enhancement of values contributing to its national scenic river status.

Because the Saline Bayou RARE II area no longer meets the inventory criteria for wilderness areas east of the 100th meridian, as outlined in Chapter 7.11b, *FSH 1909.12*, this area will be dropped from the roadless area inventory. The portion of the Saline Bayou RARE II area that is within the designated Saline Bayou National Scenic River corridor will continue to be managed and protected in accordance with the management plan for the scenic river and its corridor.

Wild & Scenic River Evaluations

Appendix D

BACKGROUND

INTRODUCTION

BACKGROUND

During the forest planning process, the Forest Service has elected to identify and evaluate rivers for possible addition to the National Wild & Scenic Rivers System. The 1968 National Wild & Scenic Rivers Act (**PL 90-542; 16 U.S.C. 1271-1287, as amended**) was designed to preserve free-flowing rivers and streams with outstandingly remarkable river related values.

National wild & scenic river designation is a three-step process. The first step requires preparation of an eligibility study which evaluates river-related values. River-related values include *scenic*, *recreational*, *geological*, *wildlife*, *fish* and *aquatic*, *historic*, and *cultural*, or *other similar* values. A river with an "outstandingly remarkable" river-related value is considered eligible for potential inclusion in the Wild & Scenic Rivers System. The second step determines the potential classification of the river. The three classifications are *wild*, *scenic*, or *recreational*.

Determination that a river is eligible does not necessarily mean that it will meet suitability criteria for inclusion in the National Wild & Scenic Rivers System. A suitability study is the third step in the process, ultimately requiring action by Congress for inclusion of a river in the National Wild & Scenic Rivers System. The suitability study for all of the eligible rivers in the Kisatchie National Forest is in Appendix E of this environmental impact statement.

INTRODUCTION

This appendix contains eligibility evaluations of 10 rivers, located wholly or partially within the Kisatchie National Forest's proclamation boundary, for inclusion in the National Wild & Scenic Rivers system. The evaluations also determine the potential classifications of the eligible rivers as either wild, scenic, or recreational.

The Forest Service completed the eligibility and classification study presented here. The rivers initially identified for eligibility study were either listed by the National Park Service on the Nationwide River Inventory (**National Park Service, January 1982**), designated by the State of Louisiana as a State Natural & Scenic River, or identified by other interests. Please see table D–1.

TABLE D–1, RIVERS EVALUATED

River / Stream, Length in Miles		Parish	Total	Private	Federal
Big Creek[2]		Grant	20.7	16.9	3.8
Fish Creek[2]		Grant	13.9	2.2	11.7
Corney Bayou,	SEGMENT A[1,2]	Claiborne	2.8	0.7	2.1
	SEGMENT B	Claiborne	0.7	0.0	0.7
Middle Fork Bayou D'Arbonne[2]		Claiborne	8.6	2.2	6.4
Castor Creek[3]		Rapides	4.9	1.5	3.4
Spring Creek[1,2]		Rapides	27.4	25.5	1.9
Kisatchie Bayou[1,2]		Natchitoches	40.5	19.3	21.2
Drakes Creek[3]		Vernon	11.2	2.5	8.7
Six Mile Creek,	SEGMENT A[2]	Vernon	4.8	1.0	3.8
	SEGMENT B	Vernon	6.2	1.1	5.1
Whisky Chitto Creek[1,2]		Vernon	11.3	5.8	5.5

[1] Listed on the Nationwide River Inventory (NPS, 1982). [2] Designated as a Louisiana State Natural and Scenic River. [3] Identified by other interest

RIVER ELIGIBILITY STUDY

RESOURCE VALUES

RIVER ELIGIBILITY STUDY

RESOURCE VALUES

Rivers eligible for wild and scenic designation must be free-flowing and possess, with their adjoining land, one or more outstandingly remarkable river-related values. The Wild & Scenic Rivers Act sets no specific requirements concerning the length of a river segment that is under consideration, but states that "a river segment is of sufficient length if, when managed as a wild, scenic, or recreational river, the outstandingly remarkable values are protected." In order to be assessed as "outstandingly remarkable," a river-related value must be a unique, rare, or exemplary feature significant at the regional or national level.

For each of the following classes, Kisatchie National Forest resource specialists developed evaluation criteria for *scenic*, *recreational*, *geologic*, *wildlife*, *fish and aquatic*, *historic and cultural*, and *botanical and ecological* river-related values:

- **Class A** — Outstandingly remarkable with *national significance*; having nationally significant qualities.
- **Class B** — Outstandingly remarkable with *regional significance*; having regionally significant qualities.
- **Class C** — *Locally significant*; sharing qualities with one of many equally significant areas in the region.
- **Class D** — *Locally common* to the Forest, having qualities in common with the local area and the region; with no outstanding qualities.

Evaluation criteria were developed based upon qualities relative to the South Central Plains Ecoregion (**Omernik & Gallant, 1987**). This area covers southwest Arkansas, southeast Oklahoma, east Texas, and most of central and northern Louisiana outside of the Mississippi Alluvial Plain ecoregion. See figure D-1.

Forest and woodland landtypes dominate one-half to three-fourths of the 54,300 square-mile South Central Plains ecoregion. The remaining area is farms and cities. Elevation increases from 80 to 650 feet, south to north, with minor local relief along most streams.

Average annual precipitation ranges from about 40 to 53 inches, increasing from northwest to southeast. Precipitation, perennial streams, and ground water generally provide abundant water. A few large reservoirs on major streams supply municipal water and support developed recreation.

Smaller streams such as the ones under study on the Kisatchie National Forest lie within the riparian association. This includes gently sloping to steep footslopes, headwaters and springs, small perennial and intermittent stream courses, and terraces. Floodplains and terraces within riparian areas have sandy and coarse loamy soils, with fine loamy and clayey soils occurring on gentle sloping footslopes and branchhead inclusions. Alluvial streams in the ecoregion usually have three general appearances: shoals, sometimes with minor falls along faults and other features; gently meandering slower runs; and strongly meandering slow water, with associated backwater swamps. Water appears naturally turbid in many streams, but the clarity of spring-fed streams is good to fair in late summer and early fall. Stream water flows fluctuate widely, dropping so low in the fall that canoeing becomes difficult because of logs and sandbars.

As a diverse landtype association within the South Central Plains, riparian plant communities include the American beech-Southern magnolia series, American beech-white oak series, hardwood slope forest, mixed hardwood-loblolly, mesic creek bottoms, wet creek bottoms, lower slope hardwood-pine, and floodplain hardwood-pine. Generally the vegetative type in the riparian association is beech, but the canopy often contains loblolly pine to varying degrees, with a mixture of hardwoods which may include: white, southern red, and cow oaks; bitternut hickory, white ash, black gum, and sweetbay magnolia. A shade-tolerant midstory and shrub layer includes hophornbeam, dogwood, maple, basswood, and huckleberries. A rich assemblage of forest forbs occur in deeply shaded ravines on older alluvial terraces within the riparian area.

Outstandingly remarkable river or river segment values are based primarily on qualities relative to a region's other rivers. The Kisatchie National Forest classification criteria for scenic, recreational, geologic, wildlife, fish-aquatic, botanical-ecological, and cultural-historical values follow.

RIVER ELIGIBILITY STUDY

RESOURCE VALUES

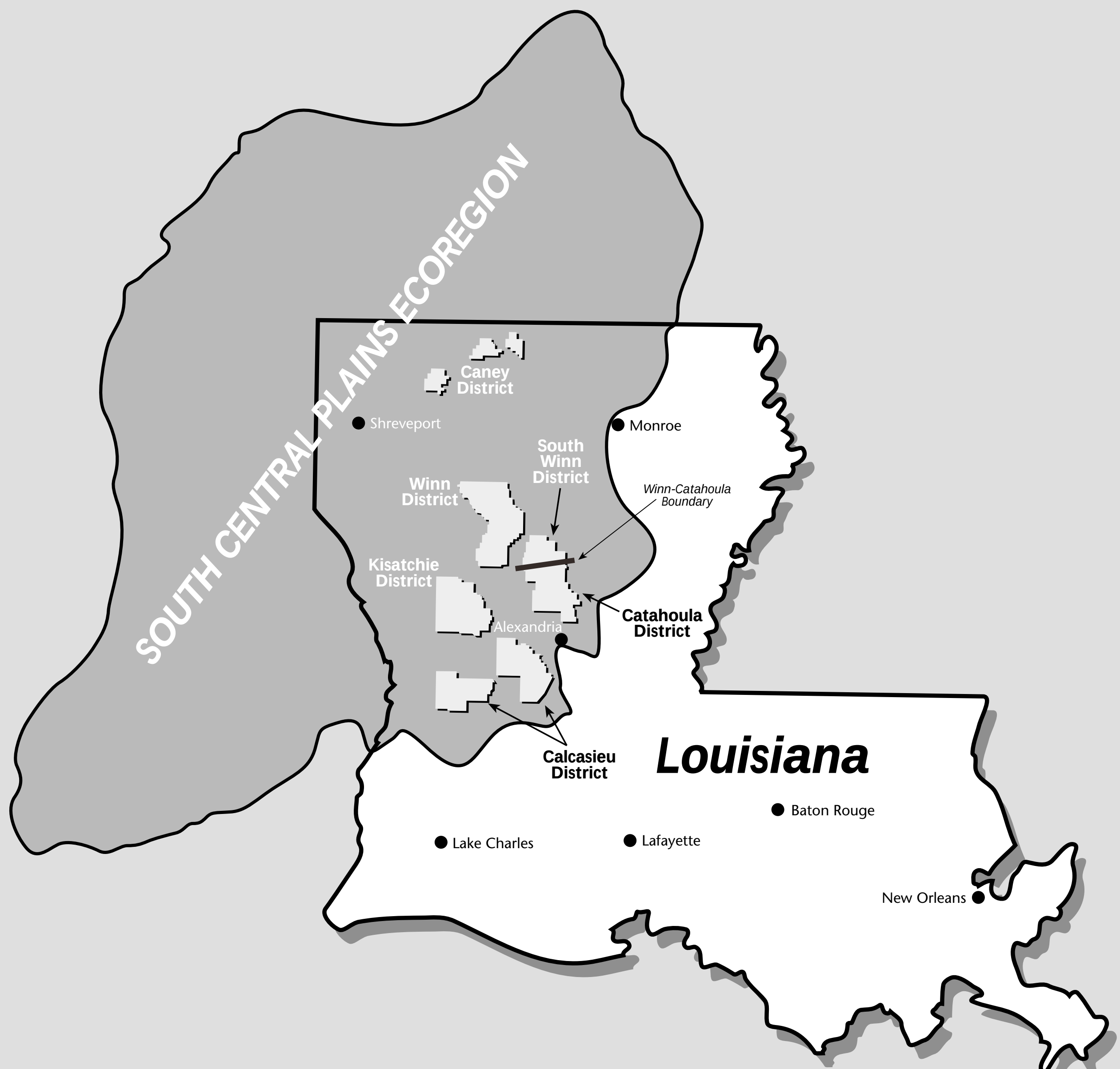
Scenic

- **Class A** — Outstandingly remarkable values include land forms with unusual or outstanding topographic features. The landscape elements of landform, vegetation, water, color and related factors result in notable or exemplary visual features and / or attractions. Forest cover is continuous or if broken, has a high degree of vegetative patterns and unusual or outstanding diversity in plant species. Scenery and visual attractions are highly diverse over the majority of the river or river corridor.

- **Class B** — Regionally outstanding values include land forms with regionally significant topographic features. The landscape elements of landform, vegetation, water, color and related factors are of regional significance. The forest cover is continu-

FIGURE D–1, SOUTH CENTRAL PLAINS ECOREGION

Omernik and Gallant, 1987



RIVER ELIGIBILITY STUDY

RESOURCE VALUES

ous or if broken, has a high degree of vegetative patterns which are regionally significant.

- **Class C** — Locally significant values indicate some variety in the terrain, but landform features are typical throughout the region. Forest cover is continuous with some variety in vegetative patterns and a common diversity in plant species.

- **Class D** — Locally common to the Forest values indicate landscape elements which are common to streams throughout the forest.

Recreational

- **Class A** — Outstandingly remarkable values provide recreational opportunities which are or could be sufficiently unique to attract visitors from outside the geographic region or state. Visitors would be willing to travel long distances to use the river resources for recreational purposes. River related opportunities could include sight-seeing, wildlife observation, photography, hiking, fishing, hunting, water play, and boating.

- **Class B** — Regionally outstanding values provide recreational opportunities unique to the region and have the potential to attract visitors from inside the physiographic region or state. River related opportunities could include sight-seeing, wildlife observation, photography, hiking, fishing, hunting, water play, and boating.

- **Class C** — Locally significant values provide recreation opportunities which are significant for the Forest, however, they are common throughout the region.

- **Class D** — Locally common to the Forest values indicates common recreational opportunities throughout the forest.

Geologic

- **Class A** — Outstandingly remarkable values indicate that the river or the area within the river corridor contains an example(s) of a rare, unusual, or unique geologic feature, process, or phenomena. The feature(s) may be in an unusually active stage of development, represent a textbook example and / or represent a significant or rare combination of geologic features.

- **Class B** — Regionally outstanding values indicate that the river or the area within the river corridor contains an example(s) of a geologic feature, process, or phenomena that is rare, unusual, unique, or significant within the physiographic region.

- **Class C** — Locally significant values indicate the geomorphic features and formations may be significant in the Forest, but are typical of those commonly found in the region. There may be some opportunities for geologic study.

- **Class D** — Locally common to the Forest indicate that the geomorphic features are common throughout the Forest and offers no significant geologic features.

Wildlife

- **Class A** — Outstandingly remarkable values include resident wildlife populations only because of the character of the stream and / or the adjacent riparian vegetation. The area within the river corridor provides exceptionally high quality habitat for wildlife of national significance or may provide unique habitat or a critical link in habitat conditions for federal or state listed threatened, endangered or sensitive (TES) species. Diversity of habitats could itself lead to a determination of outstandingly remarkable.

- **Class B** — Regionally outstanding values indicate that the area within the river corridor provides quality habitat for wildlife not common to the region. Diversity of habitats could itself lead to a determination of outstandingly remarkable.

- **Class C** — Locally significant values indicate high quality wildlife habitat usually associated with quality hunting or wildlife viewing . However, these habitat types are common throughout the region.

- **Class D** — Locally common to the Forest indicates that wildlife and wildlife habitats are not significant, rare or critical. These areas are common throughout the Forest.

Fish and aquatic community

- **Class A** — Outstandingly remarkable values indicate resident fisheries populations or aquatic communities occur only because of the character of the stream. The area within the river corridor provides exceptionally high quality habitat for fish or aquatic organisms of national importance or may provide unique habitat or a critical link in habitat conditions for federal or state listed TES species. Diversity of habitats could itself lead to a determination of outstandingly remarkable.

- **Class B** — Regionally outstanding values indicate that the area within the river corridor provides quality habitat for fish or aquatic organisms not common to the region. Diversity of habitats could itself lead to a determination of outstandingly remarkable.

- **Class C** — Locally significant values indicate high quality fisheries or aquatic community habitat. These values are usually associated with quality fishing areas, however these habitat areas are common throughout the region

- **Class D** — Locally common to the Forest indicates that fisheries or aquatic community habitats are not unique, rare or critical. These areas are common throughout the Forest.

Cultural / Historic

- **Class A** — Outstandingly remarkable values indicate the heritage resource sites within the corridor have unusual characteristics or exceptional research or interpretive values of national significance. These river corridors contain sites of national importance and meet the criteria for listing on the National Register of Historic Places (NRHP) (*36 CFR 60*).

- **Class B** — Regionally outstanding values indicate that the river corridors contain sites of regional significance that meet the criteria for listing on the National Register of Historic Places. Sites are regionally significant.

- **Class C** — Locally significant indicates that the river corridors contain sites of state and local significance that meet the criteria for listing on the National Register of Historic Places. Sites may be similar to other sites known throughout the region, but are unique to the local area. Some sites may have been disturbed prior being archaeologically recorded. This also includes known sites that have not been evaluated respective to National Register of Historic Places criteria.

- **Class D** — Locally common to the Forest indicates that the river corridors contain sites common to the Forest or state. Known sites have been determined ineligible for listing in the National Register of Historic Places.

Botanical and ecological

- **Class A** — Outstandingly remarkable values indicate that the riparian forest along the river corridor is contiguous, with no human-caused fragmentation. Geologic features harboring unique plants or plant communities may be present, and few exotic or invading weed species are present. The area within the river corridor could provide exceptionally high quality habitat for plant species of national importance, or may provide unique habitat for federally listed TES species. The occurrence of nationally rare plant species and communities could lead to a determination of outstandingly remarkable.

- **Class B** — Regionally outstanding values indicate that the riparian or bottomland forest along the river corridor is contiguous, with little human-caused fragmentation. There may be some localized invasion of exotic or invading weedy species, however, the invasions are localized enough to be controllable. Geologic features which harbor plants or plant communities unique in the region; or the occurrence of plants species or plant communities uncommon or rare in the region could in itself, lead to a determination of regionally outstanding.

RIVER ELIGIBILITY STUDY

RESOURCE VALUES

CLASSIFICATION CRITERIA

- **Class C** — Locally significant values indicate that the riparian forest along the river corridor is largely contiguous; however, human activity may be causing fragmentation. Locally significant plant communities may exist along the river corridor, and there may be some uncontrolled invasions of exotic weedy species.

- **Class D** — Locally common to the Forest indicates that the plant species and / or communities are common to the area. Forest may be greatly disturbed by artificial means or highly fragmented. Disturbed areas with human impact to the communities or uncontrolled invasions of exotic plants may occur.

CLASSIFICATION CRITERIA

The Wild & Scenic Rivers Act, Section 2(b), states that "if included [in the National Wild & Scenic Rivers System] each river shall be classified, designated, and administered" as either a *wild*, a *scenic*, or a *recreational* river area. The classification selection is based on the conditions of the river and the adjacent land at the time of evaluation. A river may be divided into segments by these classifications, based on current conditions.

The criteria to be met under each classification are: *water resources development*, *shoreline development*, *accessibility*, and *water quality*. These criteria are from the revised guidelines for wild and scenic rivers, developed jointly by the Departments of Interior and Agriculture (*Federal Register*, Vol. 47, No. 173, September 7, 1982).

- **Wild river** — *To be classified as a **wild** river requires under…*
  • *Water resources development* — a river free of impoundments.
  • *Shoreline development* — an essentially primitive shoreline with little or no evidence of human activity. However, the presence of a few inconspicuous structures is acceptable. There is to be little or no evidence of past timber harvests and no ongoing timber harvest.
  • *Accessibility* — a river area generally inaccessible except by trail. No roads, railroads, or other provisions for vehicular travel exist. However, a few roads leading to the river boundary corridor are acceptable.
  • *Water quality* — a river meeting or exceeding federally approved state standards for aesthetics, propagation of fish and wildlife normally adapted to the river, and primary contact recreation.

- **Scenic river** — *To be classified as a **scenic** river requires under…*
  • *Water resources development* — a river free of impoundments.
  • *Shoreline development* — a largely primitive and undeveloped shoreline with no substantial evidence of human activity. However, the presence of small commu-

TABLE D–2, ELIGIBILITY AND CLASSIFICATION

Summary of Eligibility Determinations and Potential Classifications of Study Rivers

River / Stream		Parish	Length (mi)	Eligible	Possible Class
Big Creek		Grant	20.7	no	N/A
Fish Creek		Grant	13.9	no	N/A
Corney Bayou	segment A	Claiborne	2.8	no	N/A
	segment B	Claiborne	0.7	no	N/A
Middle Fork Bayou D'Arbonne		Claiborne	8.6	no	N/A
Castor Creek		Rapides	4.9	yes	scenic
Spring Creek		Rapides	27.4	no	N/A
Kisatchie Bayou		Natchitoches	40.5	yes	scenic
Drakes Creek		Vernon	11.2	yes	scenic
Six Mile Creek,	segment A	Vernon	4.8	yes	scenic
	segment B	Vernon	6.2	yes	scenic
Whisky Chitto Creek		Vernon	11.3	yes	recreational

nities, dispersed dwellings, or farm structures is acceptable if the forest appears natural from the riverbank.

• *Accessibility* — The river area may be accessible in places by road. Roads may occasionally reach or bridge the river. The existence of short stretches of conspicuous or longer stretches of inconspicuous roads or railroads is acceptable.

• *Water quality* — The Act prescribes no criteria for water quality. Poor water quality does not preclude classification, provided a water quality improvement plan exists or is being developed.

Recreational river — *To be classified as a* ***recreational*** *river requires under…*

• *Water resources development* — a river may have some existing impoundments or diversions. The existence of low dams, diversions, or modifications is acceptable if the waterway remains generally natural and riverine in appearance.

• *Shoreline development* — a shoreline may have some development with substantial evidence of human activity. The presence of extensive residential developments and a few commercial structures is acceptable. Lands may have been developed for a full range of agricultural or forestry uses and may show evidence of past or ongoing timber harvest.

• *Accessibility* — a river area readily accessible by roads or railroads. Parallel roads or railroads on one or both banks and bridge crossings are acceptable.

• *Water quality* — The Act prescribed no criteria for water quality. Poor water quality does not preclude classification, provided a water quality improvement plan exists or is being developed.

CLASSIFICATION SUMMARY

Table D–2 summarizes the results of the Forest's review of rivers and streams. This review identified no potential wild rivers on the Forest. It did indicate one potential recreational stream and five potential scenic streams.

TABLE D–3, DESIGNATED WATER USES

Summary of Water Uses for Kisatchie National Forest Streams

District and Watercourse	Designated Water Uses				
Catahoula District					
Big Creek	A	B	C	D	F
Fish Creek	A	B	C	F	
Caney District					
Middle Fork D'Arbonne	A	B	C	F	
Calcasieu, Evangeline Unit					
Castor Creek	A	B	C	F	
Spring Creek	A	B	C	F	
Kisatchie District					
Kisatchie Bayou	A	B	C	E	F
Calcasieu, Vernon Unit					
Drakes Creek	A	B	C	F	
East Fork, Six Mile	A	B	C	F	
West Fork, Six Mile	A	B	C	F	
Whiskey Chitto	A	B	C	F	

This is use of state waters as established by water quality standards provided in LAC 33:IX.1111.

A. Primary contact recreation — Any recreational or other water use in which there is prolonged and intimate body contact with the water. The contact would involve considerable risk of absorbing waterborne constituents through the skin or ingesting constituents from water in quantities sufficient to pose a significant health hazard. Examples include swimming, water skiing, and similar activities.

B. Secondary contact recreation — Any recreational or other water use in which bodily contact with the water is either incidental or accidental; and in which the probability of ingesting appreciable quantities of water is minimal. Such water uses include fishing, wading, recreational boating, and any other limited contact incidental to shoreline activity.

C. Propagation of fish and wildlife — Use of water for preservation and reproduction of aquatic biota, such as indigenous species of fish and invertebrates, as well as reptiles, amphibians, and other wildlife associated with the aquatic environment. Also includes the maintenance of water quality at a level that prevents contamination of aquatic biota consumed by humans.

D. Drinking water supply — Water that is for human consumption and general household use. This designation does not apply to their tributaries or distributaries unless so specified.

E. Agriculture — Involves the use of water for crop spraying, irrigation, livestock watering, poultry operations, and other farm purposes unrelated to human consumption.

F. Outstanding natural — Resource waters include water bodies designated for preservation, protection, reclamation, or enhancement of wilderness; and aesthetic qualities and ecological regimes, such as the Louisiana Natural and Scenic Rivers System; or waters of ecological significance designated by the Office of Water Resources, DEQ.

CATAHOULA RANGER DISTRICT

BIG CREEK

BIG CREEK

For the purposes of this eligibility study, Big Creek is evaluated from U.S. Highway 167, on the west, to where it exits the national forest boundary near Fishville, on the east. This evaluation considered a total of 20.7 miles. The majority of the creek — 16.9 miles — corridor is in private ownership. National forest lands border one side for 2.6 miles and both sides for an additional 1.2 miles. Big Creek lies entirely in Grant Parish and is included in the Louisiana Natural & Scenic Rivers System. See figure D–2.

Big Creek's average flow rate is 64 cubic feet per second. Its watershed drains about 51 square miles. The water quality is good, fully supporting primary and secondary contact recreation, fish and wildlife propagation, and the supply of drinking water.

A small weir is located just downstream of Pollock. It is under Forest Service special use permit to Rapides Parish Water District #3 and provides a municipal water supply. Although the impoundment minimally affects the flow of Big Creek, it does serve as a holding facility so water can be pumped to the water treatment plant. Other developments include two municipal sewage treatment plants serving the towns of Dry Prong and Pollock.

Parish Roads 110 and 158, Forest Road 145, LA Highway 8, and U.S. Highway 165 cross Big Creek, providing public access. A Trunkline Gas Co. pipeline and the Missouri Pacific Railroad also cross Big Creek. Also, the site of a former Civilian Conservation Corps recreation area on national forest land provides access to Big Creek.

Local parish officials are interested in Big Creek and the surrounding area. They once proposed the construction of a dam on Big Creek just north of Pollock, to create a 4,993-acre reservoir. Approximately 3,140 acres of private land and 1,853 acres of national forest land would be flooded if such action were taken.

Current recreational uses include swimming, canoeing, fishing, hunting, and camping. The Forest Service has one canoe launch site on Big Creek. The Louisiana Cooperative Extension Service's Camp Grant Walker and the local YMCA Camp operate adjacent to Big Creek, near Pollock. The stream also provides sites for several private camps.

There are 26 known or recorded archeological sites along Big Creek. Data indicates 7 sites per river mile. No known TES species live within the river corridor.

Eligibility of the 20.7-mile segment was determined by:

- **Scenic value** — Some development has occurred within the stream's lower reaches. However, a relatively high proportion of natural cover still exists along the river corridor. Big Creek's undeveloped character contributes to its scenic quality. A class C rating, *locally significant*, has been assigned to the stream.

- **Recreation value** — Current Big Creek recreational uses include swimming, fishing, hunting, camping, and canoeing. Camp Grant Walker and the YMCA Camp are adjacent to the stream. A class C rating, *locally significant*, has been assigned.

- **Geologic value** — Big Creek meanders for 20.7 miles, for this evaluation segment, through flat, alluvial bottomland. Elevations range from 200 to 33 feet above MSL, yielding a gradient of 7 feet per mile. A class D rating, *locally common to the forest*, has been assigned.

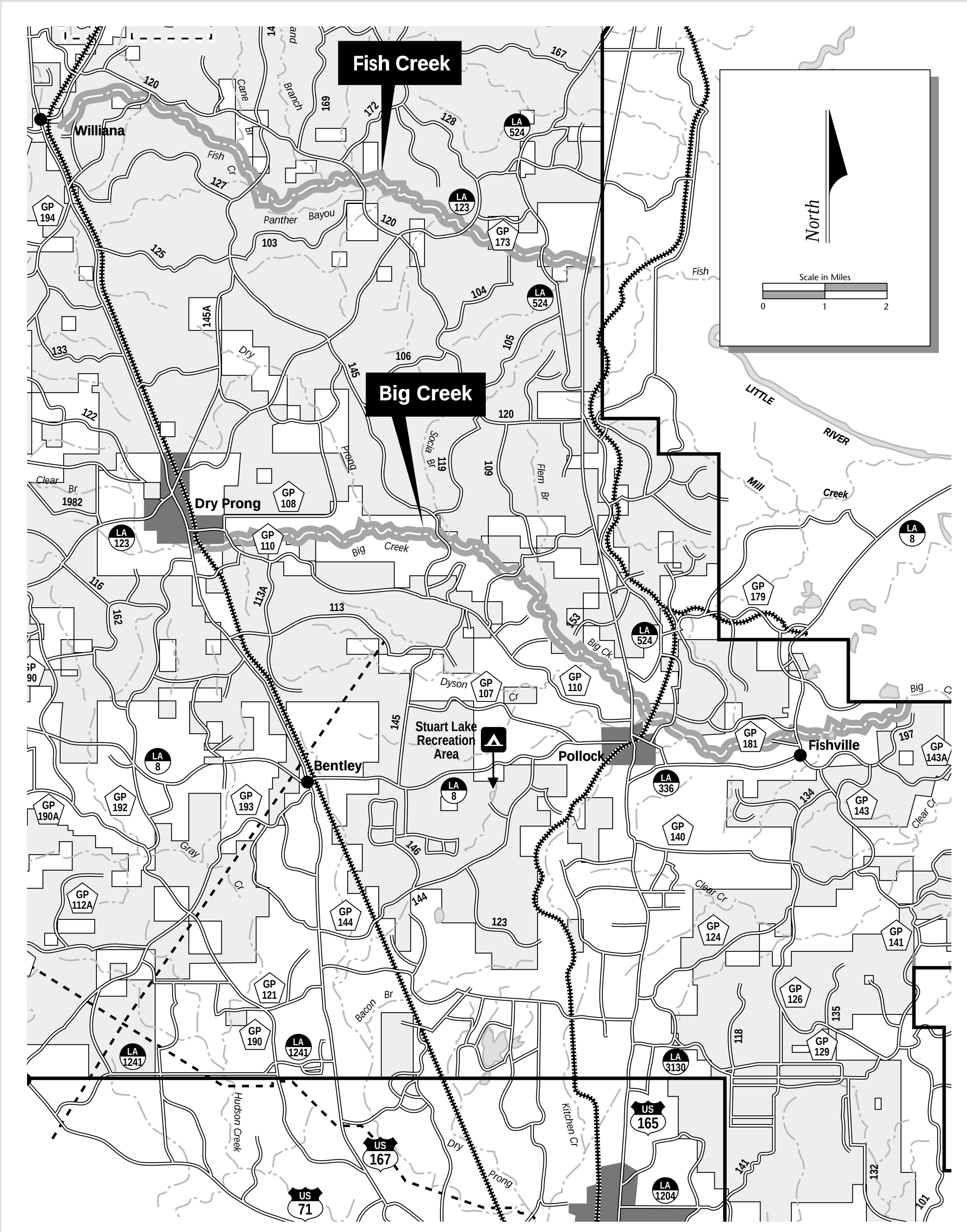
- **Wildlife values** — Throughout its lower length Big Creek is flanked by oak-gum bottomland forest interspersed with bald cypress. A wide variety of mammals, birds and invertebrates live in and along the stream; it supports good hunting opportunities. A class C rating, *locally significant*, has been assigned.

- **Fish and aquatic values** — Big Creek supports good game fish populations and abundant nongame fish. The stream and its tributaries provide great diversity in nongame fish habitat. A class C rating, *locally significant*, has been assigned.

- **Botanical and ecological values** — The U.S. Army Corps of Engineers identified more than 1,500 acres of wetlands along Big Creek. The riparian forest along the stream remains largely contiguous; however, some fragmentation exists along its lower reaches. No known sensitive plant sites occur along Big Creek. A class C rating, *locally significant*, has been assigned.

FIGURE D–2, CATAHOULA RANGER DISTRICT

Big Creek & Fish Creek



CATAHOULA RANGER DISTRICT

BIG CREEK

FISH CREEK

- **Historic and cultural values** — Of 26 archeological sites known or recorded along Big Creek, 25 are prehistoric and 1 is historic. The historic site and 11 prehistoric sites may have local or state significance respective to the National Register of Historic Places (NRHP) criteria. The Kisatchie site predictive model rates this corridor as having a high probability for containing significant sites. A class C rating, *locally significant*, has been assigned.

- **Eligibility determination** — Big Creek is ineligible for designation under the National Wild & Scenic Rivers Act. It has no outstanding scenic, recreational, geologic, wildlife, fish and aquatic, botanical and ecological, or cultural and historic values. For this reason Big Creek will not be studied further for designation under the National Wild & Scenic Rivers Act.

FISH CREEK

From its headwaters near Williana, to where it exits the Forest, this 13.9-mile evaluation segment of Fish Creek flows within Grant Parish. The stream is listed in the Louisiana Natural and Scenic River System. The majority of land ownership — approximately 11.7 miles — along Fish Creek is national forest. The remaining 2.2 miles are private. See figure D–2.

The Fish Creek watershed drains about 30 square miles. Its estimated average flow rate is 37 cubic feet per second. Water quality of the stream is considered *good* for all designated uses, including primary and secondary contact recreation, fish and wildlife propagation fully supported. See table D–3.

Beavers have dammed several of Fish Creek's tributaries, creating three large wetlands. These areas are relatively old, and now support ecologically diverse wetlands habitat. One beaver pond alone supports a population of epiphytic sedge. Occurrences of Louisiana bluestar (*Amsonia ludoviciana*) are known near Williana, and may occur along Fish Creek. Kentucky lady's slipper (*Cypripedium kentuckiense)* is found several miles north, but it too may occur along the stream.

The public can access Fish Creek by Forest Service Roads 165, 145 and 120; Louisiana Highways 123 and 524; and U.S. Highway 165. There are no developed recreation areas along Fish Creek.

Forest types here generally range from oak-gum bottomland, to the beech-magnolia typifying large open bottoms along Fish Creek's attractive lower reaches. This stream's shallow water and numerous channel obstructions would present difficulty to canoeists. Common recreation activities include fishing, hunting, and camping.

Among 12 known or recorded archeological sites along Fish Creek, 9 are prehistoric and 3 are historic. Data thus far predict 8 sites per river mile.

Eligibility of the 13.9-mile segment was determined by:

- **Scenic value** — The stream corridor remains largely undeveloped and supports a variety of natural vegetation which offers a high potential for scenic quality. The lower reaches of Fish Creek are particularly attractive, where stands of bald cypress intersperse open beech-magnolia forests. A class C rating, *locally significant*, has been assigned.

- **Recreational value** — No developed recreation areas exist along Fish Creek, and recreational access is limited to road crossings. The stream offers some fishing opportunities, but is too small for extended canoeing. A class D rating, *locally common to the forest*, has been assigned.

- **Geologic value** — Fish Creek meanders through flat, alluvial bottomland for 13.9 miles before leaving the National Forest boundary. Base flow is sustained by shallow ground water systems. Elevations range from 255 to 35 feet above MSL with a resulting gradient of 6 feet per mile. A class D rating, *locally common to the Forest*, has been assigned.

- **Wildlife values** — Wildlife populations are considered optimal for the habitat. The area supports good squirrel and deer hunting. Beaver activities have created three large wetlands along Fish Creek. These areas provide good wetlands habitat. A class C rating, *locally significant*, has been assigned.

- **Fish and aquatic values** — Various sunfish, catfish, minnows, shiners and darters are common. The fisheries habitat is good; its gravel riffles, silty pools, and in-stream obstructions, provide aquatic organisms a variety of cover. A class C rating, *locally significant*, has been assigned.

- **Botanical and ecological values** — The riparian corridor along Fish Creek is largely contiguous, with little fragmentation. Louisiana bluestar occurs at several sites near Williana, and perhaps along Fish Creek as well. Although Kentucky lady's slipper is found several miles north, it too could be found along this stream. Epiphytic sedge grows at one beaver pond along Fish Creek, but no TES species have been discovered there. A class C rating, *locally significant*, has been assigned.

- **Historic and cultural values** — Approximately 1.5 miles of the Forest Service-owned corridor (one side only) has been archaeologically surveyed. Of 12 recorded sites, 9 are prehistoric and 3 are historic. One known prehistoric site may be eligible for nomination to the NRHP; it must be formally evaluated. The Kisatchie site predictive model rates the river corridor as having a high probability for containing significant sites. A class C rating, *locally significant*, has been assigned.

- **Eligibility determination** — Fish Creek is not eligible for designation under the National Wild & Scenic Rivers Act. It lacks outstanding scenic, recreational, geologic, wildlife, fish and aquatic, botanical and ecological, or cultural and historic values. For this reason it will not be studied further for designation under the National Wild & Scenic Rivers Act.

CANEY RANGER DISTRICT

CORNEY BAYOU

MIDDLE FORK BAYOU D'ARBONNE

CORNEY BAYOU

For purposes of this eligibility study, Corney Bayou is divided into 2 segments, A and B, for a combined length of 3.5 miles. Segment A is evaluated from where it enters the Forest boundary, south to the headwaters of Corney Lake. Segment B is evaluated from Corney Lake dam, south to where it exits the Forest boundary. All portions evaluated here lie entirely within Claiborne Parish. See figure D–3.

Most of the land — about 2.8 miles — along both sides of the bayou is national forest. The remaining 0.7 mile is private land. Corney Bayou is listed by the Nationwide Rivers Inventory and is included in the Louisiana Natural & Scenic Rivers System.

- **Segment A** — From where Corney Bayou enters the Forest boundary south to Corney Lake, 2.8 miles.

  Most of the land — 2.1 miles — along this segment is national forest. Private land comprises the remaining 0.7 mile. The flow rate on the upper reaches of Corney Bayou is approximate 260 cubic feet per second. Corney Bayou watershed above Corney Lake drains 405 square miles, about 225 square miles of which are in Louisiana. The water quality fully supports designated uses: primary and secondary contact recreation, fish and wildlife propagation. See table D–3.

  This segment of Corney Bayou is sometimes flooded by the lake, and is thus not considered free-flowing. Because of this it does not qualify under the National Wild & Scenic Rivers Act and is dropped from further consideration.

- **Segment B** — From Corney Lake dam to where it exits the Forest boundary.

  This 0.7-mile segment is entirely on national forest. Heavy suspended sediment load from the lake and severe stream bank erosion on the spur dike threaten its water quality. During flood periods, deposits of sediment accumulate in the adjacent flood plain and riparian areas — which may result in considerable tree mortality and other riparian damage. Substantial amounts of sediment from upstream are being deposited in Kidd Lake, a natural lake.

  Water flow into the segment is controlled by Corney Lake dam. There is no significant inflow from other Forest streams into the bayou below the dam before it exits national forest. This segment of Corney Bayou is therefore not considered free-flowing. Consequently, it does not qualify under the National Wild & Scenic Rivers Act and is dropped from further consideration.

MIDDLE FORK BAYOU D'ARBONNE

The evaluation of Middle Fork Bayou D'Arbonne begins where it enters the Forest and ends where it exits near Louisiana Highway 9. National forest land ownership encompasses approximately 6.4 miles of this segment of Middle Fork. The remaining 2.2 miles of shoreline is private land. Middle Fork is listed by Louisiana as a state natural & scenic stream. See figure D–3.

Middle Fork Bayou D'Arbonne watershed drains 216 square miles. Its average discharge rate is 223 cubic feet per second. Water quality is considered good. It fully supports designated primary and secondary contact recreation, fish and wildlife propagation, and is an outstanding natural water resource. See table D–3. Numerous oil and gas wells along the bayou could threaten water quality.

The public can access Middle Fork from Louisiana Highways 9 and 520 or Forest Service Road 911. ArkLa Gas and Associated Natural Gas pipelines cross Middle Fork. Current recreation uses include fishing, hunting, camping, and crawfishing. Fishing is considered average. Squirrel, deer, and turkey hunting are good. No known TES occur along Middle Fork; however, there is potential for the occurrence of 2 conservation species, American pinesap and false-Solomon's seal.

Six prehistoric archeological sites are known at this location. None are eligible for nomination to the NRHP, although one potentially eligible prehistoric site lies just beyond the 1/4-mile corridor.

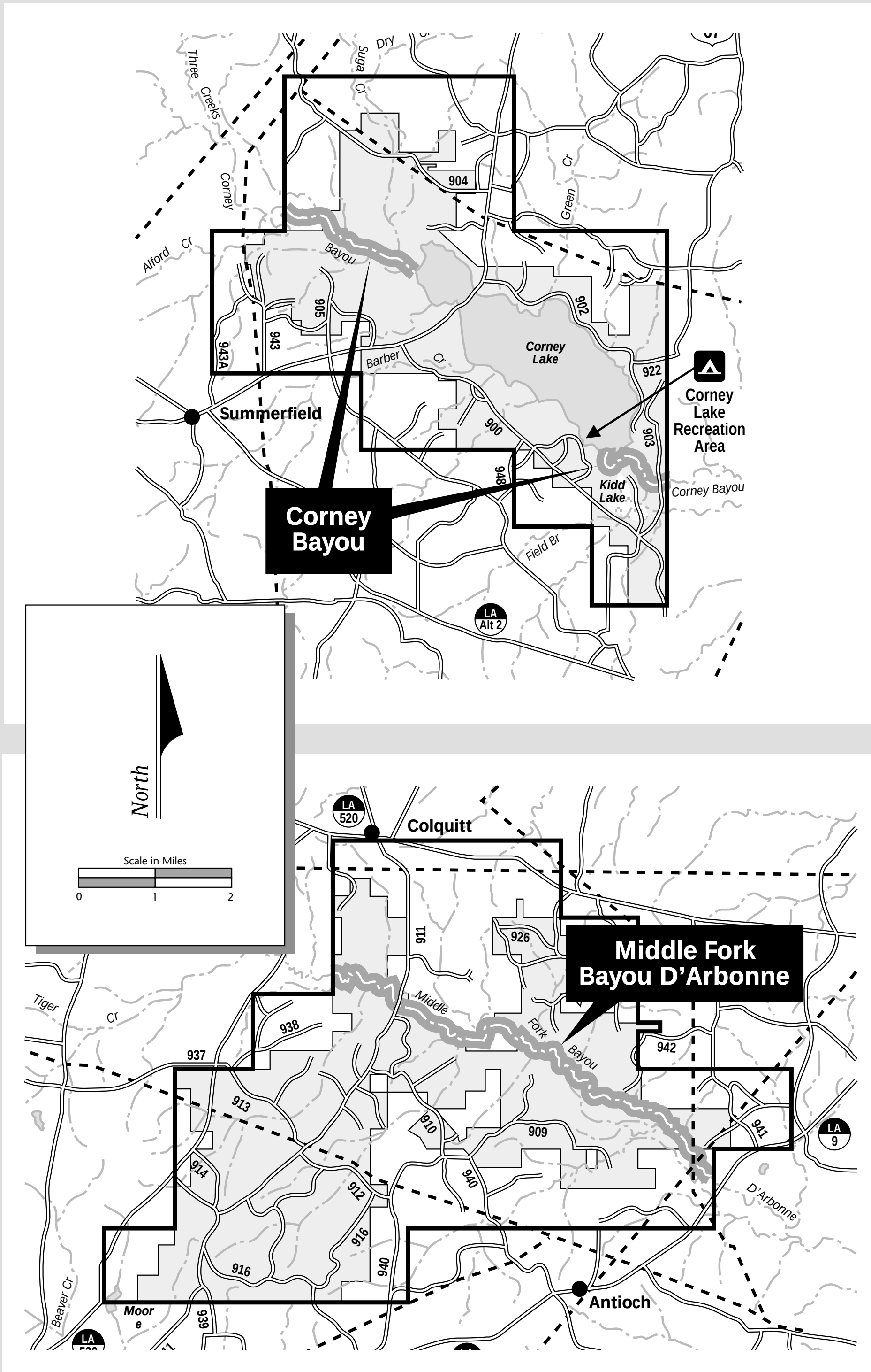
CANEY RANGER DISTRICT

CORNEY BAYOU

MIDDLE FORK BAYOU D'ARBONNE

FIGURE D–3, CANEY RANGER DISTRICT

Corney Bayou & Middle Fork Bayou D'Arbonne



CANEY RANGER DISTRICT

MIDDLE FORK BAYOU D'ARBONNE

The eligibility of this 8.6-mile segment was determined by:

- **Scenic value** — Although the majority of Middle Fork Bayou D'Arbonne remains undeveloped, several oil and gas wells along the corridor detract from its scenic quality. Attractive hardwood bottoms, flanked by upland mixed pine-hardwood, line the corridor. A class C rating, *locally significant*, has been assigned.

- **Recreational value** — Recreational access to Middle Fork is limited primarily to bridge crossings. Current recreation uses include fishing, crawfishing, hunting, and camping. A class D rating, *locally common to the Forest*, has been assigned.

- **Geologic value** — Middle Fork Bayou D'Arbonne meanders through flat, alluvial bottomland, and shallow ground water systems sustain its base flow. Elevations range from 280 to 80 feet above MSL. A class D rating, *locally common to the Forest*, has been assigned.

- **Wildlife value** — Game species populations are probably optimum for the habitat carrying capacity. Nongame species diversity is moderate-to-high. Deer, squirrel, rabbit, and waterfowl are common, and the area offers good hunting. No known TES species occur within the stream corridor. A class C rating, *locally significant*, has been assigned.

- **Fish and aquatic values** — Sunfish, and smaller species such as shiners, darters, chubs, and minnows are common. The populations of sports fisheries are fair-to-moderate, thereby limiting fishing opportunities. A class D rating, *locally common to the Forest*, has been assigned.

- **Botanical and ecological values** — The riparian forest along Middle Fork Bayou D'Arbonne is somewhat fragmented, due to oil and gas exploration activities and timber harvest operations. No known TES species occur along this segment of Middle Fork; however, there is potential for occurrence of two conservation species, American pinesap and false-Solomon's seal. A class D rating, *locally common to the Forest*, has been assigned.

- **Historic and cultural values** — Less than 3/4 mile of the Forest Service corridor has been archaeologically surveyed, and 6 prehistoric sites are recorded. None are eligible for nomination to the NRHP, although one potentially eligible prehistoric site lies just beyond the 1/4-mile corridor. Data are insufficient to indicate the site frequency per river mile; however, the Kisatchie site predictive model rates the corridor as having high probability for containing significant sites. A class D rating, *locally common to the Forest*, has been assigned.

- **Eligibility determination** — Because it lacks outstanding scenic, recreational, geologic, wildlife, fish and aquatic, botanical and ecological, or cultural and historic values, Middle Fork Bayou D'Arbonne is ineligible for designation under the National Wild & Scenic Rivers Act. It will receive no further study for designation.

CASTOR CREEK

For the purposes of this eligibility study, Castor Creek is evaluated from the convergence of Clear Creek and Brushy Creek to form Castor Creek before it flows into the swamps of Bayou Beouf. Castor Creek is located entirely within the Evangeline Unit. It flows for about 4.9 miles; 3.4 miles through national forest and 1.5 miles through private land that lies within the national forest proclamation boundary. See figure D–4.

The Castor Creek watershed is approximately 8.1 square miles, with an average discharge rate of about 13.2 cubic feet per second. Sustained by ground water base flow in the drier months, the water level varies from shallow glides to deep pools.

No developed recreation areas exist along Castor Creek; however, the Magnolia Forest Walk and the Wild Azalea National Recreation Trail cross this stream. It also flows through the Castor Creek Scenic Area. Forest Service roads 273 and 287 provide public access. Current recreation uses include swimming and wading, hiking, hunting, fishing, and camping.

Castor Creek contains one known bed of the threatened Louisiana pearlshell mussel, *Margaritifera hembeli* — a population of at least 50 — plus scattered individual occurrences. Two sensitive plant species are also known to occur here: barbed rattlesnake root and Kentucky lady's slipper. Among 20 recorded prehistoric sites, 8 may show potential for NHRP listing. The Kisatchie site predictive model rates the corridor's probability for containing significant sites as extremely high.

Eligibility of the 4.9-mile segment was determined by:

- **Scenic value** — The undeveloped character and the width of the Castor Creek hardwood bottom contributes to its scenic quality. High channel banks along the creek also add scenic value. A class C rating, *locally significant*, has been assigned.

- **Recreational value** — There are no developed sites along Castor Creek; however, Magnolia Forest Walk and Wild Azalea Trail both cross the stream, which also flows through Castor Creek Scenic Area. The now-abandoned Castor Plunge swimming area was once a locally popular recreation area. Current recreational activities include swimming and water play activities, hiking, hunting, fishing, and camping. A class D rating, *locally common to the Forest*, has been assigned.

- **Geologic value** — This segment of Castor Creek meanders through flat alluvial bottomland. Its high channel banks are common to local creeks. A class D rating, *locally common to the Forest*, has been assigned.

- **Wildlife values** — A wide variety of game and nongame species live in and along the stream. Castor Creek supports good hunting opportunities. No known TES species occur within the river corridor. A class C rating, *locally significant*, has been assigned.

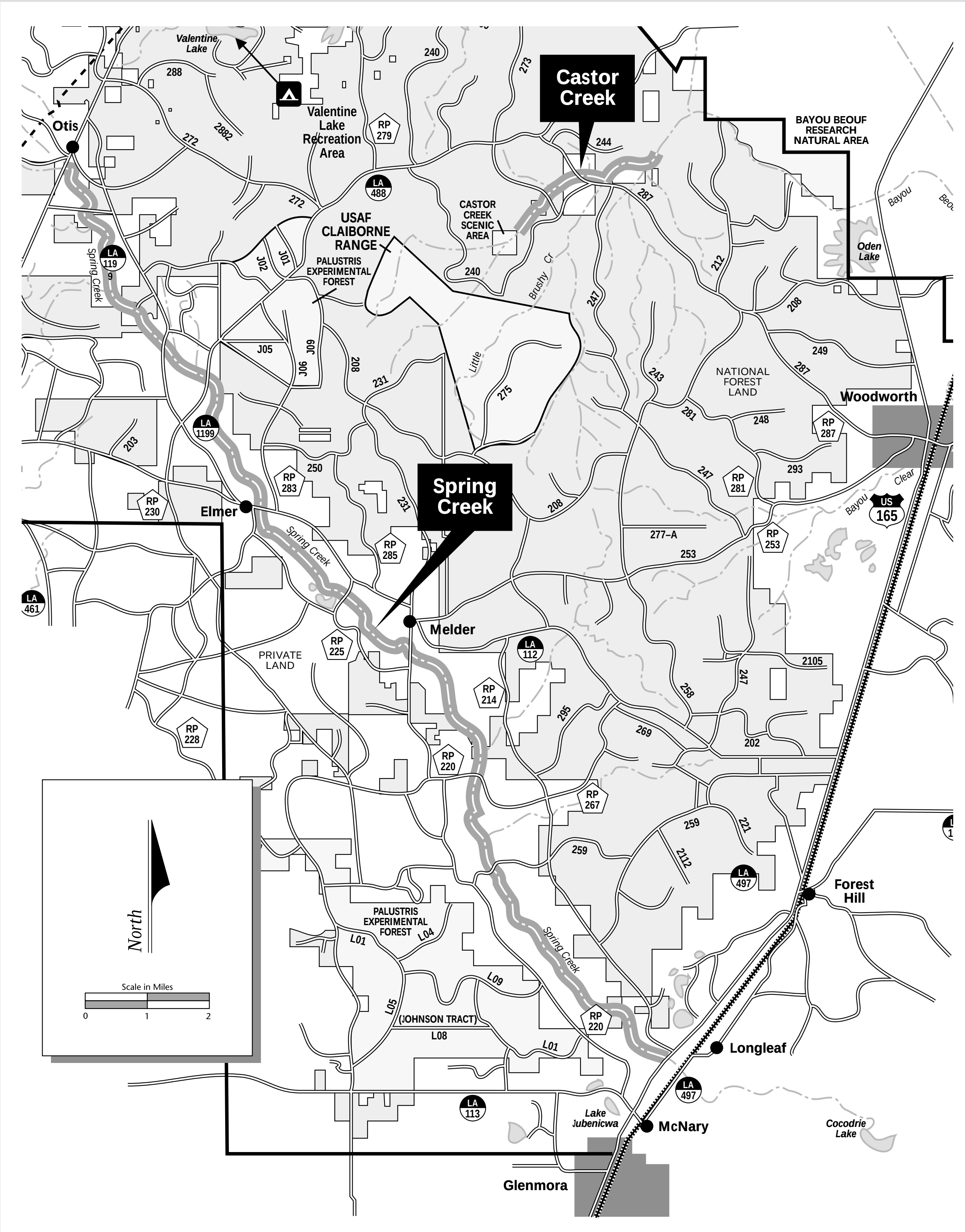
- **Fish and aquatic values** — The threatened Louisiana pearlshell mussel inhabits portions of Castor Creek. The mussel is known to occur only in Red River and Bayou Beouf tributaries, and is currently seen only in certain central Louisiana streams. A class B rating, *regionally significant*, has been assigned.

- **Botanical and ecological values** — Castor Creek's riparian corridor is mostly contiguous. Flowing through the Castor Creek Scenic area, it is one tributary feeding the Bayou Beouf Research Natural Area. Two sensitive plant species occur along Castor Creek: barbed rattlesnake root and Kentucky lady's slipper. Both grow near the Magnolia Forest Walk. A class C rating, *locally significant*, has been assigned.

- **Historic and cultural values** — Approximately 2.5 river miles have been archeologically surveyed. Among 20 recorded prehistoric sites, 8 may have potential for NRHP listing. The Castor Creek corridor has received relatively intense archeological study; thus the reliability of a predicted frequency of 8 sites per river mile is relatively high. The site predictive model rates the corridor as extremely high in the probability of significant site existence. A class C rating, *locally significant*, has been assigned.

FIGURE D–4, CALCASIEU RANGER DISTRICT

Castor Creek & Spring Creek



- **Eligibility determination** — Castor Creek is eligible for designation under the National Wild & Scenic Rivers Act. It is free-flowing, and its fish and aquatic values are outstandingly remarkable.

- **Classification determination** — According to the criteria in *FSH 1909*, Chapter 8, the entire 4.9 miles qualifies for inclusion in the Wild & Scenic Rivers System under the *scenic* classification. The stream does not qualify as *wild* because several Forest Service roads cross it.

SPRING CREEK

For the purposes of this eligibility determination, Spring Creek is evaluated from its headwaters near Otis, south to where it exits the Forest boundary on U.S. Highway 165 near Glenmora. On this 27.4-mile segment, 25.5 miles — the majority of ownership — is private; only 1.9 miles flow through national forest land. Both the Nationwide Rivers Inventory and the Louisiana Natural & Scenic Rivers System list this stream. See figure D–4.

Spring Creek drains approximately 63 square miles. Its average rate of flow is 93 cubic feet per second. Most of its tributaries flow year-round because of base flow from springs and seeps. The stream's water quality for designated uses is threatened by industrial and municipal uses; forest harvesting practices; a high density of roads and bridges; and resource extraction, exploration, and development for sand and gravel. See table D–3.

The public accesses Spring Creek via Forest Road 2789; Parish Roads 256, 220, 267, 2144; Louisiana Highways 121, 199, 112; and U.S. Highway 165. No developed recreation areas exist on this stream, but many gravel pits are sited along its length, some of which deposit silt downstream. Also, numerous agricultural and forestry-related clearings along the stream detract from its scenic values.

Current recreational uses include fishing, swimming, canoeing, hunting, and camping. Although no archeological sites are recorded, the corridor is proximal to known historic and perhaps prehistoric travel routes. No known threatened, endangered, or sensitive species occur along the stream.

Eligibility of this 27.4-mile segment was determined by:

- **Scenic value** — Numerous agricultural and forestry-related clearings, sand and gravel pits, and a high density of roads occur along Spring Creek. The portions of stream corridor with natural vegetation are attractive. A class C rating, *locally significant*, has been assigned.

- **Recreational value** — The upper reach of Spring Creek is difficult to navigate; however, one section below Amiable Church is used by canoeists. Other recreational uses include swimming and wading, hunting, and camping. No developed recreation areas exist along the stream. Public access is available at bridge crossings. A class C rating, *locally significant*, has been assigned.

- **Geologic value** — Spring Creek meanders through flat alluvial bottomland. Shallow ground water systems sustain its base flow. At one spot along the creek slow erosion on resident clay deposits has produced a small waterfall. A class C rating, *locally significant*, has been assigned.

- **Wildlife values** — The mixed pine-hardwood habitat throughout the course of Spring Creek makes for a diverse hardwood riparian association. Wildlife in the area includes whitetail deer, squirrel, rabbit, and many birds. No known TES species occur within the river corridor. A class D rating, *locally common to the Forest*, has been assigned.

- **Fish and aquatic values** — The fish habitat is gravel riffle with silty bottom pools, which, combined with in-stream obstructions, provide excellent fish and invertebrate habitats. Spring Creek supports an excellent bass population and quality fishing. A class C rating, *locally significant*, has been assigned.

- **Botanical and ecological values** — Natural vegetation along Spring Creek has been fragmented by agriculture and forestry-related activities; and the exploration and development of sand and gravel resources. No known TES species are found within the stream corridor. A class D rating, *locally common to the Forest*, has been assigned.

CALCASIEU RANGER DISTRICT, EVANGELINE UNIT

SPRING CREEK

- **Historic and cultural values** — No archeological sites are recorded along the portion of the stream's corridor administered by the Forest Service. However, because it is proximal to known historic and perhaps prehistoric transportation routes, sites of local or state significance may be expected. The Kisatchie site predictive model rates the corridor's probability as high for the existence of significant sites. A class C rating, *locally significant*, has been assigned.

- **Eligibility determination** — Spring Creek is ineligible for designation under the National Wild & Scenic Rivers Act. It has no outstandingly remarkable scenic, recreational, geologic, wildlife, fish and aquatic, botanical and ecological, or historical and cultural values. For this reason, Spring Creek will not be studied further for designation under the National Wild & Scenic Rivers Act.

KISATCHIE RANGER DISTRICT

KISATCHIE BAYOU

KISATCHIE BAYOU

For the purposes of this eligibility study, Kisatchie Bayou is evaluated between its entrance to and exit from the Kisatchie National Forest boundary. This evaluation segment of Kisatchie Bayou meanders for about 40.5 miles. Roughly 21.2 miles of it lies within Forest Service ownership. The remaining 19.3 miles flow through private land. Kisatchie Bayou is listed in the Nationwide Rivers Inventory and is listed by the State of Louisiana as a Natural & Scenic River. See figure D–5.

The Kisatchie Bayou watershed drains 140 square miles. Its average flow rate is 219 cubic feet per second. Water quality along Kisatchie Bayou is considered fair for some designated uses of primary and secondary contact. See table D–3.

Several developed and undeveloped recreation areas line Kisatchie Bayou, including Kisatchie Bayou Camp, Red Bluff Camp, and Kisatchie Falls. Forest Roads 303, 337, 350; Louisiana Highway 117; Longleaf Scenic Byway; and the Caroline Dormon Trail provide access.

Current recreation use on Kisatchie Bayou includes canoeing, swimming, wading, hunting, camping, and fishing. Kisatchie Bayou supports canoeing throughout most of the year; however, low flows during the mid- to late-summer months necessitate frequent portaging. The fisheries habitat along Kisatchie Bayou is one of few in the local area supporting warm water fly fishing or wade fishing.

Kisatchie Bayou's sandstone formations are unique for Louisiana. These exposed strata of the Kisatchie Hills area have created bluff outcroppings, small waterfalls, and small whitewater rapids, all of which are found along this segment of Kisatchie Bayou.

General forest types change over the course of Kisatchie Bayou, starting with oak-gum-hickory, transitioning to beech-magnolia until it reaches Cunningham Brake, where the forest type becomes a cypress-tupelo gum swamp. In 1990 the 1,731-acre Cunningham Brake was designated as a research natural area (RNA).

Louisiana bluestar is known to occur within 1/2 mile of Kisatchie Falls, and along several of Kisatchie Bayou's tributaries. Clammy weed and nodding pogonia are known to occur in the Cunningham Brake area. These three plants are listed as conservation species, by the Forest Service's Southern Region. Three prehistoric sites are known, one of which may have local or state significance. This site will require formal evaluation with respect to NRHP criteria.

Eligibility of this 40.5-mile segment was determined by:

- **Scenic value** — Kisatchie Bayou remains almost entirely undeveloped, with attractive natural features such as high bluffs, rock outcroppings, small waterfalls, and large sandbars — contributing to high scenic quality and a general feeling of solitude. A class B rating, *regionally outstanding*, has been assigned.

- **Recreational value** — Most canoeing occurs on Kisatchie Bayou's downstream reaches. Several developed and undeveloped areas provide good access — including Kisatchie Bayou Camp, Red Bluff Camp, and Kisatchie Falls. The Longleaf Scenic Byway and the Caroline Dormon Trail also provide access. Kisatchie Bayou Camp is the Kisatchie District's most heavily used recreation site, and uncommon sandstone formations here attract numerous visitors from outside the local area. A class B rating, *regionally outstanding*, has been assigned.

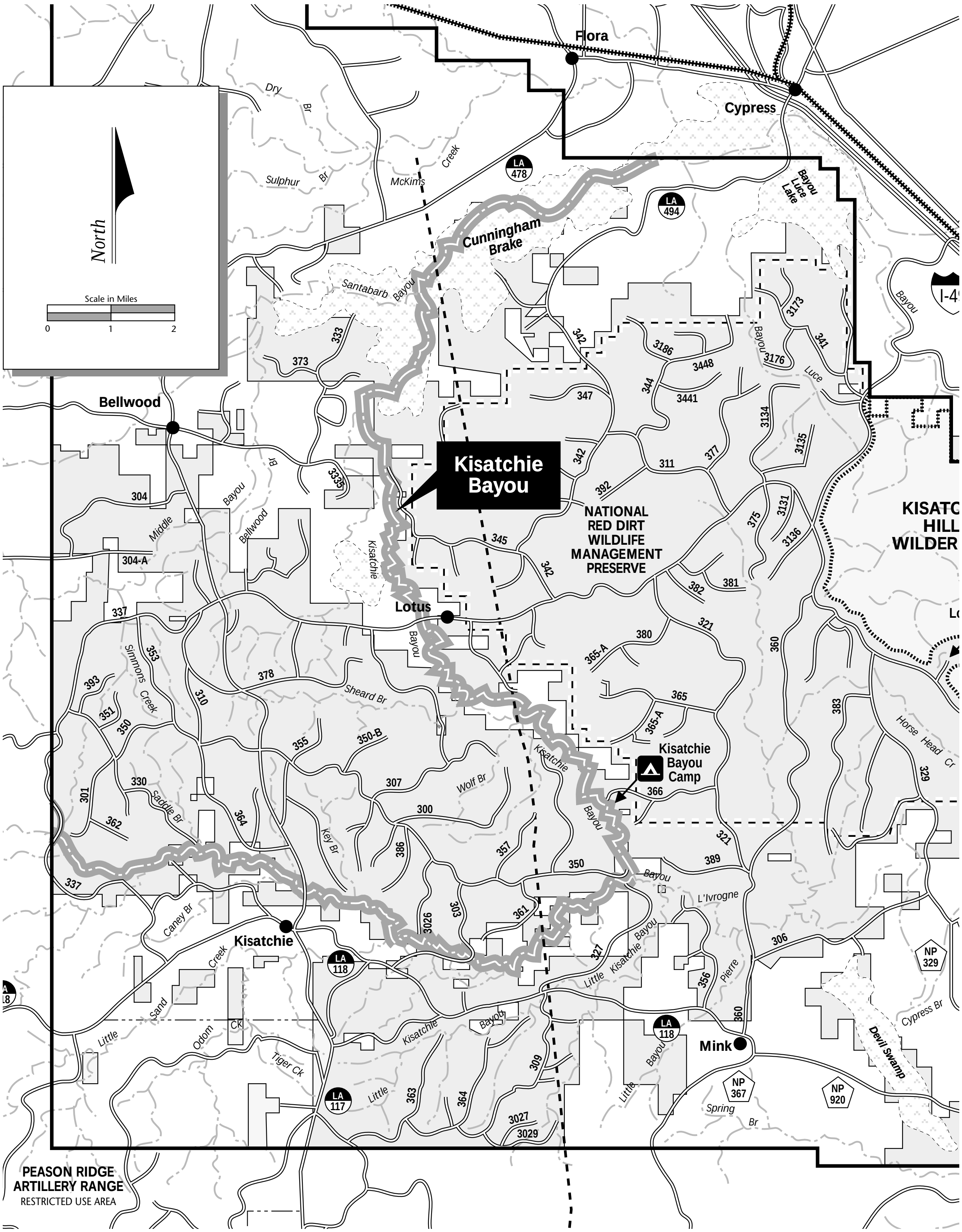
- **Geologic value** — Kisatchie Bayou meanders through flat alluvial bottomland surrounded by the Kisatchie Hills. Geologic strata are exposed in the stream's channel banks, and the streambed gradients caused by rock formations have resulted in small whitewater rapids and waterfalls. A class B rating, *regionally outstanding*, has been assigned.

- **Wildlife values** — Habitat throughout the course of Kisatchie Bayou is oak-gum-hickory, with transitions to beech-magnolia and cypress-tupelo stands. Wildlife populations are considered optimal for the habitat — including whitetail deer, squirrel, rabbit, and other fur bearers. Nongame species diversity is considered moderate-to-high. A class C rating, *locally significant*, has been assigned.

- **Fish and aquatic values** — The fisheries habitat is considered good, having gravel riffle and pools with silty sand bottoms. The fish community is composed of small species such as darters, chubs, shiners,

FIGURE D–5, KISATCHIE RANGER DISTRICT

Kisatchie Bayou



KISATCHIE RANGER DISTRICT

KISATCHIE BAYOU

minnows, and game fish such as Kentucky striped bass and catfish. Kisatchie Bayou provides excellent fishing opportunities. No known TES species live in this stream. A class C rating, *locally significant*, has been assigned.

- **Botanical and ecological values** — General forest types change over the course of Kisatchie Bayou, starting with oak-gum-hickory and transitioning to beech-magnolia until it reaches Cunningham Brake Research Natural Area, where the forest type changes to a cypress-tupelo gum swamp. The riparian corridor remains largely contiguous along Kisatchie Bayou, with little fragmentation. Louisiana bluestar thrives within 1/2 mile of Kisatchie Falls and along several of the tributaries to Kisatchie Bayou. Clammy weed and nodding pogonia grow in the Cunningham Brake area. These plants are all listed as conservation species. A class B rating, *regionally outstanding*, has been assigned.

- **Historic and cultural values** — Archeological surveys have been carried out on less than 1/2 mile — on only one side — of the national forest portion of the corridor. Three prehistoric sites are known, one of which may have local or state significance. This site will require formal evaluation with respect to NRHP criteria. Current data are insufficient to make reliable predictions regarding expected sites per mile. The Kisatchie site predictive model rates the corridor as having a high probability for containing significant sites. A class C rating, *locally significant*, has been assigned.

- **Eligibility determination** — Kisatchie Bayou is eligible for designation under the National Wild & Scenic Rivers Act. It is free-flowing and has outstandingly remarkable scenic, recreational, geologic, and botanical and ecological values.

- **Classification determination** — According to criteria in *FSH 1909*, Chapter 8, the total 40.5 miles qualifies for inclusion in the system under the *scenic* classification.

CALCASIEU RANGER DISTRICT, VERNON UNIT

DRAKES CREEK

DRAKES CREEK

For the purposes of this eligibility study, Drake's Creek is evaluated from where it enters the limited use area boundary of the Vernon Unit (Forest Road 405) to where it exits the Forest boundary. Approximately 8.4 miles of the creek corridor are bordered on both sides by national forest land, and approximately 0.3 mile is bordered by national forest lands on one side. The remaining 2.5 miles is in private ownership, primarily on the stream's lower reaches. See figure D–6.

Drakes Creek drains approximately 6.5 square miles, with depths ranging from 1/2 foot to 5 feet. It produces a flow rate of about 9 cubic feet per second. Water quality is considered good, and fully supports primary and secondary contact recreation, and fish and wildlife propagation. See table D–3.

Forest Service roads 405, 412 and 400; Parish roads 402 and 431; and Louisiana Highway 10 all provide public access to Drakes Creek. The now-abandoned Santa Fe railroad bed also provides access. Although the stream offers no developed recreation areas, current recreation uses here include fishing, hunting, and camping.

Drakes Creek tributaries drain the Drakes Creek Natural Area and the Longleaf Scenic Area. Within the 1/4-mile Drakes Creek corridor are 3 known bog plant communities, containing large-leaved rose gentian and bog button. Archeological surveys on roughly 2.75 stream miles have recorded 21 prehistoric sites, 8 of which are considered potentially eligible for NHRP listing.

Eligibility of this 11.2-mile segment was determined by:

- **Scenic value** — Drakes Creek remains largely undeveloped. It supports a variety of natural vegetation and offers high scenic quality potential. General forest types range from hardwood-pine to oak-gum-hickory, interspersed with beech-magnolia. A class C rating, *locally significant*, has been assigned.

- **Recreational value** — No developed recreation areas exist along Drakes Creek. Current recreation activities consist primarily of fishing, hunting, and camping. The stream offers good creek fishing opportunities. A class D rating, *locally common to the Forest*, has been assigned.

- **Geologic value** — Drakes Creek meanders through flat alluvial bottomland. Three known bog plant communities occur along Drakes Creek on special soils with high water tables. A class B rating, *regionally outstanding*, has been assigned.

- **Wildlife values** — Game species are probably optimum for the habitat's carrying capacity. Drakes Creek supports good hunting. Nongame species diversity ranges from moderate to high. A class C rating, *locally significant*, has been assigned.

- **Fish and aquatic values** — Drakes Creek fish populations could be considered good. The stream supports good fishing. Nongame species here could also be considered good. No known TES species live within the stream corridor. A class C rating, *locally significant*, has been assigned.

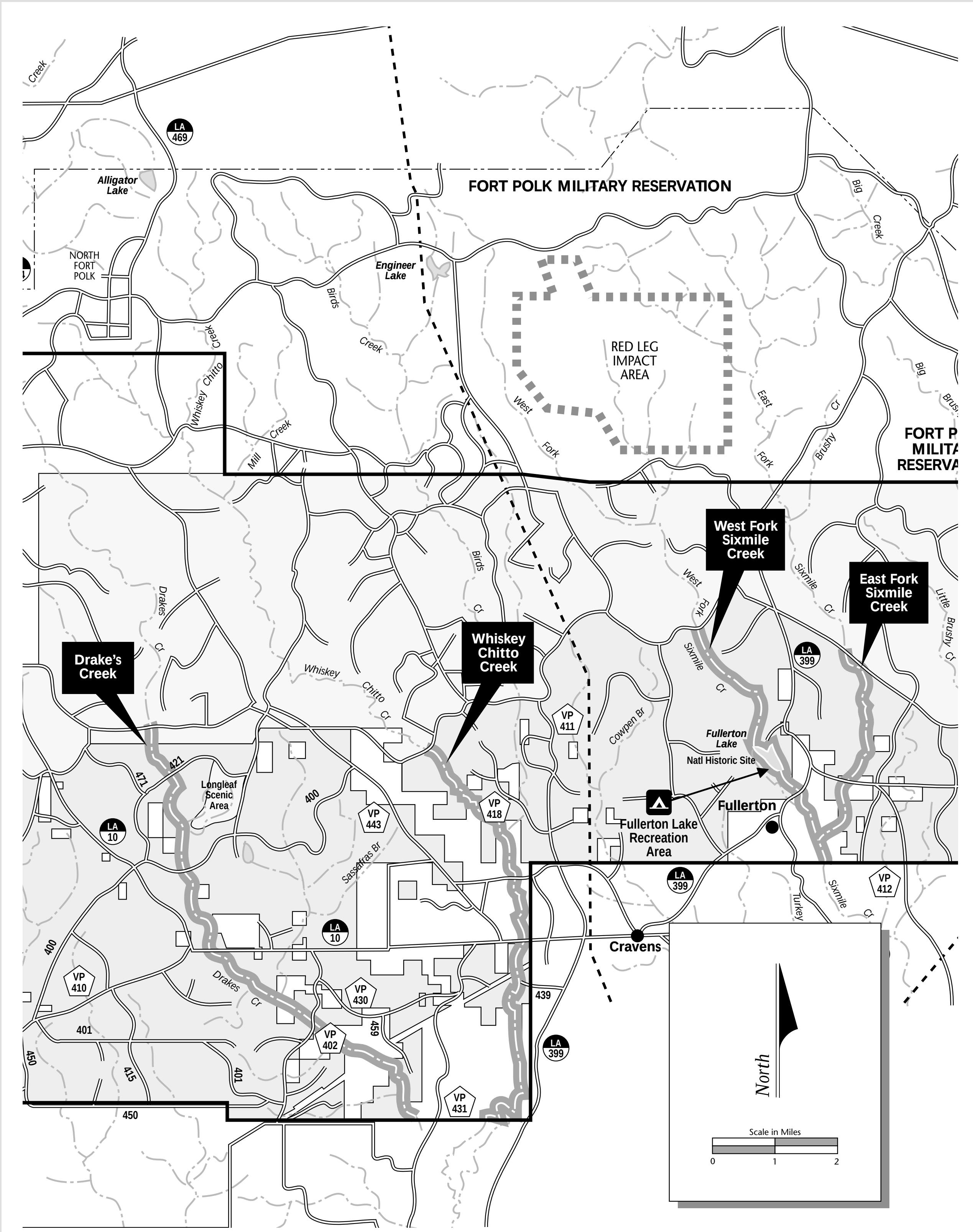
- **Botanical and ecological values** — Drakes Creek tributaries drain the Drakes Creek Natural Area and the Longleaf Scenic Area. The riparian corridor is largely contiguous, with little fragmentation. Special soils and high water tables within the 1/4-mile stream corridor support three known bog plant communities. Large-leaved rose gentian and bog button are known to occur in these bogs and are respectively listed as a conservation and a sensitive species. A class B rating, *regionally outstanding*, has been assigned.

- **Historic and cultural values** — Among 21 known archeological sites, 8 are considered potentially eligible for NHRP listing. Data suggests a frequency of slightly more than 7.5 sites per stream mile. The Kisatchie site predictive model rates the corridor as extremely high in probability for the existence of significant sites. A class C rating, *locally significant*, has been assigned.

- **Eligibility determination** — Drakes Creek is eligible for designation under the National Wild & Scenic Rivers Act. It is free-flowing and has outstandingly remarkable geologic, and botanical and ecological values.

FIGURE D–6, CALCASIEU RANGER DISTRICT

Drakes Creek • Six-Mile Creek • Whiskey Chitto Creek



CALCASIEU RANGER DISTRICT, VERNON UNIT

DRAKES CREEK

SIX MILE CREEK

- **Classification determination** — According to the criteria in *FSH 1909*, Chapter 8, the entire 11.2 miles qualifies for inclusion in the system under the *scenic* classification.

SIX MILE CREEK

For the purposes of this evaluation, Six Mile Creek is divided into two segments. Segment A is described as the East Fork and segment B the West Fork.

Both segments begin at the limited-use area boundary of the Vernon Unit at Forest Road 405. They flow south to merge and form Six Mile Creek where it exits the Forest boundary. Both are included in the state's Natural and Scenic Rivers System. Approximately 3.8 miles of shoreline along East Fork are on national forest land and 1.0 miles lie within private ownership. West Fork flows through approximately 5.1 miles of national forest land before passing through 1.1 miles of private land. See figure D–6.

The combined flow rate of both forks is approximately 70 cubic feet per second. Six Mile watershed drains approximately 45 square miles. Extensive woody debris in the creek would make canoeing difficult. Water quality is considered good, with all designated uses fully supported. See table D–3.

SEGMENT A — East Fork of Six Mile, 4.8 miles

East Fork has no developed recreation areas, but has public access via Louisiana Highway 399 and Forest Road 405. The area is considered above average for turkey hunting. Five known bog plant communities exist here, including the sensitive large-leaved gentian and yellow fringeless orchid. Of eight archeological sites recorded here, one may be eligible for NRHP listing.

The eligibility of segment A, a 4.8-mile portion of East Fork, was determined by:

- **Scenic value** — East Fork of Six Mile remains undeveloped and primitive throughout its length, with highly attractive upland forests along its corridor. Predominantly natural settings and the relatively undeveloped condition of the corridor contribute to the stream's natural scenic quality. A class C rating, *locally significant*, has been assigned.

- **Recreational value** — No developed recreation areas exist along East Fork of Six Mile. Current recreation uses include fishing, hunting, and camping. The area offers excellent wild turkey hunting. A class C rating, *locally significant*, has been assigned.

- **Geologic value** — East Fork of Six Mile meanders through flat alluvial bottomland. Shallow ground water systems sustain its base flows. Elevations range from 234 to 70 feet above MSL. Special soils and high water tables along East Fork support 5 known bog plant communities. A class B rating, *regionally outstanding*, has been assigned.

- **Wildlife values** — The area along East Fork of Six Mile provides excellent wild turkey habitat. Deer and squirrel habitat is also good. Some of the best habitat parallels the stream in the riparian zone. The area exhibits high habitat diversity. A class B rating, *regionally outstanding*, has been assigned.

- **Fish and aquatic values** — The dominant East Fork fish species are minnows, chubs and darters. However, the bass and other sunfishes in larger pools offer good fishing. No known TES species occur within the river corridor. A class C rating, *locally significant*, has been assigned.

- **Botanical and ecological values** — Riparian forest along the river corridor is largely contiguous with little fragmentation. The corridor's special soils and high water tables support five known bog plant communities wherein the large-leaved rose gentian and yellow fringeless orchid are known to occur. A class B rating, *regionally outstanding*, has been assigned.

- **Historic and cultural values** — Among eight recorded archeological sites along East Fork of Six Mile, seven are prehistoric and one is historic. One prehistoric site needs evaluation with respect to the NRHP. Currently insufficient data exist to make a reliable statement about site frequency per river mile. The Kisatchie site predictive model rates the corridor as having a high probability for the existence of significant sites. A class C rating, *locally significant*, has been assigned.

CALCASIEU RANGER DISTRICT, VERNON UNIT

SIX MILE CREEK

- **Eligibility determination** — East Fork of Six Mile Creek is eligible for designation under the National Wild & Scenic Rivers Act. It is free-flowing and has outstandingly remarkable geologic, wildlife, and botanical and ecological values.

- **Classification determination** — According to the criteria in *FSH 1909*, Chapter 8, the entire 4.8 miles qualifies for inclusion in the system under the *scenic* classification.

SEGMENT B —
West Fork of Six Mile, 6.2 miles

Forest Roads 405 and 449 give public access to West Fork. Fullerton Lake Recreation Area provides the only developed recreation within 1/4 mile of West Fork Six Mile. Current recreation uses include, fishing, hunting, camping, and hiking. The area supports a viable turkey population and offers excellent turkey hunting. One bog plant community exists along West Fork Six Mile; however, no known TES species occur in the bog.

Approximately 2.25 miles on the corridor that have been archaeologically surveyed and 22 sites have been recorded; 19 are prehistoric and 3 are historic. In 1986 the Fullerton Mill and town site was listed on the NRHP as the largest pine sawmill west of the Mississippi. It is considered regionally important. Survey data indicates a site frequency of slightly more than 9 sites per river mile.

The eligibility of segment B, a 6.2-mile portion of the West Fork of Six Mile Creek, was determined by:

- **Scenic value** — West Fork of Six Mile Creek remains largely undeveloped throughout the length of the corridor. It includes highly attractive upland forest. The predominance of natural settings and the relatively undeveloped condition of the corridor contribute to the natural scenic quality along the creek. A class C rating, *locally significant*, has been assigned.

- **Recreational value** — Fullerton Lake recreation area is within 1/4 mile of West Fork of Six Mile. It offers picnicking, camping, hiking, and fishing opportunities. The area is also known for excellent wild turkey hunting. A class C rating, *locally significant*, has been assigned.

- **Geologic value** — West Fork of Six Mile meanders through alluvial bottomland. Shallow ground water systems sustain its base flow. Elevations range from 234 to 70 feet above MSL. Special soil formations and high water tables along West Fork support bog plant communities. A class C rating, *locally significant*, has been assigned.

- **Wildlife values** — High wildlife diversity along West Fork of Six Mile results from the habitat found adjacent to the stream in its riparian zone. The area also offers excellent wild turkey habitat. Other game species such as deer and squirrel enjoy good habitat as well. A class C rating, *locally significant*, has been assigned.

- **Fish and aquatic values** — The most dominant fish species are minnows, chubs and darters. However, bass in the larger pools offer good fishing. Alligators are also known to inhabit West Fork of Six Mile. No known TES species occur within the stream corridor. A class C rating, *locally significant*, has been assigned.

- **Botanical and ecological values** — The predominately mixed pine-hardwood forest types along West Fork of Six Mile remain largely contiguous throughout the 1/4-mile stream corridor. One known bog plant community found there does not support known TES plants. A class C rating, *locally significant*, has been assigned.

- **Historic and cultural values** — Among 22 recorded archeological sites along the West Fork of Six Mile, 19 are prehistoric and 3 are historic. Additional evaluation with respect to NRHP criteria is needed at 6 sites. In 1986 the NRHP listed Fullerton Mill and town site as the largest pine sawmill west of the Mississippi River. The Kisatchie site predictive model rates as *high* the corridor's probability to contain significant sites, including additional historic sites associated with Fullerton. A class B rating, *regionally outstanding*, has been assigned.

- **Eligibility determination** — West Fork of Six Mile Creek is eligible for designation under the National Wild & Scenic Rivers Act. It is free-flowing and has outstandingly remarkable historic and cultural values.

CALCASIEU RANGER DISTRICT, VERNON UNIT

SIX MILE CREEK

WHISKY CHITTO CREEK

- **Classification determination** — According to the Criteria in *FSH 1909*, Chapter 8, the entire 6.2 miles qualifies for inclusion in the system under the *scenic* classification.

WHISKY CHITTO CREEK

For the purposes of this eligibility determination, Whisky Chitto Creek is evaluated from the limited use boundary of the Vernon Unit (Forest Road 405) south to where it exits the national forest boundary. Approximately 5.5 miles of shoreline are in national forest ownership, and the remaining 5.8 miles are private land. The Nationwide Rivers Inventory and Louisiana's State Natural & Scenic Rivers System both list the stream. See figure D–6.

Whisky Chitto drains about 26 square miles. Its flow rate is about 40 cubic feet per second. Water quality for the stream is considered good. It fully supports all designated uses, including primary and secondary contact recreation, fish and wildlife propagation, and outstanding natural resource waters. See table D–3.

No developed recreation areas lie along this segment of Whiskey Chitto; however, public access is possible from Louisiana Highway 10 and Forest Road 405. The U.S. Army has considered building a new road running east and west, crossing Whisky Chitto approximately 1 mile north of Forest Road 405.

Current recreation uses include fishing, hunting, and wildlife viewing. This segment of Whisky Chitto is not conducive to canoeing, but outfitters rent canoes farther downstream in Allen Parish. Parts of the stream are attractive and it offers good fishing.

One known bog plant community occurs within 1/4 mile of Whisky Chitto. It is known as Leo's Bog, is listed on the Louisiana Registry of Natural Areas, and is considered to be among the most diverse and least disrupted habitats of its kind in Louisiana. Three known Forest Service-listed sensitive species occur here: Sabine coneflower, bog button, and Drummond's yellow-eyed grass.

Among 12 prehistoric sites known along Whisky Chitto, 5 may be locally or regionally significant. One evaluated site contains research potential sufficient for nomination to the NRHP at the state or regional level of significance. The site predictive model rates the corridor as having a *high* probability for containing additional significant sites.

Eligibility of this 11.3-mile segment was determined by:

- **Scenic value** — This segment of Whisky Chitto remains largely undeveloped, with a highly attractive forest. The natural settings along the corridor contribute to the natural quality of the river. However, logging activities on private lands downstream detract from the quality of lower stretches. A class C rating, *locally significant*, has been assigned.

- **Recreational value** — Whisky Chitto provides good opportunities for fishing and hunting. This segment of the stream is not canoeable because of shallow water and obstructions in the waterway. Although no developed recreation areas exist along the stream, Whisky Chitto Hiking trail crosses it on a Forest Road 405 bridge. A class D rating, *locally common*, has been assigned.

- **Geologic value** — Whisky Chitto meanders through flat alluvial bottomland. Its base flow is sustained by shallow ground water systems. Elevations range from 197 to 18 feet above MSL. The soil formations along Whisky Chitto support bog plant communities. A class B rating, *regionally outstanding*, has been assigned.

- **Wildlife values** — The forest type along Whisky Chitto ranges from mixed hardwood-pine to oak-gum-hickory. Populations of whitetail deer, wild turkey, squirrel, and many species of birds are found along the stream. A class D rating, *locally common to the Forest*, has been assigned.

- **Fish and aquatic values** — Fish populations and diversity rank as moderate. The lower portions of Whisky Chitto provides a good bass fishery. As the stream shallows toward its headwaters, however, the fish community shifts toward smaller species such as minnows, chubs, and darters. A class C rating, *locally significant*, has been assigned.

CALCASIEU RANGER DISTRICT, VERNON UNIT

WHISKY CHITTO CREEK

- **Botanical and ecological values** — The riparian forest along Big Creek remains largely contiguous, however, some fragmentation has occurred along its lower reaches. One known bog plant community survives within **1/4**-mile of Whisky Chitto Creek: Leo's Bog. Three known Forest Service-listed sensitive species occur in Leo's Bog: Sabine coneflower, bog button, and Drummond's yellow-eyed grass. A class B rating, *regionally outstanding*, has been assigned.

- **Historic and cultural values** — Among 12 known prehistoric archeological sites along the Whisky Chitto Creek corridor, 5 may be locally or regionally significant. These need additional evaluation respective to NRHP criteria. One site has been evaluated and contains sufficient research potential for nomination to the NRHP at the state or regional level of significance. A class B rating, *regionally outstanding*, has been assigned.

- **Eligibility determination** — Whisky Chitto Creek is eligible for designation under the National Wild & Scenic Rivers Act. It is free-flowing and has outstandingly remarkable geologic, botanical and ecological, and historic and cultural values.

- **Classification determination** — According to the criteria in *FSH 1909*, Chapter 8, the entire 11.3 miles qualifies for inclusion in the system under the *recreational* classification. This determination is a result of the forestry uses and evidence of past or on going timber harvest on the stream's lower reaches.

TABLE D–4, WEIGHTED RANKING

Summary of Study River Rankings

River	Scenic	Recreational	Geological	Wildlife	Fish & Aquatic	Botanical & Ecological	Cultural & Historic	Total Weight	Ranking
Kisatchie Bayou	5	5	5	2	2	5	2	26	1
Six Mile Creek – SEGMENT A	2	2	5	5	2	5	2	23	2
Whiskey Chitto Creek	2	1	5	1	2	5	5	21	3
Drakes Creek	2	1	5	2	2	5	2	19	4
Six Mile Creek – SEGMENT B	2	2	2	2	2	2	5	17	5
Castor Creek	2	1	1	2	5	2	2	15	6
Big Creek	2	2	1	2	2	2	2	13	7
Spring Creek	2	2	2	1	2	1	2	12	8
Fish Creek	2	1	1	2	2	2	2	12	9
Middle Fork Bayou D'Arbonne	2	1	1	2	1	1	1	9	10

Class A = 8 points; Class B = 5 points; Class C = 2 points; Class D = 1 point

FIGURE D–7, RANKING

Weighted Ranking of Study Rivers

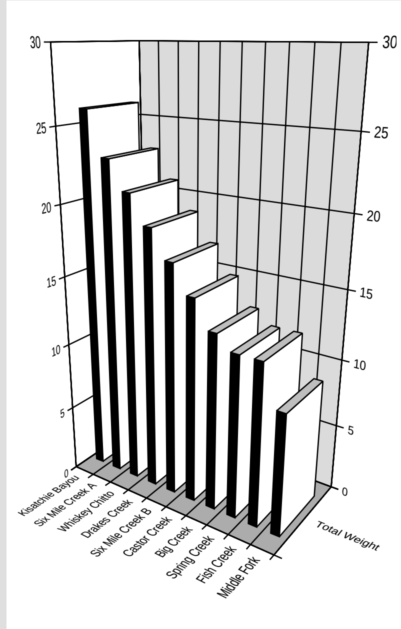


TABLE D–5, ELIGIBILITY DETERMINATIONS

Summary of Eligibility Determinations for the Study Rivers

River	Scenic	Recreational	Geological	Wildlife	Fish & Aquatic	Botanical & Ecological	Cultural & Historic
Big Creek	C	C	D	C	C	C	C
Castor Creek	C	D	D	C	B	C	C
Drakes Creek	C	D	B	C	C	B	C
Fish Creek	C	D	D	C	C	C	C
Kisatchie Bayou	B	B	B	C	C	B	C
Middle Fork Bayou D'Arbonne	C	D	D	C	D	D	D
Six Mile Creek – SEGMENT A	C	C	B	B	C	B	C
Six Mile Creek – SEGMENT B	C	C	C	C	C	C	B
Spring Creek	C	C	C	D	C	D	C
Whiskey Chitto	C	D	B	D	C	B	B

Class A = outstandingly remarkable with national significance; Class B = outstandingly remarkable with regional significance; Class C = locally significant; Class D = locally common

SUMMARY OF EVALUATIONS

Of the 10 rivers or river segments evaluated in this eligibility study, 6 were determined to have one or more outstandingly remarkable river-related value. See tables D–4 through D–6, and figure D–7.

Determination that a river is eligible does not necessarily mean that it will meet suitability criteria for potential inclusion in the National Wild & Scenic River system. The final step in the river assessment is the determination of suitability.

A detailed study report must be prepared for all rivers determined to have one or more outstandingly remarkable value. The purpose of the study is to document the Forest Service's conclusions regarding the suitability of such rivers for designation as components of the System. Appendix E of this EIS contains the suitability study for all 6 eligible rivers.

TABLE D–6, ELIGIBILITY EVALUATIONS

Summary of Eligibility Evaluations

River	Length (mi)	Outstandingly Remarkable Values	Potential Classification
Castor Creek	4.9	fish / aquatic	scenic
Drakes Creek	11.2	geologic botanical / ecological	scenic
Kisatchie Bayou	40.5	scenic recreational geological botanical / ecological	scenic
Six Mile Creek, .. SEGMENT A	4.8	geological wildlife botanical / ecological	scenic
SEGMENT B	6.2	historical / cultural	scenic
Whiskey Chitto Creek	11.3	geological botanical / ecological	recreational

Appendix E

Wild & Scenic River Suitability

PROPOSED ACTION AND PURPOSE

This study report addresses the suitability of portions or segments of Castor Creek, Drakes Creek, Kisatchie Bayou, Six Mile Creek, and Whisky Chitto Creek corridors for inclusion in the National Wild & Scenic Rivers System. The purpose of performing and submitting this study is to provide the President and Congress with a report on the suitability or nonsuitability of portions or segments of these rivers for addition to the National Wild & Scenic Rivers System. The Wild & Scenic Rivers Act requires this study, and the study is consistent with the appropriate legal and regulatory requirements.

AUTHORITY

The USDA Forest Service is the lead agency for conducting the environmental analysis and preparing this draft study report. The Secretary of Agriculture, however, is the responsible official in this action. The Secretary will recommend to the President that none, all, or part of these study river corridors be designated as a component of the National Wild & Scenic Rivers System. The final authority for designating wild and scenic rivers rests with Congress.

NEED FOR ACTION

Forest planning must address all rivers, wholly or partially on National Forest System lands, which have been either designated by Congress for study, listed in the Nationwide River Inventory, or identified by a national forest as having potential for inclusion in the Wild & Scenic Rivers System.

The Kisatchie National Forest planning team evaluated 10 rivers and their corridors for eligibility for inclusion into the National Wild & Scenic Rivers System. To be eligible for inclusion, a river must be free-flowing and with its adjacent lands must possess 1 or more outstandingly remarkable values. Of the 10 rivers evaluated, 6 segments were determined to have 1 or more outstanding remarkable values at the national or regional level.

LOCATION

The 6 rivers or segments of rivers studied in detail flow through or within the Kisatchie National Forest in central Louisiana. The watercourses under study lie wholly or partially within Natchitoches, Rapides, and Vernon Parishes. Combined, these perennial stream segments total approximately 79.4 miles.

AFFECTED ENVIRONMENT

The 6 river segments under study drain a total of 225.6 square miles. All of the study rivers are considered free-flowing streams with no known or planned impoundments or water diversions. The river corridors provide for diverse wildlife habitats. Most of the study rivers support populations of sport fish, sunfish, crappie, and catfish, along with numerous nonsport species. One study river supports the federally threatened Louisiana pearlshell mussel (*Margaritifera hembeli*).

The vegetation along the study river corridors is largely contiguous with little fragmentation. The overstory vegetation along the corridors range from pine-hardwood, to oak-gum-hickory, to beech-magnolia, to cypress-tupelo swamp. Several Forest Service-recognized sensitive or conservation plant species grow within the corridors of the study rivers.

All the study rivers remain relatively undeveloped and are located mostly in rural areas. Human influence is evident mostly from past timber harvesting practices and bridge crossings. Each study river has several bridge crossings located at various points along the study segments, maintained by either the Forest Service, parish, or state.

The study rivers are located in rural settings with no major industrial developments

PROPOSED ACTION AND PURPOSE
AUTHORITY
NEED FOR ACTION
LOCATION
AFFECTED ENVIRONMENT

AFFECTED ENVIRONMENT

OPTIONS AND THEIR CONSEQUENCES

PURPOSE OF AND NEED FOR ACTION

located adjacent to or within the watersheds. The majority of the river corridors are predominantly forested with some agricultural uses, with most of the forested area, both public and private, devoted to timber production and recreation, namely hunting. The Forest Service manages at least 50 percent or more of the areas within the river corridors on all the study rivers, except for Whisky Chitto Creek.

Under the 1985 Forest Plan most of the forested land suitable for timber production within the study river corridors were managed under management areas 11 — *general forest with grazing*, and 12 — *general forest without grazing*. The riparian ecosystems in these management areas were suitable for timber production; however, the streamside zones within their riparian ecosystems are managed primarily for water quality and wildlife under management area 20. Under this management area, other resource uses were modified by the general direction, standards, and guidelines prescribed for the enhancement of riparian area-dependent resources. In the 1999 Revised Forest Plan, the riparian portions of these areas are not considered suitable for timber production.

The study rivers and their corridors offer a wide variety of recreational opportunities. Recreation uses include swimming, wading, fishing, canoeing, hunting, picnicking, camping, hiking, and viewing nature. Known cultural and historic sites lie along or adjacent to each study river. Some are eligible or may be eligible for the National Register of Historic Places (NRHP).

TABLE E–1, STUDY RIVERS

Study River	Ranger District	Length (miles)	Potential Class
Castor Creek	Calcasieu, Evangeline Unit	4.9	Scenic
Drakes Creek	Calcasieu, Vernon Unit	11.2	Scenic
Kisatchie Bayou	Kisatchie	40.5	Scenic
Six Mile Creek			
SEGMENT A	Calcasieu, Vernon Unit	4.8	Scenic
SEGMENT B	Calcasieu, Vernon Unit	6.2	Scenic
Whisky Chitto Creek	Calcasieu, Vernon Unit	11.3	Recreational

OPTIONS AND THEIR CONSEQUENCES

The Kisatchie National Forest developed options that addressed the suitability of each of the six eligible study rivers. Each study river was evaluated independently to determine the rivers suitability for including all, some, or none of the river within the National Wild & Scenic Rivers System. Alternatives reflected pertinent issues, conditions, and needs. Each river's study report presents an array of options that encompass reasonable proposals for use of the river area.

PURPOSE OF AND NEED FOR ACTION

As part of the forest planning process, the Kisatchie National Forest identified and evaluated 10 streams to determine their eligibility for possible inclusion in the National Wild & Scenic Rivers System. Appendix D of the Forest Plan environmental impact statement (EIS) documents the evaluations and potential classifications for these 10 streams. Rivers initially identified for eligibility study were listed by the National Park Service on the Nationwide River Inventory (NRI), designated by Louisiana as a state Natural & Scenic River, or identified by other interests.

This study report assesses the suitability of the six streams which were determined as eligible for possible inclusion into the National Wild & Scenic River System. To be eligible for designation a river must be free-flowing and possess one or more outstandingly remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural, or other value, including ecological values.

Six streams were determined eligible: Castor Creek on the Evangeline Unit of the Calcasieu District; Kisatchie Bayou on the Kisatchie Ranger District; Drakes Creek, Whiskey Chitto Creek, West Fork of Six Mile Creek, and East Fork of Six Mile Creek on the Vernon Unit of the Calcasieu District. See table E–1.

Once eligibility was determined, there were two options for determining suitability. One was preparing a separate study and EIS outside the revision process for the Forest Land Management Plan (Plan; Forest Plan). The other was incorporating determination into the planning process. The Kisatchie National Forest interdisciplinary planning team chose to complete the study during the Forest Plan revision.

The determination of suitability provides the basis for the decision to recommend Congressional designation or non-designation of the rivers. Factors considered in the determination of suitability include:

- The amount of private land involved and uses of the land.
- Potential uses of the land and water that would be enhanced, foreclosed, or curtailed if designated.
- The cost of acquiring the land or, if necessary, an interest in the land.
- Interest among Federal, State and local governments.

DESCRIPTION OF THE AFFECTED ENVIRONMENT

LOCATION

The 6 streams or segments of streams that this report studied in detail flow through or within the Kisatchie National Forest, in central Louisiana. The studied perennial watercourse segments flow through Natchitoches, Rapides, and Vernon Parishes, and total approximately 79.4 miles.

- **Castor Creek** — is evaluated from where Clear Creek and Brushy Creek merge to form Castor Creek, before Castor Creek flows into Bayou Beouf Swamp. Castor Creek is located entirely in Rapides Parish and flows for approximately 4.9 miles; 3.4 miles through national forest and the remaining 1.5 miles through private land.

- **Drakes Creek** — is evaluated for approximately 11.2 miles, from where it enters the limited-use boundary of the Vernon Unit (Forest Road 405), to where it exits the forest boundary. Drakes Creek is located entirely in Vernon Parish. Approximately 8.4 miles of the creek corridor border national forest lands along both sides, with 0.3 miles bordering national forest on one side. The remaining 2.5 miles are along private ownership.

- **Kisatchie Bayou** — is evaluated for approximately 40.5 miles, from its entrance into national forest, to where it exits national forest. Kisatchie Bayou is located entirely in Natchitoches Parish. National forest lands border the bayou for approximately 21.2 miles, with private lands bordering the remaining 19.3 miles.

- **Six Mile Creek** — is located in Vernon Parish and is divided into 2 segments. Segment A, East Fork of Six Mile, and Segment B, West Fork of Six Mile, are both evaluated from where they enter the limited use boundary of the Vernon Unit, south to where they merge. Approximately 3.8 miles of shoreline along Segment A border national forest lands and 1.0 mile border private lands. Segment B flows through approximately 5.1 miles of national forest lands and 1.1 miles of private land.

- **Whiskey Chitto Creek** — is evaluated from the limited use boundary of the Vernon Unit to where it exits the national forest boundary. This section of Whisky Chitto Creek is located in Vernon Parish. Approximately 5.5 miles of the corridor are bordered by national forest lands, with the remaining 5.8 miles along private ownership.

WATERSHED AREA AND STREAMFLOW

The 6 eligible study rivers on Kisatchie National Forest drain a total of 225.6 square miles. See table E-2. These drainage areas refer only to the river segments under study by the Forest Service and not the watershed for the entire creek. All of the study rivers are free-flowing with no man-made dams or other flow regulation structures located either in or upstream of the study area. No known impoundments or water diversions exist or are planned, and no major consumptive water uses divert or draw from these streams.

Rivers normally have variable flows, with the highest generally occurring from February to May and the lowest from July to October. No U.S. Geological survey gaging stations monitor the sections of the watercourses being studied; however, the Forest Service's hydrologist has calculated the average flow rates for each. See table E–2, next page.

PURPOSE OF AND THE NEED FOR ACTION

DESCRIPTION OF THE AFFECTED ENVIRONMENT

LOCATION

WATERSHED AREA AND STREAMFLOW

DESCRIPTION OF THE AFFECTED ENVIRONMENT

CLIMATE

PHYSIOGRAPHY

GEOLOGY AND SOILS

MINERALS

CLIMATE

The climate of Louisiana is influenced by the large land mass to the north, the state's subtropical latitude, and the Gulf of Mexico to the south. Prevailing winds blow from the south or southeast, and the influence of the moist Gulf air dominates. Summer temperatures range from 85°F. to 95°F. during afternoons and 65°F. to 75°F. during early mornings. Annual summer precipitation, June–September, averages 16.11 inches.

During the cooler seasons the weather conditions vary more as warm tropical maritime air blanketing the state alternates with polar continental air. Average winter temperatures range form 55°F. to 65°F. in the afternoons to 40°F. to 50°F. during early morning hours; both higher and lower temperatures are often observed. On the average, freezing temperatures occur 30 to 40 days each year in north and central Louisiana. Average rainfall for the cooler months, October–May, is 41.33 inches (**Source:** ***Louisiana Almanac, 1992-93***).

PHYSIOGRAPHY

All the watercourses being evaluated flow through or within the Coastal Plain Province and West Gulf Coastal Plain Section, as derived from *Fennemans's Physiography of the Eastern United States*. The subsection is defined as the South Central Plains Ecoregion, as derived from the 1987 work of Omernik and Gallant. The elevations within the South Central Plains Ecoregion range from 80 to 650 feet above MSL; however the elevations of the streambeds being evaluated range from 100 to 250 feet above MSL.

GEOLOGY AND SOILS

Mostly Holocene and late Pleistocene Terrace Alluvial deposits form the floodplain and stream terrace soils of these watercourses. Castor, Drakes, Whisky Chitto, and Six Mile Creeks are located in the High Terrace Rolling Upland landtype association. The floodplains consist mostly of *Guyton* soils which are loamy, poorly drained, and subject to frequent-to-occasional flooding. Terraces soils along the streams are mostly loamy, varying from poorly drained to well-drained.

Most of the Kisatchie Bayou is located in the Kisatchie Sandstone Hills landtype association. The floodplains contain mostly Guyton soils. The upstream floodplains contain *Lotus* soils, which are sandy and moderately well-drained. Lotus soils are associated with Guyton soils on higher positions of the floodplain and stream terrace. Kisatchie Bayou also flows through Cunningham Brake, where clayey *Yorktown* and *Moreland* soils predominate. Classified as wetlands, Yorktown soils are very poorly drained, ponded, or flooded for long periods. Moreland soils occupy slightly higher positions but nevertheless have somewhat poor drainage.

MINERALS

Oil and natural gas are the two most valuable minerals available for lease on the Kisatchie National Forest. Currently no producing oil or natural gas wells lie within the corridors of the six study streams. However, recent exploration activity and leasing of lands on the Kisatchie District and the Evangeline Unit of the Calcasieu District indicate interest in the Austin Chalk, a known producing formation occurring in a broad band splayed across central Louisiana. The majority of land under Forest Service jurisdiction within stream course study corridors are presently leased or available for lease. Only a small portion of national forest lands within the corridor have outstanding or reserved mineral rights.

Common variety minerals such as sand and gravel are also available for lease. No active commercial surface mining opera-

TABLE E–2, ACRES AND FLOW RATES

Watershed Drainage Acres and Flow Rates for Eligible Study Rivers

Study River	Length (miles)	Watershed Area (miles^2 drained)	Avg. Flow Rate (feet^3 / second)
Castor Creek	4.9	8.1	13
Drakes Creek	11.2	6.5	9
Kisatchie Bayou	40.5	140.0	219
Six Mile Creek			
SEGMENT A	4.8	21.0	70
SEGMENT B	6.2	24.0	70
Whisky Chitto Creek	11.3	26.0	40
Total	**79.4**	**225.6**	

tions involving common variety minerals exist within the six stream study corridors. Several local parish police juries conduct ongoing gravel pit operations on the Vernon Unit of the Calcasieu District; however, none of them fall within any of the stream watersheds currently under study.

WATER QUALITY

The State of Louisiana has established water quality standards (**as provided in *LAC 33:IX.1111***). These standards include, but are not limited to: recreation, propagation of fish and other aquatic life forms and wildlife, oyster propagation, public water supplies, agricultural activities, and outstanding natural-resource waters. Water quality of all the study rivers is considered good, and fully supports all designated uses — including primary and secondary contact recreation, fish and wildlife propagation — and are considered to be outstanding natural resource waters. Kisatchie Bayou, Whisky Chitto Creek, and both segments of Six Mile Creek are all designated as Louisiana State Natural & Scenic streams.

FISH AND WILDLIFE

The Forest Service, with the cooperation of the Louisiana Department of Wildlife and Fisheries, manages fish and wildlife habitat on national forest lands within the stream corridors. The streams and waterways of the Kisatchie National Forest contain 113 known species of fish. Not all of them live in the 6 study streams; however, most of those streams support populations of sport fish such as largemouth bass, sunfish, crappie, and catfish and numerous nonsport fish species as well. Castor Creek is the only study stream known to contain the federally threatened Louisiana pearlshell mussel, which occurs only in certain central Louisiana streams. One known pearlshell bed in Castor Creek contains at least 50 mussels plus scattered individuals of this bivalve.

The vegetative communities along the river corridors provide habitat for numerous invertebrates, amphibians, reptiles, birds, and mammals. Some of the primary demand wildlife species known to occur in the river corridors are white-tailed deer, fox squirrel, gray squirrel, northern bobwhite, wild turkey, mourning dove, woodcock, and a variety of waterfowl.

The red-cockaded woodpecker (RCW), a species federally listed as endangered, is known to inhabit colony trees within 1/2-mile of the river corridors on Kisatchie Bayou, Drakes Creek, Whisky Chitto Creek, and both segments of Six Mile Creek. The bald eagle, also a federally listed species, is not known to nest along any of the river corridors. As they migrate, however, eagles may use the river corridors as a food source and resting place. The American alligator is found within several of the river corridors, and is federally listed as threatened due to the similarity of appearance to the endangered crocodile. The crocodile is not known to occur in any of the study corridors.

In addition to the species above, the Forest Service recognizes the following sensitive or conservation species; hispid pocket mouse, Rafinesque's big-eared bat, Cooper's hawk, Bachman's sparrow, Louisiana pine snake, Southern red-backed salamander, big south fork crayfish, and javelin crayfish.

VEGETATION

The vegetation along the study river corridors is largely contiguous, with little fragmentation. Some localized occurrences of exotic and invading weedy species may be present, but most are localized enough to be controllable.

The overstory vegetation along the corridors ranges from pine-hardwood, oak-gum-hickory, beech-magnolia, to cypress-tupelo gum swamps. Generally the vegetation type in the riparian association is beech, but to varying degrees the canopy often contains loblolly pine. Generally the hardwood mixture may include white oak, southern red oak, cow oak, hickory, white ash, blackgum, southern magnolia, sweetbay magnolia, baldcypress, sweetgum, and Nuttall oak.

A shade-tolerant midstory and shrub layer includes hophornbeam, dogwood, maple, arrowwood, basswood, huckleberries, serviceberry, American beautyberry, Japanese honeysuckle, and common greenbrier. Also, along the river corridors of Drakes Creek, Whisky Chitto Creek, East Fork Six Mile Creek, and West Fork Six Mile Creek there are special soils and high water tables which support bog plant communities.

Several Forest Service-recognized sensitive or conservation plant species are found within the study stream corridors. Plants known to occur within these corridors in-

DESCRIPTION OF THE AFFECTED ENVIRONMENT

VEGETATION

SPECIAL EMPHASIS MANAGEMENT AREAS

HUMAN INFLUENCES

clude Louisiana bluestar (*Amsonia ludoviciana*), clammy weed (*Polanisia erosa*), nodding pogonia (*Triphora trianthophora*); large-leaved rose gentian (*Sabatia macrophylla*), bog button (*Lachnocaulon digynum*), yellow fringeless orchid (*Platanthera integra*), Sabine coneflower (*Rudbeckia scabrifolia*), Drummond's yellow-eyed grass (*Xyris drummondii*); barbed rattlesnake root (*Prenanthes barbata*); and Kentucky lady's slipper (*Cypripedium kentuckiense*).

Current Forest Plan management emphasis within the study river corridors is on riparian area dependent resources. Other resource uses that take place — like timber, range, wildlife, and recreation — are modified by general directions, and the standards and guidelines in the prescription for enhancing riparian area-dependent resources.

SPECIAL EMPHASIS MANAGEMENT AREAS

Two special interest areas, two Louisiana natural areas, and one research natural area (RNA) either encompass or border portions of several of the study river corridors. Special interest areas, Louisiana natural areas, and RNAs differ slightly in their management goals.

Special interest areas are managed to protect and enhance sensitive scenic, geological, botanical, and cultural features, and to provide for public use and enjoyment. Motorized travel is restricted to designated, existing routes.

Louisiana natural areas recognize the conservation of outstanding or special natural areas. The Louisiana Natural Areas Registry is dedicated to the preservation of biological diversity to preserve the best remaining examples of our country's natural heritage.

Research natural areas emphasize nonmanipulative research, observation and study. No roads are permitted except as required to meet research area objectives.

Portions of Drakes Creek Natural Area and Longleaf Scenic Area lie within the 1/2-mile river corridor of Drakes Creek. The Drakes Creek Natural Area was placed on the Louisiana Natural Areas Registry in March 1991 because of the unique and diverse natural plant communities occurring on the hillside seeps or bogs in the area. At least six state and globally rare species occur in Drakes Creek, including bog button (*Lachnocaulon digynyum*), Sabine cone-flower (*Rudbeckia scabrifolia*), Drummond's yellow-eyed grass (*Xyris drummondii*), large-leaved rose gentian (*Sabatia macrophylla*), Texas pipewort (*Eriocaulon texense*), and southern bladderwort (*Utricularia juncea*). The Longleaf Scenic Area features an old-growth longleaf pine tract of approximately 265 acres, surrounded by younger forest.

Leo's Bog, adjacent to Whisky Chitto Creek, was listed on the Louisiana Natural Areas Registry in July 1992. It is among the most diverse and least disrupted habitats of its kind known in Louisiana. Several Forest Service-recognized sensitive or conservation plant species occur within this plant community: large-leaved rose gentian (*Sabatia macrophylla*), bog button (*Lachnocaulon digynum*), Sabine cone flower (*Rudbeckia scabrifolia*), and Drummond's yellow-eyed grass (*Xyris drummondii*).

The Castor Creek Scenic Area centers around the junction of Brushy Creek and Castor Creek. This scenic area of roughly 90 acres features a variety of large loblolly pine, sweetgum, ash, beech, magnolia, and cypress trees.

The lower reaches of Kisatchie Bayou flow through the Cunningham Brake Research Natural Area. Established in 1990, this RNA includes 1,731 acres and offers opportunities for scientific and educational study of plant and animal species associated with this type of ecosystem.

HUMAN INFLUENCES

The study streams are located mostly in rural areas. All remain relatively undeveloped. Human influence is evident primarily from past timber harvesting practices and bridge crossings. Several bridges are located at various points along the studied segments of each stream. They are maintained by the Forest Service, the state, or a parish.

Kisatchie Bayou is the most developed of the six study streams. Several camps sit along the banks of Kisatchie Bayou on private land, two of which are accessed by cable bridges suspended across the stream. The Longleaf Scenic Byway and the Caroline Dormon Trail also cross the Bayou, and the Forest Service maintains several developed and undeveloped recreation areas along the watercourse: Kisatchie Bayou Camp, Red Bluff Camp, and Kisatchie Falls.

Tennessee Gas Pipeline Company maintains a 50-foot right-of way (ROW) for an underground pipeline. It crosses Kisatchie Bayou 3 times; twice on national forest land and once on private land. The now-abandoned Santa Fe railroad bed, recently acquired by the Forest Service, crosses the lower reaches of Drakes Creek. Today pilings are the only remnants of a railroad bridge dismantled prior to Forest Service acquisition.

PUBLIC ACCESS

The following describes briefly roads, bridges, pipelines, and other public access points to the study stream corridors.

- **Castor Creek** — No developed recreation areas exist along Castor Creek; however, the Magnolia Forest Walk and the Wild Azalea National Recreation Trail do cross it. The stream also flows through the Castor Creek Scenic Area. Forest Service Roads 273 and 287 provide public access.

- **Drakes Creek** — Forest Service Roads 405, 412, and 400; Parish Roads 402 and 431; and Louisiana Highway 10 provide access to Drakes Creek. The old Santa Fe Railroad bed also gives public access. The stream corridor contains no developed recreation sites.

- **Castor Creek** — Several developed and undeveloped recreation areas exist along Kisatchie Bayou, including Kisatchie Bayou Camp, Red Bluff Camp, and Kisatchie Falls. Other access is provided by Forest Service Roads 303, 337, and 350; Louisiana Highway 117; the Longleaf Trail Scenic Byway; and the Caroline Dormon Trail.

- **Six Mile Creek** — Public access to Segment A of the East Fork of Six Mile is somewhat limited. Forest Road 405 and Louisiana Highway 399 are the only public access points crossing East Fork. No developed recreation areas exist along the stream.

  Forest Roads 405 and 449 give public access to West Fork. Fullerton Lake Recreation Area is the only developed recreation area within the stream corridor. Whisky Chitto hiking trail crosses West Fork, leading from Fullerton Lake Recreation Area to its intersection with the Big Branch hiking trail.

- **Whiskey Chitto Creek** — Although no developed recreation areas exist along this segment of Whisky Chitto Creek, the public can gain access from Louisiana Highway 10 and Forest Service Road 405. Also, Whisky Chitto hiking trail crosses the creek parallel to Forest Service Road 405.

RECREATION ACTIVITIES

The six study streams and their corridors offer a wide variety of recreational opportunities. Recreational uses involving the rivers themselves include; swimming, wading, fishing, and canoeing. The river corridors attract visitors for recreational uses such as camping, hunting, picnicking, hiking, and viewing nature. These rivers receive most of their use in the vicinity of access points such as roads, bridges, or developed recreation areas.

No developed recreation areas exist along Castor Creek, Drakes Creek, Segment A of Six Mile Creek, or Whisky Chitto Creek. Fishing activities in these areas occur in limited areas adjacent to access points. Most recreation is limited to activities within the corridors of those streams.

The two developed Forest Service areas along Kisatchie Bayou are Kisatchie Bayou Camp and Red Bluff Camp. The Kisatchie Falls area remains undeveloped. Kisatchie Bayou Camp, the most popular recreation area along the Bayou, offers opportunities for picnicking, wading and swimming, and camping. The scenic sandstone formations found at Kisatchie Bayou are uncommon to this area of the South Central Plains. These formations influence streambed structure, resulting in bluff outcrops, small waterfalls, and small whitewater rapids which attract numerous visitors to the area each year. Kisatchie Bayou also supports canoeing throughout most of the year. From midsummer to the late summer months, however, low water requires frequent portages, increasing canoeing difficulty.

Red Bluff Camp is a primitive camp on the lower stretches of Kisatchie Bayou. Here the bayou is deeper and less sandy than in other areas. Red Bluff Camp receives most of its use during the various hunting seasons. The Caroline Dormon Trail crosses the Bayou. It offers backpacking, hiking, mountain biking, and horseback riding opportunities.

Fullerton Lake Recreation Area lies within

DESCRIPTION OF THE AFFECTED ENVIRONMENT

RECREATION ACTIVITIES

WILD & SCENIC RIVERS IN THE REGION

HERITAGE RESOURCES

the corridor of West Fork Six Mile Creek. It offers picnicking, hiking, camping, fishing, and boating opportunities. This area is the site of the old Fullerton Sawmill and community, which was one of the largest sawmills operating in the South during the early 1900s. Fullerton was placed on the National Register of Historic Places in 1986. A 1.5-mile trail traverses the ruins and foundations of the mill on its route around the lake. The Whisky Chitto Trail leads from Fullerton across the Forest until it intersects with the Big Branch Trail.

The Wild Azalea National Recreation Trail is Louisiana's longest hiking trail, winding approximately 27 miles through the piney woods and hardwood bottoms of the Evangeline Unit of the Calcasieu Ranger District. It crosses Castor Creek inside the Castor Creek Scenic Area.

WILD & SCENIC RIVERS IN THE REGION

The Winn District boasts the only congressionally designated river within the South Central Plains Region. In October 1986 approximately 19 miles of Saline Bayou was designated as a national scenic river — from the Bienville Parish line to Saline Lake. It is now part of the National Wild & Scenic Rivers System.

The Louisiana Natural and Scenic Rivers System is one of the most extensive state river conservation programs in the nation. The system encompasses 51 rivers or river segments totaling over 1,500 miles.

Nineteen of those rivers run through the South Central Plains Region (**defined by Omernik and Gallant, 1987**): Bayou Dorcheat, Saline Bayou, Black Lake Bayou, Corney Bayou, Bayou D'Arbonne, Middle Fork Bayou D'Arbonne, Bayou L'Outre, Bayou Bartholomew, Little River, Fish Creek, Big Creek, Trout Creek, Spring Creek, Kisatchie Bayou, Calcasieu River, Ten Mile Creek, Whisky Chitto Creek, Pearl Creek, and Six Mile Creek. See table E–3 and figure E–1.

Arkansas recognizes four of its rivers that flow through the South Central Plains Ecoregion. Lower Saline River is included in the Arkansas Natural and Scenic River Commission (ANSRC) System, designated by the Arkansas General Assembly. Three other rivers, Dorcheat Bayou, Champagnolle Creek, and Saline River — and its North Fork, Alum Fork, Middle Fork, and South Fork — are considered outstanding and worthy of protection by ANSRC registry. None of Oklahoma's state-recognized rivers lie within the South Central Plains Ecoregion. The Texas State Legislature currently recognizes no state natural and scenic river program. Please see figure E–1.

HERITAGE RESOURCES

Cultural and historic sites have been recorded along or adjacent to each study stream. Some are eligible for listing on the National Register of Historic Places (NRHP). Others may be eligible.

- **Castor Creek** — Approximately 2.5 river miles have been archaeologically surveyed. Of 20 prehistoric sites recorded, 8 may have the potential for listing on the NRHP. Castor Creek has received relatively intense archeological study within the corridor, thus the predicted site frequency of 8 sites per river mile has a relatively high degree of reliability. The Kisatchie Site Predictive Model rates the corridor as having an extremely high probability for containing significant sites.

- **Drakes Creek** — Of 21 known archeological sites, 8 are considered potentially eligible for listing on the NRHP. Data suggests a frequency of slightly over 7.5 sites per river mile. The Kisatchie Site Predictive Model rates the corridor as having an extremely high probability for containing significant sites.

- **Kisatchie Bayou** — Less than 1/2 mile of the Forest Service corridor has been archaeologically surveyed. Of 3 known prehistoric sites, 1 may have local or state significance. This site will require formal evaluation respective to NRHP criteria. Data are insufficient to make reliable statements regarding predicted sites per mile. The Kisatchie Site Predictive Model rates the corridor as having a high probability for containing significant sites.

- **Six Mile Creek**
  - *Segment A* — There are 8 recorded archeological sites along East Fork Six Mile; 7 prehistoric and 1 historic. One prehistoric site needs evaluation respective to the NRHP. There are insufficient data to make a reliable statement about

DESCRIPTION OF THE AFFECTED ENVIRONMENT

HERITAGE RESOURCES

TABLE E–3, RIVERS WITH FEDERAL OR STATE STATUS

South Central Plains Ecoregion

Designated by	Map Key	River Name	Status
Louisiana	1	Bayou Dorcheat	LN
Forest Service	2	Saline Bayou	NR
Louisiana	3	Black Lake Bayou	LN
	4	Corney Bayou	LN
	5	Bayou D'Arbonne	LN
	6	Middle Fork Bayou D'Arbonne	LN
	7	Bayou L'Outre	LN
	8	Bayou Bartholomew	LN
	9	Little River	LN
	10	Fish Creek	LN
	11	Big Creek	LN
	12	Trout Creek	LN
	13	Spring Creek	LN
	14	Kisatchie Bayou	LN
	15	Calcasieu River	LN
	16	Ten Mile Creek	LN
	17	Six Mile Creek	LN
	18	Whisky Chitto Creek	LN
	19	Pearl Creek	LN
Arkansas	20	Saline River (and North, Alum, Middle, & South Forks)	AR
	21	Lower Saline River	AS
	22	Dorcheat Bayou	AR
	23	Champagnolle Creek	AR

LN — the Louisiana Natural & Scenic Rivers System; AR — a registry of rivers which the Arkansas Natural and Scenic Commission deems as outstanding and worthy of protection; AS — the Arkansas Natural and Scenic River System, designated by the Arkansas General Assembly; NR — the National Wild & Scenic River System

site frequency per river mile. The Kisatchie Site Predictive Model rates the corridor as having a high probability for containing significant sites.

• *Segment B* — There are 22 recorded archeological sites along the West Fork of Six Mile Creek, 19 prehistoric and 3 historic. Six sites need additional evaluation respective to NRHP criteria. The Fullerton Mill and Town site was listed on the NRHP in 1986, as the largest pine sawmill west of the Mississippi River, and is considered regionally important.

Whiskey Chitto Creek — There are 12 known prehistoric archeological sites along the Whisky Chitto Creek corridor, of which 5 may be locally or regionally significant. These need additional evaluation respective to NRHP criteria. The Whisky Chitto site has been evaluated and contains enough research potential for nomination to the NRHP at the state or regional level of significance.

FIGURE E–1, STATE OR FEDERAL RIVERS

Rivers Having Status Within the South Central Plains Ecoregion

DESCRIPTION OF THE AFFECTED ENVIRONMENT

POTENTIAL HYDROPOWER USE AND FLOOD CONTROL

NAVIGABILITY AND RIPARIAN RIGHTS

PRIVATE OWNERSHIP

LAND USE

POTENTIAL HYDROPOWER USE AND FLOOD CONTROL

The potential for hydropower or flood control development along any of the study streams or segments of study streams is poor. No known or proposed structures exist within the study corridors.

NAVIGABILITY AND RIPARIAN RIGHTS

Distinguishing between navigable and nonnavigable water bodies can be somewhat confusing with regard to pertinent water rights and riparian rights laws. The State of Louisiana has a twofold navigability test:

- ***Navigable in fact*** — Is the body of water navigable at the present time?
- ***Navigable in law*** — Was the body of water navigable in 1812?

Louisiana rivers are *navigable in fact* when in their condition they are used or are susceptible of being used as highways for commerce over which trade and travel on water may be conducted in customary modes.

By virtue of the Equal Footing Doctrine the State of Louisiana owns the bed and bottom of all its waterways that were navigable in fact in 1812. If the waterway was used for purposes of trade and commerce in 1812, when Louisiana was admitted to the Union, it is to be considered to have been a navigable body of water even though it may no longer serve that purpose.

A waterway *navigable in law* remains state-owned until it dries up, or until dereliction, at which time the adjacent landowners gain ownership. However, final authority on navigability rests in the courts.

PRIVATE OWNERSHIP

Currently more than 50 percent of the acreage within all study corridors, except Whisky Chitto Creek, is national forest land. See table E–4.

The Wild & Scenic Rivers Act prohibits the Secretaries of Interior and Agriculture from acquiring fee title to private land by condemnation if more than 50 percent of the acreage within a river corridor is owned by the Federal or state government. Condemnation is permitted, but only for clearing title and acquiring scenic and other easements that are reasonably necessary to provide public access to a river or to protect outstanding values when they are threatened (***U.S. v Lindsay, 595 F .2d 5, 9th Cir., 1979*** **and** ***U.S. v Brown, 552 F .2d 817, 8th Cir. 1977***).

It is unlikely that the Forest Service would condemn land for fee title because more that 50 percent of the acreage within the corridors is national forest, except for Whisky Chitto Creek. Condemnation for scenic easements would only be considered when outstanding values are impacted or threatened. Private landowners would have the primary responsibility to manage their lands to protect the outstanding values of the river corridor, and this would be encouraged. No easements would be needed to provide additional public access to any stream.

LAND USE

The study streams flow through rural settings. No major industrial developments are located within or adjacent to their watersheds. The majority of river corridors are predominantly forested, with some agricultural use. Most public and private forested areas have been devoted to timber production and to hunting for recreation.

Kisatchie Bayou is the most developed of the study streams. Several camps and residences are located on its adjacent private lands. The Forest Service maintains two developed recreation areas along Kisatchie Bayou. National forest lands within the study corridor are managed under direction of the Forest Plan, which emphasizes the riparian area dependent resources.

Kisatchie Bayou, Six Mile Creek, and Whisky Chitto Creek are all designated as Louisiana Natural & Scenic streams. The State Legislature prohibits the following activities on scenic rivers:

- Channelization.
- Clearing and snagging.
- Channel realignment.
- Reservoir construction.
- Commercial clearcutting of native trees within 100 feet of the ordinary high water mark.

All other uses or activities with potential to significantly impact the wilderness quality, aesthetics, or ecological integrity of the river, especially within 100 feet, are subject to permit. The state is developing specific management plans for each river included in the State Natural & Scenic Rivers System.

TIMBER MANAGEMENT

Within the study river corridors, most of the forested lands are not suitable for timber production. The streamside zones within these riparian ecosystems are managed primarily for water quality and wildlife. Management prescriptions for other resource uses will be modified by the general direction, standards, and guidelines for enhancement of riparian area-dependent resources.

A portion of the Kisatchie Bayou corridor runs through the Cunningham Brake RNA. As with other such areas, this RNA provides for nonmanipulative research, observation, and study of undisturbed ecosystems typifying important forest types. It is considered unsuitable for timber production.

SCENIC MANAGEMENT

Scenery along river corridors normally offers great diversity in color, texture, and character. The inherent attractiveness provided by the rivers greatly influence the scenic resource. Most of the study rivers meander through flat, alluvial bottomland hardwood forest types. Channel banks range from sandy flats to deep cuts. Views from the rivers are generally limited from 200 to 500 feet during leaf-on conditions, and could range up to 1/4 mile during leaf-off. Forest types along river corridors are a mixture of hardwood species, to varying degrees interspersed with loblolly pine. Predominant hardwoods found along corridors may include but are not limited to: beech, white oak, Southern red oak, cow oak, hickory, ash, blackgum, sweetgum, tupelogum, Southern magnolia, sweetbay magnolia, and baldcypress.

Current management for scenic condition objectives (SCO) along the river corridors vary from *preservation* to *partial retention*. All rivers designated in the State scenic river system have been assigned a SCO of retention, which includes East and West Forks of Six Mile Creek, Whisky Chitto Creek, and the portion of Kisatchie Bayou outside Cunningham Brake RNA. The portion of Kisatchie Bayou flowing through Cunningham Brake is assigned a SCO of preservation. Various sections along the Drakes Creek and Castor Creek corridors are assigned SCOs ranging from retention to maximum modification.

TABLE E–4, STUDY CORRIDOR OWNERSHIP

Study Stream	Total Area (ACRES)	Private Owned (ACRES)	USFS Owned (ACRES)	USFS Owned (PERCENT)
Castor Creek	1,415	304	1,111	77
Drakes Creek	2,162	753	1,409	65
Kisatchie Bayou	10,054	4,462	5,592	56
Six Mile Creek	2,320	531	1,789	77
Whisky Chitto Creek	2,530	1,401	1,129	45

FINDING OF ELIGIBILITY & POTENTIAL CLASSIFICATION

AUTHORITY

ELIGIBILITY

FINDING OF ELIGIBILITY & POTENTIAL CLASSIFICATION

AUTHORITY

Both the Wild & Scenic Rivers Act and the Final Revised Interagency Guidelines for Eligibility, Classification, and Management of River Areas (***47 Federal Register 39545*, September 7, 1982**) provide direction for determining the eligibility and classification of study rivers.

ELIGIBILITY

To be eligible for designation as a component of the National Wild & Scenic Rivers System, a stream must be free-flowing and possess with its adjoining lands one or more outstandingly remarkable values in the following categories: *scenic*, *recreational*, *geologic*, *wildlife*, *fish* and *aquatic*, *historic* and *cultural*, or *other similar values*. Other similar values include but are not limited to *hydrologic*, *paleontologic*, or *botanical* and *ecological* resources.

Appendix D of this EIS documents the process used by the Kisatchie National Forest to determine the eligibility for each study stream. Outstanding values for the six study corridors are summarized briefly below.

CASTOR CREEK

Castor Creek was determined to have regionally outstanding fish and aquatic values. The federally threatened Louisiana pearlshell mussel occurs in this stream.

DRAKES CREEK

Drakes Creek features regionally outstanding geologic and botanical-ecological values because of its unique bog plant communities. Portions of the Drakes Creek Natural Area and Longleaf Scenic Area also lie within the stream corridor.

KISATCHIE BAYOU

Kisatchie Bayou is known for its outstandingly remarkable scenic, recreational, geologic, and botanical-ecological values. Its attractive natural attributes include high bluffs, rock outcroppings, small waterfalls, and large sandbars, all of which contribute to high-quality scenery. Kisatchie Bayou also offers various recreational opportunities — such as canoeing, hiking, camping, picnicking, and fishing. These attract visitors from across the region. Sandstone formations exposed along the banks and the bedrock gradients in the channel cause small whitewater rapids and waterfalls. The vegetation along Kisatchie Bayou is largely contiguous with little fragmentation. The general forest types change over the course of Kisatchie Bayou, beginning with oak-gum-hickory and transitioning to beech-magnolia — until it reaches Cunningham Brake, where the forest type changes to a cypress-tupelo swamp.

SIX MILE CREEK

Segment A of the East Fork of Six Mile has outstandingly remarkable geologic, wildlife, and botanical-ecological values. The five known bog plant communities found along the corridor of East Fork Six Mile Creek contribute to the outstanding geologic and botanical-ecological values. The area along East Fork Six Mile also provides excellent wild turkey habitat and for other wildlife species as well.

Segment B of the West Fork of Six Mile is eligible for further study because of outstandingly remarkable historic and cultural values. The Fullerton Mill and Town site, which is found within the stream corridor, was listed on the NRHP in 1986 as the largest pine sawmill west of the Mississippi River. It is considered regionally important.

WHISKY CHITTO CREEK

Whisky Chitto Creek contains outstandingly remarkable geologic, botanical-ecological, and historic-cultural values. Leo's Bog was placed on the Louisiana Registry of Natural Areas in 1992. It is considered one of the most diverse and least disrupted habitats of its kind in Louisiana.

Twelve known prehistoric archeological sites exist along the Whisky Chitto Creek corridor. Pending evaluations, five of these may be locally or regionally significant. The Whisky Chitto Site, however, has been evaluated and contains enough research potential for nomination to the NRHP at the state or regional significance level.

CLASSIFICATION

Three classifications of rivers, or river segments, characterize the heart of the National Wild & Scenic Rivers System; *wild*, *scenic*, and *recreational*. Classification is based on the condition of the river and the adjacent lands at the time of the study. The classifications briefly described below are fully described in Appendix D of this EIS.

1. **Wild river** — Those rivers or sections of rivers that are free of impoundments and generally inaccessible except by trail, with watersheds or shorelines essentially primitive and with water unpolluted.

2. **Scenic river** — Those rivers or sections of rivers that are free of impoundments, with shorelines or watersheds still largely primitive and undeveloped, but accessible in places by roads. The existence of short stretches of conspicuous or longer stretches of inconspicuous roads or railroads are acceptable.

3. **Recreational river** — Those rivers or sections of rivers readily accessible by road or railroad, which may have some development along their shorelines. The existence of low dams, diversions, or modifications is acceptable if the waterway remains generally natural in appearance.

The basis for the *recommended* classification of each river or river segment is described below.

- **Castor Creek** — Qualifies for inclusion in the Wild & Scenic Rivers System under the *scenic* classification, because of Forest Service Roads 273 and 287, which cross the stream.

- **Drakes Creek** — Qualifies for inclusion in the Wild & Scenic Rivers System under the *scenic* classification, due to the number of public roads which cross the creek.

- **Kisatchie Bayou** — Qualifies for inclusion in the Wild & Scenic Rivers System under the *scenic* classification, due to several roads and pipelines which cross the bayou.

- **Six Mile Creek** — Both Segments A and B qualify for inclusion in the Wild & Scenic Rivers System under the *scenic* classification because several roads cross both segments.

- **Whiskey Chitto Creek** — Qualifies for inclusion in the Wild & Scenic Rivers System under the *recreational* classification, due to the forestry uses and evidence of past or ongoing timber harvest activities on the river's lower reaches.

OPTIONS & ENVIRONMENTAL CONSEQUENCES

OPTION DEVELOPMENT

ENVIRONMENTAL CONSEQUENCES

OPTIONS & ENVIRONMENTAL CONSEQUENCES

OPTION DEVELOPMENT

The Kisatchie National Forest developed options addressing the suitability of each of the eligible study streams. Each one is evaluated independently to determine its suitability for including all, some, or none of it within the National Wild & Scenic Rivers System. Options presented reflect pertinent issues, conditions, and needs. Analysis of the existing situation provides the foundation for the proposal and options. Each stream's study report presents an array of options encompassing reasonable proposals for stream area use.

ENVIRONMENTAL CONSEQUENCES

The effects analyzed in this chapter reflect options developed for each stream, with regard to its suitability for the Wild & Scenic Rivers System. Factors considered in determining suitability include:

- Characteristics that do or do not make the area a worthy addition to the system.
- Current land ownership status and use.
- Reasonably foreseeable potential uses of the land and water that would be enhanced, foreclosed, or curtailed if the area were included in the system.
- The Federal agency that will administer the area, if it is added to the system.
- The extent to which administration of the river, including cost, would be shared by state and local agencies.
- Estimated cost to the United States of acquiring necessary lands, interest in land, and of administering the area — should it be added to the system.
- A determination of the degree to which the state and its political subdivisions might participate in the preservation and administration of the river, should it be proposed for inclusion in the system.

It is important to note that the effects analyzed in this chapter correspond to options developed regarding suitability or unsuitability of each study stream. The determination of suitability provides the basis for the decision to recommend for or against Congressional designation of the streams, which ultimately requires action by Congress to include a river in the National Wild & Scenic Rivers System

CASTOR CREEK

OPTIONS

Option A

Option A would recommend the 4.9-mile segment of Castor Creek — from the confluence of Clear Creek and Brushy Creek to its entrance into Bayou Beouf swamp — as *scenic*, and suitable for inclusion within the National Wild & Scenic Rivers System. The river would be administered by the Forest Service. Legislation would call for adopting a program of action or river management plan for the entire corridor. Such plan or action would be carried out cooperatively with Federal and state government agencies and would also provide protection for the Louisiana pearlshell mussel and its habitat.

The river corridor would be managed for natural-appearing landscapes and would have a variable width of approximately 1/4 mile on each side of the proposed river. Approximately 1,111 acres of national forest lands and 304 acres of private lands are located within in the 1/4-mile corridor of Castor Creek. This option would require no land acquisition by the Federal Government to achieve designation. The Federal Government would affect private land exchanges and fee acquisitions on a willing seller basis, primarily in small tracts. This is a continuation of current policy and practice.

The inventory of cultural and historic resources on Federal lands would continue. Recorded sites would then be evaluated according to the NRHP criteria of significance. Sites determined to be significant would be avoided or mitigated prior to conducting management activities with a potential for ground disturbance, including recreation facility or trail construction. Forest insect and disease outbreaks would be managed in accordance with the 1987 southern pine beetle EIS decision and the current Louisiana pearlshell mussel recovery plan.

Current recreation management activities on national forest lands would continue with little change. No developed recreational areas exist along Castor Creek. The base water flow of Castor Creek is insufficient to support canoeing opportunities. The majority of recreation use within the corridor is related to hunting and hiking.

The scenic condition objective (SCO) along the Castor Creek corridor would be *retention*. The primary goal of a retention SCO is to manage visually sensitive areas to promote a diverse landscape that appears natural. All of the acres currently classed as *suitable for timber production* within the river corridor would be classed as land *not appropriate for timber production* on a regulated basis — or unsuitable. These acres would be managed to retain scenic conditions, encourage dispersed recreational opportunities, and provide for plant and animal diversity while maintaining quality habitat for the Louisiana pearlshell mussel — as outlined in the *Louisiana Pearlshell Recovery Plan* (December 3, 1990).

Option B

Option B would recommend that the State of Louisiana consider making the 4.9-mile segment of Castor Creek a Louisiana Natural & Scenic stream. The Louisiana Natural & Scenic Rivers System is one of the most extensive state river conservation programs in the nation. Totaling more than 1,500 miles, it encompasses 51 rivers or river segments. The Louisiana Natural & Scenic Rivers Act established a regulatory program empowering the Secretary of the Louisiana Department of Wildlife and Fisheries to administer the system through regulation and permits.

Prohibited acts on Louisiana's State Natural and Scenic streams are channelization, channel realignment, clearing and snagging, impoundments of any type, or commercial clearcutting of timber within 100 feet of the low-water mark. Other activities potentially having a direct and significant ecological impact on a designated stream must be permitted by the Louisiana Department of Wildlife and Fisheries. Activities typically requiring a permit include construction or major work on bridges, pipeline or powerline crossings; bulkheads, piers, docks, and ramps; waste water discharges; or land development adjacent to a designated stream. The Forest Service would work cooperatively with the State in developing a scenic river plan for Castor Creek.

Inventory of cultural and historic resources on federal lands would continue. Sites determined to be significant would be avoided or mitigated prior to conducting management activities with potential for ground disturbance, including recreation facilities or trail construction. Forest insect and disease outbreaks would be managed in accordance

OPTIONS & ENVIRONMENTAL CONSEQUENCES

CASTOR CREEK

OPTIONS

ENVIRONMENTAL CONSEQUENCES

with the pearlshell mussel recovery plan and the 1987 southern pine beetle EIS decision.

The SCO along Castor Creek would be *retention*. A retention SCO would maintain the visually sensitive area in a manner promoting a natural-appearing and diverse landscape, while maintaining quality habitat for the Louisiana pearlshell mussel — as outlined in the recovery plan. This option would require no land acquisition by the Federal Government.

Option C

Option C, the *no action* option, is preferred for Castor Creek. It would not propose Castor Creek for inclusion into the Wild & Scenic river program. The outstandingly remarkable fish and aquatic values of Castor Creek's Louisiana pearlshell mussel habitat would be protected — as outlined in the recovery plan.

Recovery plans delineate reasonable actions which are believed to be required to recover and protect the listed species. Approved plans represent the official position of the U.S. Fish & Wildlife Service and are subject to modification as dictated by new findings, changes in species' status, and the completion of recovery tasks.

The Louisiana pearlshell is sensitive to water quality degradation. To protect Castor Creek's water quality, the Kisatchie National Forest has enacted a beaver control program within the known mussel range. It restricts the use of off-road vehicles near known populations, and requires reviews of grazing permits to ensure that cattle pose no threat to existing mussel beds.

Inventory of cultural and historic resources on Federal lands would continue. Sites determined to be significant would be avoided or mitigated prior to conducting management activities with potential of ground disturbance, including recreation facilities or trail construction. Forest insect and disease outbreaks would be managed in accordance with the pearlshell mussel recovery plan and the 1987 southern pine beetle EIS decision.

The scenic condition objectives (SCOs) along Castor Creek would be *retention* for the segment running through the Castor Creek Scenic Area, the remainder of the stream would be managed for *partial retention* and *modification* SCOs. All SCOs would encourage dispersed recreational opportunities, and provide for plant and animal diversity while maintaining quality habitat for the Louisiana pearlshell mussel as outlined in the recovery plan. This option would require no land acquisition by the Federal Government.

ENVIRONMENTAL CONSEQUENCES

Recreation

Castor Creek offers limited recreational opportunities. No developed recreation areas exist within the stream corridor. The Magnolia Forest Walk and Wild Azalea National Recreation Trail cross Castor Creek. The majority of recreation use within the corridor is related to hunting and hiking. The stream's base water flow is insufficient to support canoeing.

Option A

Increased public awareness due to designation as a national scenic river could cause slightly larger increases in recreation use within the Castor Creek corridor. If such increases introduced adverse impacts to the stream or its corridor, controls could be established on the federally owned segments to regulate the amount and type of use. Additional recreation use could threaten the stream's water quality, which in turn could significantly impact the threatened Louisiana pearlshell mussel habitat. Recreation use increases would require additional monitoring of the pearlshell habitat.

There could be a change in the recreation opportunity spectrum (ROS) class within the river corridor. The area is currently managed as being in the *roaded natural* ROS class. If designated, the ROS class could be changed to *semiprimitive*, where the natural environment dominates. Under the semiprimitive ROS class, improvements would be limited mainly to trails and a few scattered structures.

Options B and C

Options B and C would induce little change in recreational opportunities and use within the corridor. Hunting- and hiking-related recreation would remain relatively constant. Under Option B, development of recreation facilities within 100 feet of the stream must be permitted by the Department of Wildlife and Fisheries.

The ROS class within the river corridor would not change. The area is currently managed as being in the *roaded natural* ROS class. Within the roaded natural class, the natural environment dominates; however, there is evidence of human activities. Improvements are mainly limited to roads, trails, and a few scattered structures.

Visual resources

The visual character of Castor Creek corridor is defined primarily by existing vegetation and the appearance of the channel. The stream's undeveloped character, the width of its hardwood bottom, and its high channel banks contribute to its high-quality scenery values.

Options A and B

Under Option A, potential exists for increased human influence and use — which could result in more river bank deterioration and littering. However, the lands along Castor Creek would retain the existing landscape and their high-quality scenery.

Under both options, national forest lands within the river corridor would be assigned a SCO of *retention*. The primary goal of a retention SCO is managing visually sensitive areas to promote a natural-appearing diverse landscape. The stream corridor would be managed to retain scenery while maintaining quality Louisiana pearlshell mussel habitat as outlined in the recovery plan.

Option C

In Option C, the SCO along Castor Creek would be *retention* for the segment running through the Castor Creek Scenic Area. The remainder of the stream would be managed for a *partial retention* or *modification* SCO.

Land ownership and use

The Castor Creek scenic river study corridor contains approximately 1,415 acres, 304 acres of which are privately owned.

Option A

Uses and developments determined to directly or adversely affect wild and scenic river values, especially new impoundments and water intake structures, would be prohibited. Although designation would require no acquisition of private lands, private lands could be acquired by the Federal Government — but only on a willing seller or exchange basis. Because more than 50 percent of the river corridor is federally owned, the Federal government cannot condemn private land within the stream corridor for the purpose of acquisition. However, acquiring scenic easements to protect wild and scenic values on designated segments would still be possible. It is anticipated that the federal-to-private land ownership ratio in the stream corridor would remain about the same.

Option B

If Castor Creek is designated by the State of Louisiana as a natural and scenic stream, certain activities would either be prohibited or would require a permit from the Louisiana Department of Wildlife and Fisheries. Prohibitions on designated streams would include channelization; channel realignment; clearing and snagging; impoundments of any type; and commercial clearcutting of timber within 100 feet of the low water mark. Other activities potentially having direct and significant ecological impacts on the stream would require a permit. Bridges, bulkheads, piers, docks, ramps, waste water discharges, and land development adjacent to the stream are typical activities requiring permits.

Option C

No changes to land uses would occur under this option. National forest lands within the corridor would continue to be managed for the protection of the Louisiana pearlshell mussel. Private lands would not be impacted. Land ownership in the river corridor would remain in approximately the extant ratio of Federal and private ownership.

Effects on private land

Approximately 304 acres or 27 percent of the land within the 1/4-mile study corridor of Castor Creek is privately owned.

Option A

This option would introduce some effects to private lands. This option would require no fee title land acquisition by the Federal Government to achieve designation. Private land exchange and fee acquisition on a willing seller basis by the Federal Government would occur, primarily in small tracts. This is a continuation of current policy.

Restrictions to development or use of private lands would result from current laws or zoning ordinances, or those developed in the future, by parish or state governments empowered with such authority. Condemnation could be used to clear title or acquire scenic easements. There could also be increases in trespassing and littering on private lands as river use increases.

Option B

Some effects to private lands would result from this option if Castor Creek became a State Natural & Scenic stream. The Louisiana Natural & Scenic Rivers Act established a regulatory program and empowered the Secretary of the Louisiana Department of Wildlife and Fisheries to administer the system through regulation and permits.

Certain activities have been prohibited by the State of Louisiana, and a permit system has been established to regulate other activities on scenic rivers. The Forest Service would work cooperatively with the State in developing a scenic river plan for Castor Creek.

Option C

No significant effects would accrue to private lands from this option. Restrictions to the development or use of private lands would result from future laws or zoning ordinances developed by parish or state governments with such authority.

Access

Current public access to Castor Creek is limited. Forest Service roads 273 and 287 provide access, as do the Magnolia Forest Walk and Wild Azalea Trail.

Option A

Under Option A, access to the river on Forest Service lands would remain substantially unchanged. Access to the river from private land could become more prevalent over time. Because Castor Creek has limited recreational potential other than hunting and hiking, additional access sites would not be needed.

Options B and C

There would be no effects to river access on Forest Service or private lands as a result of either of these options due to the limited recreational potential of Castor Creek.

Vegetation

Options A, B, and C

The riparian corridor along Castor Creek is largely contiguous. Castor Creek flows through the Castor Creek Scenic area and is one of the tributaries which feeds the Bayou Beouf RNA. Two listed *conservation* plant species are known to occur along Castor Creek: barbed rattlesnake root (*Prenanthes barbata*) and Kentucky lady's slipper orchid (*Cypripedium kentuckiense*). Both grow near the Magnolia Forest Walk.

The potential for vegetation change would be the same for all options on national forest lands. The current Forest Service direction for protecting the habitat of the Louisiana pearlshell mussel places restrictions on harvesting and salvage operations within the area.

Private lands would remain unaffected by Options A and C. However, if designated as a State Natural & Scenic stream under Option B, some state government restrictions on vegetative manipulation would occur within 100 feet of the stream's low water mark.

Fish and wildlife including threatened and endangered species

Option A

Anticipated increases in recreation use along the river corridor could result in greater human contact and therefore could affect fish and wildlife — especially the threatened Louisiana pearlshell mussel. The Louisiana pearlshell mussel is sensitive to water quality degradation and could be negatively impacted by increased human presence. Possible impacts from increased use would be monitored through the Kisatchie Water Resource Inventory Work Plan, which collects water quality data on streams where the Louisiana pearlshell is known to occur. If recreational use along the corridor is determined to have adverse impacts on the pearlshell, there would be a potential for reducing or eliminating recreational use.

Options B and C

No significant effects to present fish and wildlife habitat are foreseen under Options B and C. Recreation use along Castor Creek corridor is expected to stay relatively constant, with small increases in use over time. Corridor recreation use determined to adversely impact the Louisiana pearlshell mussel would be a potential reason for reducing or eliminating recreation use.

Soil and water

Option A

Increased recreation use and development along Castor Creek could cause short-term water degradation. Possible soil loss impacts to water quality from increased use would be monitored through the Kisatchie water resource inventory work plan which would collect pertinent data on streams where the Louisiana pearlshell mussel is known to occur. Current forest policy and existing Federal and state regulations should ensure that water quality would not be permanently affected by other resource activities.

Options B and C

No significant effects on current soil and water conditions are foreseen under Options B and C. Current use levels along the Castor Creek corridor would be expected to remain relatively constant. Slight increases in recreation use over time would not impact stream water quality. Monitoring of water quality would continue in accordance with the Kisatchie water resource inventory work plan.

Heritage resources

Options A, B, and C

The site predictive model for the Kisatchie National Forest rates the corridor as having an extremely high probability for containing significant sites. Impacts to cultural and historic artifacts from resource management activities such as trail construction would be mitigated. Archeological surveys would be conducted prior to construction, and projects relocated if significant sites were inventoried. Option A could result in an increased potential for disturbance of sites from illegal artifact collection in areas of increased dispersed recreation use.

Social and economic

Option A

This option would produce only slight effects on current growth patterns and employment conditions in the local community. The 1990 census data showed Rapides Parish to have a population of 131,556. There could be a small increase in revenue to the local economy, from anticipated increases in recreation-related expenditures by river users attracted by wild and scenic river designation. No significant effect on the current social environment is foreseen. Amenity values for adjacent landowners would be preserved to the greatest degree in this option.

Options B and C

These options would have little effect on current growth patterns or the social environment. Revenues to local economies resulting from recreational use of the stream would not increase under these options. Amenity values would be preserved under both options.

CASTOR CREEK FOREST PLAN ALTERNATIVES

Alternatives A–F

No National Wild & Scenic River designation. Outstandingly remarkable values would be protected by Forest Plan standards and guidelines for streamsides and riparian areas, and for the Louisiana pearlshell mussel.

TABLE E–5, ENVIRONMENTAL CONSEQUENCES SUMMARY

Castor Creek — Three Options

	Option A	Option B	Option C
Recreational Development and Use	Designation would cause slightly larger increases in recreation use within the creek corridor. Controls would be established on the federally managed segments to regulate the amount and type of use. Additional recreational use could threaten water quality. The ROS class within the corridor would change from *roaded natural* to *semiprimitive*.	There would be little change in the recreational opportunities and uses within the corridor. New development of recreation facilities within 100 feet of the corridor must be permitted by the Louisiana Department of Wildlife and Fisheries.	There would be no change in the recreational opportunities and use within the corridor.
Visual Resources	There is a potential for increased human influence and use which could result in more river bank deterioration and littering. However, the lands along Castor Creek would retain the existing landscape and their scenic quality. National forest lands within the river corridor would be assigned a SCO of *retention*.	There would be no significant effect to the existing visual conditions on Castor Creek. The SCOs within the river corridor would be *retention* for the segment of the corridor which runs through the Castor Creek Scenic Area, the remainder of the corridor would be assigned *partial retention*.	There would be no significant effect to existing visual conditions. The SCO within the corridor would be *retention* for the segment running through Castor Creek Scenic Area, the remainder would be managed for *partial retention* and *modification* SCOs.
Land Ownership and Use	Uses and development determined to have a direct and adverse effect on wild and scenic river values, in particular all new impoundments and water intake structures would be prohibited. No land acquisition of private lands would be required for designation.	If designated by the State of Louisiana as a natural and scenic stream certain activities would either be prohibited or would require a permit from the Department of Wildlife and Fisheries. Channelization of the stream; channel realignment; clearing and snagging; impoundments of any type; and commercial clearcutting of timber within 100 feet of the low-water mark would be prohibited.	No change in land uses would occur under this option. National forest lands within the corridor would continue to be managed for protection of the Louisiana pearlshell mussel. Private lands would not be impacted. Land ownership in the corridor would remain in about the same federal-to-private ownership ratio.
Effects on Private Land	No fee title land acquisition by the Federal Government would be required for designation under this option. Restrictions to development or use of private lands could result from laws or zoning ordinances currently in effect, or developed in the future by parish or state government bodies empowered with such authority. Condemnation could be used to clear title or acquire scenic easements. There could also be some increase in trespass and litter on private lands as river use increases.	Certain activities would either be prohibited or would require a permit from the Department of Wildlife and Fisheries. Channelization of the stream; channel realignment; clearing and snagging; impoundments of any type; and commercial clearcutting of timber within 100 feet of the low-water mark would be prohibited. Other activities that may have a direct, significant, ecological impact on the stream would require a permit.	No changes to land uses would occur under this option. National forest lands within the corridor would continue to be managed for the protection of the Louisiana pearlshell mussel. Private land would not be impacted.
Access	Access to Castor Creek on national forest lands would remain substantially unchanged. Access to the creek from private land could become more prevalent over time. Additional access sites would not be needed.	Access to national forest or private lands would not be affected as a result of state designation.	Same as Option B.

TABLE E–5, ENVIRONMENTAL CONSEQUENCES SUMMARY

Castor Creek — Three Options

Vegetation	The potential for vegetative change would not be significant on national forest lands. The current Forest Service direction for protecting the habitat for the Louisiana pearlshell mussel places restrictions on harvesting and salvage operations within the area.	Same as Option A.	Same as Option A
Fish and Wildlife Including T&E Species	Increases in recreation use along the corridor could result in greater human contact and their effects to fish and wildlife, especially the threatened Louisiana pearlshell mussel. Possible impacts from increased use would be monitored through the Kisatchie water resource inventory work plan (WRI). If recreational use along the corridor is determined to have adverse impacts on the Louisiana pearlshell, there would be a potential for reduction or elimination of the recreational use.	No significant effects to present fish and wildlife habitat conditions are foreseen under this option. Use along the Castor Creek corridor is expected to stay relatively constant, with small increases in use over time. If recreational use along the corridor is determined to have adverse impacts on the Louisiana pearlshell, there would be a potential for reduction or elimination of the recreational use.	Same as Option B
Soil and Water	Increased recreational use and developments along Castor Creek could result in short term water degradation. Possible impacts of soil loss to water quality from increased use would be monitored through the Kisatchie WRI.	No significant effects on current soil and water conditions are foreseen under Options B and C. Slight increases in recreation use over time would not impact the water quality of Castor Creek. Water quality data will continue to be monitored in accordance with the Kisatchie WRI	Same as Option B.
Heritage Resources	The site predictive model for the Kisatchie National Forest rates the corridor as having an extremely high probability for containing significant sites. Impacts to cultural and historic sites from resource management activities such as trail construction would be mitigated. Option A could result in an increase in disturbance of sites from illegal artifact collection in areas of increased dispersed recreation use.	Same as Option A	Same as Option A
Social and Economic	There would be no significant effects on current growth patterns and employment conditions in the local community. There could be a small increase in revenue to the local economy from anticipated increases in recreation related expenditures by river users attracted by wild and scenic river designation. No significant effect to the current social environment is foreseen.	There would be no significant effect to current growth patterns or the social environment. Revenues to local economies resulting from recreational use of the river would not increase under this option.	Same as Option B.

OPTIONS & ENVIRONMENTAL CONSEQUENCES

DRAKES CREEK

OPTIONS

DRAKES CREEK

OPTIONS

Option A

Option A would recommend the 11.2-mile segment of Drakes Creek — from where it enters the limited use boundary of the Vernon Unit (FDR 405) to where it exits the forest boundary — as *scenic*, and suitable for inclusion within the National Wild & Scenic Rivers System. The river would be administered by the Forest Service. Legislation would call for the adoption of a program of action, or river management plan. Management of the entire corridor would be carried out to provide permanent protection of the geologic and botanical-ecological values of Drakes Creek, in cooperation with the Federal Government, state and local governmental bodies, and citizen coalition groups or councils.

The river corridor would be managed for natural-appearing landscapes, and would have a variable width of approximately 1/4 mile on each side of the proposed river. Approximately 2,162 acres within the 1/4-mile corridor are national forest, and approximately 753 acres are in private ownership. Although this option would require no land acquisition by the Federal Government, private land exchange and fee acquisition on a willing seller basis would occur, primarily in small tracts. This is a continuation of current policy and practice.

Inventory of cultural and historic resources on Federal lands would be continued. Recorded sites would then be evaluated according to the NRHP criteria of significance. Sites determined to be significant would be avoided or mitigated prior to conducting management activities with a potential ground disturbance, including recreation facility or trail construction. Forest insect and disease outbreaks would be managed in accordance with the 1987 southern pine beetle EIS decision.

Current recreation management activities on the national forest lands would continue with little change. There are no developed recreation areas along Drakes Creek. Because the stream's base water flow is insufficient to support canoeing, the majority of recreation use within the corridor is related to hiking and hunting.

The SCO along the Drakes Creek corridor would be *retention*. The primary goal of the retention SCO is to manage visually sensitive areas to promote a natural-appearing diverse landscape. All of the acres within the river corridor would be classed as land *not appropriate for timber production* on a regulated basis — or unsuitable. These acres would be managed to retain scenic conditions, encourage dispersed recreation opportunities, and provide for plant and animal diversity.

Option B

Option B would recommend that the State of Louisiana consider making the 11.2-mile segment of Drakes Creek a state natural & scenic stream. The Louisiana Natural & Scenic Rivers System is one of the most extensive state river conservation programs in the nation, totaling more than 1,500 miles and encompassing 51 rivers or river segments. The Louisiana Natural & Scenic Rivers Act established a regulatory program empowering the Secretary of the Louisiana Department of Wildlife and Fisheries to administer the System through regulation and a permit system.

Channelization, channel realignment, clearing and snagging, impoundments of any type, or commercial clearcutting of timber within 100 feet of the low-water mark of state natural & scenic streams are prohibited by the State of Louisiana. Other activities that may have a direct and significant ecological impact on the stream must be permitted by the Louisiana Department of Wildlife and Fisheries.

Some activities requiring a permit include: bridges, pipelines, and powerline crossings; bulkheads, piers, docks, and ramps; waste water discharges; or land development adjacent to the stream. The Forest Service would work cooperatively with the State in developing a scenic river plan.

Inventory of cultural and historic resources on federal lands would continue. Sites determined as significant would be avoided or mitigated prior to conducting management activities with potential for ground disturbance — including recreation facility or trail construction. Forest insect and disease outbreaks would be managed in accordance with the 1987 southern pine beetle EIS decision.

The SCO along Drakes Creeks corridor would be *retention*. A retention SCO would encourage dispersed recreation opportunities, and provide for plant and animal diversity. This option would require no land acquisition by the Federal Government.

Option C

Option C would not propose Drakes Creek for designation into the wild & scenic river program. The outstandingly remarkable values of the stream corridor are currently either protected under an agreement with the State or they are located within the Longleaf Scenic Area.

In March 1991 Drakes Creek Natural Area was placed on the Louisiana Natural Areas Registry because of the unique and diverse natural plant communities in its hillside seeps or bogs. Management emphasis for the Longleaf Scenic Area is *semiprimitive nonmotorized recreation*, while maintaining its natural ecological and aesthetic diversity.

Inventory of cultural and historic resources on Federal lands would continue. Sites determined to be significant would be avoided or mitigated prior to conducting management activities with potential for ground disturbance, including recreation facility or trail construction. Forest insect and disease outbreaks would be managed in accordance with the 1987 southern pine beetle EIS decision.

The SCO along Drakes Creek would be *retention* for the segment running through the Longleaf Scenic Area. the remainder of the stream would be managed for *partial retention* and *modification* SCOs. All SCOs would encourage dispersed recreation opportunities and provide for plant and animal diversity. This option would require no land acquisition by the Federal Government.

ENVIRONMENTAL CONSEQUENCES

Recreation

Drakes Creek offers limited recreational opportunities. The corridor contains no developed recreation areas . The majority of recreational use here are related to hunting and hiking. The stream's base water flow is insufficient to support canoeing.

Option A

Increased public awareness due to designation as a national scenic river could cause slightly larger increases in recreation use within the Drakes Creek corridor. If increased recreational use caused adverse impacts to the stream or its corridor, controls to regulate the amount and type of use could be established on the federally owned segments.

There could be a change in the ROS class within the stream corridor. The area is currently managed as being in the *roaded natural* ROS class. If designated, the ROS class could be changed to *semiprimitive* where the natural environment dominates. Under the semiprimitive ROS class, improvements are essentially limited to trails and a few scattered structures.

Options B and C

Under Options B and C the recreation opportunities and use within the stream corridor would change little. Hunting- and hiking-related recreation would remain relatively constant. Under Option B, the development of recreation facilities within 100 feet of the stream would require a permit from the Louisiana Department of Wildlife and Fisheries.

There would be no change in the ROS class within the corridor. The area is currently managed as being in the *roaded natural* ROS class. Within the roaded natural class the natural environment dominates; however, there is evidence of human activities. Improvements are limited mainly to roads, trails, and a few scattered structures.

Visual resources

The visual character of Drakes Creek corridor is defined primarily by existing vegetation and the appearance of the channel. The stream remains largely undeveloped and supports a variety of natural vegetation offering high potential for scenic quality.

Options A and B

Under Option A, there is a potential for increased human influence and use which could result in more river bank deterioration and littering. However, the lands along Drakes Creek would retain the existing landscape and their scenic quality. Under both options, national forest lands within the

OPTIONS & ENVIRONMENTAL CONSEQUENCES

DRAKES CREEK

ENVIRONMENTAL CONSEQUENCES

stream corridor would be assigned a sco of *retention*. A primary goal of the retention sco is to manage visually sensitive areas in a manner promoting a diverse, natural-appearing landscape.

Option C

The sco along Drakes Creek would be either *partial retention* or *modification*. Activities on private lands within 100 feet of the stream that may have a direct, significant, ecological impact on the stream would require a permit from the Louisiana Department of Wildlife and Fisheries.

Land ownership and use

The scenic river study corridor of Drakes Creek contains approximately 2,162 acres, 753 acres of which are privately owned.

Option A

Uses and developments determined to have a direct and adverse effect on wild & scenic river values — in particular, all new impoundments and water intake structures would be prohibited. Although no land acquisition of private lands would be required for designation, there could be acquisition of private lands by the Federal Government on a willing seller or exchange basis only. Because more than 50 percent of the river corridor is federally owned, the Federal Government cannot acquire private land within the river corridor by condemnation. Acquisition of scenic easements to protect wild & scenic river values or to provide public access on designated segments would still be possible. However, it is not expected that easements would be necessary across private lands. It is anticipated that the ratio of federal-to-private land ownership in the corridor would remain about the same.

Option B

If Drakes Creek is designated by the State of Louisiana as a natural & scenic stream, certain activities would be prohibited or would require a permit from the Louisiana Department of Wildlife and Fisheries. Channelization, channel realignment, clearing and snagging, impoundments of any type, and commercial clearcutting of timber within 100 feet of the low water mark would be prohibited. Other activities that may have a direct, significant, ecological impact on the stream must be permitted. Bridges, bulkheads, piers, docks, ramps, waste water discharges, and land development adjacent to the stream are some activities requiring a permit.

Option C

No changes to land uses would occur under this option. Multiple-use management of national forest lands within the corridor would continue. The ratio of federal-to-private land ownership in the corridor would remain about the same.

Effects on private land

Approximately 753 acres or 35 percent of the land within the 1/4-mile study corridor of Drakes Creek is privately owned.

Option A

This option would introduce some effects to private lands. This option would require no fee title land acquisition by the Federal Government to achieve designation. Private land exchange and fee acquisition on a willing seller basis by the Federal Government would occur, primarily in small tracts. This is a continuation of current policy.

Restrictions to development or use of private lands could result from current laws or zoning ordinances, or those developed in the future, by parish or state governments empowered with such authority. Condemnation could be used to clear title or acquire scenic easements. There could also be increases in trespassing and littering on private lands as river use increases.

Option B

This option would affect private land if Drakes Creek became a natural & scenic stream. The Louisiana Natural & Scenic Rivers Act established a regulatory program empowering the Secretary of the Louisiana Department of Wildlife and Fisheries to administer the system through regulation and permits. Certain activities have been prohibited by the State of Louisiana, and a permitting system has been established to regulate other activities on scenic rivers. The Forest Service would work cooperatively with the State in developing a scenic river plan.

Option C

No significant effects would accrue to private lands under this option. Restrictions to development or use of private lands would result from future laws or zoning ordinances developed by parish or state governments.

Access

Current public access to Drakes Creek is limited. Forest Service roads 405, 412, and 400; parish roads 402 and 431; and Louisiana Highway 10 provide access.

Option A

Under Option A, national forest accesses to Drakes Creek would remain substantially unchanged. Access from private land could become more prevalent over time. Because the stream has limited recreational potential other than hunting and hiking, no additional access sites would be needed.

Options B and C

Because of the limited recreation potential of Drakes Creek, stream access on national forest and private land would remain unaffected under either of these options.

Vegetation

Options A, B, and C

The riparian corridor along Drakes Creek is largely contiguous, with little fragmentation. The stream's tributaries drain the Drakes Creek Natural Area and the Longleaf Scenic Area. Two conservation or sensitive species, large-leaved rose gentian (*Sabatia macrophylla*) and bog button (*Lachnocaulon digynum*) occur in bogs along the stream.

The potential for vegetation change would be greatest under Option C. Options A and C would not affect private lands. However, if designated as a state natural & scenic stream under Option B, manipulation of vegetation within 100 feet of the stream's low water mark would be somewhat restricted.

Fish and wildlife, including threatened and endangered species

Option A

Anticipated increases in recreation along the Drakes Creek corridor could result in greater human contact, and thus could affect fish and wildlife species. If recreation use along the corridor is determined to have adverse impacts on wildlife and fish species, there could be some potential for reduction or elimination of such use.

Options B and C

No significant effects to present fish and wildlife habitat conditions are foreseen under Options B and C. Recreation use along the Drakes Creek corridor is expected to stay relatively constant, with small increases in use over time.

Soil and water

Option A

Increased recreational use and developments along Drakes Creek could result in short-term water degradation. Current forest policy and existing federal and state regulations should ensure that water quality will not be permanently affected by other resource activities.

Options B and C

No significant effects on current soil and water conditions are foreseen under Options B and C. Current use levels along the Drakes Creek corridor would be expected to remain relatively constant. Slight increases in recreation use over time would not be expected to adversely impact the water quality of Drakes Creek.

Heritage resources

Options A, B, and C

The site predictive model for the Kisatchie National Forest rates the Drakes Creek corridor as extremely high for probability of containing significant sites. Impacts to cultural and historic artifacts from resource management activities such as trail construction would be mitigated. Archeological

TABLE E–6, ENVIRONMENTAL CONSEQUENCES SUMMARY

Drakes Creek — Three Options

	Option A	Option B	Option C
Recreational Development and Use	Designation would cause slightly larger increases in recreation use within the corridor. Controls would be established on the federally managed segments to regulate the amount and type of use. The ROS class within the river corridor would change from *roaded natural* to *semiprimitive*.	There would be little change in the recreational opportunities and uses within the corridor. New development of recreation facilities within 100 feet of the corridor must be permitted by the Louisiana Department of Wildlife and Fisheries.	There would be no change in the recreational opportunities and use within the corridor.
Visual Resources	There is potential for increased human influence and use which could result in more river bank deterioration and littering. However, the lands along Drakes Creek would retain the existing landscape and scenic quality. National forest lands within the river corridor would be assigned a SCO of *retention*.	There would be no significant effect to the existing visual conditions on Drakes Creek. The SCOs within the river corridor would be *retention* for the segment of the corridor which runs through the Longleaf Scenic Area, the remainder of the corridor would be assigned *partial retention*.	There would be no significant effect to the existing visual conditions on Drakes Creek. The SCOs within the corridor would be *retention* for the segment running through the Longleaf Scenic Area, the remainder would be managed for *partial retention* and *modification* SCOs.
Land Ownership and Use	Uses and development determined to have a direct and adverse effect on wild and scenic river values, in particular all new impoundments and water intake structures would be prohibited. No land acquisition of private lands would be required for designation.	If designated by the State of Louisiana as a natural and scenic stream certain activities would either be prohibited or would require a permit from the Department of Wildlife and Fisheries. Channelization of the stream; channel realignment; clearing and snagging; impoundments of any type; and commercial clearcutting of timber within 100 feet of the low-water mark would be prohibited.	No changes in land uses would occur under this option. National forest lands within the corridor would continue to be managed for the protection of the Louisiana pearlshell mussel. Private lands would not be impacted. Land ownership in the river corridor would remain in about the same federal-to-private ownership ratio.
Effects on Private Land	No fee title land acquisition by the Federal Government would be required for designation under this option. Restrictions to development or use of private lands could result from laws or zoning ordinances currently in effect, or developed in the future by parish or state government bodies empowered with such authority. Condemnation could be used to clear title or acquire scenic easements. There could also be some increase in trespass and litter on private lands as river use increases.	Certain activities would either be prohibited or would require a permit from the Department of Wildlife and Fisheries. Channelization of the stream; channel realignment; clearing and snagging; impoundments of any type; and commercial clearcutting of timber within 100 feet of the low-water mark would be prohibited. Other activities that may have a direct, significant, ecological impact on the stream would require a permit.	No changes to land uses would occur under this option. Forest Service lands within the corridor would continue to be managed for the protection of the Louisiana pearlshell. Private land would not be impacted.
Access	Access to Drakes Creek on national forest lands would remain essentially unchanged. Access from private land could become more prevalent over time. Additional access sites would not be needed.	Access on national forest or private lands would not be affected by state designation.	Same as Option B.

TABLE E–6, ENVIRONMENTAL CONSEQUENCES SUMMARY

Drakes Creek — Three Options

Vegetation	The potential for vegetative change would not be significant on national forest lands. Private lands would be unaffected under this option.	The potential for vegetative change would not be significant on national forest lands. Some restriction on vegetative manipulation would occur within 100 feet of the low-water mark of Drakes Creek.	The potential for vegetative change would not be significant on national forest lands. Private lands would be unaffected under this option.
Fish and Wildlife Including T&E Species	Increases in recreation use along the river corridor could result in greater human contact and their effects to fish and wildlife. If recreational use along the corridor is determined to have adverse impacts on wildlife and fish, there would be a potential for reduction or elimination of the recreational use.	No significant effects to present fish and wildlife habitat conditions are foreseen under this option. Use along the Drakes Creek corridor is expected to stay relatively constant, with small increases in use over time. If recreational use along the corridor is determined to have adverse impacts on wildlife and fish species, there would be potential for reduction or elimination of the recreational use.	Same as Option B
Soil and Water	Increased recreational use and developments along Drakes Creek could result in short-term water degradation.	No significant effects on current soil and water conditions are foreseen under this option. Slight increases in recreation use over time would not impact the water quality of Drakes Creek.	Same as Option B.
Heritage Resources	The site predictive model for the Kisatchie National Forest rates the corridor as having an extremely high probability for containing significant sites. Impacts to cultural and historic sites from resource management activities such as trail construction would be mitigated. Option A could result in an increase in disturbance of sites from illegal artifact collection in areas of increased dispersed recreation use.	Same as Option A	Same as Option A
Social and Economic	There would be no significant effects on current growth patterns and employment conditions in the local community. There could be a small increase in revenue to the local economy from anticipated increases in recreation related expenditures by river users attracted by wild and scenic river designation. No significant effect to the current social environment is foreseen.	There would be no significant effect to current growth patterns or the social environment. Revenues to local economies resulting from recreational use of the river would not increase under this option.	Same as Option B.

OPTIONS & ENVIRONMENTAL CONSEQUENCES

DRAKES CREEK

ENVIRONMENTAL CONSEQUENCES

DRAKES CREEK FOREST PLAN ALTERNATIVES

surveys would be conducted prior to construction, and projects relocated if significant sites were inventoried. Option A could produce increased site disturbance from illegal artifact collection in areas of increased dispersed recreation use.

Social and economic

Option A

Only slight effects would accrue to current local community social environment, growth patterns, or employment conditions. The 1990 census data show the Vernon Parish population as 61,961. A small increase in revenue to the local economy could result from anticipated greater recreation-related expenditures from river users attracted by wild and scenic river designation. Amenity values for adjacent landowners would be preserved to the greatest degree by this option. However, some loss of amenity values would occur as the river corridor became more developed.

Options B and C

These options would introduce little effect to current growth patterns or the social environment. Revenues to local economies resulting from recreation use of the river would not increase. Amenity values would be preserved.

DRAKES CREEK FOREST PLAN ALTERNATIVES

Alternatives A–F

No National Wild & Scenic River designation. Drakes Creek would be protected by Forest Plan standards and guidelines for streamsides, riparian areas, and other areas; and by special interest designation.

KISATCHIE BAYOU

OPTIONS

Option A

Option A would recommend the 40.5-mile segment of Kisatchie Bayou — from its entrance into the Kisatchie National Forest to where it exits the forest boundary — as *scenic*, and suitable for inclusion within the National Wild & Scenic Rivers System. Because a large portion of the stream corridor is in private ownership, it could be jointly administered by the Forest Service and the State of Louisiana. This legislation would call for the adoption of a program of action or river management plan for the entire corridor. This would require the cooperation of the Federal Government, state and local governmental bodies, and citizen coalition groups or councils, for the purpose of providing permanent protection of the scenic, recreational, geologic, and botanical and ecological values of Kisatchie Bayou.

The stream corridor would be managed for natural-appearing landscapes, and would have a variable width of approximately 1/4 mile on each side. This 1/4-mile corridor contains approximately 10,053 acres, roughly 5,591 acres of which are national forest land. The remaining 4,462 acres are privately owned. This option would require no land acquisition by the Federal Government; private land exchanges and fee acquisitions on a willing seller basis would instead occur, primarily in small tracts. This would be a continuation of current policy and practice.

Inventory of cultural and historic resources on federal lands would continue. Recorded sites would then be evaluated according to the NRHP criteria of significance. Significant sites would be avoided or mitigated prior to conducting management activities with potential for ground disturbance, including recreation facility or trail construction. Forest insects and diseases would be managed in accordance with the 1987 southern pine beetle EIS decision.

Current recreation management activities on national forest lands would continue with little change. There are several developed and undeveloped recreation areas along Kisatchie Bayou, including Kisatchie Bayou Camp, Red Bluff Camp, and Kisatchie Falls. The Longleaf Scenic Byway and the Caroline Dormon Trail provide access to Kisatchie Bayou. Throughout most of the year, base water flow of the stream is insufficient to support canoeing. Recreation activities within the corridor are primarily picnicking, swimming or water play, camping, hiking, hunting, and canoeing.

The scenic condition objective along the Kisatchie Bayou corridor would be *preservation* for the segment of the corridor that runs through Cunningham Brake RNA. The remainder of the corridor would be managed for *retention*. The primary goal of the retention SCO is to manage visually sensitive areas in a manner that promotes a natural appearing and diverse landscape. All of the acres within the river corridor would be classed as land *not appropriate for timber production* on a regulated basis — or unsuitable. These acres would be managed to retain scenic conditions, encourage dispersed recreational opportunities, and provide for plant and animal diversity.

Option B

Option B would propose that Kisatchie Bayou not be designated into the Wild & Scenic Rivers System. The oustandingly remarkable values of Kisatchie Bayou would be protected through the Louisiana Natural & Scenic Rivers System, one of the most extensive state river conservation programs in the nation, encompassing over 51 rivers or river segments totaling more than 1,500 miles. Kisatchie Bayou is listed by the state as a natural and scenic stream. Its outstandingly remarkable values would be protected accordingly. The Louisiana Natural & Scenic Rivers Act established a regulatory program which empowered the secretary of the Louisiana Department of Wildlife and Fisheries to administer the system through regulation and permits.

The State of Louisiana prohibits stream channelization, channel realignment, clearing and snagging, impoundments of any type, or commercial clearcutting of timber within 100 feet of the low-water mark of state natural and scenic streams. Other activities that may directly and significantly impact the stream's ecology would require a permit from the Louisiana Department of Wildlife and Fisheries. Some activities which must be permitted include: bridge, pipeline, and powerline crossings; bulkheads, piers, docks, and ramps; waste water discharges; or land

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KISATCHIE BAYOU

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development adjacent to the stream. The State is developing a scenic river plan for Kisatchie Bayou.

Inventory of cultural and historic resources on federal lands would continue. Sites determined as significant would be avoided or mitigated prior to management activities with potential for ground disturbance, including recreation facility or trail construction. Forest insects and diseases would be managed in accordance with the 1987 southern pine beetle EIS decision.

The SCO along Kisatchie Bayou's corridor would be *preservation* for the segment running through Cunningham Brake RNA, the remainder of the stream would be managed for a *retention* SCO. Both SCOs would encourage dispersed recreational opportunities, and provide for plant and animal diversity. No land acquisition by the Federal Government would be required under this option.

Option C

Option C would recommend the 40.5-mile segment of Kisatchie Bayou — from its entrance into the Forest to where it exits the Forest — as suitable for inclusion within the National Wild & Scenic Rivers System, and would classify it as *recreational*. The stream could be jointly administered by the Federal Government and the State of Louisiana. This legislation would call for adopting a cooperative program of action or river management plan for the entire corridor by the Federal Government, state and local governments, and citizen coalition groups or councils. This would provide permanent protection of the stream's scenic, recreational, geologic, and botanical and ecological values.

The proposed corridor would be managed for natural-appearing landscapes and would vary in width, averaging about 1/4 mile on each side. This 1/4-mile corridor contains about 10,053 acres, roughly 5,591 acres of which are national forest. The remaining 4,462 acres are privately owned. This option requires no land acquisition by the Federal Government; private land exchange and fee acquisition on a willing seller basis would instead occur, primarily in small tracts, a continuation of current policy and practice.

Inventory of cultural and historic resources on Federal lands would continue. Recorded sites would then be evaluated according to the NRHP criteria of significance. Sites determined as significant would be avoided or mitigated prior to management activities with potential for ground disturbance, including recreation facility or trail construction. Forest insect and disease outbreaks would be managed in accordance with the 1987 southern pine beetle EIS decision.

Current recreation management activities on national forest lands would continue with little change. Several developed and undeveloped recreational areas exist along Kisatchie Bayou, including Kisatchie Bayou Camp, Red Bluff Camp, and Kisatchie Falls. The Longleaf Scenic Byway and the Caroline Dormon Trail provide access. The stream's base water flow is sufficient to support canoeing throughout most of the year. The major recreation uses within the corridor are picnicking, swimming or water play, camping, hiking, hunting, and canoeing.

The SCO along the Kisatchie Bayou corridor would be *preservation* for the segment of the corridor that runs through Cunningham Brake RNA. The remainder would be managed for *retention*. The primary goal of the retention SCO is to manage visually sensitive areas in a manner promoting a natural-appearing, diverse landscape. All of the acres within the river corridor would be classed as land *not appropriate for timber production on a regulated basis — or* unsuitable. These acres would be managed to retain scenic conditions, to encourage dispersed recreational opportunities, and to provide for plant and animal diversity.

No land acquisition by the Federal Government would be required for designation under this option. Instead, private land exchange and fee acquisition on a willing seller basis would occur, primarily in small tracts, a continuation of current policy.

ENVIRONMENTAL CONSEQUENCES

Recreation

Several developed and undeveloped recreation areas exist along Kisatchie Bayou: Kisatchie Bayou Camp, Red Bluff Camp, and Kisatchie Falls. Current recreation uses along the stream include canoeing, swimming, wading, hunting, camping, and fishing. Streamflow supports canoeing throughout most of the year. From midsummer to the late summer months, however, canoeing would be difficult because low water requires frequent portages.

Options A and C

Increased public awareness due to the designation of Kisatchie Bayou as a national scenic river could cause increased recreation use within the stream corridor. If such increases caused adverse impacts, controls would be established on the federally owned portions to regulate the amount and type of use.

The ROS class within the stream corridor could change. This area is currently managed as a *roaded natural* ROS class. If the stream is designated, the ROS class could be changed to *semiprimitive,* where the natural environment dominates. Under the semiprimitive ROS class improvements are limited mainly to trails and a few scattered structures.

Option B

Option B would introduce little change in the recreational opportunities and use within the Kisatchie Bayou corridor; swimming, camping, canoeing, hunting, and hiking recreation opportunities would remain relatively constant. Since the stream is designated as a Louisiana Natural & Scenic river, development of recreation facilities within 100 feet must be permitted by the Louisiana Department of Wildlife and Fisheries.

The ROS class within the river corridor would not change. This area is in the *roaded natural* ROS class. Within the roaded natural class the natural environment dominates; however, evidence of human activities exists. Improvements are limited primarily to roads, trails, and a few scattered structures.

Visual resources

The visual character of Kisatchie Bayou corridor is defined by pristine natural features such as high bluffs, rock outcroppings, small waterfalls, and large sandbars. Vegetation cover changes over the course of the bayou, starting with oak-gum-hickory in the upper reaches, then transitioning to beech-magnolia, and finally to a cypress-tupelo swamp at Cunningham Brake.

Options A, B, and C

There is a potential for increased human influence and use which could result in more river bank deterioration and littering. However, the lands along Kisatchie Bayou would retain the existing landscape and their scenic quality. National Forest lands within the river corridor would be assigned a SCO of *retention*. A primary goal of the retention SCO is managing visually sensitive areas to promote natural appearing, diverse landscapes.

Land ownership and use

The scenic river study corridor of Kisatchie Bayou contains about 10,053 acres, 4,462 acres of which are privately owned.

Options A and C

Uses and development determined to directly and adversely affect wild and scenic river values, in particular all new impoundments and water intake structures, would be prohibited. Although no land acquisition of private lands would be required for designation, private lands could be acquired by the Federal Government only on a willing seller or exchange basis. Because more than 50 percent of the river corridor is federally owned, private land cannot be acquired within the river corridor by condemnation. Acquisition of scenic easements to protect wild & scenic river values or to provide public access on designated segments would still be possible. However, it is expected that no easements across private lands would be necessary. It is anticipated that the ratio of federal-to-private land ownership in the river corridor would remain about the same.

Option B

Kisatchie Bayou is currently designated by the State of Louisiana as a Natural & Scenic stream. Certain activities are either prohibited or require a permit from the Louisiana Department of Wildlife and Fisheries. Channelization of the stream; channel realignment; clearing and snagging; impoundments of any type; and commercial clearcutting of timber within 100 feet of the low-water mark are prohibited. Other activities that may have a direct, significant, ecological impact on the stream must be permitted. Bridges, bulkheads, piers, docks, ramps, waste water discharges, and land development adjacent to the stream are examples of activities which must be permitted.

OPTIONS & ENVIRONMENTAL CONSEQUENCES

KISATCHIE BAYOU

ENVIRONMENTAL CONSEQUENCES

Effects on private land

Approximately 4,462 acres or 44 percent of the land within the 1/4-mile study corridor of Kisatchie Bayou is privately owned.

Options A and C

This option would introduce some effects to private lands. This option would require no fee title land acquisition by the Federal Government to achieve designation. Private land exchange and fee acquisition on a willing seller basis by the Federal government would occur, primarily in small tracts. This is a continuation of current policy.

Restrictions to development or use of private lands would result from current laws or zoning ordinances, or developed in the future, by parish or state government bodies empowered with such authority. Condemnation could be used to clear title or acquire scenic easements. There could also be increases in trespassing and littering on private lands as river use increases.

Option B

Private lands are currently somewhat restricted along the Kisatchie Bayou corridor. The Louisiana Natural and Scenic Rivers Act established a regulatory program and empowered the Secretary of the Louisiana Department of Wildlife and Fisheries to administer the System through regulation and permits. Certain activities have been prohibited by the State of Louisiana and a permitting system has been established to regulate other activities on scenic rivers.

Access

Access to Kisatchie Bayou is served by Forest Service Roads 303, 337, 250, Louisiana Highway 117, Longleaf Trail Scenic Byway, and the Caroline Dormon Trail.

Options A and C

Under Options A and C, access to Kisatchie Bayou from national forest lands would remain substantially unchanged. Access to the river from private land could become more prevalent over time. As recreation use of the river increased, additional national forest access points would be needed, and improvement of existing developed and undeveloped access sites would be necessary to prevent vegetation loss, soil compaction, and river bank erosion.

Option B

Access to Kisatchie Bayou would remain substantially unchanged. Access to the bayou from private land would become more prevalent over time. If recreation use of the river increases, additional national forest access points would be needed.

Vegetation

Options A, B, and C

The riparian corridor along Kisatchie Bayou would change little under all options. This corridor is largely contiguous, with little fragmentation. General forest types change over its entire course. Louisiana bluestar (*Amsonia ludoviciana*) is known to occur within 1/2 mile of Kisatchie Falls, and along several Kisatchie Bayou tributaries. Clammy weed (*Polanisia erosa*) and nodding pogonia (*Triphora trianthophora*) are known to occur in the Cunningham Brake area. These plants are all listed as sensitive or conservation species. Potential for vegetation change would be greatest under Option B.

Fish and wildlife including threatened and endangered species

Options A and C

Anticipated increases in recreation use along Kisatchie Bayou could result in greater human contact and potentially adverse impacts to fish and wildlife. If this occurred, it might create a potential need to reduce or eliminate recreational use.

Option B

No significant effects to present fish and wildlife habitat conditions are foreseen under Option B. Recreation use along the Kisatchie Bayou corridor is expected to stay relatively constant, with small increases in use over time.

Soil and water

Options A and C

Increased recreational use and developments along Kisatchie Bayou could result in short-term water degradation. Current forest policy and existing federal and state regulations should ensure that water quality would not be permanently affected by other resource activities.

Option B

No significant effects on current soil and water conditions are foreseen under Option B. Current use levels along the Kisatchie Bayou corridor would be expected to stay relatively constant. Slight increases in recreation use over time would not be expected to adversely impact the water quality of Kisatchie Bayou.

Heritage resources

Alternatives A, B, and C

The Kisatchie National Forest site predictive model rates the Kisatchie Bayou corridor as having a high probability for containing significant sites. Impacts to cultural and historic sites from resource management activities such as trail construction would be mitigated. Archeological surveys would be conducted prior to construction, and projects relocated if significant site were inventoried. In areas of increased dispersed recreation use, Options A and C could cause more site disturbances from illegal artifact collection.

Social and economic

Options A and C

Under these options only slight effects would accrue to local community current growth patterns or employment conditions. The 1990 census data showed Natchitoches Parish to have a population of 36,689. A small increase in revenue to the local economy could result from anticipated increases in recreation-related expenditures by river users attracted by the wild & scenic river designation. No significant effect on the current social environment is foreseen. Amenity values for adjacent landowners would be preserved to the greatest degree under these options. However, some loss of amenity values would occur as the river corridor becomes more developed.

Option B

Under this option little effects on current growth patterns or the social environment would occur. Revenues to local economies resulting from recreational use of the stream would not increase. Amenity values would be preserved.

KISATCHIE BAYOU
FOREST PLAN ALTERNATIVES

Alternatives A, B, D,Mod D, E, F

No national wild & scenic river designation. The outstandingly remarkable values of Kisatchie Bayou would be adequately protected through Louisiana Natural & Scenic Rivers designation and Forest Plan standards and guidelines for streamsides, riparian areas, and other areas.

Alternative C

Recommend 40.5 miles for national scenic river designation.

TABLE E–7, ENVIRONMENTAL CONSEQUENCES SUMMARY

Kisatchie Bayou — Three Options

	Option A	Option B	Option C
Recreational Development and Use	Designation would cause slightly larger increases in recreation use within the corridor. Controls would be established on the federally managed segments to regulate the amount and type of use. The ROS class within the corridor would change from *roaded natural* to *semiprimitive.*	There would be little change in the recreational opportunities and uses within the corridor. New development of recreation facilities within 100 feet of the corridor would require a permit from the Louisiana Department of Wildlife and Fisheries.	Same as Option A
Visual Resources	There is a potential for increased human influence and use which could result in more river bank deterioration and littering. However, the lands along Kisatchie Bayou would retain the existing landscape and their scenic quality. National Forest lands within the corridor would be assigned a SCO of *retention.*	There would be no significant effect to the existing visual conditions on Kisatchie Bayou. The SCOs within the corridor would be managed for *partial retention.*	Same as Option A
Land Ownership and Use	Uses and development determined to have a direct and adverse effect on wild and scenic river values, in particular all new impoundments and water intake structures, would be prohibited. No land acquisition of private lands would be required for designation.	Kisatchie Bayou is designated by the State of Louisiana as a natural and scenic stream. Certain activities are either prohibited or require a permit from the Department of Wildlife and Fisheries. Channelization of the stream; channel realignment; clearing and snagging; impoundments of any type; and commercial clearcutting of timber within 100 feet of the low-water mark would be prohibited.	Same as Option A
Effects on Private Land	No fee title land acquisition by the Federal Government would be required for designation under this option. Restrictions to development or use of private lands could result from laws or zoning ordinances currently in effect, or developed in the future by parish or state government bodies empowered with such authority. Condemnation could be used to clear title or acquire scenic easements. There could also be some increase in trespass and litter on private lands as river use increases.	Certain activities are either prohibited or require a permit from the Department of Wildlife and Fisheries. Channelization of the stream; channel realignment; clearing and snagging; impoundments of any type; and commercial clearcutting of timber within 100 feet of the low-water mark would be prohibited. Other activities that may have a direct, significant, ecological impact on the stream would require a permit.	Same as Option A.
Access	Access to Kisatchie Bayou on national forest lands would remain substantially unchanged. Access to the bayou from private land could become more prevalent over time. Additional access sites would not be needed.	There would be no effects to access on national forest or private lands as a result of state designation.	Same as Option A.
Vegetation	The potential for vegetative change would not be significant on national forest lands. Private lands would be unaffected under this option.	The potential for vegetative change would not be significant on national forest lands. Some restriction on vegetative manipulation do occur within 100 feet of the low-water mark of Kisatchie Bayou.	Same as Option A.

TABLE E–7, ENVIRONMENTAL CONSEQUENCES SUMMARY

Kisatchie Bayou — Three Options

Fish and Wildlife Including T&E Species	Increases in recreation use along the corridor could result in greater human contact and their effects to fish and wildlife. If recreational use along the corridor is determined to have adverse impacts on wildlife and fish, there would be a potential for reduction or elimination of the recreational use.	No significant effects to present fish and wildlife habitat conditions are foreseen under this option. Use along the Kisatchie Bayou corridor is expected to stay relatively constant, with small increases in use over time. If recreational use along the corridor is determined to have adverse impacts on wildlife and fish species, there would be potential for reduction or elimination of the recreational use.	Same as Option A.
Soil and Water	Increased recreational use and developments along Kisatchie Bayou could result in short-term water degradation.	No significant effects on current soil and water conditions are foreseen under this option. Slight increases in recreation use over time would not impact the water quality of Kisatchie Bayou.	Same as Option A.
Heritage Resources	The site predictive model for the Kisatchie National Forest rates the corridor as having an extremely high probability for containing significant sites. Impacts to cultural and historic sites from resource management activities such as trail construction would be mitigated. This option could result in an increase in disturbance of sites from illegal artifact collection in areas of increased dispersed recreation use.	Same as Option A	Same as Option A
Social and Economic	There would be no significant effects on current growth patterns and employment conditions in the local community. There could be a small increase in revenue to the local economy from anticipated increases in recreation-related expenditures by river users attracted by wild and scenic river designation. No significant effect to the current social environment is foreseen.	There would be no significant effect to current growth patterns or the social environment. Revenues to local economies resulting from recreational use of the river would not increase under this option.	Same as Option A.

OPTIONS & ENVIRONMENTAL CONSEQUENCES

SIX MILE CREEK

OPTIONS

SIX MILE CREEK

OPTIONS

Option A

Option A would recommend both segments of Six Mile Creek — Segment A, 4.8 miles; and Segment B, 6.2 miles — from where they enter the limited use boundary of the Vernon Unit (FDR 405) south to where both segments merge together and exit the Forest boundary, as suitable for inclusion within the National Wild & Scenic Rivers System under a *scenic* classification. Both segments of the river would be administered by the Federal Government.

Legislation would call for the adoption of a cooperative program of action or management plan for the entire Six Mile Creek corridor. Through the Federal Government, state and local governments, and citizen coalition groups or councils, this would provide permanent protection of the geologic, botanical and ecological, wildlife, and cultural and historical values of the stream.

The proposed river corridor would be managed for natural-appearing landscapes and would have a variable width corridor of approximately 1/4 mile on each side. There are approximately 1,077 acres within Segment A and 1,243 acres within Segment B. Approximately 531 acres are within the 1/4-mile corridor where the two segments merge to form Six Mile Creek. This option would require no land acquisition by the Federal Government to achieve designation. Private land exchange and fee acquisition on a willing seller basis would occur, primarily in small tracts, a continuation of current policy and practice.

Inventory of cultural and historic resources on federal lands would continue. Recorded sites would then be evaluated according to the NRHP criteria of significance. Sites determined as significant would be avoided or mitigated prior to management activities with potential for ground disturbance, including recreation facility or trail construction. Forest insect and disease outbreaks would be managed in accordance with the 1987 southern pine beetle EIS decision.

Recreation management activities on national forest lands would continue with little change. Fullerton Lake Recreation Area provides the only developed recreation area within the corridor of Segment B of the West Fork Six Mile. The base water flow of Six Mile Creek is insufficient to support canoeing. The majority of recreational uses within the corridor are camping, hiking, and hunting.

The SCO along the Six Mile Creek corridor would be *retention*. The primary goal of the retention SCO is to manage visually sensitive areas in a manner that promotes a diverse, natural-appearing landscape. All of the acres within the river corridor would be classed as land *not appropriate for timber production on a regulated basis* — or unsuitable. These acres would be managed to retain scenic conditions, encourage dispersed recreational, and provide for plant and animal diversity.

Option B

Option B would recommend that both segments of Six Mile Creek not be designated into the Wild & Scenic Rivers System. The outstandingly remarkable values of Six Mile Creek would be protected through the Louisiana Natural & Scenic Rivers System, one of the most extensive state river conservation programs in the nation, encompassing more than 51 rivers or river segments totaling over 1,500 miles. Six Mile Creek is listed by the State of Louisiana as a natural and scenic stream. The Louisiana Natural and Scenic Rivers Act established a regulatory program empowering the Secretary of the Louisiana Department of Wildlife and Fisheries to administer the system through regulation and permits.

Channelization of the stream, channel realignment, clearing and snagging, impoundments of any type, or commercial clearcutting of timber within 100 feet of the low-water mark of state natural & scenic streams are prohibited by the State of Louisiana. Other activities that may have a direct, significant, ecological impact on the stream must be permitted by the Louisiana Department of Wildlife and Fisheries. Some activities which must be permitted include: bridge, pipeline, and powerline crossings; bulkheads, piers, docks, and ramps; waste water discharges; or land development adjacent to the stream.

Inventory of cultural and historic resources on Federal lands would continue. Sites determined as significant would be avoided or mitigated prior to conducting management activities with a potential ground disturbance, including recreation facility or trail construction. Forest insect and disease outbreaks would be managed in accordance with the 1987 southern pine beetle EIS decision.

The SCO along both segments of Six Mile Creek would be *retention*. Retention would encourage dispersed recreation and provide for plant and animal diversity. This option would require no land acquisition by the Federal Government.

Option C

Option C would recommend Segments A and B of Six Mile Creek — from where they enter the limited use boundary of the Vernon Unit (FDR 405) south to where the segments merge and exit the Forest boundary — suitable for inclusion within the National Wild & Scenic Rivers System as *recreational*. The river would be administered by the Federal Government. Legislation would prescribe adoption of a cooperative program of action or management plan for the entire Six Mile Creek corridor, to provide permanent protection of its geologic, botanical and ecological, wildlife, and cultural and historical values. This would be administered through the Federal Government, state and local governmental bodies, and citizen coalition groups or councils.

A proposed corridor with a variable width of about 1/4 mile on each side would be managed for natural-appearing landscapes. Segment A contains about 1,077 acres; Segment B about 1,243 acres. Roughly 531 acres lie within the 1/4-mile corridor where both segments merge to form Six Mile Creek. Under this option the Federal Government would not be required to acquire land in order to achieve designation. Instead, private land exchange and fee acquisition on a willing seller basis by would occur, primarily in small tracts, a continuation of current policy and practice.

Inventory of cultural and historic resources on federal lands would continue. Recorded sites would then be evaluated according to the NRHP criteria of significance. Sites determined as significant would be avoided or mitigated prior to management activities with potential for ground disturbance, including recreation facility or trail construction. Forest insects and diseases would be managed in accordance with the 1987 southern pine beetle EIS decision.

Current recreation management activities on national forest lands would continue with little change. There is one developed recreational area within the corridor of Segment B of the West Fork of Six Mile. The base water flow of Six Mile Creek is insufficient to support canoeing. The majority of recreational uses within the corridor are camping, hiking, and hunting activities.

The SCO along the Six Mile Creek corridor would be *retention*. The primary goal of the retention SCO is to manage visually sensitive areas in a manner that promotes natural-appearing, diverse landscapes. All the acres within the river corridor would be classed as land *not appropriate for timber production on a regulated basis* — or unsuitable. These acres would be managed to retain scenic conditions, encourage dispersed recreational opportunities, and provide for plant and animal diversity.

Option D

Option D would propose that the 6.2-mile Segment B of the West Fork of Six Mile, be suitable for inclusion as *scenic* within the National Wild & Scenic Rivers System. Segment A of the East Fork of Six Mile would not be proposed for designation. West Fork of Six Mile would be administered by the Forest Service. Legislation would call for the adoption of a cooperative program of action or river management plan for the entire corridor whereby the Federal Government, state and local governments, and citizen coalition groups or councils would jointly provide permanent protection of Six Mile Creek's cultural and historical values.

The proposed corridor would be managed for natural-appearing landscapes and would have a variable width of approximately 1/4 mile on each side. There are approximately 1,243 acres within the corridor of Segment B. No land acquisition by the Federal Government would be required for designation under this option. Instead, private land exchange and fee acquisition on a willing seller basis would occur, primarily in small tracts, a continuation of current policy and practice.

The outstandingly remarkable geologic, wildlife, botanical, and ecological values of East Fork of Six Mile Creek would be protected through the Louisiana Natural & Scenic Rivers System. Six Mile Creek is listed by the State of Louisiana as a Natural and Scenic River.

OPTIONS & ENVIRONMENTAL CONSEQUENCES

SIX MILE CREEK

OPTIONS

ENVIRONMENTAL CONSEQUENCES

The Fullerton Mill and Town site was listed on the NRHP in 1986, as the largest pine sawmill west of the Mississippi River. Inventory of cultural and historic resources along West Fork Six Mile Creek on federal lands would continue. Recorded sites would then be evaluated according to the NRHP criteria of significance. Sites determined to be significant would be avoided or mitigated prior to conducting management activities with a potential ground disturbance, including recreation facility or trail construction. Forest insect and disease outbreaks would be managed in accordance with the 1987 southern pine beetle EIS decision.

Current recreation management activities on national forest lands would continue with little change. Fullerton Lake Recreation Area is the only one within the corridor of Segment B of the West Fork of Six Mile. The base water flow of Six Mile Creek is insufficient to support canoeing. The major recreational uses within the corridor are camping, hiking, and hunting.

The SCO along both East Fork and West Fork of Six Mile Creek corridor would be *retention*. The primary goal of the retention SCO is to manage visually sensitive areas in a manner promoting natural-appearing, diverse landscapes. All the acres within the river corridor would be classed as land *not appropriate for timber production on a regulated basis* — or unsuitable. These acres would be managed to retain scenic conditions, encourage dispersed recreational opportunities, and provide for plant and animal diversity.

ENVIRONMENTAL CONSEQUENCES

Recreation

The corridor of Segment B of the West Fork of Six Mile Creek contains one developed recreation area. No developed recreation areas exist along Segment A. Recreation use on Six Mile Creek includes hunting, camping, and fishing.

Options A, C, and D

Increased public awareness due to designation as a National Scenic river could cause increased recreation use within the Six Mile Creek corridor. If increased recreational use resulted in adverse impacts to the river or its corridor, controls would be established on the federally owned segments to regulate the amount and type of use.

There could be a change in the Recreation Opportunity Spectrum (ROS) class within the river corridor. The area is currently in the *roaded natural* ROS class. If designated, the ROS class could be changed to *semiprimitive* where the natural environment dominates. Under the semiprimitive ROS class improvements are mainly limited to trails and a few scattered structures.

Option B

There would be little change in the recreational opportunities and use within the corridor under Option B. Camping, hunting, and hiking related recreation opportunities would remain relatively constant. Six Mile Creek is currently designated as a Louisiana Natural and Scenic river, development of recreation facilities within 100 feet of the stream would require a permit from the Louisiana Department of Wildlife and Fisheries.

There would be no change in the ROS class within the river corridor. The area is currently in the *roaded natural* ROS class. Within the roaded natural class, the natural environment dominates, however, there is evidence of human activities. Improvements are mainly limited to roads, trails, and a few scattered structures.

Visual resources

The visual character of Six Mile Creek corridor is defined by attractive upland forests along the river corridor. The predominance of natural settings and the relatively undeveloped condition of the corridor contribute to the natural scenic quality along the creek.

Options A, B, C, and D

The potential for increased human influence and use could result in more river bank deterioration and littering. However, the lands along Six Mile Creek would retain the existing landscape and their scenic quality. National Forest lands within the river corridor would be assigned a SCO of *retention*. A primary goal of the retention SCO is to manage visually sensitive areas in such a manner as to promote a natural-appearing and diverse landscape. Under Option D, only Segment B of the West Fork of Six Mile would be managed for retention. The Segment A objective would be partial retention.

Land ownership and use

The scenic river study corridor of Six Mile Creek contains about 2,320 acres, 531 acres of which are privately owned.

Options A , C, and D

Uses and development determined to have a direct and adverse effect on wild and scenic river values — in particular all new impoundments and water intake structures — would be prohibited. Although no acquisition of private lands would be required for designation, the Federal Government could acquire private lands — but only on a willing seller or exchange basis. Because more than 50 percent of the river corridor is federally owned, private land cannot be acquired by the Federal Government within the river corridor by condemnation. Acquisition of scenic easements to protect wild and scenic river values or to provide public access on designated segments would still be possible. However, it is not expected that easements would be necessary on private lands. It is anticipated that land ownership in the river corridor would remain in about the same ratio of Federal and private ownership as now exists.

Option B

Six Mile Creek is currently designated by the State of Louisiana as a natural & scenic stream. Certain activities are either prohibited or require a permit from the Louisiana Department of Wildlife and Fisheries. Channelization of the stream; channel realignment; clearing and snagging; impoundments of any type; and commercial clearcutting of timber within 100 feet of the low-water mark are prohibited. Other activities that may have a direct, significant, ecological impact on the stream must be permitted. Bridges, bulkheads, piers, docks, ramps, waste water discharges, and land development adjacent to the stream are some activities which would require a permit.

Effects on private land

Approximately 2,320 acres or 23 percent of the land within the 1/4-mile study corridor of Six Mile Creek is privately owned.

Options A ,C and D

This option would introduce some effects to private lands. This option would require no fee title land acquisition by the Federal Government to achieve designation. Private land exchange and fee acquisition on a willing seller basis by the Federal government would occur, primarily in small tracts. This is a continuation of current policy.

Restrictions to development or use of private lands would result from current laws or zoning ordinances, or developed in the future, by parish or state government bodies empowered with such authority. Condemnation could be used to clear title or acquire scenic easements. There could also be increases in trespassing and littering on private lands as river use increases.

Option B

Some restrictions currently apply to lands along the Six Mile Creek corridor. The Louisiana Natural & Scenic Rivers Act established a regulatory program and empowered the Secretary of the Louisiana Department of Wildlife and Fisheries to administer the system through regulation and permits. Certain activities have been prohibited by the State of Louisiana and a permitting system has been established to regulate other activities on the scenic rivers.

Access

Current public access to Segment A of the East Fork of Six Mile Creek is served by Forest Road 405 and LA Highway 339. Forest Roads 405 and 449 give access to West Fork of Six Mile. The Whisky Chitto Trail also gives access to West Fork of Six Mile Creek.

OPTIONS & ENVIRONMENTAL CONSEQUENCES

SIX MILE CREEK

ENVIRONMENTAL CONSEQUENCES

Options A, C, and D

If designated, the use on Six Mile Creek would be expected to increase. However, because of the limited recreational opportunities along Six Mile Creek, access from national forest lands would remain substantially unchanged. Access from private land could become more prevalent over time.

Option B

Access to Six Mile Creek would remain substantially unchanged. However, access to the creek from private land would become more prevalent over time. If recreation use of the river increases, additional access points would be needed from national forest lands.

Vegetation

Options A, B, C, and D

None of the options would produce much change to the Six Mile Creek riparian corridor — which is largely contiguous, with little fragmentation. Within five known bog communities along Segment A of the East Fork of Six Mile Creek, two listed *conservation* plant species occur: large-leaved rose gentian (*Sabatia marcophylla*) and yellow fringeless orchid (*Platanthera integra*). One known bog plant community grows within the 1/4-mile corridor of West Fork of Six Mile; however, no known TES species occur in this community. Potential for vegetation change would be greatest under Option B.

Fish and wildlife including threatened and endangered species

Options A, C, and D

Anticipated increases in recreation use along the Six Mile Creek corridor could result in greater human contact and consequent effects to fish and wildlife. If recreational use along the corridor is determined to cause adverse impacts to wildlife and fish, recreational use might be reduced or eliminated.

Option B

No significant effects to present fish and wildlife habitat conditions are foreseen under Option B. Recreation use along the Six Mile Creek corridor is expected to stay relatively constant, with small increases in use over time.

Soil and water

Options A , C, and D

Increased recreational use and developments along Six Mile Creek could result in short-term water degradation. Current forest policy and existing federal and state regulations should ensure that water quality would not be permanently affected by other resource activities.

Option B

No significant effects on current soil and water conditions are foreseen under Option B. Current use levels along the Six Mile Creek corridor would be expected to stay relatively constant. Slight increases in recreation use over time would not be expected to adversely impact the water quality of Six Mile Creek.

Heritage resources

Options A, B, C, and D

The Kisatchie National Forest site predictive model rates probability of the Six Mile Creek corridor as high for containing significant sites. The Fullerton Mill and Town site was listed on the NRHP in 1986 as the largest pine sawmill west of the Mississippi River. Much of the ruins and foundations of the mill site are still evident. Impacts to cultural and historic artifacts from resource management activities such as trail construction would be mitigated. Archeological surveys would be conducted prior to construction, and projects relocated if a significant site was inventoried. Options A, C, and D could cause increased site disturbance from illegal artifact collection in areas of increased dispersed recreation use.

Social and economic

Options A , C, and D

Under these options, only slight effects would accrue to current local community growth patterns and employment conditions. The 1990 census data showed Vernon Parish to have a population of 61,961. There could be a small increase in revenue to the local economy from anticipated increases in recreation related expenditures by river users attracted by wild & scenic river designation. No significant effect on the current social environment is foreseen. Amenity values for adjacent landowners would be preserved to the greatest degree. However, there would be some loss of amenity values as the corridor developed.

Option B

Under this option, little effects would accrue to current local community growth patterns or social environment. Revenues to local economies resulting from recreational use of the river would not increase under this option. Amenity values would be preserved in both options.

SIX MILE CREEK
FOREST PLAN ALTERNATIVES

Alternatives A–F

No national wild & scenic river designation. The outstandingly remarkable values of Six Mile Creek would be adequately protected through Louisiana Natural & Scenic rivers designation and Forest Plan standards and guidelines for streamsides, riparian areas, and other areas.

TABLE E–8, ENVIRONMENTAL CONSEQUENCES SUMMARY

Six Mile Creek — Four Options

	Option A	Option B	Option C	Option D
Recreational Development and Use	Designation would cause slightly larger increases in recreation use within the corridor. Controls would be established on the federally managed segments to regulate the amount and type of use. The ROS class within the river corridor would change from *roaded natural* to *semiprimitive*.	There would be little change in the recreational opportunities and uses within the corridor. New development of recreation facilities within 100 feet of the corridor must be permitted by the Louisiana Department of Wildlife and Fisheries.	Same as Option A.	Same as Option A except for segment A. East Fork Six Mile would retain its *roaded natural* ROS class
Visual Resources	There is a potential for increased human influence and use which could result in more river bank deterioration and littering. However, the lands along Six Mile Creek would retain the existing landscape and their scenic quality. National Forest lands within the river corridor would be assigned a SCO of *retention*.	There would be no significant effect to the existing visual conditions on Six Mile Creek. The SCOs within the river corridor would be managed for *partial retention*.	Same as Option A.	Same as Option A for segment B, West Fork Six Mile. Segment A, East Fork would be the same as Option B.
Land Ownership and Use	Uses and development determined to have a direct and adverse effect on wild and scenic river values, in particular all new impoundments and water intake structures would be prohibited. No land acquisition of private lands would be required for designation.	Six Mile Creek is designated by the State of Louisiana as a natural and scenic stream. Certain activities are prohibited or require a permit from the Department of Wildlife and Fisheries. Stream channelization; channel realignment; clearing and snagging; impoundments of any type; and commercial clearcutting within 100 feet of low-water mark are prohibited.	Same as Option A.	Same as Option A for segment B, West Fork Six Mile. Segment A, East Fork would be the same as Option B.
Effects on Private Land	No fee title land acquisition by the Federal Government would be required for designation under this option. Restrictions to development or use of private lands could result from laws or zoning ordinances currently in effect, or developed in the future by parish or state government bodies empowered with such authority. Condemnation could be used to clear title or acquire scenic easements. There could also be some increase in trespass and litter on private lands as river use increases.	Certain activities are either prohibited or require a permit from the Department of Wildlife and Fisheries. Channelization of the stream; channel realignment; clearing and snagging; impoundments of any type; and commercial clearcutting of timber within 100 feet of the low-water mark would be prohibited. Other activities that may have a direct, significant, ecological impact on the stream must be permitted.	Same as Option A.	Same as Option A for segment B, West Fork Six Mile. Segment A, East Fork would be the same as Option B.
Access	Access to Six Mile Creek on Forest Service lands would remain substantially unchanged. Access to the bayou from private land could become more prevalent over time. Additional access sites would not be needed.	There would be no effects to access on Forest Service or private lands as a result of state designation.	Same as Option A.	Same as Option A for segment B, West Fork Six Mile. Segment A, East Fork would be the same as Option B.
Vegetation	The potential for vegetative change would not be significant on national forest lands. Private lands would be unaffected under this option.	The potential for vegetative change would not be significant on Forest Service lands. Some restrictions on vegetative manipulation do occur within 100 feet of the low-water mark of Six Mile Creek.	Same as Option A.	Same as Option A for segment B, West Fork Six Mile. Segment A, East Fork would be same as Option B.

TABLE E–8, ENVIRONMENTAL CONSEQUENCES SUMMARY

Six Mile Creek — Four Options

Fish and Wildlife Including T&E Species	Increases in recreation use along the river corridor could result in greater human contact and their effects to fish and wildlife. If recreational use along the corridor is determined to have adverse impacts on wildlife and fish, there would be a potential for reduction or elimination of the recreational use.	No significant effects to present fish and wildlife habitat conditions are foreseen under this option. Use along the Six Mile Creek corridor is expected to stay relatively constant, with small increases in use over time. If recreational use along the corridor is determined to have adverse impacts on wildlife and fish species, there would be potential for reduction or elimination of the recreational use.	Same as Option A.	Same as Option A for segment B, West Fork Six Mile. Segment A, East Fork would be same as Option B.
Soil and Water	Increased recreational use and developments along Six Mile Creek could result in short-term water degradation.	No significant effects on current soil and water conditions are foreseen under this option. Slight increases in recreation use over time would not impact the water quality of Six Mile Creek.	Same as Option A.	Same as Option A for segment B, West Fork Six Mile. Segment A, East Fork would be same as Option B.
Heritage Resources	The site predictive model for the Kisatchie National Forest rates the corridor as having an extremely high probability for containing significant sites. Impacts to cultural and historic sites from resource management activities such as trail construction would be mitigated. This option could result in an increase in disturbance of sites from illegal artifact collection in areas of increased dispersed recreation use.	Same a Option A.	Same as Option A.	Same as Option A.
Social and Economic	There would be no significant effects on current growth patterns and employment conditions in the local community. There could be a small increase in revenue to the local economy from anticipated increases in recreation related expenditures by river users attracted by wild and scenic river designation. No significant effect to the current social environment is foreseen.	There would be no significant effect to current growth patterns or the social environment. Revenues to local economies resulting from recreational use of the river would not increase under this option.	Same as Option A.	Same as Option A for segment B, West Fork Six Mile. Segment A, East Fork would be same as Option B.

OPTIONS & ENVIRONMENTAL CONSEQUENCES

WHISKY CHITTO CREEK

OPTIONS

WHISKY CHITTO CREEK

OPTIONS

Option A

Option A would recommend the 11.3-mile segment of Whisky Chitto Creek — from where it enters the limited use boundary of the Vernon Unit (FDR 405) south to where it exits the Forest — suitable for inclusion as *recreational* within the National Wild & Scenic Rivers System. Because more than 50 percent of the river is in private ownership, it would be jointly administered by the Forest Service and the State of Louisiana. Legislation would call for adopting a program of action or management plan for the entire corridor, wherein the Federal Government, state and local governments, and citizen coalition groups or councils would cooperate to provide permanent protection of the geologic, botanical and ecological, and historic and cultural values.

The river corridor would be managed for natural-appearing landscapes and would have a variable width of about 1/4 mile on each side of the proposed river. Of about 2,530 acres within the corridor, 1,129 acres are owned by the U.S. Forest Service and 1,401 acres are privately owned. No land acquisition by the Federal Government would be required for achievement of designation under this option. Instead, private land exchange and fee acquisition on a willing seller basis would occur, primarily in small tracts, a continuation of current policy and practice.

Inventory of cultural and historic resources on Federal lands would continue. Recorded sites would then be evaluated according to the NRHP criteria of significance. Sites determined to be significant would be avoided or mitigated prior to conducting management activities with a potential ground disturbance, including recreation facility or trail construction. Forest insect and disease outbreaks would be managed in accordance with the 1987 southern pine beetle EIS decision.

Current recreation management activities on national forest lands would continue with little change. No developed recreation areas exist within the Whiskey Chitto Creek corridor. The base water flow of Whisky Chitto Creek is insufficient to support canoeing. The major recreation uses within the corridor are hiking and hunting.

The sco along the corridor would be *retention*. The primary goal of the retention sco is managing visually sensitive areas in a manner promoting a natural-appearing, diverse landscape. All of the acres within the river corridor would be classed as land *not appropriate for timber production on a regulated basis* — or unsuitable. These acres would be managed to retain scenic conditions, encourage dispersed recreational opportunities, and provide for plant and animal diversity.

Option B

Option B would propose that Whisky Chitto Creek not become part of the Wild & Scenic Rivers System. The outstanding remarkable geologic, botanical, ecological, and historic and cultural values of the stream would be protected through the Louisiana Natural & Scenic Rivers System. It is listed by the State of Louisiana as a natural and scenic river. Louisiana's Natural & Scenic Rivers System is one of the most extensive state river conservation programs in the nation, encompassing more than 51 rivers or river segments totaling over 1,500 miles. The Louisiana Natural & Scenic Rivers Act established a regulatory program which empowered the Secretary of the Louisiana Department of Wildlife and Fisheries to administer the System through regulation and permits.

Channelization of the stream, channel realignment, clearing and snagging, impoundments of any type, or commercial clearcutting of timber within 100 feet of the low-water mark of state Natural and Scenic streams are prohibited by the State of Louisiana. Other activities that may have a direct, significant, ecological impact on the stream must be permitted by the Louisiana Department of Wildlife and Fisheries. Some activities which must be permitted include: bridge, pipeline, and powerline crossings; bulkheads, piers, docks, and ramps; waste water discharges; or land development adjacent to the stream. The State is currently developing a scenic river plan.

Inventory of cultural and historic resources on federal lands would continue. Sites determined to be significant would be avoided or mitigated prior to conducting potentially ground-disturbing management activities, including recreation facility or trail construction. Forest insect and disease outbreaks would be managed in accordance with the 1987 southern pine beetle EIS decision.

The sco along Whisky Chitto Creek would be *retention*. A retention sco would encourage dispersed recreation, and provide for plant and animal diversity. No land acquisition by the Federal Government would be required.

ENVIRONMENTAL CONSEQUENCES

Recreation

No developed recreation areas lie within the Whisky Chitto Creek corridor. Recreation use on the stream includes hunting, camping, and fishing. Although canoeing is a popular recreational activity on its lower reaches, the base water flow is insufficient to support canoeing on this segment.

Option A

Increased public awareness due to designation as a national scenic river could cause increased recreation use within the Whisky Chitto Creek corridor. If increased recreational use caused adverse impacts to the river or its corridor, controls would be established on the federally owned segments to regulate the amount and type of use.

There could be a change in the recreation opportunity spectrum (ROS) class within the river corridor. The area is currently managed as the *roaded natural* ROS class. If designated, the class could be changed to *semiprimitive* where the natural environment dominates. Under the semiprimitive ROS class improvements are limited mainly to trails and a few scattered structures.

Option B

Under Option B recreation opportunity and use in Whisky Chitto Creek corridor would change little. Camping, hunting, and hiking would remain relatively constant. The stream is designated as a Louisiana natural & scenic river, so development of recreation facilities within 100 feet would require a permit from the Department of Wildlife and Fisheries.

The ROS class within the river corridor would not change. The area is currently managed in the *roaded natural* ROS class. Within the roaded natural class the natural environment dominates; however, there is evidence of human activities. Improvements are limited mainly to roads, trails, and a few scattered structures.

Visual resources

The visual character of Whisky Chitto Creek corridor is defined by the natural settings along the corridor which contribute to its scenic quality.

Options A and B

Option A presents potential for increased human influence and use, which could cause more river bank deterioration and littering. However, the lands along Whisky Chitto Creek would retain the existing landscape and their scenic quality. Under both options, national forest lands within the corridor would be assigned a *retention* SCO. A primary goal of the retention SCO is to manage visually sensitive areas to promote natural-appearing, diverse landscapes.

Land ownership and use

About 1,401 acres of the 2,530-acre Whisky Chitto Creek study corridor are privately owned.

Option A

Uses and developments determined to directly and adversely affect wild and scenic river values — in particular all new impoundments and water intake structures — would be prohibited. Although no land acquisition of private lands would be required for designation, the Federal Government could acquire private lands on a willing seller or exchange basis. Because more than 50 percent of the river corridor is in private ownership, private lands could be acquired by the Federal Government within the river corridor by condemnation. However, it is unlikely that the Forest Service would exercise this option. Acquisition of scenic easements to provide public access and to protect wild and scenic river values on designated segments would still be possible. It is anticipated that land ownership in the river corridor would remain at about the present ratio of federal and private ownership.

Option B

Whisky Chitto Creek is currently designated by the State of Louisiana as a natural & scenic stream. Certain activities are either prohibited or require a permit from the Louisiana

OPTIONS & ENVIRONMENTAL CONSEQUENCES

WHISKY CHITTO CREEK

ENVIRONMENTAL CONSEQUENCES

Department of Wildlife and Fisheries. Channelization of the stream, channel re-alignment, clearing and snagging, impoundments of any type, and commercial clearcutting of timber within 100 feet of the low-water mark are prohibited. Other activities that may have a direct, significant, ecological impact on the stream would require a permit. Examples are bridges, bulkheads, piers, docks, ramps, waste water discharges, and land development adjacent to the stream.

Effects on private land

Approximately 1,401 acres or 55 percent of the land within the 1/4-mile study corridor of Whisky Chitto Creek is privately owned.

Option A

This option would introduce some effects to private lands. This option would not require fee title land acquisition by the Federal Government to achieve designation. Private land exchange and fee acquisition on a willing seller basis by the Federal Government would occur, primarily in small tracts. This is a continuation of current policy.

All restrictions to development or use of private lands would result from current laws or zoning ordinances, or those developed in the future by parish or state governments empowered with such authority. Condemnation could be used to clear title or acquire scenic easements. There could also be increases in trespassing and littering on private lands as river use increases.

Option B

There are currently some restrictions to lands along the Whisky Chitto Creek corridor. The Louisiana Natural and Scenic Rivers Act established a regulatory program and empowered the Secretary of the Louisiana Department of Wildlife and Fisheries to administer the system through regulation and permits. Certain activities have been prohibited by the State of Louisiana and a permitting system has been established to regulate other activities on the scenic rivers.

Access

Current access to Whisky Chitto Creek is gained from LA Highway 10 and Forest Road 405. The Whisky Chitto Trail also gives access to Whisky Chitto Creek.

Option A

If designated as a National Scenic River, use on Whisky Chitto Creek would be expected to increase. However because of the limited recreational opportunities along Whisky Chitto Creek access to the creek on Forest Service lands would remain substantially unchanged. Access to the river from private land could become more prevalent over time.

Option B

Access to Whisky Chitto Creek would remain substantially unchanged. Access to the creek from private land would become more prevalent over time. If recreation use of the river increases, additional access point s would be needed from Forest Service lands.

Vegetation

Options A and B

There would be little change to the riparian corridor along Whisky Chitto Creek under both options. The corridor is largely contiguous with most of the fragmentation occurring in its lower reaches. There is one known bog within the 1/4 mile river corridor known as Leo's Bog. Leo's Bog is listed on the Louisiana Registry of Natural Areas and is considered to be among the most diverse and least disrupted habitats of its kind known to occur in Louisiana. Four known Forest Service-sensitive species occur in Leo's Bog: Sabine coneflower (*Rudbeckia scabrifolia*), Bog button (*Lachnocaulon digynum*), Drummond's yellow-eyed grass (*Xyris drummondii*), and large-leaved rose gentian (*Sabatia macrophylla*). The potential for vegetative change would be the greater under Option B.

Fish and wildlife including threatened and endangered species

Option A

Anticipated increases in recreation use along the Whisky Chitto Creek corridor could result in greater human contact and their effects to fish and wildlife species. If recreational use along the corridor is determined to have adverse impacts on wildlife and fish species, there would be a potential for reduction or elimination of the recreational use.

Option B

No significant effects to present fish and wildlife habitat conditions are foreseen under Option B. Recreation use along the Whisky Chitto Creek corridor is expected to stay relatively constant, with small increases in use over time.

Soil and water

Option A

Increased recreational use and developments along Whisky Chitto Creek could result in short-term water degradation. Current Forest policy and existing federal and state regulations should ensure that water quality would not be permanently affected by other resource activities.

Option B

No significant effects on current soil and water conditions are foreseen under Option B. Use along the Whisky Chitto Creek corridor would be expected to change little. Slight increases in recreation use over time should not adversely impact water quality.

Heritage resources

Options A and B

The Kisatchie National Forest site predictive model rates probability of the Whisky Chitto Creek corridor as high for containing significant sites. Impacts to cultural and historic artifacts from resource management activities such as trail construction would be mitigated. Archeological surveys would be conducted prior to construction, and projects relocated if significant sites were inventorid. Option A could cause increased site disturbance from illegal artifact collection in areas of increased dispersed recreation use.

Social and economic

Option A

This option would have only slight effects on current local community growth patterns and employment conditions. The 1990 census data showed Vernon Parish to have a population of 61,961. There could be a small increase in revenue to the local economy from anticipated increases in recreation related expenditures by river users attracted by wild & scenic river designation. No significant effect on the current social environment is foreseen. Amenity values for adjacent landowners would be preserved to the greatest degree in this option. However, there would be some loss of amenity values as the river corridor developed.

Option B

This option would have little effects on current local community growth patterns or the social environment. Revenues to local economies resulting from recreational use of the river would not increase. Amenity values would be preserved.

WHISKEY CHITTO CREEK FOREST PLAN ALTERNATIVES

Alternatives A–F

No national wild & scenic river designation. The outstandingly remarkable values of Whiskey Chitto Creek would be adequately protected through Louisiana natural & scenic rivers designation and Forest Plan standards and guidelines for streamsides, riparian areas, and other areas.

TABLE E–9, ENVIRONMENTAL CONSEQUENCES SUMMARY

Whiskey Chitto Creek — Two Options

	Option A	Option B
Recreational Development and Use	Designation would cause slightly larger increases in recreation use within the creek corridor. Controls would be established on the Federally managed segments to regulate the amount and type of use. The ROS class within the river corridor would change from *roaded natural* to *semiprimitive*.	There would be little change in the recreational opportunities and uses within the corridor. New development of recreation facilities within 100 feet of the corridor would require a permit from the Louisiana Department of Wildlife and Fisheries.
Visual Resources	There is a potential for increased human influence and use which could result in more river bank deterioration and littering. However, the lands along Whisky Chitto Creek would retain the existing landscape and their scenic quality. National forest lands within the river corridor would be assigned a SCO of *retention*.	There would be no significant effect to the existing visual conditions on Whisky Chitto Creek. The SCOs within the river corridor would be managed for *partial retention*.
Land Ownership and Use	Uses and development determined to have a direct and adverse effect on wild and scenic river values, in particular all new impoundments and water intake structures would be prohibited. No land acquisition of private lands would be required for designation.	Whisky Chitto Creek is designated by the State of Louisiana as a natural and scenic stream. Certain activities are either prohibited or require a permit from the Department of Wildlife and Fisheries. Channelization of the stream; channel realignment; clearing and snagging; impoundments of any type; and commercial clearcutting of timber within 100 feet of the low-water mark would be prohibited.
Effects on Private Land	No fee title land acquisition by the Federal Government would be required for designation under this option. Restrictions to development or use of private lands could result from laws or zoning ordinances currently in effect, or developed in the future by parish or state government bodies empowered with such authority. Condemnation could be used to clear title or acquire scenic easements. There could also be some increase in trespass and litter on private lands as river use increases.	Certain activities are either prohibited or require a permit from the Department of Wildlife and Fisheries. Channelization of the stream; channel realignment; clearing and snagging; impoundments of any type; and commercial clearcutting of timber within 100 feet of the low-water mark would be prohibited. Other activities that may have a direct, significant, ecological impact on the stream must be permitted.
Access	Access to Whisky Chitto Creek on national forest lands would remain essentially unchanged. Access to the stream from private land could become more prevalent over time. Additional access sites would not be needed.	Access on national forest or private lands would not be affected as a result of state designation.
Vegetation	The potential for vegetative change would not be significant on Forest Service lands. Private lands would be unaffected under this option.	The potential for vegetative change would not be significant on Forest Service lands. Some restrictions on vegetative manipulation do occur within 100 feet of the low-water mark of Whisky Chitto Creek.

TABLE E–9, ENVIRONMENTAL CONSEQUENCES SUMMARY

Whiskey Chitto Creek — Two Options

Fish and Wildlife Including T&E Species	Increases in recreation use along the river corridor could result in greater human contact and their effects to fish and wildlife. If recreational use along the corridor is determined to have adverse impacts on wildlife and fish, there would be a potential for reduction or elimination of the recreational use.	No significant effects to present fish and wildlife habitat conditions are foreseen under this option. Use along the Whisky Chitto Creek corridor is expected to stay relatively constant, with small increases in use over time. If recreational use along the corridor is determined to have adverse impacts on wildlife and fish species, there would be a potential for reduction or elimination of the recreational use.
Soil and Water	Increased recreational use and developments along Whisky Chitto Creek could result in short-term water degradation.	No significant effects on current soil and water conditions are foreseen under this option. Slight increases in recreation use over time would not impact the water quality of Whisky Chitto Creek.
Heritage Resources	The site predictive model for the Kisatchie National Forest rates the corridor as having an extremely high probability for containing significant sites. Impacts to cultural and historic sites from resource management activities such as trail construction would be mitigated. This option could result in an increase in disturbance of sites from illegal artifact collection in areas of increased dispersed recreation use.	Same as Option A.
Social and Economic	There would be no significant effects on current growth patterns and employment conditions in the local community. There could be a small increase in revenue to the local economy from anticipated increases in recreation related expenditures by river users attracted by wild and scenic river designation. No significant effect to the current social environment is foreseen.	There would be no significant effect to current growth patterns or the social environment. Revenues to local economies resulting from recreational use of the river would not increase under this option.

SUMMARY

SUMMARY

The determination of any river's suitability provides the basis for the decision to recommend Congressional designation or non-designation. Rivers determined suitable for possible inclusion into the National Wild & Scenic Rivers System are analyzed in Forestwide options.

See table E–10 for recommendation summaries for the Forest Plan alternatives.

TABLE E–10, SUITABILITY SUMMARY

Forest Plan Alternatives

River	Length (miles)	Alternatives A, B, D, Mod D, E, F	Alternative C
Castor Creek	4.9	No state or federal river designation	No state or federal river designation
Drakes Creek	11.2	No state or federal river designation	No state or federal river designation
Kisatchie Bayou	40.5	Louisiana natural & scenic river designation; no national W&S river designation	Louisiana natural & scenic river designation; recommend national W&S river designation
Six Mile Creek, SEGMENT A	4.8	Louisiana natural & scenic river designation; no national W&S river designation	Louisiana natural & scenic river designation; no national W&S river designation
Six Mile Creek, SEGMENT B	6.2	Louisiana natural & scenic river designation; no national W&S river designation	Louisiana natural & scenic river designation; no national W&S river designation
Whisky Chitto Creek	11.3	Louisiana natural & scenic river designation; no national W&S river designation	Louisiana natural & scenic river designation; no national W&S river designation

Scenery Management System

OVERVIEW

This appendix documents the Scenery Management System (SMS), a process implemented by the Kisatchie National Forest concurrent with its Forest Plan revision. It replaces the Visual Resource Management (VRM) System. The Kisatchie undertook the process described here prior to publication of the *Scenery Management System Handbook* and is consistent with VRM and the new SMS. The SMS is designed to be implemented as part of the Forest Plan revision process. It requires a sequence of steps to produce *scenic integrity objective* (SIO) assignments for each plan alternative.

The *Scenery Management System Handbook* gives a detailed explanation of the SMS process. This appendix documents the Forest's interpretation of national direction and explains the heavy reliance on geographical information system (GIS) capabilities for data analysis and map production. Using GIS saves substantial time, yields high-quality products, and allows flexibility to make rapid changes. The process ensures equitable consideration of scenery in development of plan alternatives and full integration with management of other resources.

This appendix describes nine primary steps for integrating the SMS into the planning process. Other SMS components; such as standards and guidelines, and monitoring requirements, are included in the Forest Plan. See figure F–1. The steps are as follows:

- Analyze existing scenic integrity.
- Determine landscape character.
- Determine inherent scenic attractiveness.
- Map seen area and distance zones.
- Determine constituent concern levels.
- Determine initial scenic class assignments.
- Consolidate scenic class assignments.
- Assign scenic integrity objectives to management areas.
- Analyze and ensure consistency with ROS class and other management-assigned SIO minimums.

ANALYZE EXISTING SCENIC INTEGRITY

Existing scenic integrity (ESI) is defined as the current state of the landscape, considering previous human alterations. Although ESI is not a direct contributor to final scenic class assignments, it serves multiple purposes in forest planning and provides important benchmarks for decision-making. Several methods which could be used to determine ESI are referenced in section 2 of the *Scenery Management System Handbook*; however, the Kisatchie National Forest took a different approach. Utilizing GIS, criteria were developed to map ESI based upon the standards and guidelines of the current Forest Plan.

FIGURE F–1, ESTABLISHING SIOs

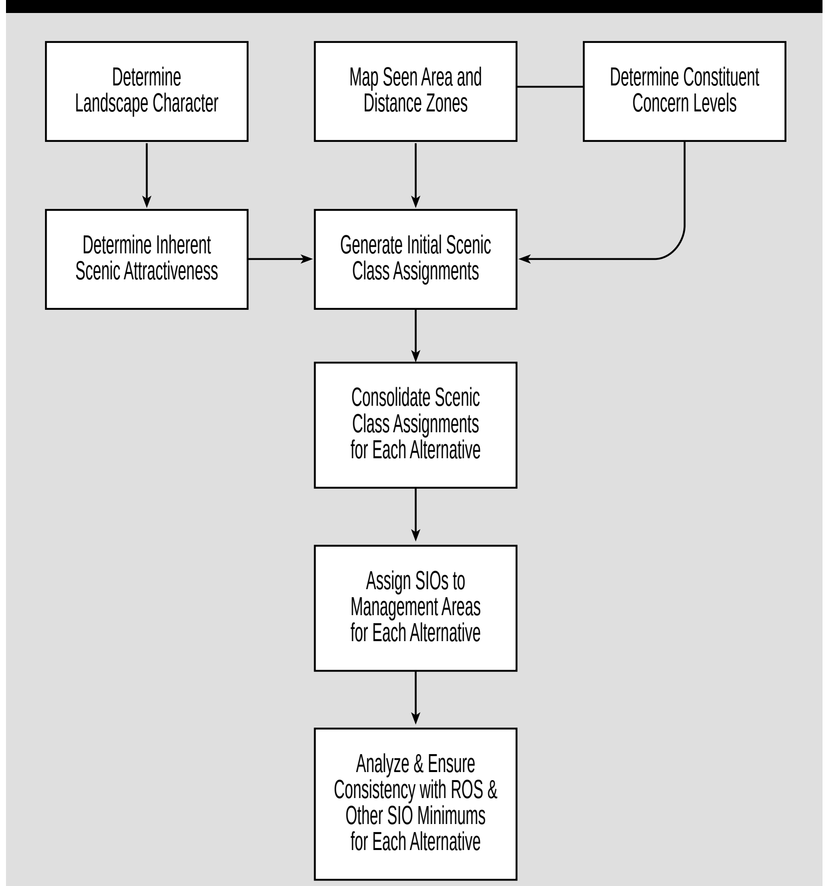


TABLE F–1, SCENIC INTEGRITY ANALYSIS

Opening Size in Acres	Assigned Integrity Rating
80+	Unacceptable alteration
50 to 80	Marginally acceptable
30 to 50	Modification
20 to 30 in pine	Partial retention
10 to 20 in hardwood	Partial retention
20 and less in pine	Retention
10 and less in hardwood	Retention

ANALYZE EXISTING SCENIC INTEGRITY

DETERMINE LANDSCAPE CHARACTER

DETERMINE INHERENT SCENIC ATTRACTIVENESS

This process shows all areas on the Forest that currently meet *visual quality objectives* (**VQOs**) of *retention*,*partial retention*, *modification*, *maximum modification*, and *unacceptable alteration*, based on 1985 Forest Plan standards and guidelines. See table F–1.

Stands less than 15 years old were considered openings. Open areas such as utility corridors and oil well sites were mapped as modification. All stands more than 15 years were mapped as retention because at that age they are no longer considered openings. Adjoining stands were treated as one opening.

The majority of the Forest meets the criteria for high scenic integrity even though most of the Forest is currently assigned a low scenic integrity objective.

Once the revised Forest Plan is approved, a new **ESI** map will be produced, based upon new standards and guidelines. This map will be used to determine the location and extent of rehabilitation required to achieve the assigned **SIO**.

DETERMINE LANDSCAPE CHARACTER

Landscape character descriptions were determined for the Forest, each focusing on key attributes found consistently throughout the Kisatchie. Landscape descriptions give an overview of landform patterns, water characteristics, vegetation patterns, and cultural elements.

These descriptions were developed within the ecological framework as described in *Ecological Subregions of the United States: Section Descriptions*, *July 1994* and based upon the map, *Ecoregions and Subregions of the United States* (**Bailey and others, 1994**), which maps the *domain*, *division*, *province*, and *section* levels nationwide.

The Kisatchie National Forest is located within three provinces and three subsections as described by the above-named publications: *Southeastern Mixed Forest Province*, *Mid Coastal Plains*, *Western Section*; *Outer Coastal Plain Mixed Forest Province*, *Coastal Plains and Flatwoods*, *Western Gulf Section*; and the *Lower Mississippi Riverine Forest Province*, *Mississippi Alluvial Basin Section*.

DETERMINE INHERENT SCENIC ATTRACTIVENESS

The *inherent scenic attractiveness* (**ISA**) *analysis* measures the scenic importance of a landscape based upon human perceptions of the intrinsic beauty of *landform*, *rock form*, *vegetation patterns*, and *water characteristics*. Forest landscape character descriptions serve as frames of reference for determining **ISAS**. Landscapes with distinctive characteristics should be evaluated differently because each has an inherent ability to produce varying levels of intrinsic beauty. Features are compared singularly or in combination with those features found in a characteristic landscape. Using this comparison, an area's overall inherent scenic attractiveness can be determined.

The three **ISA** classifications are: *class A — distinctive*; *class B — typical or common*; and *class C — undistinguished*. However, based upon an individual forest's needs and conditions, these classes can be broken into one or more subclasses. These classifications are used along with distance zones and concern levels to produce *scenic class assignments* (**SCAs**).

Using the landscape character descriptions for the three provinces reported as occurring on the Kisatchie National Forest, criteria were developed on the basis of **ISAS**. Using existing **GIS** data layers, 30 square-meter units of land were each awarded points for varying characteristics. Intermediate maps were produced for landform and rock form, vegetative patterns, and water bodies.

Points awarded to each 30 square-meter land unit for each characteristic were totaled and assigned to A, B, or C classes. However, during field verification the inherent scenic attractiveness within class B proved to vary significantly. Areas at the higher end of the

TABLE F–2, LANDSCAPE CHARACTERISTICS

Characteristic	Rule	Points
Landform	Greater than 20% slopes	20
	Between 16% and 20% slopes	9
	Between 10% and 15% slopes	7
	Between 6% and 9% slopes	5
	Between 4% and 5% slopes	2
	Less than 3% slopes	0
Rock Form	Kisatchie Soils with known rock outcroppings	6
Vegetation Cover	Cypress-tupelo all ages	16
	Longleaf pine over 60 years of age	16
	Hardwood-pine over 60 years of age	16
	Pine-hardwood over 60 years of age	16
	Bottomland hardwood over 60 years of age	16
	Upland oaks over 60 years of age	16
	Yellow pine over 80 years of age	16
	Longleaf pine 41 to 60 years of age	13
	Hardwood-pine 41 to 60 years of age	13
	Pine-hardwood 41 to 60 years of age	13
	Bottomland hardwood 41 to 60 years of age	13
	Upland oaks 41 to 60 years of age	13
	Yellow pine 41 to 80 years of age	13
	Longleaf pine 21 to 40 years of age	9
	Hardwood-pine 21 to 40 years of age	9
	Pine-hardwood 21 to 40 years of age	9
	Bottomland hardwood 21 to 40 years of age	9
	Upland oaks 21 to 40 years of age	9
	Yellow pine 21 to 40 years of age	9
	Longleaf pine 20 years of age and under	5
	Hardwood-pine 20 years of age and under	5
	Pine-hardwood 20 years of age and under	5
	Bottomland hardwood 20 years of age and under	5
	Upland oaks 20 years of age and under	5
	Yellow pine 20 years of age and under	5
	Scrub oak all ages	3
	All other vegetation	1
	Non-forest	0
Water Features	Within 1/4 mile of lakes over 10 acres	10
	Within 1/4 mile of NW&S river	10
	Within 1/4 mile of state scenic stream	2
	Within 1/4 mile of lakes between 5 and 10 acres	6
	Within 200 feet of 4th-order perennial streams	5
	Within 100 feet of 3rd-order intermittent streams	3

class deserved more recognition for ISA than those with barely sufficient points to rate in class B. The Kisatchie therefore divided class B into three subclasses: B+, B, and B-. This subdivision allowed greater refinement, accuracy, and flexibility in scenic class assignments. From this new point distribution, the ISA map was produced.

Tables F–2 and F–3 display the criteria and point assignments.

TABLE F–3, ISA CLASS RATINGS

All Kisatchie National Forest lands were assigned an ISA classification based on total points for all attributes in accordance with the following ratings:

Class Rating	Points Assigned
Class A	25 +
Class B+	20 through 24
Class B	15 through 19
Class B-	10 through 14
Class C	0 through 9

MAP SEEN AREA AND DISTANCE ZONES

Seen area and distance zone mapping are components of the landscape visibility phase of the Scenery Management System. The first step in seen area mapping is to determine which travelways and use areas will be inventoried for landscape visibility. The Kisatchie National Forest chose to inventory all roads which are traffic service level (TSL) C or better, trails, canoeable and boatable streams, and recreational lakes.

There are two methods for mapping the seen area: manual or using GIS, which can efficiently and effectively analyze both distance zones and viewsheds.

Because the Kisatchie is relatively flat, distance zones were used to determine the seen area. Using GIS, distance zones as seen from all TSL C or better roads, canoeable and boatable streams, and recreational lakes were

TABLE F–4, SCENIC CLASS ASSIGNMENT MATRIX

Distance Zone and Concern Level

ISA	FG1	MG1	FG2	MG2	FG3	MG3
A	1	3	2	4	3	4
B+	1	4	2	4	3	5
B	1	4	2	5	4	5
B-	2	4	3	6	5	6
C	2	5	4	7	6	7

MAP SEEN AREA AND DISTANCE ZONES

DETERMINE CONSTITUENT CONCERN LEVELS

DETERMINE INITIAL SCENIC CLASS ASSIGNMENTS

CONSOLIDATE SCENIC CLASS ASSIGNMENTS

mapped as foreground, middle ground, or background. Foreground was determined to be 2,000 feet (approximately 3/8 mile), middle ground was determined to be from 2,001 to 21,120 feet (from 3/8 mile to 4 miles), and anything greater than 4 miles was considered background. After GIS ran the distance zone analysis, it was determined that the Forest has no background. This was expected due to relatively high road density.

DETERMINE CONSTITUENT CONCERN LEVELS

Constituent and concern level analyses are components of the landscape visibility phase of the Scenery Management System. The next step was to determine how important these travelways are to people. *Concern levels* measure the degree of public importance and can be divided into three categories: levels 1, 2, and 3. A rating of 1 represents the highest level of concern or sensitivity, and 3 denotes the lowest. The Kisatchie National Forest rated the concern levels of travelways and use areas based on past management concerns and on comments received during the Forest Plan scoping process, open houses, and district visits. Constituent analysis was integral to the scoping process.

Once concern levels were digitized into our GIS system, they were combined with foreground and middleground distance zone buffers, which yielded a landscape visibility map.

DETERMINE INITIAL SCENIC CLASS ASSIGNMENTS

Initial scenic classes were assigned by analytical correlation of the inherent scenic attractiveness classes, the distance zones and concern levels in accordance with the matrix displayed as table F–4. Scenic classes define the relative value of scenery on all lands and helped determine how scenic resources were allocated during the alternative development process. The Forest modified the scenic class matrix as outline in the *Scenery Management System Handbook* to better fit conditions on the Forest.

CONSOLIDATE SCENIC CLASS ASSIGNMENTS

Many stands have two or more scenic classes assigned, primarily due to a detailed GIS analysis of biophysical inherent scenic attractiveness. This was unacceptable for final analysis because it would result in many forest stands with multiple SIOs, greatly complicating implementation and compliance. A process was developed to convert stands with more than one scenic class, except those cut by distance zone and desired future condition (DFC) boundaries, to one scenic class per stand.

The process is weighted to give greater value to management areas that emphasize scenery and other non-commodity values. In other words, the higher the management emphasis for scenery of a management area (MA), the greater the likelihood that the entire stand will be converted to a higher (numerically lower) scenic class.

The actual required steps followed to accomplish this for each Forest Plan alternative are described below:

1. Split stands on DFC and distance zone boundaries and create separate stands from the split stands in the GIS database.
2. Stand by stand, compute stand size and percentage of each scenic class within each stand.
3. Compare percentage of highest (numerically lowest) scenic class present to entire stand inclusion threshold percentage for the MA of the stand.

Following are the MA inclusion threshold percentages:

- Commodity DFC 60
- Amenity DFC 20
- Restoration DFC 50
- Hardwood DFC 30
- Wildlife DFC 40

4. If the percentage of the highest scenic class is greater than the inclusion threshold percentage for the DFC, convert the entire stand to that scenic class.

5. If the percentage of the highest scenic class is lower than the inclusion threshold percentage for the DFC, convert acreage of that highest class to the next lowest (numerically highest) scenic class.

6. Repeat steps 2 through 5 until entire stand is allocated to a single scenic class.

CONSOLIDATE SCENIC CLASS ASSIGNMENTS

Scenic class assignment maps were produced for each Forest Plan alternative. Consolidated scenic class maps vary between alternatives based on their management area differences. Maps for each district and alternative are not shown, but are contained in the Forest Plan process records.

ASSIGN SCENIC INTEGRITY OBJECTIVES TO MANAGEMENT AREAS

ASSIGN SCENIC INTEGRITY OBJECTIVES TO MANAGEMENT AREAS

The interdisciplinary team determined how scenic classes would be allocated to each management area to yield SIO assignments, as table F–5 illustrates. Management area boundaries are based on DFC boundaries, and they vary by Forest Plan alternative. Assigning SIOs by management area is the most logical and ecologically sound method because the relative management concern for scenery is linked closely to assigned management area DFCs. Other approaches, such

TABLE F–5, SCENIC INTEGRITY OBJECTIVE ASSIGNMENT MATRIX

	Management Area (MA)												
Scenic Class	1	2	3	4	5	6	7	8	9	10	11	12	13
1	H	H	H	H	H	H	H	H	L	H	H	L	VH
2	M	H	M	H	M	M	H	M	L	H	H	L	VH
3	L	H	L	H	L	M	H	M	L	H	M	L	VH
4	L	M	L	M	L	L	M	L	L	H	L	L	VH
5	L	M	L	L	L	L	L	L	L	H	L	L	VH
6	L	L	L	L	L	L	L	L	L	H	L	L	VH
7	VL	L	L	L	L	L	L	L	L	H	L	L	VH

MA1 ..... Forest Products
MA2 ..... Amenity Values
MA3 ..... Native Community Restoration
MA4 ..... RCW / Amenity Values
MA5 ..... RCW / Native Community Restoration
MA6 ..... RCW / Wildlife Habitats
MA7 ..... Hardwoods
MA8 ..... Wildlife Habitats
MA9 ..... Military Intensive Use
MA10 ... National Scenic Rivers
MA11 ... National Wildlife Management Preserves
MA12 ... Palustris Experimental Forest
MA13 ... Kisatchie Hills Wilderness

VH .... Very high SIO
H .... High SIO
M .... Moderate SIO
L .... Low SIO
VL .... Very low SIO

TABLE F–6, MINIMUM CONSISTENT SIOs

In Each ROS Class

Preservation	Very High
Semi-primitive non-motorized	High
Semi-primitive motorized	High
Roaded natural-appearing	Moderate
Roaded natural modified	Very Low
Rural	Very Low
Urban	Very Low

TABLE F–7, FOREST TOTAL SIO ASSIGNMENTS

Displayed in Acres

	Alt. A	Alt. B	Alt. C	Alt. D	Mod D	Alt. E	Alt. F
Very high	9,628	8,699	8,699	8,699	8,699	8,699	8,699
High	28,941	87,844	203,523	93,980	93,980	143,475	106,027
Moderate	19,413	80,350	113,536	89,155	89,155	98,054	121,395
Low	68,933	421,943	280,811	415,020	415,020	354,675	369,925
Very low	470,846	9,280	1,531	1,278	1,278	3,233	2,081

Displayed as Percent

	Alt. A	Alt. B	Alt. C	Alt. D	Mod D	Alt. E	Alt. F
Very high	1.6	1.4	1.4	1.4	1.4	1.4	1.4
High	4.8	14.4	33.5	15.5	15.5	23.6	17.4
Medium	3.2	13.2	18.7	14.7	14.7	16.1	20.0
Low	11.5	69.4	46.2	68.2	68.2	58.3	60.8
Very low	78.8	1.5	0.3	0.2	0.2	0.5	0.3

as simply varying scenic class allocation scenarios by alternative, would not reflect scenery values or concerns as accurately.

Figure F–2 displays SIO assignment maps for the six Forest Plan action alternatives. These maps were used in the analysis of the alternatives, and relative differences.

Under the *no action alternative* the scenic resource is managed in accordance with the old VMS system. Reproducible maps portraying VQO assignments are not available.

Table F–7 presents SIO assignments by alternative, in acres and percent of the Forest total.

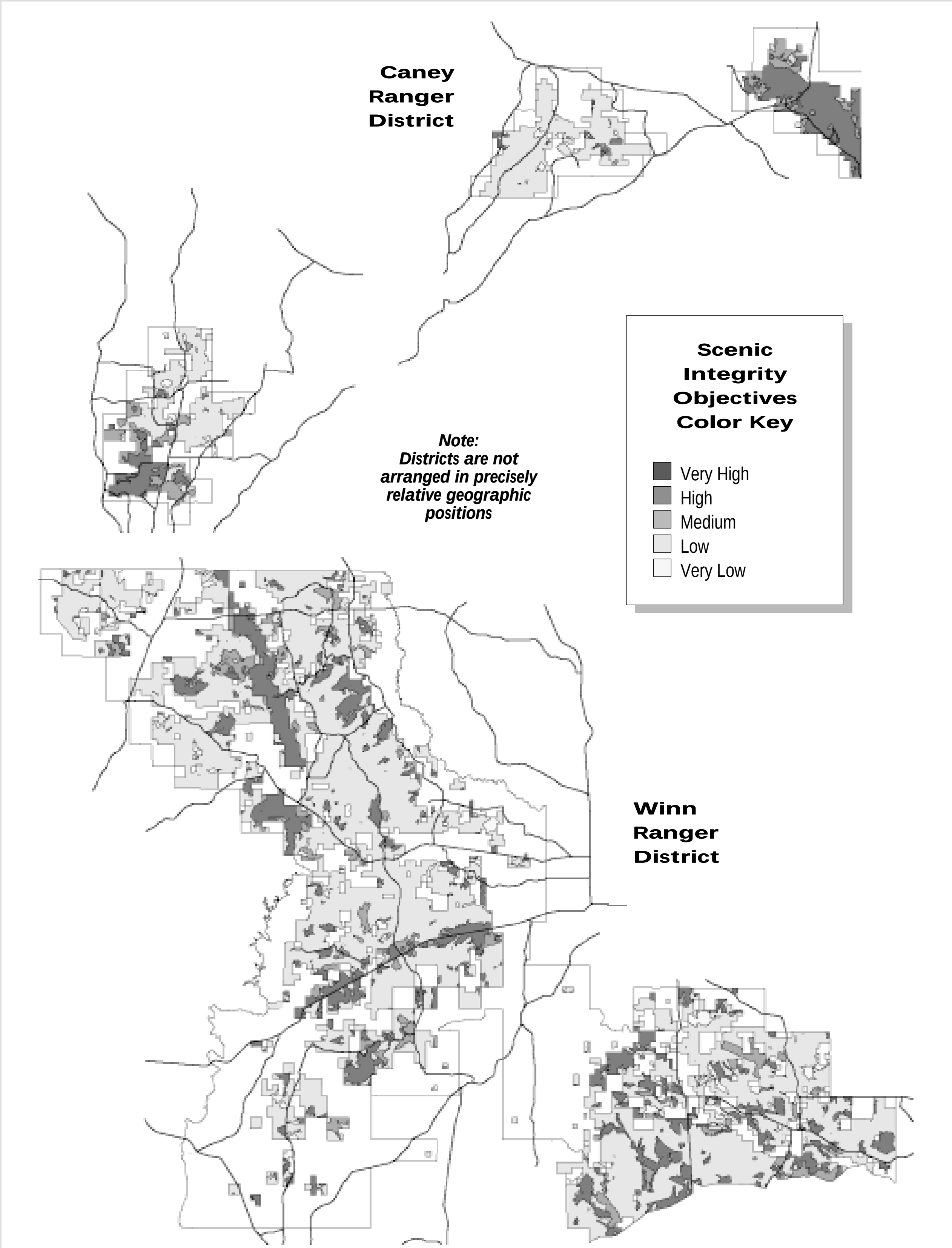
ANALYZE & ENSURE CONSISTENCY WITH ROS CLASS AND OTHER MANAGEMENT-ASSIGNED SIO MINIMUMS

A final working SIO map of the alternative selected for implementation is being developed in the Forest's GIS system as a separate GIS layer. Minor differences between the SIO assignments displayed in Figure F–2 and the final working map are anticipated. Using GIS, SIOs assigned up to this point will be evaluated for consistency with minimum SIOs required in each ROS class. Areas not meeting minimum SIO requirements in the assigned ROS class will be reassigned to the appropriate category. See also table F–6.

The ROS class assignment process is explained in Appendix G. All developed recreation sites not already assigned the SIO of *high* will be reassigned to that category. All administrative sites will be assigned the SIO of *VL*.

FIGURE F–2, SCENIC INTEGRITY OBJECTIVES

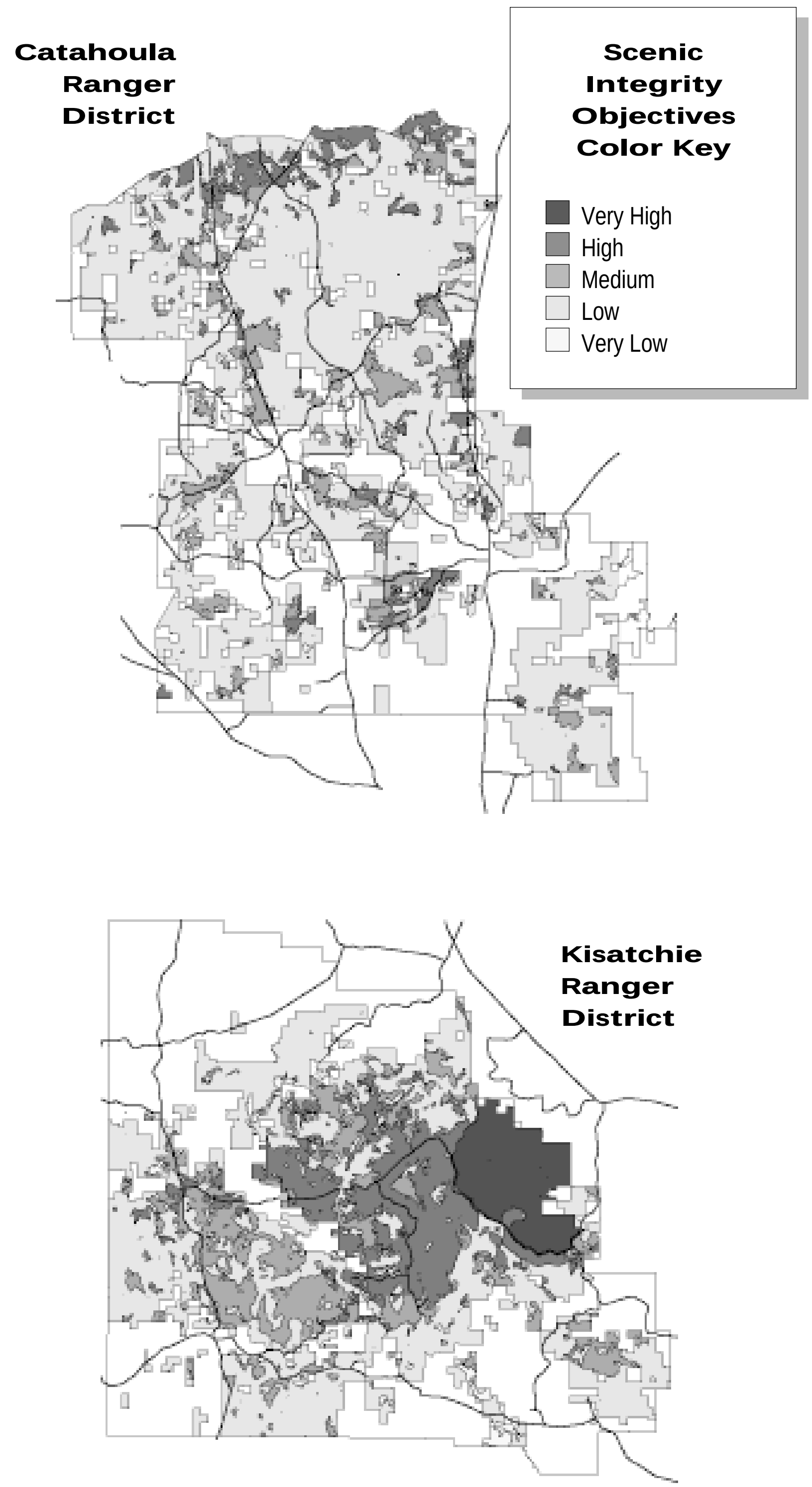
Alternative B – Panel 1



SCENIC INTEGRITY OBJECTIVES

FIGURE F–2, SCENIC INTEGRITY OBJECTIVES

Alternative B – Panel 2



SCENIC INTEGRITY OBJECTIVES

FIGURE F–2, SCENIC INTEGRITY OBJECTIVES

Alternative B – Panel 3

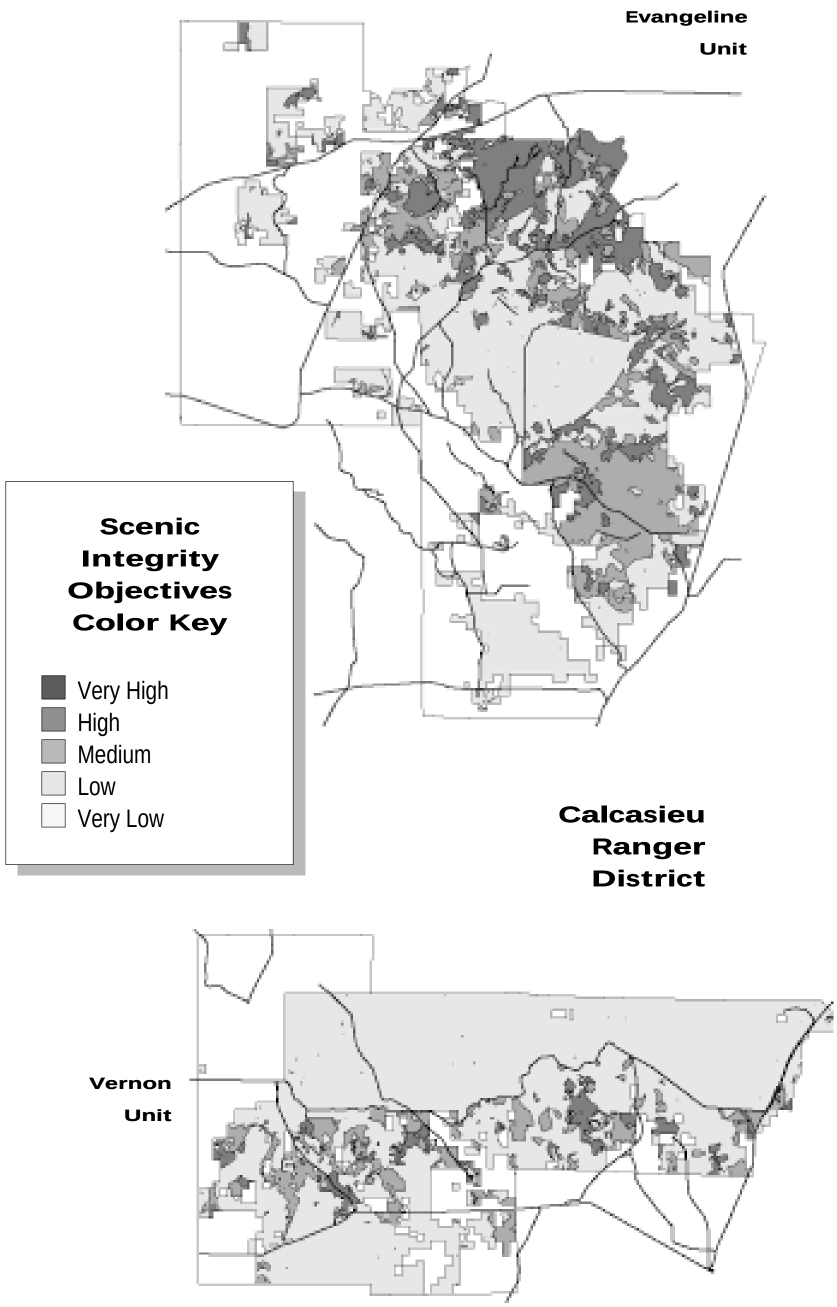
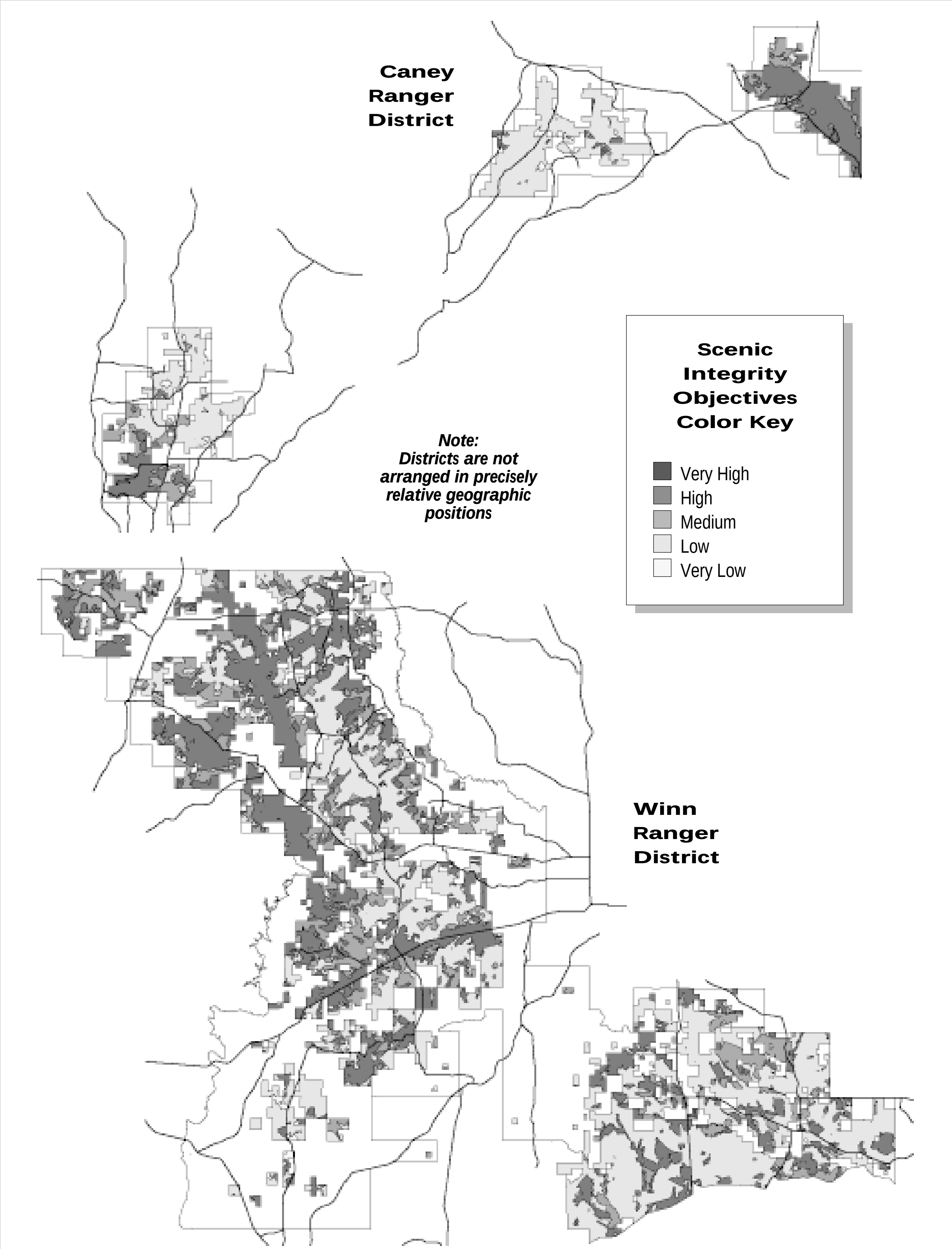


FIGURE F–2, SCENIC INTEGRITY OBJECTIVES

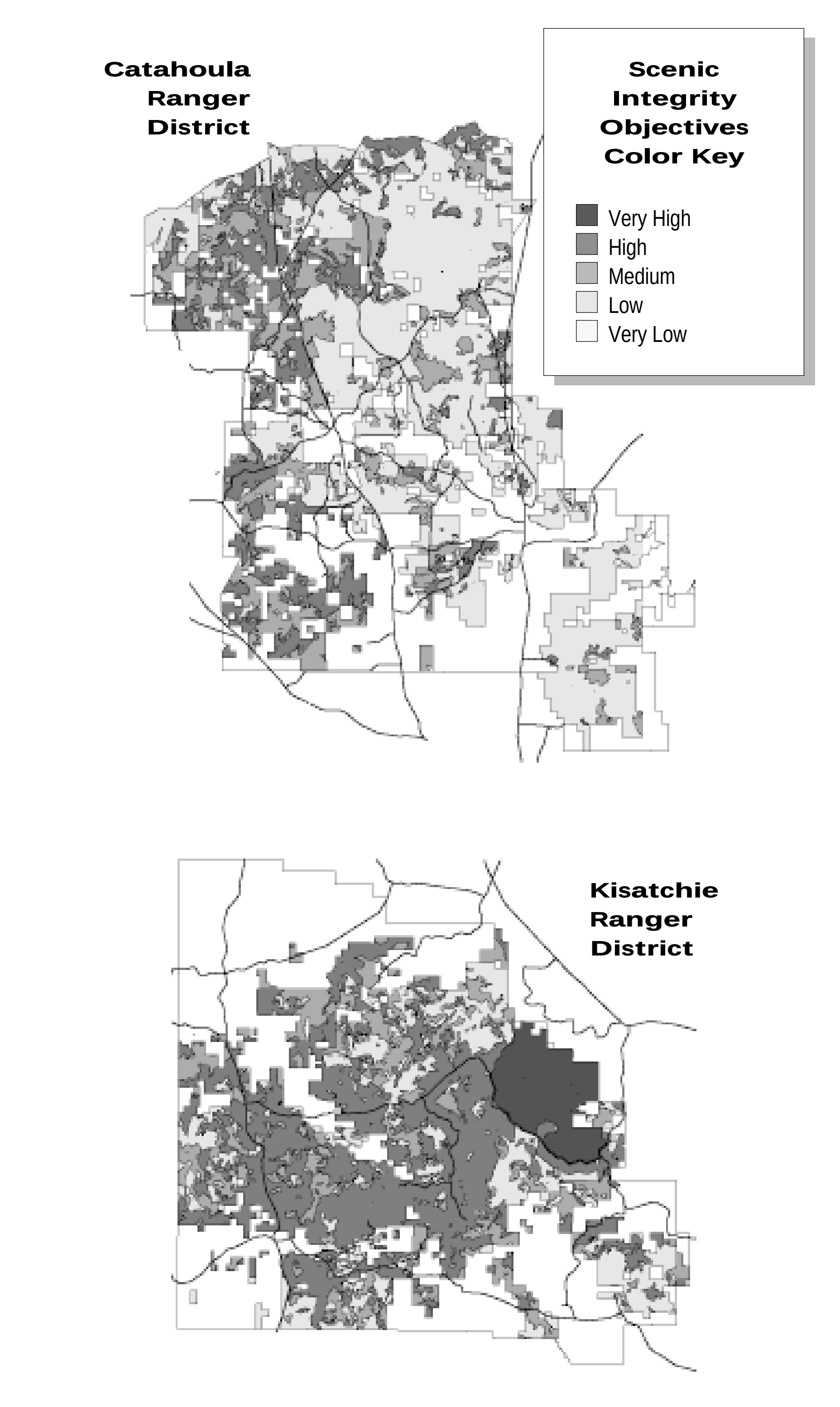
Alternative C – Panel 1



SCENIC INTEGRITY OBJECTIVES

FIGURE F–2, SCENIC INTEGRITY OBJECTIVES

Alternative C – Panel 2



SCENIC INTEGRITY OBJECTIVES

FIGURE F–2, SCENIC INTEGRITY OBJECTIVES

Alternative C – Panel 3

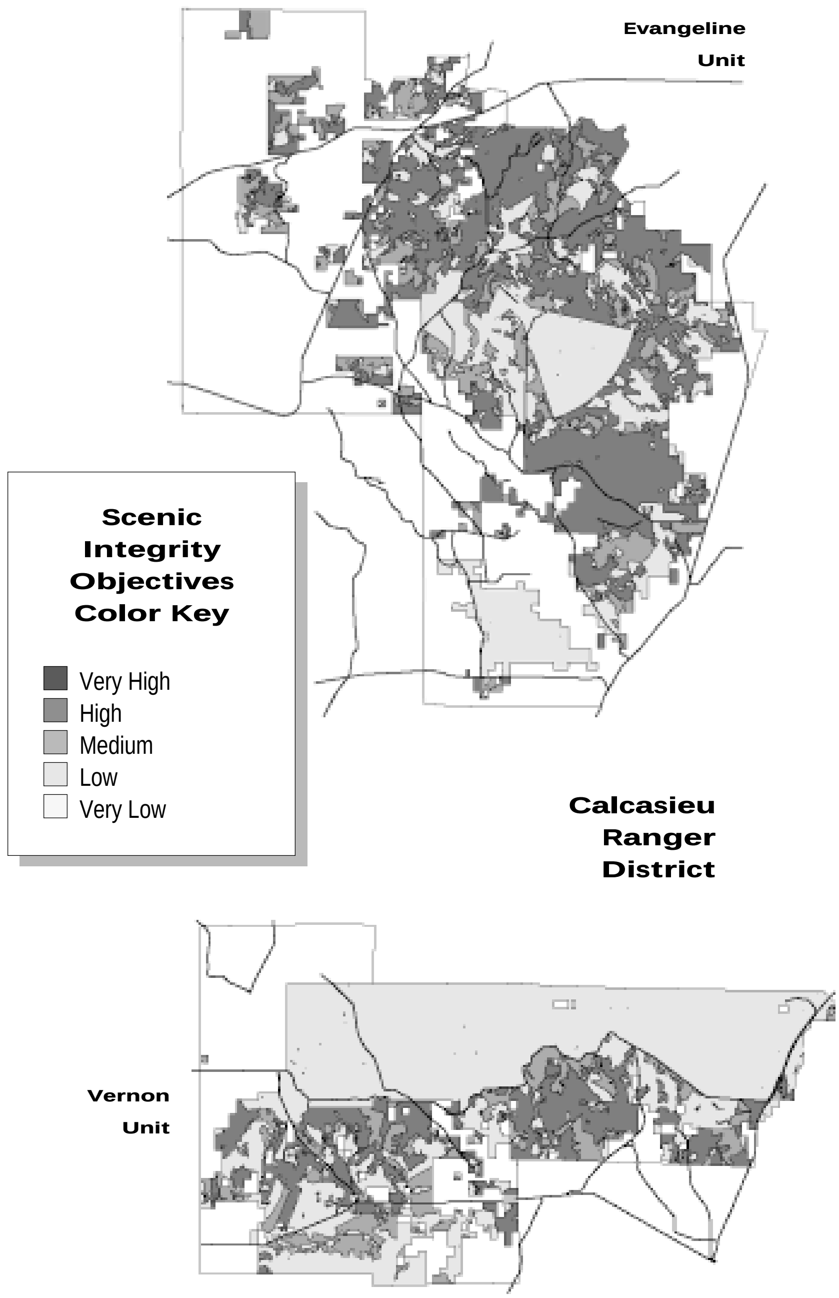
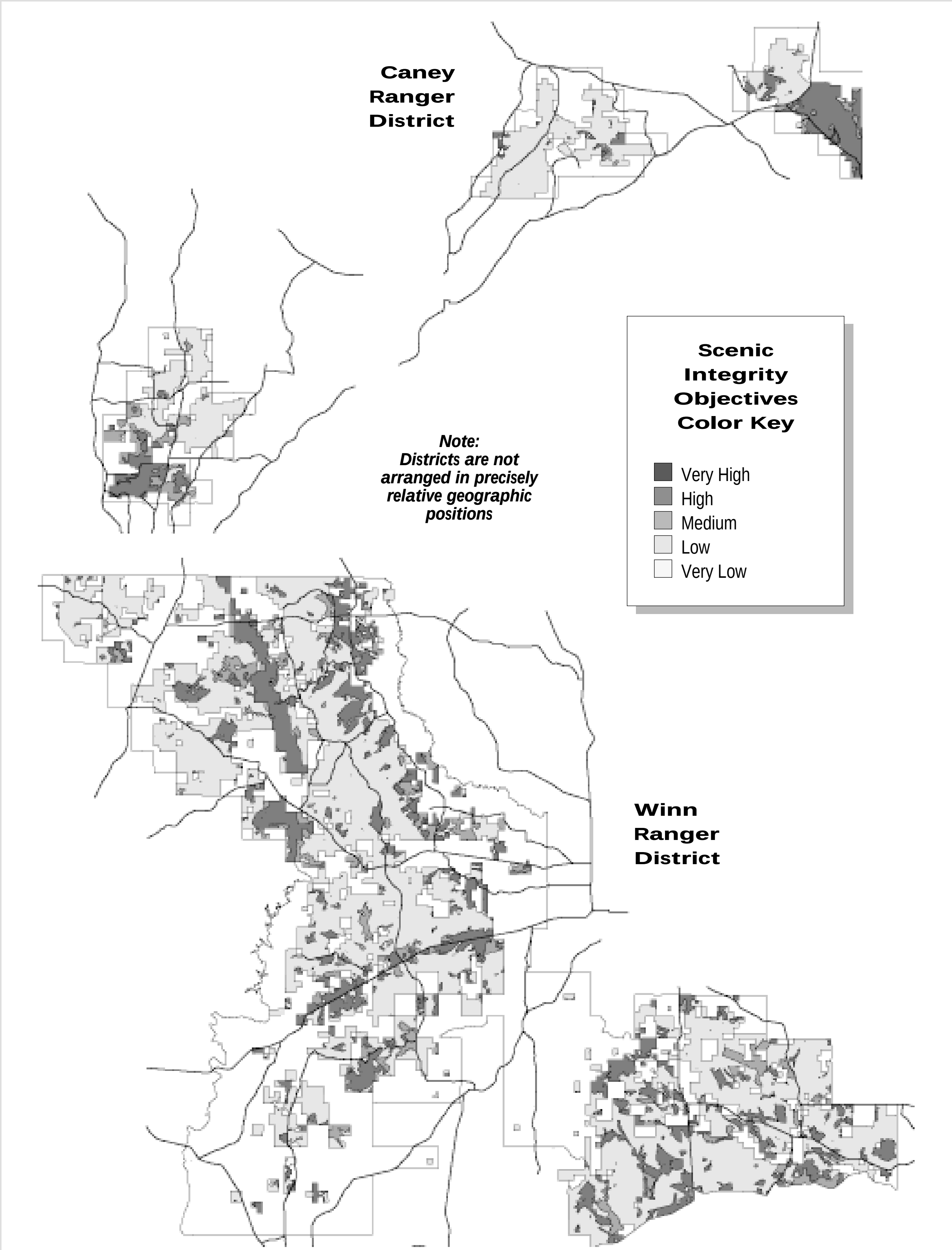


FIGURE F–2, SCENIC INTEGRITY OBJECTIVES

Alternative D, Mod D – Panel 1



SCENIC INTEGRITY OBJECTIVES

FIGURE F–2, SCENIC INTEGRITY OBJECTIVES

Alternative D, Mod D – Panel 2

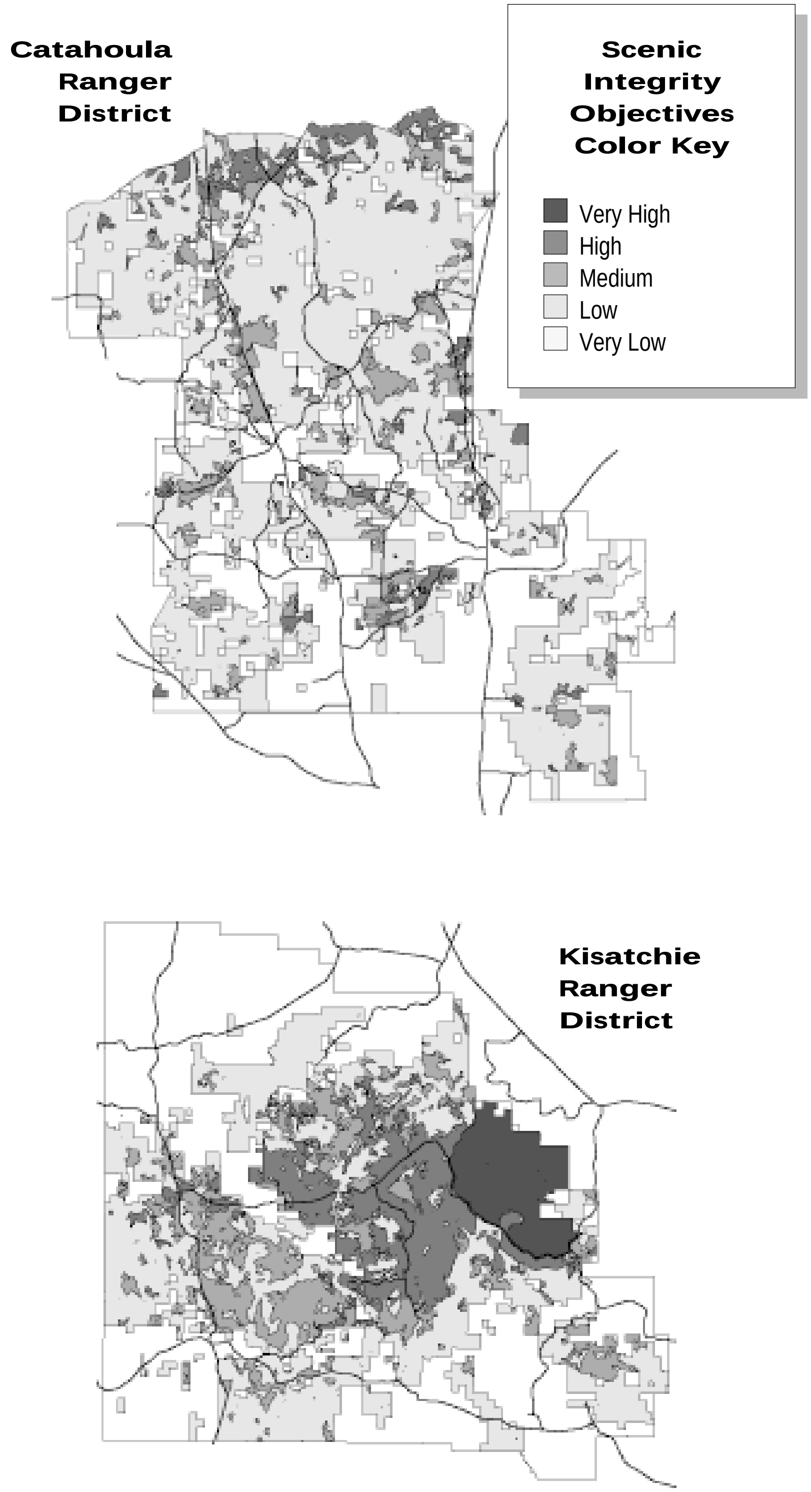


FIGURE F–2, SCENIC INTEGRITY OBJECTIVES

SCENIC INTEGRITY OBJECTIVES

Alternative D, Mod D– Panel 3

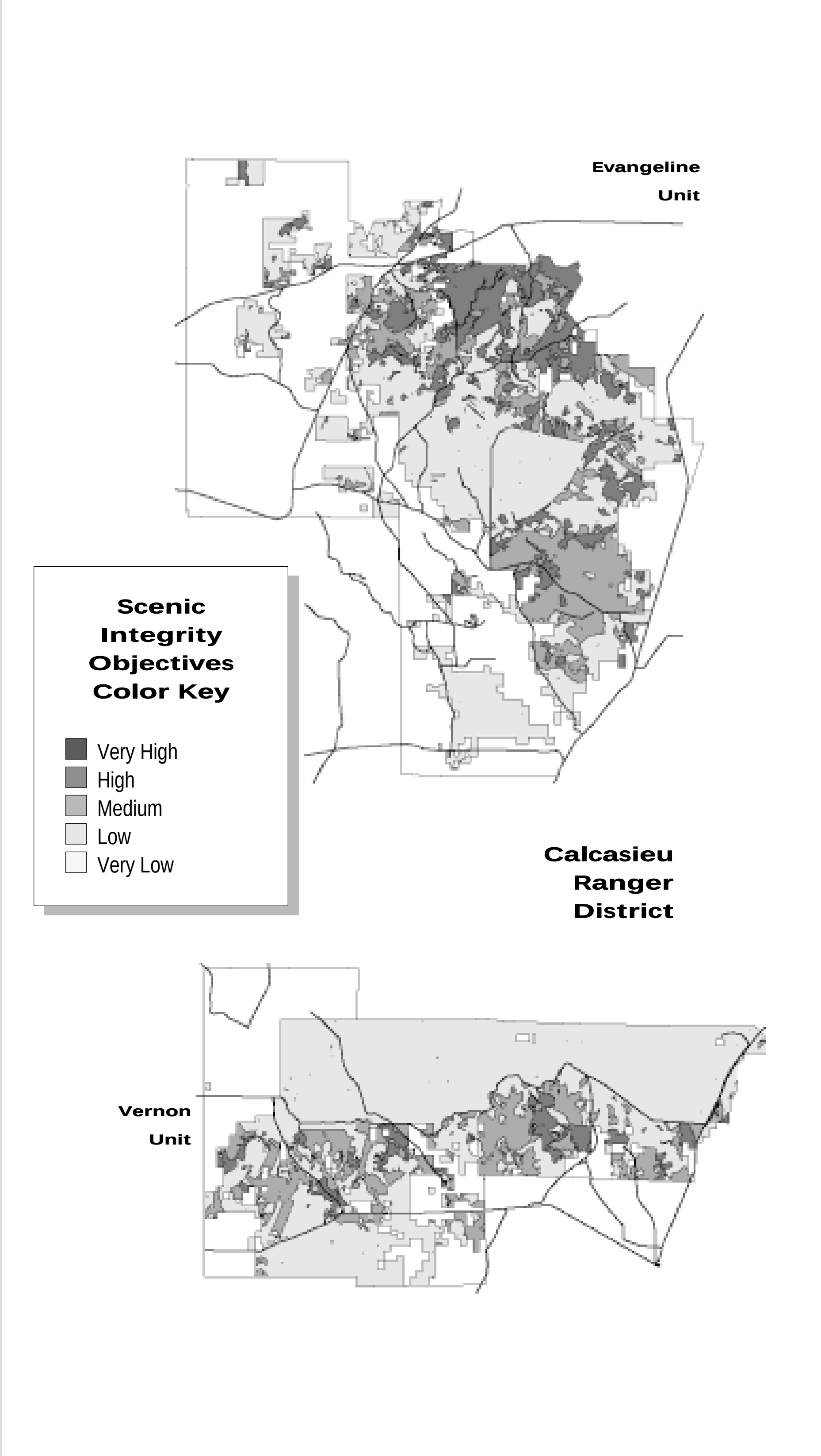


FIGURE F–2, SCENIC INTEGRITY OBJECTIVES

Alternative E – Panel 1

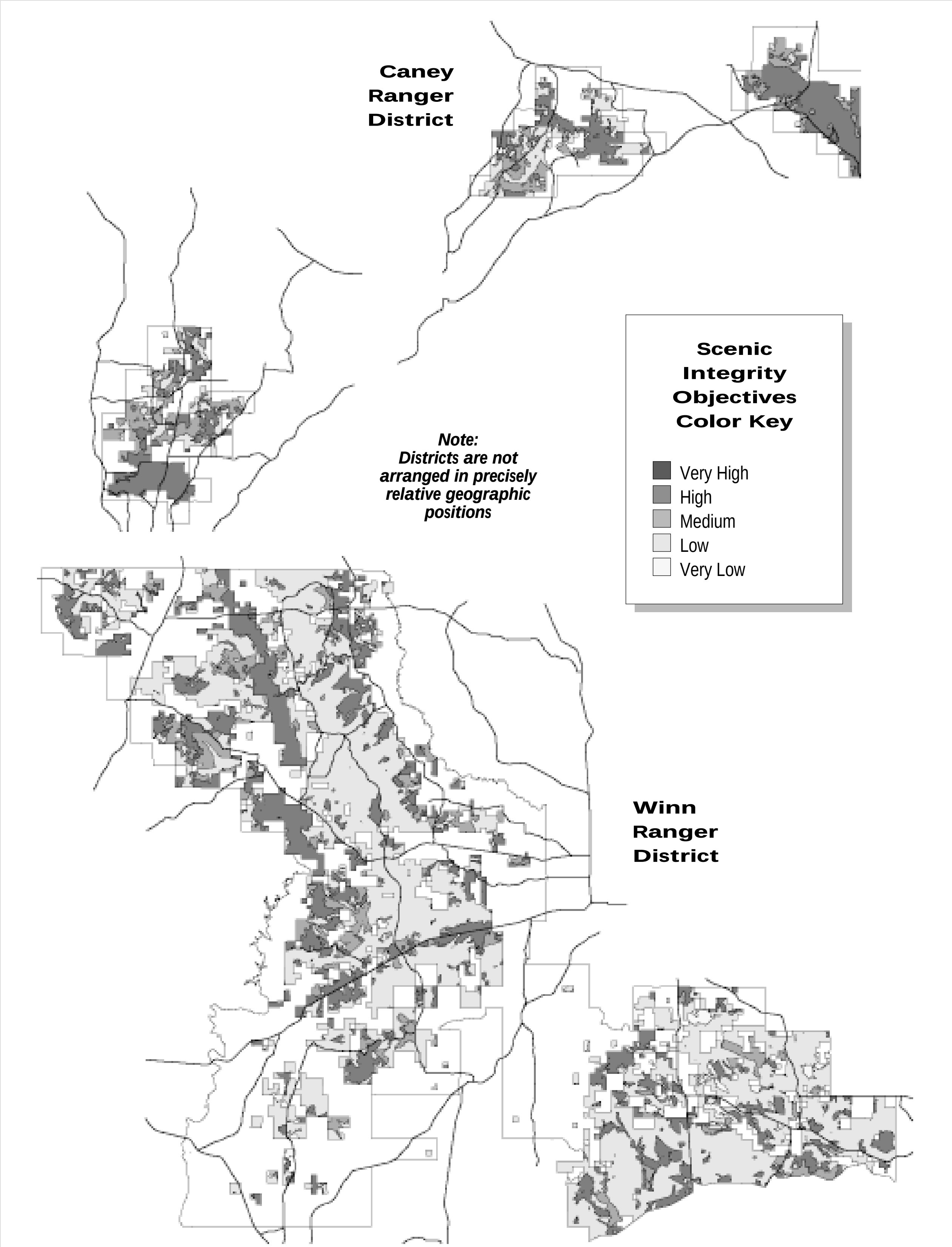
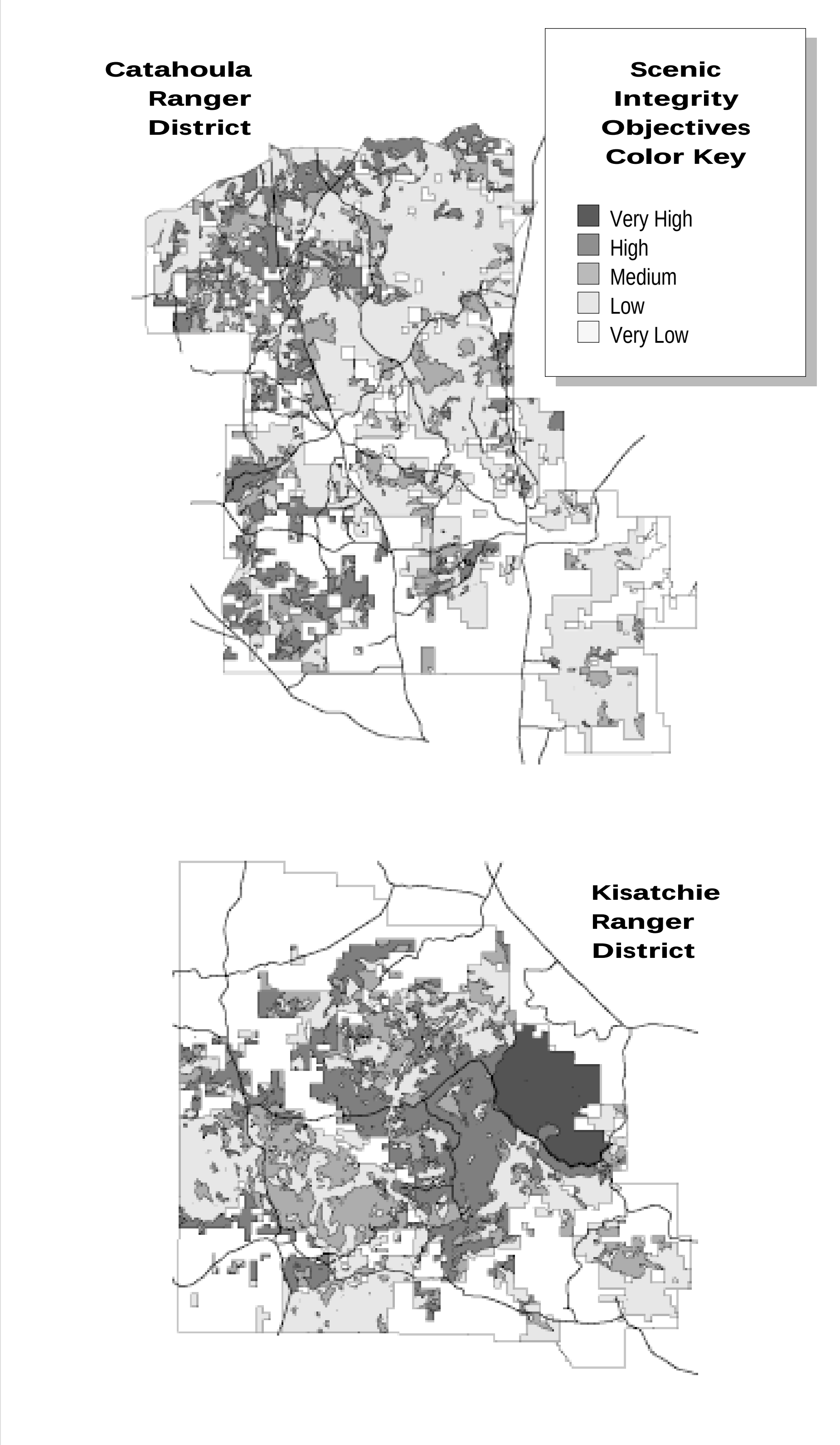


FIGURE F–2, SCENIC INTEGRITY OBJECTIVES

SCENIC INTEGRITY OBJECTIVES

Alternative E – Panel 2



SCENIC INTEGRITY OBJECTIVES

FIGURE F–2, SCENIC INTEGRITY OBJECTIVES

Alternative E – Panel 3

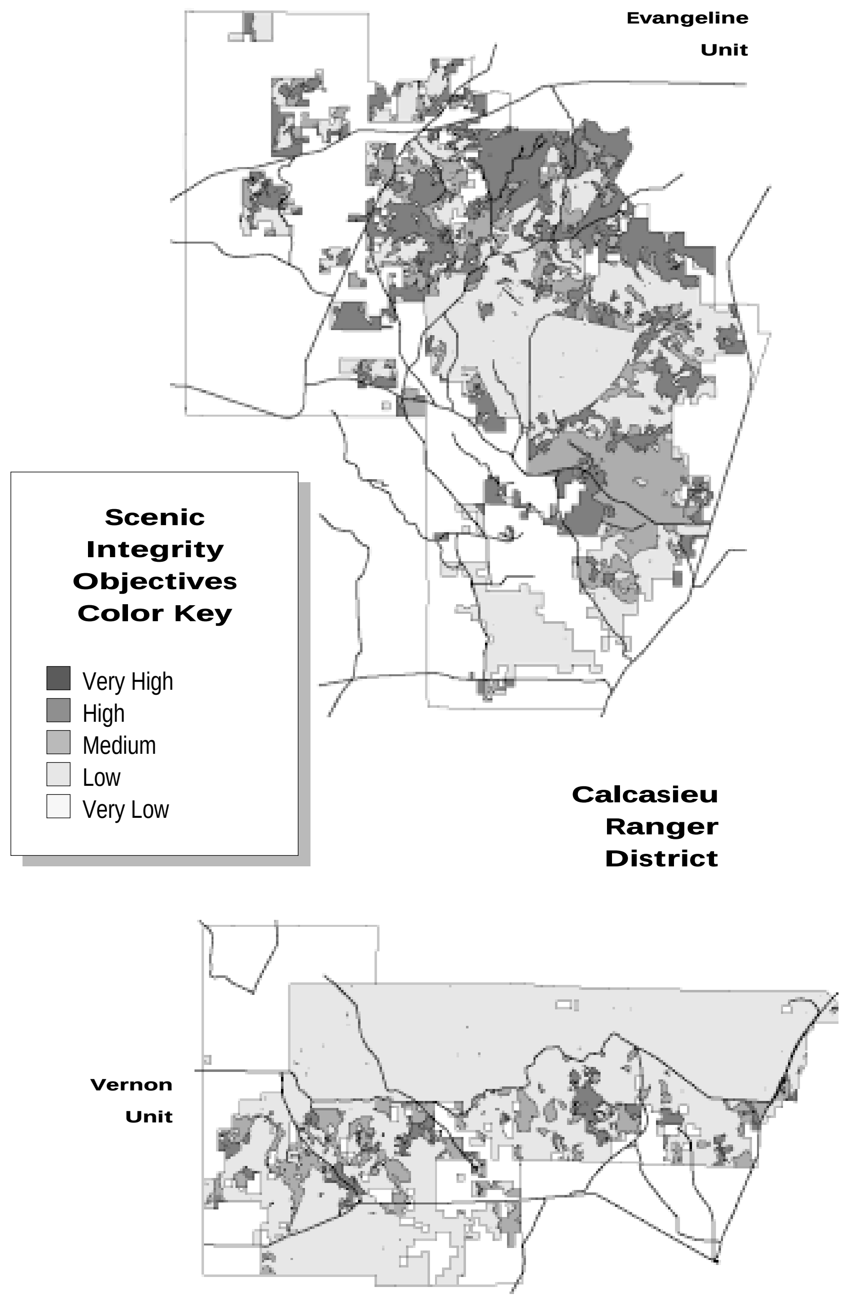
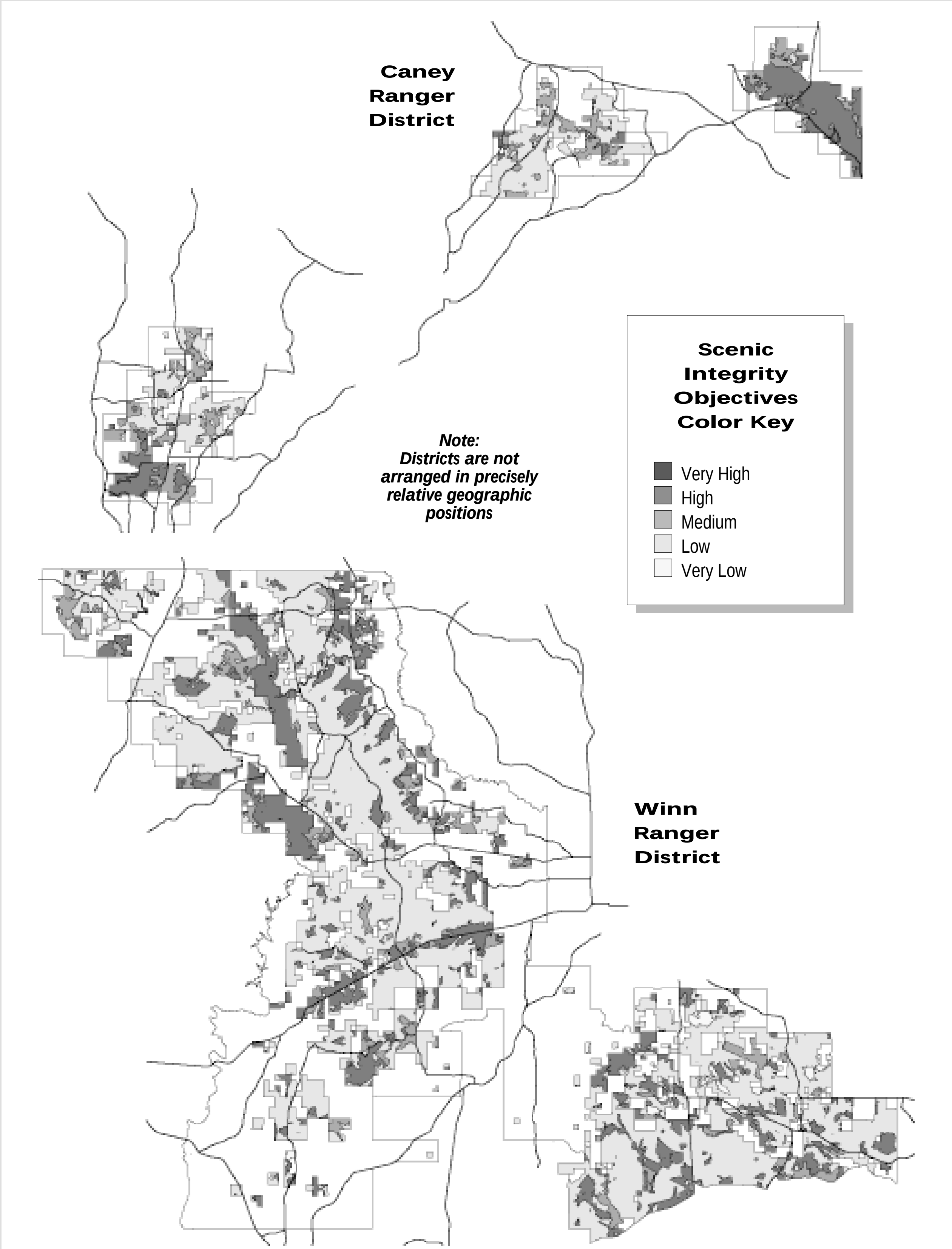


FIGURE F–2, SCENIC INTEGRITY OBJECTIVES

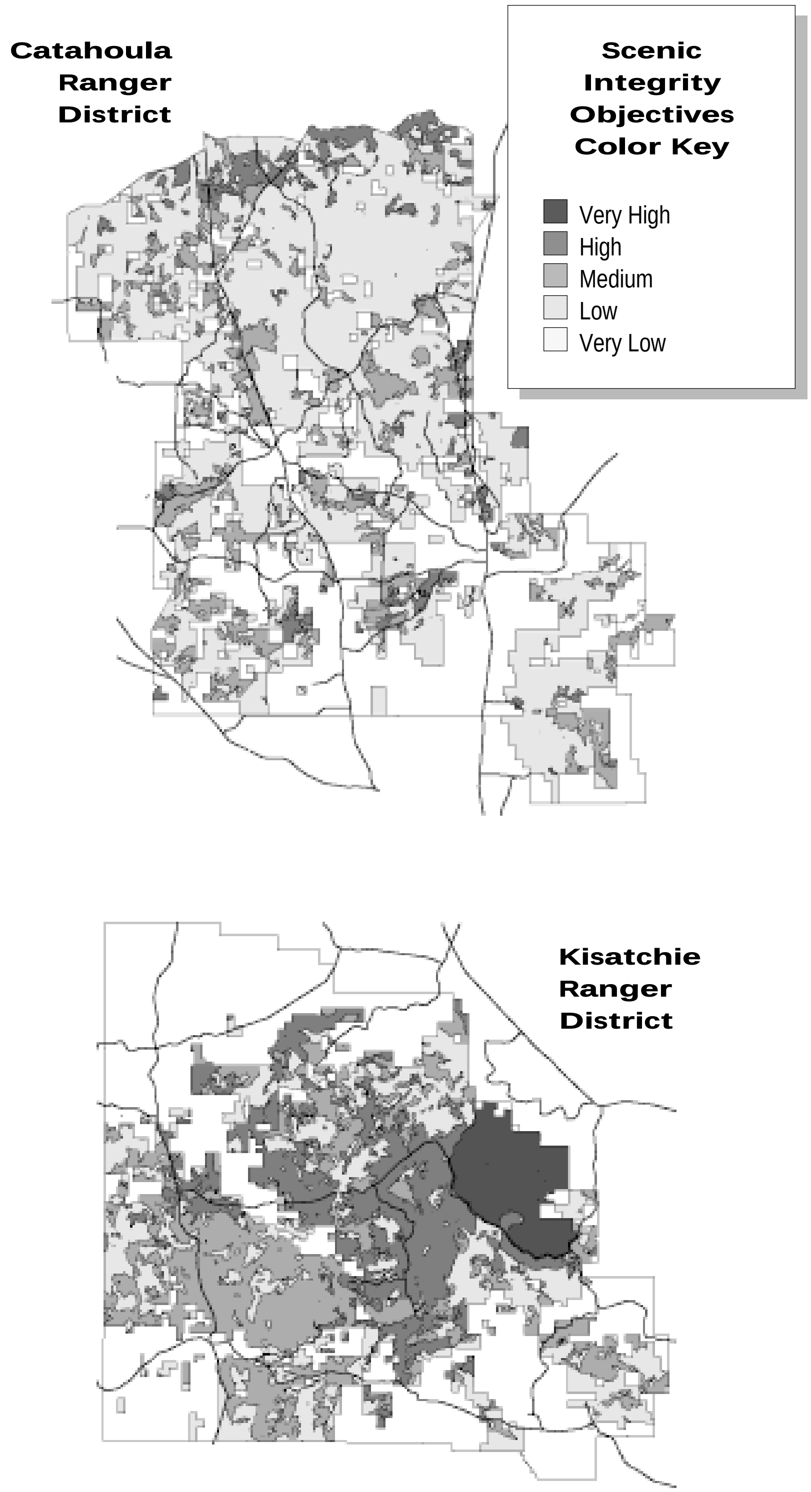
Alternative F – Panel 1



SCENIC INTEGRITY OBJECTIVES

FIGURE F–2, SCENIC INTEGRITY OBJECTIVES

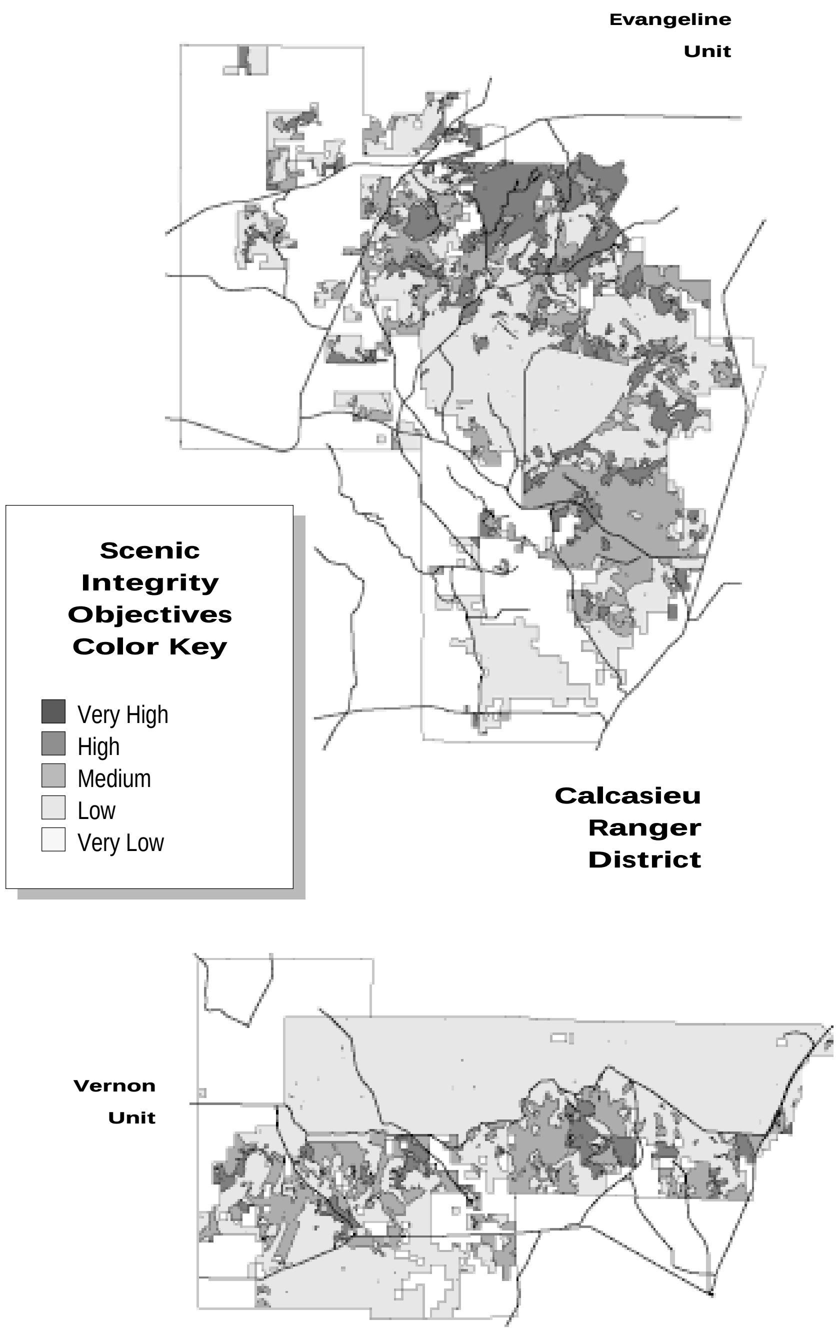
Alternative F – Panel 2



SCENIC INTEGRITY OBJECTIVES

FIGURE F–2, SCENIC INTEGRITY OBJECTIVES

Alternative F – Panel 3



Recreation Opportunity Spectrum Implementation

Appendix G

INTRODUCTION

The Recreation Opportunity Spectrum (ROS) system was used to delineate, define and integrate outdoor recreation opportunities in the forest planning process in accordance with the *ROS Users Guide* and the *Forest Service Manual*.

The ROS system defines six recreation opportunity classes that provide different settings and opportunities for recreation use — *primitive*, *semiprimitive non-motorized*, *semiprimitive motorized*, *roaded natural*, *rural* and *urban*. Each ROS class may be divided into subclasses to better reflect local conditions. The urban class is not normally appropriate for national forest lands.

PROCESS

The following narrative describes the Kisatchie National Forest's implementation of the ROS system. Assignment of adopted ROS classes was based on desired management emphasis of the recreation settings.

Using geographic information system (GIS) geophysical analytical capabilities and interdisciplinary team input, the following steps were undertaken to implement ROS and integrate it into the forest planning process.

- The 6 national standard ROS classes were determined to be acceptable for application on the Forest, recognizing not all classes must exist on every forest. The Forest elected to use the option of breaking the roaded natural class into two subclasses: roaded natural-appearing and roaded natural-modified.

- The national eligibility criteria for each class were determined to be appropriate for inventory of the current ROS class eligibility of all lands. The inventory to determine existing ROS class eligibility is based primarily on the physical setting considering remoteness, size and evidence of humans.

- The average distance a person can walk in 1/2 hour on this forest was determined to be one mile. Therefore, the inventory boundary between the roaded natural class and semiprimitive is 1 mile from travelways, and the inventory boundary for the primitive class is 3 miles from travelways. For this analysis traffic service level (TSL) A, B and C roads are considered "better than primitive" roads and TSL-D roads are identified as primitive roads.

- The Forest was inventoried for all areas of at least 2,500 acres and at least 3 miles from any road, to identify existing primitive ROS class eligible lands. No lands meeting the remoteness or size criteria were identified.

- The Forest was inventoried for all areas of at least 2,500 acres and at least 1 mile from any road, to identify existing semiprimitive non-motorized ROS class eligible lands. The only area on the Forest meeting the remoteness and size criteria for semiprimitive non-motorized was a portion of the Kisatchie Hills Wilderness.

- The Forest was inventoried for all areas at least 1 mile from TSL-C or better roads and at least 2,500 acres in size, to identify existing semiprimitive motorized ROS class eligible lands. The only area on the Forest meeting the remoteness and size criteria for semiprimitive motorized was a portion of the Kisatchie Hills Wilderness.

- Since no lands on the Forest meet the size and eligibility criteria for primitive or semiprimitive, except Kisatchie Hills Wilderness, all lands were found to meet the size and remoteness criteria for roaded natural. The entire Forest (except Kisatchie Hills Wilderness) meets the size and remoteness criteria only for roaded natural

PROCESS

RECREATION OPPORTUNITY SPECTRUM CLASS ASSIGNMENT

(which includes roaded natural-appearing and roaded natural modified subclasses) ROS class.

- To provide a reasonable range of ROS classes in the final forest plan alternatives and to communicate to the public the variation in potential recreation settings, initial ROS classes were assigned administratively for each forest plan alternative. The assignments were based primarily on ROS criteria other than size and remoteness and the management emphasis of specific area delineations assigned in the forest plan revision process.

RECREATION OPPORTUNITY SPECTRUM CLASS ASSIGNMENT

All lands on the Forest were assigned an initial ROS class under each plan alternative, except areas where recreation use is essentially excluded. The acres assigned to certain classes varies by plan alternative because of variations in management area goals, objectives and desired future conditions and other special management emphasis area acreages. This allowed desired recreation setting differences between the plan alternatives to play a role in the selection of the preferred plan alternative. The initial assignments were made in sequence starting at the Primitive end of the spectrum and ending with Urban. Lands were assigned the most primitive class eligible in situations where lands with special management emphasis have different ROS class eligibility than the parent management area.

Maps of the ROS class assignments are contained in the planning process records. By alternative, the ROS class assignments resulting from the above analysis, with quantity in acres, follow:

Primitive (P) — Management Area 13 (Kisatchie Hills Wilderness).

Alternative A	8,700
Alternative B	8,700
Alternative C	8,700
Alternative D	8,700
Alternative ModD	8,700
Alternative E	8,700
Alternative F	8,700

Semiprimitive non-motorized (SPNM) — Management Area 10 (National Scenic Rivers), special interest areas, research natural areas and walk-in areas.

Alternative A	33,096
Alternative B	41,461
Alternative C	46,757
Alternative D	55,128
Alternative ModD	57,269
Alternative E	55,128
Alternative F	55,812

Semiprimitive Motorized (SPM) — Management Area 7 (Hardwoods) and designated old growth patches.

Alternative A	0
Alternative B	43,004
Alternative C	178,339
Alternative D	90,649
Alternative ModD	89,963
Alternative E	76,386
Alternative F	108,866

Roaded natural-appearing (RNA) — Management Areas 2 (amenity values) , 4 (RCW / amenity values) , 8 (wildlife habitats) , and 11 (national wildlife management preserves) , uneven-aged management patches, Louisiana natural and scenic river corridors, and riparian area protection zones.

Alternative A	527,897
Alternative B	214,424
Alternative C	147,724
Alternative D	214,152
Alternative ModD	217,152
Alternative E	209,310
Alternative F	201,478

Roaded natural modified (RNM) — Management Areas 1 (forest products) , 3 (native community restoration) , 5 (RCW / native community restoration) , and 6 (RCW / wildlife habitats).

Alternative A	0
Alternative B	252,107
Alternative C	196,961
Alternative D	196,126
Alternative ModD	191,671
Alternative E	212,573
Alternative F	191,018

Rural (R) — Management Area 12 (Palustris Experimental Forest), all administrative sites and developed recreation sites.

Alternative A	2,615
Alternative B	6,162
Alternative C	6,162
Alternative D	6,162
Alternative ModD	6,162
Alternative E	6,162
Alternative F	6,162

Urban (U) — None, urban class areas are not normally an appropriate management objective for national forest lands.

Alternative A	0
Alternative B	0
Alternative C	0
Alternative D	0
Alternative ModD	0
Alternative E	0
Alternative F	0

ROS class not assigned — An ROS class was not assigned to certain areas because recreation is prohibited or severely restricted.

Alternative A	34,153
Alternative B	37,142
Alternative C	18,357
Alternative D	32,083
Alternative ModD	32,083
Alternative E	34,741
Alternative F	30,964

RECREATION OPPORTUNITY SPECTRUM CLASS DESCRIPTIONS

The following narrative describes the characteristics of each ROS class. Assigned ROS classes do not necessarily reflect current or actual planned on-the-ground conditions but can describe and define desired future conditions and help focus management emphasis on appropriate recreation program priorities.

REMOTENESS

Not all areas assigned semiprimitive classes meet remoteness criterion.

PRIMITIVE

Out of sight and sound of human activity. Greater than a 1 1/2-hour walk from all roads, railroads or trails with motorized use. This was determined to be 3 miles on the Kisatchie National Forest.

SEMIPRIMITIVE NON-MOTORIZED

Distant from sight and sound of human activity. Greater than a 1/2-hour walk, but less than a 1 1/2-hour walk, from any motorized travelway. This was determined to be 1 mile on the Kisatchie National Forest.

SEMIPRIMITIVE MOTORIZED

Distant from sight and sound of human activity. Greater than a 1/2-hour walk from better than primitive roads but less than a 1/2-hour walk from primitive roads. This was determined to be 1 mile on the Kisatchie National Forest.

ROADED NATURAL-APPEARING

Within 1/2 mile from better-than-primitive roads.

ROADED NATURAL MODIFIED

Within 1/2 mile from better-than-primitive roads.

RURAL

No distance criteria.

URBAN

No distance criteria.

SIZE

Not all areas assigned the semiprimitive classes meet the size criterion.

PRIMITIVE

Greater than 2,500 acres.

SEMIPRIMITIVE NON-MOTORIZED

Greater than 2,500 acres.

RECREATION OPPORTUNITY SPECTRUM CLASS DESCRIPTIONS

REMOTENESS

SIZE

RECREATION OPPORTUNITY SPECTRUM CLASS DESCRIPTIONS

SIZE

ROAD STANDARDS

EVIDENCE OF HUMANS CRITERIA

SEMIPRIMITIVE MOTORIZED

Greater than 2,500 acres.

ROADED NATURAL-APPEARING

No size restrictions.

ROADED NATURAL MODIFIED

No size restrictions.

RURAL

No size restrictions.

URBAN

No size restrictions.

ROAD STANDARDS

PRIMITIVE

No roads.

SEMIPRIMITIVE NON-MOTORIZED

No roads better than TSL-D.

SEMIPRIMITIVE MOTORIZED

No roads better than TSL-D.

ROADED NATURAL-APPEARING

All road levels except interstate highways.

ROADED NATURAL MODIFIED

All road levels.

RURAL

All road levels.

URBAN

All road levels.

EVIDENCE OF HUMANS CRITERIA

PRIMITIVE

The setting is essentially an unmodified natural environment with little evidence of humans. Trails are present, but are constructed to a low standard. Structures are extremely rare.

SEMIPRIMITIVE NON-MOTORIZED

Evidence of past human activities may be present. These influences should mimic natural occurrences. Primitive roads may be present and structures are rare and isolated.

SEMIPRIMITIVE MOTORIZED

Evidence of past human activities may be present. These influences should mimic natural occurrences. Primitive roads and trails are present with motorized use. Structures are rare and isolated.

ROADED NATURAL-APPEARING

Evidence of past human activities may be present. Natural settings may have modifications which range from being easily noticed to moderately dominate to observers within the area. There is strong evidence of designed roads and highways. Structures are generally scattered, remaining almost unnoticed by the travel route observer.

ROADED NATURAL MODIFIED

Evidence of past human activities may be present. Natural settings may have modifications which range from being easily noticed to strongly dominate to observers within the area. These influences should mimic natural occurrences. Roads and trails are present with motorized use. Structures are generally scattered but small clusters evident to travel route observers may exist.

RURAL

Management activities or facilities may dominate the natural landscape. There is strong evidence of designated roads and highways. Structures are readily apparent and may range from scattered to small dominant clusters.

URBAN

The landscape is dominated by structures and other facilities with human influence readily apparent. There is strong evidence of designated roads and highways and streets.

CHARACTER OF EXPERIENCE

PRIMITIVE

Extremely high probability of experiencing isolation from the sights and sounds of humans, independence, closeness to nature, tranquility, and self reliance through the application of outdoor skills in an environment that offers a high degree of challenge and risk. Challenge level 1 and most difficult access.

SEMIPRIMITIVE NON-MOTORIZED

High, but not extremely high, probability of experiencing isolation from the sights and sounds of humans, independence, closeness to nature, tranquility, and self reliance through the application of outdoor skills in an environment that offers challenge and risk. Challenge level 1 and 2 and more and most difficult access.

SEMIPRIMITIVE MOTORIZED

Moderate probability of experiencing isolation from the sights and sounds of humans, independence, closeness to nature, tranquility, and self reliance through the application of outdoor skills in an environment that offers challenge and risk. Opportunity to have a high degree of interaction with the natural environment. Opportunity to use motorized equipment while in the area. Challenge level 1 and 2 and more and most difficult access.

ROADED NATURAL-APPEARING

Moderate probability of experiencing isolation from the sights and sounds of humans, independence, closeness to nature, tranquility, and self reliance through the application of woodsman and outdoor skills in an environment that offers challenge and risk. Opportunity to have a high degree of interaction with the natural environment. Opportunities for both motorized and non-motorized forms of recreation are possible. Challenge level 3 and more difficult access.

ROADED NATURAL MODIFIED

About equal probability to experience affiliation with other user groups and for isolation from sights and sound of humans. Opportunity to have a high degree of interaction with the natural environment. Challenge and risk opportunities associated with more primitive type of recreation are not very important. Practice and testing of outdoor skills might be important. Opportunities for both motorized and non-motorized forms of recreation are possible. Challenge level 3 and more difficult access.

RURAL

Probability for experiencing affiliation with individuals and groups is prevalent, as is the convenience of sites and opportunities. These factors are generally more important than the physical environment. Opportunities for wildland challenges, risk taking, and of outdoor skills are generally unimportant. Challenge level 4, difficulty level not a factor.

URBAN

Probability for experiencing affiliation with individuals and groups is prevalent, as is the convenience of sites and opportunities. Experiencing natural environments, having challenges and risks afforded by the natural environment, and the use of outdoor skills are relatively unimportant. Opportunities for competitive and spectator sports and for passive uses of highly human influenced parks and open spaces are common. Challenge level 4, difficulty level not a factor.

CHARACTER OF SETTING

PRIMITIVE

Area is characterized by fairly large, essentially unmodified natural environment. Interaction between users is very low and evidence of other users is minimal. The area is managed to be essentially free from evidence of human induced restrictions and controls. Motorized use in the area is not permitted.

RECREATION OPPORTUNITY SPECTRUM CLASS DESCRIPTIONS

CHARACTER OF SETTING

SIGNING AND LAW ENFORCEMENT

SEMIPRIMITIVE NON-MOTORIZED

Area is characterized by a predominantly natural or natural appearing environment of moderate to large size. Interaction between users is low, but there is often evidence of other users. The area is managed in such a way that minimum on-site controls and restrictions may be present, but are subtle. Motorized use is not permitted.

SEMIPRIMITIVE MOTORIZED

Area is characterized by a predominantly natural or natural-appearing environment of moderate to large size. Interaction between users is low, but there is often evidence of other users. The area is managed in such a way that minimum on-site controls and restrictions may be present, but are subtle. Motorized use may be limited in some areas.

ROADED NATURAL-APPEARING

Area is characterized by a predominantly natural or natural-appearing environment of moderate size. Interaction between users is low, but there is often evidence of other users. The area is managed in such a way that minimum on-site controls and restrictions may be present, but are subtle. Motorized use is permitted, but may be restricted in some areas.

ROADED NATURAL MODIFIED

Area is characterized as a generally natural-appearing environment, that may be substantially modified as a result of management activities. Moderate evidence of the sights and sounds of humans may be present. Such evidences usually harmonize with the natural environment. Interaction between users may be low to moderate, but with evidence of other users prevalent. Resource modification and utilization practices are evident, but harmonize with the natural environment. Motorized use is permitted, but may be restricted in some areas.

RURAL

Area is characterized by substantially modified natural environment. Resource modification and utilization practices are to enhance specific recreation activities and to maintain vegetative cover and soil. Sights and sounds of humans are readily evident, and the interaction between users is often moderate to high. A considerable number of facilities are designed for use by a large number of people. Facilities are often provided for special activities. Facilities for intensified motorized use and parking are available.

URBAN

Area is characterized by a substantially urbanized environment, although the background may have natural-appearing elements. Renewable resource modification and utilization practices are to enhance specific recreation activities. Vegetative cover is often exotic and manicured. Sights and sounds of humans, on-site, predominate. Large numbers of users can be expected, both on-site and in nearby areas. Facilities for highly intensified motor use and parking are available with forms of mass transit often available to carry people throughout the site.

SIGNING AND LAW ENFORCEMENT

PRIMITIVE

Signing — Few signs will be present and used only for resource protection and visitor safety.

Law enforcement — Presence, not normally visible.

SEMIPRIMITIVE NON-MOTORIZED

Signing — Signs will be limited and used only for resource protection, visitor safety, and administrative regulations.

Law enforcement — Presence, minimum.

SEMIPRIMITIVE MOTORIZED

Signing — Signs will be limited and used only for resource protection, visitor safety, and administrative regulations.

Law enforcement — Presence, limited.

ROADED NATURAL-APPEARING

Signing — Signs are common and used for resource protection, visitor safety, administrative regulations, interpretation, and general information.

Law enforcement — Presence, higher visibility than in SPM with routine patrols in developed recreation areas.

ROADED NATURAL MODIFIED

Signing — Signs are common and used for resource protection, visitor safety, administrative regulations, interpretation, and general information.

Law enforcement — Presence, higher visibility than in SPM with routine patrols in developed recreation areas.

RURAL

Signing — Signs are common and used for resource protection, visitor safety, administrative regulations, interpretation, and general information.

Law enforcement — Presence, highly visible, with routine patrols in high-use developed recreation areas.

URBAN

Signing — Signs are common and used for resource protection, visitor safely, administrative regulations, interpretation, and general information.

Law enforcement — Presence, highly visible, with routine patrols in high-use developed recreation areas.

TRAIL AND MECHANICAL USE

PRIMITIVE

Non-Motorized trail use is permitted. Restrictions on equestrian use may be imposed. No motorized use on or off-trail. No mechanical use except wheelchairs.

SEMIPRIMITIVE NON-MOTORIZED

Non-Motorized trail use is permitted. No motorized use on or off-trail. Mountain bikes and wheelchairs are permitted.

SEMIPRIMITIVE MOTORIZED

Motorized and non-motorized use may be permitted on designated roads and trails. Motorized off-road and trail use may be restricted in certain areas.

ROADED NATURAL-APPEARING

Motorized and non-motorized use may be permitted on designated roads and trails. Motorized off-road and trail use may be restricted in certain areas.

ROADED NATURAL MODIFIED

Motorized use permitted on designated roads and trails. Motorized off-road and trail use may be restricted in certain areas.

RURAL

Motorized use permitted on designated roads and trails. Motorized off-road and trail use may be restricted in certain areas.

URBAN

Motorized use permitted on designated roads and trails. Motorized off-road and trail use may be restricted in certain areas.

FACILITY DEVELOPMENT LEVELS

PRIMITIVE

Development level 1.

SEMIPRIMITIVE NON-MOTORIZED

Development levels 1 and 2.

SEMIPRIMITIVE MOTORIZED

Development levels 1 and 2..

ROADED NATURAL-APPEARING

Development levels 1,2 and 3.

ROADED NATURAL MODIFIED

Development levels 1,2 and 3.

RECREATION OPPORTUNITY SPECTRUM CLASS DESCRIPTIONS

FACILITY DEVELOPMENT LEVELS

SOCIAL SETTING

MINIMUM ACCEPTABLE SCENIC INTEGRITY OBJECTIVES (SIOs)

RURAL

Development levels 1,2,3 and 4.

URBAN

Development levels 4 and 5.

SOCIAL SETTING

Supervisor's Orders may be enacted if actual use deviates significantly from the group sizes described below.

PRIMITIVE

The maximum group size likely to be encountered is 10 people, the average group size is 2. Usually less than 2 other parties encountered on trail in one day. No other parties are visible from campsites.

SEMIPRIMITIVE NON-MOTORIZED

The maximum group size likely to be encountered is 10 people, the average group size is 3. Usually fewer than 3 other parties encountered on trail in one day. Three or less other parties are visible from campsites.

SEMIPRIMITIVE MOTORIZED

The maximum group size likely to be encountered is 10 people, the average group size is 3. Usually fewer than 3 other parties encountered on trail in one day. Three or less other parties visible from campsites.

ROADED NATURAL-APPEARING

The maximum group size likely to be encountered is 25 people, the average group size is 5. Usually fewer than 15 other parties encountered on trail in one day. Three or less other parties visible from campsite.

ROADED NATURAL MODIFIED

The maximum group size likely to be encountered on trail or in undeveloped areas is 25 people, the average group size is 5. Usually fewer than 15 other parties encountered on trail in one day. At developed recreation sites the maximum group size depends on capacity of site or facilities. Number of encounters is not relative in developed sites.

RURAL

The maximum group size depends on capacity of site or facilities. Number of encounters is not relevant in this class.

URBAN

The maximum group size depends on capacity of site or facilities. Number of encounters is not relevant in this class.

MINIMUM ACCEPTABLE SCENIC INTEGRITY OBJECTIVES (SIOs)

These represent minimums. Higher level, more restrictive SIOs, are often assigned by implementation of the Scenery Management System.

PRIMITIVE

Very high (preservation).

SEMIPRIMITIVE NON-MOTORIZED

High (retention).

SEMIPRIMITIVE MOTORIZED

High (retention).

ROADED NATURAL-APPEARING

Medium (partial retention).

ROADED NATURAL MODIFIED

Very low (maximum modification).

RURAL

Very low (maximum modification).

URBAN

Very low (maximum modification).

RECREATION OPPORTUNITY SPECTRUM CLASS DESCRIPTIONS

CHARACTER OF ACTIVITY

Recreation activities considered appropriate in each ROS class.

PRIMITIVE

- Viewing scenery
- Hiking and backpacking
- Walking
- Horseback
- Tent camping
- Nature study
- Fishing
- Swimming
- Canoeing
- Picnicking
- Gathering forest products
- Hunting

SEMIPRIMITIVE NON-MOTORIZED

- Viewing scenery
- Hiking and backpacking
- Walking
- Horseback
- Tent camping
- Nature study
- Fishing
- Swimming
- Canoeing
- Picnicking
- Gathering forest products
- Hunting
- Bicycling

SEMIPRIMITIVE MOTORIZED

- Viewing scenery
- Hiking and backpacking
- Walking
- Horseback
- Tent camping
- Nature study
- Fishing
- Swimming
- Canoeing
- Picnicking
- Gathering forest products
- Hunting
- Bicycling
- Viewing activities
- Viewing works of humankind
- Automobile use — on and off road
- Motorcycle and ATV use — on and offroad
- Interpretive services
- Motorized boat use

ROADED NATURAL-APPEARING

- Viewing scenery
- Hiking and backpacking
- Walking
- Horseback
- Tent camping
- Nature study
- Fishing
- Swimming
- Canoeing
- Picnicking
- Gathering forest products
- Hunting
- Bicycling
- Viewing activities
- Viewing works of humankind
- Automobile use — on and off road
- Motorcycle and ATV use — on and off road
- Interpretive services
- Motorized boat use

ROADED NATURAL MODIFIED

- Viewing scenery
- Hiking and backpacking
- Walking
- Horseback
- Tent camping
- Nature study
- Fishing
- Swimming
- Canoeing
- Picnicking
- Gathering forest products
- Hunting
- Bicycling
- Viewing activities
- Viewing works of humankind
- Automobile use — on and off road
- Motorcycle and ATV use — on and off road
- Interpretive services
- Motorized boat use
- Developed camping

RURAL

- Viewing scenery
- Hiking and backpacking
- Walking
- Horseback
- Tent camping
- Nature study
- Fishing
- Swimming

CHARACTER OF ACTIVITY

RECREATION OPPORTUNITY SPECTRUM CLASS DESCRIPTIONS

CHARACTER OF ACTIVITY

- Canoeing
- Picnicking
- Gathering forest products
- Hunting
- Bicycling
- Viewing activities
- Viewing works of humankind
- Automobile use — on and off road
- Motorcycle and ATV use — on and off road
- Interpretive services
- Motorized boat use
- Developed camping
- Team sports participation
- Individual sports participation
- Games and play participation
- Swimming and water play

URBAN

- Viewing scenery
- Hiking and backpacking
- Walking
- Horseback
- Tent camping
- Nature study
- Fishing
- Swimming
- Canoeing
- Picnicking
- Gathering forest products
- Hunting
- Bicycling
- Viewing activities
- Viewing works of humankind
- Automobile use — on and off road
- Motorcycle and ATV use — on and off road
- Interpretive services
- Motorized boat use
- Developed camping
- Team sports participation
- Individual sports participation
- Games and play participation
- Swimming and water play

Plant and Animal Scientific Names

The following is a listing of the plant and animal species common and scientific names that are cited in the text of the EIS.

PLANTS

EARLY LAND PLANTS — MOSSES, FERNS, HORSETAILS, CLUBMOSSES

- Alabama lip-fern – *Cheilanthes alabamensis* (Buckl.) Kunze
- Black-stemmed spleenwort – *Asplenium resiliens* L.
- Hairy lip-fern – *Cheilanthes lanosa* (Michx.) D.C. Eaton
- Japanese climbing fern – *Lygodium japonicum* (Thunb.) Swartz
- Maidenhair spleenwort – *Asplenium trichomanes* L.
- Nodding clubmoss – *Palhinhaea cernua* (L.) Vasconcellos & Franco
- Purple cliff-brake fern – *Pellaea atropurpurea* (L.) Link
- Riddell's spike moss – *Selaginella arenicola* ssp. *riddellii* (Van Eselt.) R. Tyron

CONIFERS

- Loblolly pine – *Pinus taeda* L.
- Longleaf pine – *Pinus palustris* P. Mill
- Shortleaf pine – *Pinus echinata* P. Mill
- Slash pine – *Pinus elliottii* Engelm

FLOWERING PLANTS

DICOTS

- American basswood – *Tilia americana* L.
- American beech – *Fagus grandifolia* Ehrh.
- American holly – *Ilex opaca* Ait.
- American pinesap – *Monotropa hypopithys* L.
- Asters – *Aster* spp.
- Awl-shaped scurf-pea – *Psoralea subulata* Bush
- Barbed rattlesnake root – *Prenanthes barbata* (T. & G.) Milstead
- Beech – *Fagus grandifolia* Ehrh.
- Bigleaf snowbell – *Styrax grandifolia* Ait.
- Black hickory – *Carya texana* Buckl.
- Black snakeroot – *Sanicula canadensis* L.
- Black oak – *Quercus velutina* Lam.
- Blackjack oak – *Quercus marilandica* Muench.
- Blazing stars – *Liatris* spp.
- Blue sage – *Salvia azurea* Lam.
- Bluestem grasses – *Andropogon* spp. and *Schizachyrium* spp.
- Boneset – *Eupatorium* spp.
- Bracken fern – *Pteridium aquilinum* (L.) Kuhn
- Broad-leaved Barbara's buttons – *Marshallia trinervia* (Walt.) Trel. ex Branner & Cov.
- Broomrape – *Orobanche uniflora* L.
- Broom sedge – *Andropogon virginicus* L.
- Calyciphilic flame flower – *Talinum calycinum* Engelm.
- Chain fern – *Woodwardia* spp.
- Cherry bark oak – *Quercus pagoda* Raf.
- Chinese tallow tree – *Sapium sebiferum* (L.) Roxb.
- Christmas fern – *Polystichium acrostichoides* (Michx.) Schott
- Clammy weed – *Polanisia erosa* (Nutt.) Iltis
- Climbing magnolia – *Schichandra coccinea* Michx.
- Composites – Asteraceae (=Compositae)
- Coral honeysuckle – *Lonicera sempervirens* L.
- Cupleaf beardtongue – *Penstemon murrayanus* Hook.
- Drummond's nailwort – *Paronychia drummondii* T. & G.
- Eastern hophornbeam – *Ostrya virginiana* (Mill.) K. Koch.
- Feverwort – *Triosteum perfoliatum* L.
- Flowering dogwood – *Cornus florida* L.
- Fragrant goldenrod – *Solidago odora* Ait.
- French mulberry – *Callicarpa americana* L.
- Geocarpon – *Geocarpon minimum* Mack.
- Golden asters – *Chrysopsis* spp., *Heterotheca* spp., and *Pityopsis* spp.
- Goldenrod – *Solidago* spp.
- Grass-of-parnassus – *Parnassia grandifolia* DC.
- Grasses – Poaceae (=Graminae)
- Greenbrier – *Smilax* spp.

PLANTS

FLOWERING PLANTS

DICOTS

- Green hawthorne – *Crataegus viridus* L.
- Groundplum – *Astragalus crassicarpus* Nutt. var. *trichocalyx* (Nutt.) Barneby
- Hawthorns – *Crataegus* spp.
- Hickory – *Carya* spp.
- Hoary pea – *Tephrosia virginiana* (L.) Pers.
- Huckleberry – *Vaccinium* spp.
- Inland sea-oats – *Chasmanthium latifolium* (Michx.) Yates
- Ironweed – *Vernonia* spp.
- Ironwood – *Carpinus caroliniana* Walt.
- Japanese honeysuckle – *Lonicera japonica* Thunb.
- Kudzu – *Pueriria montana* (Lour.) Merr. var. *lobata* (Willd.) Maesen & Almeida
- Large-leaved rose gentian – *Sabatia macrophylla* Hook.
- Laurel oak – *Quercus laurifolia* Michx.
- Legumes – Fabaceae (=Leguminosae)
- Little bluestem – *Andropogon scoparius* Michx. [=*Schizachyrium scoparium* (Michx.) Nash]
- Lizard's tail – *Saururus cernuus* L.
- Long-leaved wild buckwheat – *Eriogonum longifolium* Nutt.
- Louisiana bluestar – *Amsonia ludoviciana* Vail
- Louisiana sedge – *Carex louisianica* L. H. Bailey
- Louisiana squarehead – *Tetragonotheca ludoviciana* (T.&G.) Gray
- Mayapple – *Podophyllum peltatum* L.
- Many-flowered wild buckwheat – *Eriogonum multiflorum* Benth.
- Mexican plum – *Prunus mexicana* S. Wats.
- Milkpea – *Galactia* spp.
- Milkweed – *Asclepias* spp.
- Mockernut hickory – *Carya tomentosa* Nutt.
- Narrow-leaved milkweed – *Asclepias stenophylla* Gray
- Noseburn – *Tragia urticifolia* Michx.
- Nutmeg hickory – *Carya myristicaeformis* (Michx. f.) Nutt.
- Nutrush – *Cyperus* spp.
- Nuttall oak – *Quercus nuttallii* Palmer
- Oak – *Quercus* spp.
- October jointweed – *Polygonella polygama* (Vent.) Engelm. & Gray
- Overcup oak – *Quercus lyrata* Walt.
- Pale purple coneflower – *Echinacea pallida* (Nutt.) Nutt.
- Panic grasses – *Panicum* spp.
- Partridge pea – *Cassia fasciculata* Michx.
- Partridge berry – *Mitchella repens* L.
- Persimmon – *Diospyros virginiana* L.
- Pignut hickory – *Carya glabra* (Mill.) Sweet
- Post oak – *Quercus stellata* Wang. var. *stellata*
- Prairie redroot – *Ceanothus herbaceus* Raf
- Privet – *Ligustrum spp.*
- Purple bluet – *Hedyotis purpurea* L. var. *calycosa* Gray
- Purple coneflower – *Echinacea purpurea* (L.) Moench
- Robbin's phacelia – *Phacelia strictiflora* (Engelm. & Gray) Gray
- Rough-leaf coneflower – *Rudbeckia grandiflora* (Sweet) D. C.
- Sabine coneflower – *Rudbeckia scabrifolia* L. E. Brown
- Sedges – Cyperaceae
- Sericea lespedeza – *Lespedeza cuneata* (Dum.-Cour.) G. Don
- Shagbark hickory – *Carya ovata* (Mill.) K. Koch
- Shooting star – *Dodecatheon meadia* L.
- Shumard oak – *Quercus shumardii* Buckl.
- Slender gay-feather – *Liatris tenuis* Shinners
- Slender heliotrope – *Lithospermum tenellum* (Nutt.) Torr.
- Small-flowered flame flower – *Talinum parviflorum* Nutt.
- Southern jointweed – *Polygonella americana* (Fisch. & Mey.) Small
- Southern magnolia – *Magnolia grandiflora* L.
- Southern red oak – *Quercus falcata* Michx. var. *falcata*
- Soxman's milkvetch – *Astragalus soxmanorium* Lundell
- Spangle-grass – *Leptochloa* spp.
- Spiny coneflowers – *Echinacea* spp.
- Stagger bush – *Lyonia mariana* (L.) D. Don.
- Sunflowers – Asteraceae (=Compositae)
- Swamp chestnut oak – *Quercus michauxii* Nutt.
- Swamp dogwood – *Cornus stricta* Lam.
- Sweet bay – *Magnolia virginiana* L.
- Sweet gum – *Liquidamber styraciflua* L.
- Sycamore – *Platanus occidentalis* L.
- Tropical soda apple – *Solanum viarum* Dunal
- Viburnum – *Viburnum* spp.
- Violets – *Viola* spp.
- Viperina – *Zornia bracteata* (Walt.) Gmel.
- Virginia Dutchman's pipe – *Aristolochia serpentaria* L.
- Water ash – *Fraxinus caroliniana* Mill.
- Water hickory – *Carya aquatica* (Michx. f.) Nutt.
- Water locust – *Gleditsia aquatica* Marsh.
- Water oak – *Quercus nigra* L.
- Wedge-leaved Whitlow grass – *Draba cuneifolia* Nutt. ex T.&G.
- White oak – *Quercus alba* L.
- Wild azalea – *Rhododendron canescens*

(Michx.) Sweet
- Wild bergamont – *Monarda fistulosa* L.
- Wild geranium – *Geranium maculatum* L.
- Wild grape – *Vitis* spp.
- Wild indigo – *Baptisia* spp.
- Willow oak – *Quercus phellos* L.
- Winged elm – *Ulmus alata* Michx.
- Yellow pimpernel – *Taenidia integerrima* (L.) Drude
- Yellowroot – *Xanthorhiza simplicissima* Marsh.

MONOCOTS

- Bearded grass-pink – *Calopogon barbatus* (Walt.) Ames
- Black snakeroot – *Zigadenus densus* (Desr.) Fern.
- Bluejoint panic grass – *Panicum tenerum* Beyr.
- Bog moss – *Mayaca aubletii* Michx.
- Carolina purpletop – *Tridens carolinianus* (Steud.) Henr.
- Comb's redtop panic grass – *Panicum rigidulum* Nees var. *combsii* (Scribn. & Ball) LeLong
- Crested coral-root – *Hexalectris spicata* (Walt.) Barnh.
- Drummond's yellow-eyed grass – *Xyris drummondii* Malme
- Epiphytic sedge – *Carix decomposita* Muhl
- Fairy wand – *Chamaelirium luteum* (L.) Gray
- False solomon's seal – *Smilacina racemosa* (L.) Desf.
- Great-plain's ladies'-tresses – *Spiranthes magnicamporum* Sheviak
- Harper's yellow-eyed grass – *Xyris scabriflora* Harper
- Inland sea-oats – *Chasmanthium latifolium* (Michx.) Yates
- June grass – *Koeleria macrantha* (Ledeb.) Schult.
- Kentucky lady's slipper – *Cypripedium kentuckiense* C.F. Reed
- Large beakrush – *Rhynchospora macra* (C.B. Clarke) Small
- Mead's sedge – *Carex meadii* Dewey
- Millet beakrush – *Rhynchospora miliacea* (Lam.) Gray
- Mohlenbrock's umbrella sedge – *Cyperus grayioides* Mohl.
- Mohr's bluestem – *Andropogon liebmanii* Hack.
- Nodding pogonia – *Triphora trianthophora* (Sw.) Rydb.
- Northern burmannia – *Burmannia biflora* L.
- Oklahoma grass-pink – *Calopogon oklahomensis* Goldman
- Ozark dropseed – *Sporobolus ozarkanus* Fern.
- Pensacola bahiagrass – *Paspalum notatum* Fluegge var. *saurae* Parodi
- Pinehill bluestem – *Andropogon scoparium* Michx. var. *divergens*
- Pineland yellow-eyed grass – *Xyris stricta* Chapm.
- Prairie cordgrass – *Spartina pectinata* Link.
- Redtop panic grass – *Panicum rigidulum* Nees var. *combsii* (Schribn. & Ball) LeLong
- Roughhair panic grass – *Panicum strigosum* Muhl. var. *leucoblepharis* (Trin.) LeLong
- Rye – *Secale cereale* L.
- Sessile-leaved bellwort – *Uvularia sessilifolia* L.
- Shortbeak baldsedge – *Psilocarya scirpoides* (Vahl) Wood
- Slender wake-robin – *Trillium gracile* Freeman
- Small-toothed sedge – *Carex microdonta* Torr. & Hook.
- Texas sunnybell – *Schoenolirion wrightii* Sherman
- Tiny bog button – *Lachnocaulon digynum* Korn.
- Trillium – *Trillium* spp.
- Tussock sedge – *Carex stricta* Lam.
- Wheat – *Triticum aestivum* L.
- White-fringed orchid – *Platanthera blephartiglottis* (Willd.) Lindl.
- Vetiver grass – *Vetiveria zizanioides* (L.) Nash
- Wild coco – *Pteroglossaspis ecristata* (Fern.) Rolfe (=*Euplohia ecristata* (Fern.) Ames)
- Wild hyacinth – *Camassia scilloides* (Raf.) Cory
- Wiry witch grass – *Panicum flexile* (Gatt.) Scribn.
- Yellow fringeless orchid – *Platanthera integra* (Nutt.) Gray ex Beck
- Yellow pitcher plants – *Sarracenia* spp.

ANIMALS

MAMMALS

- Big brown bat – *Eptesicus fuscus*
- Cotton mouse – *Peromyscus gossypinus*
- Coyote – *Canis latrans*
- Fox squirrel – *Sciurus niger*
- Fulvous harvest mouse – *Reithrodontomys fulvescens*
- Golden mouse – *Ochrotomys nuttalli*
- Gray squirrel – *Sciurus carolinensis*
- Hispid cotton rat – *Sigmodon hispidus*

ANIMALS

MAMMALS

BIRDS

FISH

- Hispid pocket mouse – *Perognathus hispidus*
- Least shrew – *Cryptotis parva*
- Long-tailed weasel – *Mustela frenata*
- Louisiana black bear – *Ursus americanus luteolus*
- Nutria – *Myocastor coypus*
- Rafinesque's big-eared bat – *Corynorhinus rafinesquii*
- Red bat – *Lasiurus borealis*
- Southern flying squirrel – *Glaucomys volans*
- Swamp rabbit – *Sylvilagus aquaticus*
- Virginia oppossum – *Didelphis virginiana*
- White-footed mouse – *Peromyscus leucopus*
- White-tailed deer – *Odocoileus virginianus*

BIRDS

- Acadian Flycatcher – *Empidonax virescens*
- American Kestrel – *Falco sparverius*
- American Woodcock – *Scolopax minor*
- Anhinga – *Anhinga anhinga*
- Bachman's Sparrow – *Aimophila aestivalis*
- Bald Eagle – *Haliaeetus leucocephalus*
- Barred Owl – *Strix varia*
- Black-and-white Warbler – *Mniotilta varia*
- Blue-gray Gnatcatcher – *Polioptila caerulea*
- Brown Thrasher – *Toxostoma rufum*
- Cooper's Hawk – *Accipiter cooperii*
- Eastern Bluebird – *Sialia sialis*
- Eastern Screech Owl – *Otus asio*
- Eastern Wood-pewee – *Contopus virens*
- European Starling – *Sturnus vulgaris*
- Field Sparrow – *Spizella pusilla*
- Henslow's Sparrow – *Ammodramus henslowii*
- Hooded Warbler – *Wilsonia citrina*
- House Sparrow – *Passer domesticus*
- Kentucky Warbler – *Oporornis formosus*
- Louisiana Waterthrush – *Seiurus motacilla*
- Mallard – *Anas platyrhynchos*
- Mourning Dove – *Zenaida macroura*
- Northern Bobwhite – *Colinus virginianus*
- Northern Parula – *Parula americana*
- Pileated Woodpecker – *Dryocopus pileatus*
- Prairie Warbler – *Dendroica discolor*
- Prothonotary Warbler – *Protonotaria citrea*
- Red-bellied Woodpecker – *Melanerpes carolinus*
- Red-cockaded Woodpecker – *Picoides borealis*
- Red-headed Woodpecker – *Melanerpes erythrocephalus*
- Red-shouldered Hawk – *Buteo lineatus*
- Snowy Egret – *Egretta thula*
- Summer Tanager – *Piranga rubra*
- Swainson's Warbler – *Limnothlypis swainsonii*
- Warbling Vireo – *Vireo gilvus*
- White-breasted Nuthatch – *Sitta carolinensis*
- White-eyed Vireo – *Vireo griseus*
- Wild Turkey – *Meleagris gallopavo*
- Wood Duck – *Aix sponsa*
- Wood Thrush – *Hylocichla mustelina*
- Worm-eating Warbler – *Helmitheros vermivorus*
- Yellow-billed Cuckoo – *Coccyzus americanus*
- Yellow-crowned Night Heron – *Nyctanassa violacea*
- Yellow-throated Vireo – *Vireo flavifrons*

FISH

- Banded pygmy sunfish – *Elassoma zonatum*
- Blackspot shiner – *Notropis atrocaudalis*
- Blackspotted topminnow – *Fundulus olivaceus*
- Blacktail redhorse – *Moxostoma poecilurum*
- Bluegill – *Lepomis macrochirus*
- Blue sucker – *Cycleptus elongatus*
- Bluehead shiner – *Pteronotropis hubbsi*
- Bluntnose darter – *Etheostoma chlorosomum*
- Bowfin – *Amia calva*
- Brook silverside – *Labidesthes sicculus*
- Brown madtom – *Noturus phaeus*
- Chain pickerel – *Esox niger*
- Channel catfish – *Ictalurus punctatus*
- Creek chub – *Semotilus atromaculatus*
- Creek chubsucker – *Erimyzon oblongus*
- Cypress darter – *Etheostoma proeliare*
- Dollar sunfish – *Lepomis marginatus*
- Dusky darter – *Percina sciera*
- Freckled madtom – *Noturus nocturnus*
- Gizzard shad – *Dorosoma cepedianum*
- Goldstripe darter – *Etheostoma parvipinne*
- Green sunfish – *Lepomis cyanellus*
- Harlequin darter – *Etheostoma histrio*
- Lake chubsucker – *Erimyzon sucetta*
- Largemouth bass – *Micropterus salmoides*
- Longear sunfish – *Lepomis megalotis*
- Mosquitofish – *Gambusia affinis*
- Paddlefish – *Polyodon spathula*
- Pirate perch – *Aphredoderus sayanus*
- Redear sunfish – *Lepomis microlophus*
- Redfin darter – *Etheostoma whipplei*
- Redfin pickerel – *Esox americanus*
- Redfin shiner – *Lythrurus umbratilis*
- Sabine shiner – *Notropis sabinae*
- Scaly sand darter – *Ammocrypta vivax*
- Slough darter – *Etheostoma gracile*
- Speckled darter – *Etheostoma stigmaeum*
- Spotted bass – *Micropterus punctulatus*

- Spotted sucker – *Minytrema melanops*
- Spotted sunfish – *Lepomis punctatus*
- Striped shiner – *Luxilus chrysocephalus*
- Tadpole madtom – *Noturus gyrinus*
- Warmouth – *Lepomis gulosus*
- Western sand darter – *Etheostoma clarum*
- Yellow bullhead – *Ameiurus natalis*

AMPHIBIANS

- Bird-voiced treefrog – *Hyla avivoca*
- Dwarf salamander – *Eurycea quadridigitata*
- Eastern narrow-mouthed toad – *Gastrophyne carolinensis*
- Eastern newt – *Notopthalmus viridescens*
- Louisiana slimy salamander – *Plethodon kisatchie*
- Marbled salamander – *Ambystoma opacum*
- Small-mouthed salamander – *Ambystoma texanum*
- Southern red-backed salamander – *Plethodon serratus*
- Spotted salamander – *Ambystoma maculatum*
- Spring peeper – *Hyla crucifer*
- Squirrel treefrog – *Hyla squirella*

REPTILES

- Alligator snapping turtle – *Macroclemys temminckii*
- American alligator – *Alligator mississippiensis*
- Broad-headed skink – *Eumeces laticeps*
- Cottonmouth – *Agkistrodon piscivorus*
- Louisiana pine snake – *Pituophis melanoleucus ruthveni*
- Painted turtle – *Chrysemys picta*
- Prairie kingsnake – *Lampropeltis calligaster*

MUSSELS

- Louisiana pearlshell mussel – *Margaritifera hembeli*
- Southern hickorynut – *Obovaria jacksoniana*
- Southern creekmussel – *Strophitus subvexus*
- Squawfoot – *Strophitus undulatus*

INSECTS

- Black turpentine beetle – *Dendroctonus terebrans*
- Caddisfly – *Diplectrona rossi*
- Forest tent caterpillar – *Malacosoma disstria*
- Fruittree leafroller – *Archips argyrospila*
- Ips beetle – *Ips avulsus*
- Schoolhouse springs stonefly – *Leuctra szczytkoi*
- Southern pine beetle – *Dendroctonus frontalis*
- Yellow brachycercus mayfly – *Brachycercus flavus*

CRUSTACEANS

- Crayfish – *Orconectes hathawayi*
- Crayfish – *Orconectes maletae*

ANIMALS
FISH
AMPHIBIANS
REPTILES
MUSSELS
INSECTS
CRUSTACEANS

Biological Assessment

PURPOSE

PROPOSED ACTION

LOCATION AND GENERAL DESCRIPTION OF THE PLANNING AREA

SPECIES DESCRIPTIONS

PURPOSE

The purpose of this Biological Assessment is to determine the effects of implementation of the Revised Land and Resource Management Plan for the Kisatchie National Forest (Plan) on all federally-listed species that occur or have potential habitat on the Kisatchie National Forest (KNF). The objectives of this Biological Assessment are to document the occurrence or possibility of occurrence of federally-listed species within the KNF and to determine the effects of implementing the Forest Plan on federally-listed species.

PROPOSED ACTION

The proposed action is the implementation of the Plan. The Plan sets management direction for the KNF for the next 10 to 15 years. Forestwide goals, desired future conditions (DFCS), objectives, and standards and guidelines are found in Chapter 2; management area and sub-management area goals, DFCS, and standards and guidelines are found in Chapter 3; implementation direction is found in Chapter 4; and monitoring and evaluation direction is found in Chapter 5. The Plan is a program-level document; consequently, site-specific management decisions are not expressed.

LOCATION AND GENERAL DESCRIPTION OF THE PLANNING AREA

The boundary of the KNF encompasses approximately 1,024,659 acres, of which 603,769 acres are National Forest land. The Forest consists of 5 Ranger Districts: Catahoula, Calcasieu, Kisatchie, Winn, and Caney. These Districts are located within Grant, Rapides, Vernon, Natchitoches, Winn, Webster, and Claiborne Parishes of west-central and northwestern Louisiana.

The area is predominately rural. The Forest is generally within a 2 1/2 hour drive of Shreveport and Baton Rouge, and within 4 hours of New Orleans.

The Forest's topography ranges from level on stream terraces and floodplains to undulating and hilly in the uplands. Elevations range from 80 feet above sea level in floodplains to 200 - 425 feet above sea level in Kisatchie Hills. The general slope of the Forest is southward toward the Gulf of Mexico.

The climate of the area is subtropical. Annual rainfall averages 59 inches. Summer temperatures range from 65° - 75° Fahrenheit (F) in the early morning hours to 85° - 100+° F in the afternoon. Winter temperatures range from 40° - 50° F in the early morning hours to 55° - 65° F in the afternoon. The average annual temperature is 68° F and the average humidity is 74 %.

Located within the Forest boundaries today are 4 vegetation communities: longleaf pine, shortleaf pine/oak-hickory, mixed hardwood/loblolly pine, and riparian. These communities are situated within nine landtype associations (LTAS): high terrace rolling uplands, Kisatchie sandstone hills, undulating clayey uplands, alluvial floodplains and stream terraces, Winn rolling uplands, Fort Polk rolling uplands, Red River alluvial plains, Caney Lakes loamy uplands, and north Louisiana clayey hills.

SPECIES DESCRIPTIONS

The federally-listed species that occur or have potential habitat on the KNF are the Louisiana black bear, Bald Eagle, Red-Cockaded Woodpecker, American alligator, and Louisiana pearlshell mussel.

SPECIES DESCRIPTIONS

LOUISIANA BLACK BEAR

STATUS

DESCRIPTION

REPRODUCTION AND DEVELOPMENT

RANGE AND POPULATION LEVELS

LOUISIANA BLACK BEAR (*Ursus americanus luteolus*)

STATUS

Threatened (*Federal Register*, January 7, 1992). The decline in Louisiana black bear abundance primarily can be attributed to habitat loss, human disturbance, and illegal kill (Black Bear Conservation Committee (BBCC), 1996).

DESCRIPTION

The Louisiana black bear is 1 of 16 recognized subspecies of the American black bear (*Ursus americanus*). Louisiana black bears normally are black with a brown muzzle and an occasional white blaze on the chest. Average body weights are 150 - 350 pounds for adult males and 120 - 250 pounds for adult females. Body lengths range from 3 - 6 feet from nose to their short tail. Body size typically varies depending on the quality and quantity of available food. Classified as a carnivore by taxonomists, black bears are not active predators and only prey on vertebrate animals when the opportunity arises. Bears are better described as opportunistic feeders as they eat almost anything that is available, thus they are more typically omnivorous. Bears spend considerable time foraging for food. Feeding signs usually are evident in areas of bear activity. Torn logs, broken saplings, clawed trees, and trampled food plants are indicators of feeding activities. Bears utilize all levels, from treetops to the understory, of the forest for feeding. They apparently use their keen sense of smell to locate food sources. (BBCC, 1996)

REPRODUCTION AND DEVELOPMENT

Female black bears typically begin having cubs at 3-5 years of age. Females as young as 2 years of age may produce young in high quality habitats. Conversely, females in marginal habitats may not produce young prior to their 7th year. Limited availablity of berries and/or mast during the previous year may decrease litter size, or even decrease the chances of a bear having cubs. Mating generally occurs in the summer months and egg implantation usually is delayed for about 5 months. Cubs are born in winter dens in January and February. Although twins are most common, litter sizes range from 1 - 5. Cubs are born in a helpless state. Measuring about 8 inches in length and weighing 8 - 12 ounces, they develop and grow rapidly. The sex ratio at birth is usually 1:1 males to females. (BBCC 1996)

Mother and cubs leave the den in April or May when the young weigh 4 - 8 pounds. The cubs stay with their mother through the 1st year, which includes sharing a winter den. They emerge with her again in the spring, and live with her until the summer when the family unit dissolves. In mild winters, with residual food sources available, it is common for the family unit to remain active through the winter. After the family unit dissolves, the female goes back into estrus, breeds, and repeats the cycle. (BBCC, 1996)

RANGE AND POPULATION LEVELS

The American black bear once was found throughout North America from Alaska and northern Canada south to northern Mexico. Black bears found in eastern Texas, southern Mississippi, southeast Arkansas, and the entire state of Louisiana, are considered to belong to *Ursus americanus luteolus*. Accurate data on the historical status and distribution of the Louisiana black bear in this region are generally lacking. However, there are numerous historic references to the animals being "widespread" and "common." It has been reported that black bears once occupied most forested areas in the region, but reached their peak abundance in the expansive forested bottomlands of the Mississippi and Atchafalaya River drainages prior to human settlement in the early 1800's (BBCC, 1996). A record of the parishes containing bears in 1890 shows 17 to be inhabited — all in the Mississippi-Atchafalaya region (St. Amant, 1959). Although once considered abundant, by the 1950's, population estimates of black bears in Louisiana were low. Lyle St. Amant, in his 1959 book Louisiana Wildlife Inventory, estimated that 80 - 120 bears remained in Louisiana. St. Amant believed bears were restricted to the Tensas and Atchafalaya basins. In 1981, Dewey Wills (Louisiana Department of Wildlife and Fisheries wildlife biologist) estimated 110 - 125 bears in Louisiana (BBCC, 1996). Weaver (1990) wrote that population estimates for Louisiana and Mississippi are speculative. Louisiana could have as many as 300 bears, with 50 or more in Madison and Tensas Parishes. He also noted that while reproduction is documented in both states, researchers are uncertain if it is compensating for mortality. The only current reliable estimates of bear numbers in Louisiana are for the Tensas River basin population. In 1991, 60 - 100 bears were estimated in the Tensas basin; this etimate is now thought to be conservative (BBCC, 1996).

No Louisiana black bears permanently occupy any portion of the KNF. Transient bears have been reported very infrequently on the Forest.

HABITAT

Black bears that exist today in Louisiana and Mississippi do so primarily in relatively large contiguous areas of bottomland hardwood habitat. Estimates of home range size indicate that an adult male may utilize over 40,000 acres and an adult female up to 18,000 acres. The ingredients of prime black bear habitat include escape cover, dispersal corridors, abundant and diverse natural foods, water, and denning sites. High quality escape cover is critical for bears that live in fragmented habitats and in close proximity to humans. Black bears are adaptable and can thrive if afforded areas of retreat that ensure little chance of close contact or visual encounters with humans. The thick understory typical of bottomland hardwood forests provide such natural cover. (BBCC, 1996)

HABITAT ON THE KISATCHIE NATIONAL FOREST

No sufficiently large contiguous areas of bottomland hardwood habitat with low densities of road networks exist on KNF; therefore, no KNF district provides optimum black bear habitat. The best available habitat areas for bear on the Forest are the Kisatchie Hills Wilderness (8,679 acres, located on Kisatchie Ranger District), Saline Bayou National Scenic River corridor (5,150 acres, located on Winn Ranger District), and Cunningham Brake (1,646 acres, located on Kisatchie Ranger District); however, these areas are marginal due to their relatively small size.

MANAGEMENT AND PROTECTION

Large tracts of mature bottomland hardwood forest, composed of a mix of tree species, will likely provide for black bear needs and will not require intensive management to maintain good bear habitat. Natural disturbance, in the form of tree falls and wind storms, typically provide sufficient forest openings needed for forage production and cover. Leaving land alone should be the first management option considered. Otherwise, rotation length of hard mast-producing trees should be 70 - 100 years. Stand thinnings should be made when silviculturally feasible, preferably in 5 - 15 year intervals. Roads should be limited to a minimum of 0.5 miles apart; controlling vehicular traffic on these roads by the use of gates will limit disturbances to bears. Any tree species having a large enough cavity for a bear should be maintained; however, special consideration should be given bald cypress and tupelogum with visible cavities, having a minimum diameter at breast height (dbh) of 36 inches, and occurring along rivers, lakes, streams, bayous, sloughs, or other water bodies. Several trees 30 inches dbh or greater should be present on each timber stand; this will ensure large trees are available for avenues of escape / security for mother and cubs and provide future den trees in the stand. Forested areas should be connected with travel corridors. Streamside management zones (SMZS) should be located on all intermittent and flowing waterways and they should be as wide as possible (at least 50 yards). Pine stands should be burned on a 3 - 5 year rotation, always protecting SMZS. Some forest openings should be maintained in early successional native plant species such as dewberry or pokeweed. Hard mast-producing species, such as oaks and pecans, should be favored on suitable sites. (BBCC, 1996)

The Louisiana black bear is afforded protection under the Endangered Species Act of 1973.

SPECIES DESCRIPTIONS

BALD EAGLE

STATUS

DESCRIPTION

REPRODUCTION AND DEVELOPMENT

RANGE AND POPULATION LEVELS

BALD EAGLE (*Haliaeetus leucocephalus*)

STATUS

On July 12, 1995, the U.S. Fish and Wildlife Service reclassified the Bald Eagle from endangered to threatened throughout the lower 48 states (*Federal Register*, July 12, 1995). Previously, the eagle had been listed as endangered in all states except Michigan, Minnesota, Oregon, Washington, and Wisconsin, where it continues to be classified as threatened (*Federal Register*, March 11, 1967 and February 14, 1978).

Eagle populations declined due to shooting, habitat destruction, and organochlorine pesticides (primarily DDT) (Fuller, Henny, and Wood, 1995). However, the major factor leading to the decline of the Bald Eagle was lowered reproductive success following the introduction of the pesticide DDT in 1947. DDT residues caused eggshell thinning which led to broken eggs. Use of DDT was suspended in 1972 and by the late 1970s, eagle populations began to show signs of recovery. Currently, the most significant factors affecting the recovery of the Bald Eagle in the Southeast are habitat destruction and disturbance by humans. In a U.S. Department of Interior study of bald eagle deaths, accidental trauma, such as impacts with vehicles, power lines, or other structures was the most frequent cause of death (23%), followed by gunshot (15%), and electrocution (12%) (Franson, Sileo, and Thomas, 1995).

DESCRIPTION

A large raptor, the Bald Eagle has a wingspread of about 7 feet. Its plumage is mainly dark brown to black, and adults have a pure white head and tail. First-year juveniles are often chocolate brown to blackish, sometimes with white mottling on the tail, belly, and underwings. The head and tail become increasingly white with age until full adult plumage is reached in the fifth or sixth year. An opportunistic predator, the Bald Eagle feeds primarily on fish but also takes a variety of birds, mammals, and turtles (live and carrion) when fish are not readily available. (USDA, 1995).

REPRODUCTION AND DEVELOPMENT

The breeding season of Bald Eagles varies with latitude. The general tendency is for winter breeding in the South with a progressive shift toward spring breeding in northern latitudes. In the Southeast, nesting activities generally begin in early September; egg laying begins as early as late October and peaks in late December. The female does most of the nest construction, but the male assists. The typical nest is constructed of large sticks with softer materials such as dead weeds, cornstalks, grasses, and sod added as nest lining. Bald Eagle nests are very large, sometimes measuring up to 6 feet in width and weighing hundreds of pounds. Many nests are used year after year. Eagles may lay 1 - 3 eggs, but the usual clutch size is 2 eggs. A second clutch may be laid if the first is lost. Incubation lasts 34 - 38 days. The young fledge 9 - 14 weeks after hatching, but parental care may continue for another 4 - 6 weeks. Bald Eagles reach sexual maturity at 4 - 6 years of age. The life span is not known, but it is potentially long because eagles have been known to live for 50 years in captivity. (USDA, 1995)

RANGE AND POPULATION LEVELS

The Bald Eagle is found throughout North America from northern Alaska and Canada, south to southern California and Florida. Breeding occurs throughout the same area. Nesting in the Southeast occurs in 3 primary areas: peninsular Florida, coastal South Carolina, and coastal Louisiana. Sporadic breeding takes place in the rest of the southeastern states. During 1993, the number of occupied Bald Eagle territories in the lower 48 states was estimated at 4,016 (Biological Assessment of Revised Forest Plan of National Forests of Florida). An occupied territory indicates activity in a nesting area by a pair of eagles, it does not necessarily mean that the activity resulted in offspring. The number of occupied territories in the Southeast in 1993 was 982. Of those nests, 651 successfully fledged young. In the Southeast, Bald Eagle populations have increased during the last 13 years. In 1981, the number of eagle territories was estimated at 396. One of the more notable increases has been the establishment of a few nests in states that once had none. These increases are believed to be a result of the successful hacking program undertaken in the Southeastern United States. (USDA, 1995)

HABITAT

The Bald Eagle utilizes primarily riparian habitat; it is associated with coasts, rivers, and lakes, usually nesting near large bodies of water where it feeds. Selection of nesting sites varies tremendously depending on the species of trees growing in a particular area. In the Southeast, nests are constructed in dominant or codominant pines or cypress. Nests usually are constructed in living trees, but Bald Eagles occasionally will use dead ones. Certain general elements seem to be consistent among nest site selection; these include: (1) the proximity of water (usually within 0.5 miles) and a clear flight path to the water, (2) the largest living tree in a stand, and (3) an open view of the surrounding area. The proximity of good perching trees also may be a factor in nest site selection. An otherwise suitable site may not be used if excessive human activity occurs in the area. Bald Eagle wintering areas possess many of the same characteristics as nest sites. The birds, however, are not as closely limited to shores at this time, with adults and immatures gathering food where it is most easily available. Roost sites are an important component of wintering areas. Eagles may roost singly or in groups exceeding 100 birds. (USDA, 1995)

HABITAT ON THE KISATCHIE NATIONAL FOREST

Bald Eagle habitat potentially exists on or near Corney Lake (Caney Ranger District), Kincaid Lake (Calcasieu Ranger District), Saline Lake (Winn Ranger District), Saline Bayou (Winn Ranger District), and Iatt Lake (Catahoula Ranger District).

MANAGEMENT AND PROTECTION

Current protective measures include legal and regulatory measures, captive rearing, and habitat protection and improvement. The Bald Eagle is protected by Federal laws, which are enforced by both the U.S. Fish and Wildlife Service (USFWS) and State game departments. Nests sites are protected under management programs on such Federal lands as national wildlife refuges and national forests. (USDA, 1995)

SPECIES DESCRIPTIONS

RED-COCKADED WOODPECKER

STATUS

DESCRIPTION

REPRODUCTION AND DEVELOPMENT

RANGE AND POPULATION LEVELS

HABITAT

RED-COCKADED WOODPECKER (*Picoides borealis*)

STATUS

Endangered (*Federal Register*, October 13, 1970). The Red-cockaded Woodpecker (RCW) was once common throughout the Southern pine lands. Settling and clearing of the Southeast resulted in the loss of much RCW habitat. By 1970 the RCW declined to such low numbers that it was included on the Federal Endangered Species list (USDA, 1993, 1995)

DESCRIPTION

The RCW is slightly larger than a bluebird, about 7 inches long (RCW EIS). RCW's have a black- and white-barred back, black-flecked flanks, and black bars on their outer white tail feathers. They have a relatively large white cheek patch and a narrow band of black from the eye to the crown. Adult males have small red patches of a few feathers on each side of the posterior of their heads. These "cockades" seldom are visible in the field. Nestling and fledgling males, however, are distinguished easily from the time they are approximately 15 days old. These juvenile males have a red oval patch in the center of their otherwise black crown, and the patch is retained until the first molt in the fall following fledging. At the time the red crown patch is molted, the late-juvenile males acquire the far less prominent red-cockades of adult males. (Lennartz and Henry 1984) The diet is composed mainly of insects, insect eggs, and larvae. (USDA Forest Service (USFS) 1993)

REPRODUCTION AND DEVELOPMENT

RCWS nest between April and July. Only the breeding male courts and mates with the female. The female usually lays 2 to 4 eggs in the breeding male's roost cavity. Clan members take turns incubating the eggs during the day, but the breeding male stays with the eggs at night (Hooper, Robinson, and Jackson, 1980). Helpers aid the parents with incubation, feeding, and brooding. Survival of nestlings is higher at nests attended by helpers. Following fledging, juveniles remain in their natal territory through summer and into fall. During late fall, winter, and early spring, juvenile females disperse, but at least some juvenile males remain with their natal clan and become helpers the following nesting season(s). (USDI, 1985).

RANGE AND POPULATION LEVELS

The RCW is a non-migratory species that once occurred throughout the pine belt of the southern United States. The historic range of the RCW extended from New Jersey to Missouri to Texas to Florida. By the 1930's, most of the South's pine forest had been cut over. Undoubtedly, RCW populations declined dramatically as the old-growth pine forest disappeared. The current range of the RCW is limited and fragmented. The largest remaining RCW populations exist on the National Forests extending along the Coastal Plain from North Carolina to Texas, the Piedmont of Georgia and Alabama, and into the interior highlands of Arkansas, Oklahoma, Tennessee, and Kentucky. (USDA, 1995) Current population level (1998 data) is estimated at 4,950 groups (R.Costa, USFWS).

HABITAT

The RCW is the only bird that makes nesting and roosting cavities in live southern pines (Hooper, Robinson, and Jackson, 1980). They also tend to select trees infected with a heartwood-decaying fungus for cavity construction. Heartrot is not common in longleaf pine until the trees are about 100 years of age and about 75 years of age in loblolly pine. Most RCW cavities therefore are found in older, mature pines. RCWS prefer open, park-like pine stands with very little midstory vegetation. The aggregate of cavity trees and peripheral habitat is called a cluster. (USDA, 1995). Individual clusters may have from 1 to 30 cavity trees (USDI, 1985). Rcws may abandon a cavity if brushy undergrowth reaches cavity height. This undergrowth impedes entrance to the cavity and can attract other cavity competitors. Once a cavity is complete, the RCW creates "pitch wells" near the entrance causing resin flow that coats the tree trunk. This coating prevents predators such as rat snakes from reaching the cavity entrance and eating eggs or young. Territory size depends on the quality of habitat surrounding the cluster.

(USDA, 1993)

HABITAT ON THE KISATCHIE NATIONAL FOREST

The RCW and its habitat exist on 302,800 acres (pine and pine-hardwood) of the Calcasieu, Catahoula, Kisatchie, and Winn Ranger Districts. In 1986, the Caney population was declared extirpated by the USFWS.

MANAGEMENT AND PROTECTION

Recommendations in the species' recovery plan include: (1) survey, monitor, and assess the status of individual populations and the species; (2) implement protection and management of nesting and foraging habitat on Federal lands; (3) encourage protection and management on private lands; (4) conduct research on habitat needs and management, population dynamics, and genetic variation; and (5) inform and involve the public. (USDI, 1985)

The USFS, USFWS, and U.S. Army are working on comprehensive management and recovery guidelines for their respective Federal properties (national forests, national wildlife refuges, and Army installations) where the bird will be recovered. Additionally, the issues involving protection and management of RCWS on private lands are being addressed through a three-part private lands strategy which includes a procedural manual for private landowners, Statewide Habitat Conservation Plans, and Memorandums of Agreement with industrial forest landowners.

SPECIES DESCRIPTIONS

AMERICAN ALLIGATOR

STATUS

DESCRIPTION

REPRODUCTION AND DEVELOPMENT

AMERICAN ALLIGATOR (*Alligator mississippiensis*)

STATUS

Threatened, due to similarity of appearance to the American crocodile (*Crocodylus acutus*). Historically, alligators were depleted from many parts of their range as a result of market hunting and loss of habitat, and 30 years ago many people believed this species would never recover. In 1967, the alligator was listed as "endangered" (under a federal law that preceded the Endangered Species Act of 1973). A combined effort by the USFWS and state wildlife agencies in the South saved these unique animals. The Endangered Species Act prohibited alligator hunting, allowing the species to rebound in numbers in many areas where it had been depleted. As the alligator began to make a comeback, states established alligator population monitoring programs and used this information to ensure alligator numbers continued to increase. In 1987, the USFWS pronounced the American alligator fully recovered and consequently removed it from the list of endangered species. (Biological Assessment of Revised Forest Plan of National Forests of Florida)

Although the viability of the American alligator apparently is secure, some species of crocodiles and caimans still are in trouble. For this reason, the USFWS still regulates the legal trade in alligator skins, or products made from them, in order to protect endangered species of crocodiles and caimans that have hides similar in appearance to alligators. (Biological Assessment of Revised Forest Plan of National Forests of Florida)

DESCRIPTION

The alligator is a very large (to 230 inches; 5,842 mm), lizardlike reptile with tough leathery skin overlying bony plates on back and tail; ventral scales more or less quadrangular; snout long and broadly rounded; eyes and nostrils protruding; vent opening longitudinal; dorsum uniformly dark in adults, black with yellow crossbands in juveniles (Dundee and Rossman, 1989). It has a powerful tail which it uses to propel itself through water. The tail accounts for half the alligator's length. The American alligator can be distinguished from the crocodile by head shape and color. The crocodile has a narrower snout, and, unlike the alligator, has teeth in the lower jaw which are visible when its mouth is shut. In addition, adult alligators are black, while crocodiles are brownish. Young alligators feed on insects, small fish, crustaceans, amphibians, and reptiles (Dundee and Rossman, 1989). Adult food consists of virtually any animal small enough to be captured and swallowed (Wilson, 1995); however, they primarily feed on fish, turtles, and snails.

REPRODUCTION AND DEVELOPMENT

Courtship and mating occur in April and May. Nest buildling and egg laying occurs from May to July. During the breeding season, male alligators are territorial and frequently make a roaring or bellowing sound that can be heard up to a mile away. Mating takes place in the water. In southwestern Louisiana, female alligators construct their nest mounds from marsh vegetation that they strip around the mound. Two to 58 eggs are deposited in a more or less oval cavity, the top of which lies about 7 inches below the top of the mound. The female stays near the mound for 62 to 65 days while the eggs are incubating to protect the nests from predators such as raccoons, opossums, bears, hogs, and humans (Dundee and Rossman, 1989). When the young are ready to hatch, they begin to call and the female removes the nest covering so the hatchlings can emerge. The young, which are tiny replicas of adult alligators with a series of yellow bands around their bodies, then find their way to water. For several days, they continue to live on yolk masses within their bellies. Alligators reach breeding maturity at about 8 - 13 years of age, at which time they are about 6 - 7 feet long. From then on, growth continues at a slower rate. Old males may grow to be 14 feet long and weigh up to 1,000 pounds during a life span of 30 or more years. (Biological Assessment of Revised Forest Plan of National Forests of Florida)

SPECIES DESCRIPTIONS

AMERICAN ALLIGATOR

RANGE AND POPULATION LEVELS

HABITAT

HABITAT ON THE KISATCHIE NATIONAL FOREST

MANAGEMENT AND PROTECTION

RANGE AND POPULATION LEVELS

The American alligator ranges from the coastal region of southeastern North Carolina to extreme southern Florida. It is found as far west as eastern Texas (Wilson, 1995). They are found throughout Louisiana, but are confined to large lakes and the floodplains of major streams in the uplands of the state (Dundee and Rossman, 1989). Alligator population levels in central and northern Louisiana are high enough to support minor harvesting.

HABITAT

The American alligator occurs in still or slow-moving bodies of water such as lakes, bayous, swamps, canals, and occasionally drainage ditches. It is most abundant in the extensive coastal marshes of Louisiana. They will enter salt marshes on occasion but do not nest there (Dundee and Rossman, 1989).

HABITAT ON THE KISATCHIE NATIONAL FOREST

American alligator habitat exists primarily in riparian and wetland areas and secondarily in streamside areas.

MANAGEMENT AND PROTECTION

The American alligator is protected by Federal laws, which are enforced by the USFWS and State game departments. Alligator harvesting (trapping) is permitted usually during September in Louisiana and is regulated through a special tagging and licensing system. Harvesting alligators outside the designated areas or outside the harvest season violates state and federal laws (Dundee and Rossman 1989)(Capt B.Poston, LDWF, pers. commun.). Approximately 28,000 alligators were harvested statewide in Louisiana in 1998; 47 and 11 alligators were harvested in central Louisiana and northwest Louisiana, respectively, in 1998 (L.McNeese, LDWF, pers.commun.)

SPECIES DESCRIPTIONS

LOUISIANA PEARLSHELL MUSSEL

STATUS

DESCRIPTION

REPRODUCTION AND DEVELOPMENT

RANGE AND POPULATION LEVELS

HABITAT

LOUISIANA PEARLSHELL MUSSEL (*Margaritifera hembeli*)

STATUS

Threatened (*Federal Register*, March 16, 1993). The USFWS initially listed the Louisiana pearlshell as an endangered species on February 5, 1988 (53 FR 3567), known to exist only in 12 populations in 11 streams of the Bayou Boeuf watershed of Rapides Parish. These populations were impacted adversely by stream impoundments and sedimentation from gravel pits on nearby private lands and from timber harvesting in streamside areas. In 1991, 12 additional populations of the species were found in 8 streams in the Red River drainage of adjacent Grant Parish. An unknown number of additional populations occur on private property within the geographic area of the currently known range. The expansion of the known range was sufficient for the USFWS to downlist this species from "endangered" to a "threatened" status. However, the miniscule range of this species coupled with the relatively low population numbers and continued, unavoidable threats presented by overzealous collectors, sedimentation from private lands, and predation by raccoons and muskrats contribute to its status as a "threatened" species.

DESCRIPTION

The shell of the Louisiana pearlshell is oblong with moderately full beaks without obvious sculpture. The posterior ridge is low, the anterior end is rounded, and the ventral margin is generally straight or slightly curved. The shell surface has uneven growth lines and occasionally has faint sculpture lines on the posterior end. The epidermis is brown to blackish and the nacre is white to purple with numerous pits. The margins of the mantle do not unite or approach each other and do not form bracchial or anal siphons. The marsupium is formed by all 4 gills, and the gills lack watertubes. The diaphragm is incomplete, formed only by the gills. Glochidia are small, semicircular, and globular, without hooks. Adults are about 4 inches long, 2 inches high, and 1 inch wide. (Louisiana Pearlshell Recovery Plan, 1990)

REPRODUCTION AND DEVELOPMENT

The life history of the Louisiana pearlshell has not been studied beyond a biological and morphological study of museum specimens by Smith (1988). The life history is presumed to be similar to that of other unionids. During the spawning period, males discharge sperm into the water and females collect the sperm by the siphoning process. Eggs are fertilized and held in the females gills where they develop into larvae or glochidia. The glochidia are discharged into the water where they attach to a fish host, become encysted, and metamorphose into juvenile mussels that are capable of surviving if they fall to suitable substrate. The fish host for glochidia of Louisiana pearlshell is reported to be the brown madtom (*Noturus phaeus*). Mussels also are dependent on water currents to bring food particles within range of their siphons.

RANGE AND POPULATION LEVELS

The Louisiana pearlshell is known only from the Bayou Boeuf drainage in Rapides Parish and Red River drainage in Grant Parish, Louisiana. Twenty-four known populations exist in these 2 areas. Over 16,400 individuals currently comprise the metapopulation; there is speculation that there has been some decline in the metapopulation since 1985 (Shively and Vermillion 1999).

HABITAT

Louisiana pearlshell prefer clean, low alkaline water. They typically are found in flowing water at depths ranging from 12 - 24 inches on stable sand and gravel bottoms. Generally, about 1 inch of the shell protrudes from the substrate. In streams with unstable bottoms, only adults are found and they often appear to be in stress. (Louisiana Pearlshell Recovery Plan, 1990)

HABITAT ON THE KISATCHIE NATIONAL FOREST

As stated above, the Louisiana pearlshell is known only from the Bayou Boeuf drainage in Rapides Parish and Red River drainage in Grant Parish, Louisiana. These areas include the Evangeline Unit and Catahoula Ranger District, respectively.

MANAGEMENT AND PROTECTION

KNF management activities are restricted within Louisiana pearlshell watersheds to maintain stream quality and to avoid adverse impacts to the mussel in compliance with Endangered Species Act provisions. Off-road vehicles and cattle grazing are restricted near known populations. Streamside management zones have been implemented and are managed for water quality and wildlife; timber harvesting in these zones is limited to selective cutting for the purpose of wildlife habitat improvement. Additionally, water quality of Louisiana pearlshell streams is monitored and a beaver-control program is conducted annuallly within the known range of this mussel.

EFFECTS OF REVISED PLAN IMPLEMENTATION

LOUISIANA BLACK BEAR

Effects of Revised Plan Implementation

The Plan provides management direction for the KNF for the next planning period (10 - 15 years). The Plan can be amended during the planning period, if necessary. All Forest Service activities will comply with individual species' recovery plans and habitat management guidelines, unless otherwise noted. The effects of individual projects (timber sales, recreation projects, habitat improvement projects, road projects, etc.) will be documented in individual evaluations of the individual projects. The following analysis tiers to the detailed wildlife and fish effects discussions disclosed in Chapter 4, pages 4-39 through 4-61, of the Final Environmental Impact Statement (FEIS) for the Final Land and Resource Management Plan of the Kisatchie National Forest. The disclosure of effects from the FEIS for Vegetation Management in the Coastal Plain/Piedmont, January 1989, as amended (USDA Forest Service, 1989); and, the FEIS for the Management of the Red-cockaded Woodpecker and its Habitat on National Forests in the Southern Region (USDA Forest Service, 1995) is also incorporated here by reference.

LOUISIANA BLACK BEAR

The USFWS does not list the KNF for recovery of the Louisiana black bear. Currently, the USFWS considers the only bear-occupied habitat as the Tensas River basin (in northwestern Louisiana) and the Atchafalaya River basin (in southern and east-central Louisiana). Additionally, the KNF does not currently enter into the USFWS and BBCC's recovery equation for the Louisiana black bear (USFWS 1995).

KNF acreage is inadequate to support a viable population of Louisiana black bears. Excessive habitat fragmentation exists due to an extensive Forest road network and extensive private land in-holdings. Additionally, current, heavy recreation use diminishes the suitability of potential habitat for bears.

The management activities proposed in the revised Forest Plan generally will produce excellent potential bear habitat. Approximately 81,000 acres of the Forest will be designated and managed as old-growth forest patches, and another 215,000 acres of the Forest containing attributes characteristic of unmanaged old-growth (such as Kisatchie Hills Wilderness and Forest Streamside Habitat Protection Zones (SHPZS) and Riparian Area Protection Zones (RAPZS)) will exist on lands not considered appropriate for timber production. The prescribed fire frequencies will mimic historic landscape fire frequencies (Forestwide guideline FW-067).

Riparian areas will have priority for land acquisition (FW-192). The integrity of streamside, riparian, and wetland ecosystems is being enhanced: sand and gravel pits are prohibited, timber production is curtailed, oil/gas development is prohibited, and the impact of roads, trails, and crossings will be minimized (FW-510 through FW-531). An existing Special Use Permit Agreement between Fort Polk and KNF minimizes damage to potential bear habitat from military training on the Vernon Unit. The cattle-grazing program is being curtailed to a seasonal program (April to October only) (FW-287); cattle utilization of forage will be limited (FW-288) and cattle will be attracted from streamside and riparian areas by the placement of feeding troughs, salt, and mineral blocks (FW-295); these factors will serve to reduce damage to potential bear habitat. Recreational events will be authorized after environmental analyses (FW-298 and FW-337). Facilities, roads, and campgrounds will be located outside 100-year floodplain boundaries, if possible; critical facilities will be located outside the 500-year floodplain (FW-532 and FW-533). New road construction will be minimized through improvement of existing roads (FW-556). Best Management Practices will be adhered to for road development and maintenance (FW-559). Short-term impacts of road construction / reconstruction on water quality will be reduced by monitoring and controlling construction / reconstruction activities within and immediately adjacent to water courses during periods of low flow and ensuring that effective erosion control measures are used during construction / reconstruction of major drainage structures and approaches (FW-563). Impacts on wildlife habitat resulting from road location and road construction / reconstruction will be reduced as much as possible; where options exist, road location will be chosen which minimizes loss of mast-producing vegetation (FW-563). Much of the Forest will be within a RCW HMA and timber-management activities will be restricted in RCW HMA areas which will be beneficial to bears (FW-819 through FW-845).

Timber management activities will be greatly restricted in SHPZS, RAPZS, and wetland areas which will be greatly beneficial to bears (FW-510 through FW-513 and FW-515 through FW-518). Management activities in general will be restricted in SHPZs, RAPZs, and wetland areas which will be greatly beneficial to bears (FW-510 through FW-536). Wilderness "management" would result in late successional habitat types which would benefit bears (Management Area guidelines MA-13-19, MA-13-20, and MA-13-58).

Implementation of the *Revised Land and Resource Management Plan for Kisatchie National Forest* is not likely to adversely affect the Louisiana black bear.

BALD EAGLE

Potential Bald Eagle habitat would be found primarily in riparian areas. Management activities impacting riparian areas will be greatly restricted (FW-515 through FW-519). Prescribed burns will be allowed to burn naturally into RAPZS from adjacent areas, but RAPZS will not be prescribe burned, per se (FW-067, FW-071, FW-080). Riparian areas will have priority for land acquisition (FW-192). The integrity of riparian ecosystems is being enhanced: sand and gravel pits are prohibited, timber production is curtailed, oil/gas development is prohibited, and the impact of roads, trails, and crossings will be minimized (FW-515 through FW-531). The cattle-grazing program is being curtailed to a seasonal program (April to October only) (FW-287); cattle utilization of forage will be limited (FW-288) and cattle will be attracted from streamside and riparian areas by the placement of feeding troughs, salt, and mineral blocks (FW-295); these factors will serve to reduce damage to potential eagle habitat. Recreational events will be authorized after environmental analyses (FW-298 and FW-337). Impacts on wildlife habitat resulting from road location and road construction / reconstruction will be reduced as much as possible (FW-563). Timber management activities will be greatly restricted in SHPZS, RAPZS, and wetland areas which will be greatly beneficial to eagles (FW-510 through FW-531). Management activities in general will be restricted in SHPZS, RAPZS, and wetland areas which will be greatly beneficial to eagles (FW-510 through FW-536). Wilderness "management" would result in late successional habitat types which would benefit eagles (MA-13-19, MA-13-20, and MA-13-58). Nesting and roosting eagles that are discovered on the Kisatchie National Forest would be protected by adherence to the USFWS's Habitat Management Guidelines for the Bald Eagle in the Southeast Region (FW-848).

Implementation of the *Revised Land and Resource Management Plan for Kisatchie National Forest* is not likely to adversely affect the Bald Eagle.

RED-COCKADED WOODPECKER

Considerable management activity in the revised Forest Plan focuses upon the RCW. This management meets or exceeds the allowable guidelines of the RCW ROD. Prescribed burning frequencies are 2 - 5 years throughout RCW HMAS (FW-799) and are conducted during dormant and growing seasons (FW-800, FW-801). Cavity trees are protected from accidental ignition (FW-765, FW-766) and damage from plowline installation (FW-767). Critical habitat for federally-listed species such as the RCW is a priority for land acquisition (FW-192). Road, powerline, and pipeline construction is prohibited within clusters, replacement stands, and recruitment stands (FW-771). Maintenance of powerlines, pipelines, and low-standard roads occurs outside the nesting season (FW-772). Military activities are highly restricted within clusters (Special Use Permit Agreement,Fort Polk and the Kisatchie National Forest, as amended 1992). Cattle-grazing is not considered detrimental to RCWS. Development of new recreational areas are prohibited within clusters (FW-762). Existing uses will be modified or relocated if they adversely affect the woodpecker (FW-764) and all potentially disturbing activities within clusters will be scheduled before or after the 1 March - 31 July nesting period (FW-768). Timber management practices are restricted to those permitted by the RCW ROD. Timber rotations range from 100 - 120 years depending on the species of pine being managed (FW-822). Thinning to reduce southern pine beetle risk and to enhance RCW habitat is emphasized (FW-794, FW-803, FW-804, FW-819, FW-820). Forag-

EFFECTS OF REVISED PLAN IMPLEMENTATION

RED-COCKADED WOODPECKER

ing habitat requirements are those dictated by the USFS R8 RO and the USFWS (FW-789, FW-794). A wide range of timber regeneration methods that are based on existing stand condition, site quality, and the need to balance current habitat needs with regeneration of the Forest to provide future habitat is utilized (FW-833 through FW-845). Restoration of longleaf and shortleaf pines in areas where they occurred in pre-Columbian times and where they would provide better habitat for RCWS is encouraged (FW-828, FW-829). Regeneration of the oldest 1/3 of pine acres is limited (FW-795, FW-796). Oil/gas developments also are restricted within the constraints of the RCW ROD (FW-805 through FW-818). In accordance with RCW FEIS guidance that "each individual Forest will refine the tentative population objectives ... during the forest plan revision process," the KNF developed appropriate and realistic RCW HMA population objectives; the logic behind the assignment of these objectives is discussed in the Revised Plan Final EIS, pages 3-40 to 3-41.

Management constraints were used to model (in FORPLAN) the effects of management actions on the RCW and its habitat. These constraints are detailed in Appendix B of the Final EIS, pages B-22 and B-23. Spatial effects modelling was also conducted. Timber harvesting allocation and scheduling information for the first 2 periods (20 years), as determined by the FORPLAN model, were incorporated into a database. This database was linked with database information found in the Forest's Geographic Information System (GIS), using the FORPLAN analysis area (aa) as the common field. This was done in order to test the appropriateness of the FORPLAN timber management prescriptions within the HMAS. The GIS provided a way of "looking" at the areas scheduled for harvesting in the first two periods within the HMAS. The results of this spatial analysis showed that foraging stands and nesting stands for active, inactive, and recruitment (tentative population) clusters were not being inadvertently harvested in the planning model. It also showed that tagged foraging stands were near cluster sites and that foraging stands within 1.5 miles of active clusters were generally larger (averaged 118 acres per cluster) than tagged stands for recruitment clusters beyond 1.5 miles of an active cluster (averaged 83 acres per cluster)(C. Brevelle, KNF, pers. commun.).

Implementation may impact the 8 active RCW clusters within the Kisatchie Hills Wilderness (KHW). The KHW clusters were not incorporated into the Kisatchie Ranger District HMA in accordance with guidance presented in the RCW FEIS, pg 169. The KHW RCW groups were not among those considered as essential in past decisions (USDA, Forest Service 1987). Management activities (artificial cavities, midstory control, and prescribed burning) will be conducted outside the wilderness boundary to entice the KHW RCW groups to "translocate" to the adjacent 60,200-acre Kisatchie Ranger District HMA. Prescribed natural fire will be allowed in the Wilderness. In addition, management-ignited prescribed fire will also be used in the Wilderness. Periodic fire will result in the maintenance of some suitable habitat for the active clusters while the groups are being encouraged to move to suitable habitat outside of the Wilderness. However, the 5-8 year frequency may not be sufficient to control midstory encroachment. Therefore, the 8 active KHW RCW cluster sites may eventually become unsuitable due to midstory encroachment.

Management practices and activities overall will have beneficial effects on the RCW at the metapopulation level. However, placement of restrictors, installation of artificial cavities, prescribed burning, and translocation have the remote potential of adversely affecting individual RCWS. Therefore, implementation of the *Revised Land and Resource Management Plan for Kisatchie National Forest* may affect the Red-cockaded Woodpecker.

AMERICAN ALLIGATOR

Alligators are apt to be found in streams, riparian areas, and wetland areas. Land and associated riparian ecosystems on water frontage such as lakes and major streams will have priority for land acquisition (FW-192). All streams, riparian areas, and significant wetland areas will be incorporated into SHPZS and RAPZS and management activities affecting them will be greatly restricted (FW-510 through FW-536). Prescribed burns will be allowed to burn naturally into SHPZS, but SHPZS will not be prescribe burned, per se (FW-067, FW-071, FW-080). SHPZS will be excluded from oil/gas development (FW-223, FW-225, FW-514). The military will be restricted to stream crossings that are acceptable to the KNF and that are hardened or

EFFECTS OF REVISED PLAN IMPLEMENTATION

AMERICAN ALLIGATOR

LOUISIANA PEARLSHELL MUSSEL

bridged (U.S. Army 1998). Cattle grazing will be seasonal (April to October) (FW-287) and cattle feeding troughs, salt, and mineral blocks will be placed outside streamsides and riparian areas (FW-295) which will protect water quality which potentially affects aquatic species abundance which potentially affects alligators' food supplies. Sediment from recreation roads and trails could adversely impact stream water quality; the number of stream crossings will be minimized as much as possible and on larger streams, crossings will be hardened or bridges will be used to reduce sedimentation (FW-362). Recreational events will be authorized after environmental analyses (FW-298 and FW-337). Nevertheless, recreationists utilizing streams, riparian areas, and wetland areas would be a nuisance to any existing alligators. Best Management Practices will be adhered to for road development and maintenance (FW-559). Potential alligator habitat will be protected by reducing the delivery of sediment into the stream channel by providing improved roadway ditch relief by increasing the number of lead-off ditches; constructing lead-off ditches so they do not discharge directly into streams; providing temporary erosion control measures during construction and/or reconstruction — hay-bale ditch checks, inclusion of annual rye grass seed into the permanent seed mix, and placing silt fences along the road ROW where needed; and ensuring that roads to be constructed are located as far from streams as practical (preferably along ridges) (FW-851). Timber management activities are not apt to adversely affect alligators because SHPZs and RAPZS are classified as not suitable for timber production (FW-511 and FW-516). Any herbicide use within SHPZS and RAPZS requires District ID team input to ensure protection of aquatic species such as the alligator (FW-651). Wilderness "management" would result in late successional habitat types which would benefit alligators (MA-13-19, MA-13-20, and MA-13-58).

Implementation of the *Revised Land and Resource Management Plan for Kisatchie National Forest* is not likely to adversely affect the American alligator.

LOUISIANA PEARLSHELL MUSSEL

Whereas Louisiana pearlshell mussels are found only in streams, the only management activities that impact this species will be those activities that impact streams. All streams will be incorporated into SHPZS. Management activities affecting SHPZS and RAPZS inside pearlshell mussel sub-watersheds, will be greatly restricted (FW-510 through FW-514, and FW-519). Prescribed burns will be allowed to burn naturally into SHPZS from adjacent areas, but SHPZS will not be prescribe burned, per se (FW-067, FW-071, FW-080). SHPZS will be excluded from oil/gas development (FW- 223, FW-225, FW-514). More than 5 miles separates mussel streams from the closest military troop training area; therefore, military troop usage will not impact the mussels. The U.S. Air Force, however, operates Claiborne Range on the Evangeline Unit and lead from ordnance has a remote potential to leach into Brushy Creek and a tributary of Clear Creek which flow into Castor Creek which has a relatively high population of mussels. The lead content in these waters currently is undetectable (J.Novosad, KNF, Soil Scientist, pers. commun.). Only 1 cattle grazing allotment impacts a Louisiana pearlshell stream and little, if any, cattle-induced damage to the mussel has been reported (Mary May, KNF, Wildlife Biologist, pers. commun.). When the permittee allows this allotment to go "inactive," the allotment will be removed from the grazing program. To further mitigate matters, all grazing will be seasonal (April to October) instead of year-long (FW-287). Sediment from recreation roads and trails could adversely impact stream water quality. The number of stream crossings will be minimized as much as possible and on larger streams, crossings will be hardened, or bridges will be used to reduce sedimentation (FW-362). Recreational events will be authorized after environmental analyses (FW-298 and FW-337). Facilities, roads, and campgrounds will be located outside 100-year floodplain boundaries, if possible; critical facilities will be located outside the 500-year floodplain (FW-532 and FW-533). New road construction will be minimized through improvement of existing roads (FW-556). Best Management Practices will be adhered to for road development and maintenance (FW-

559). The Louisiana pearlshell mussel habitat will be protected by reducing the delivery of sediment into the stream channel by providing improved roadway ditch relief by increasing the number of lead-off ditches; constructing lead-off ditches so they do not discharge directly into streams; providing temporary erosion control measures during construction and/or reconstruction — haybale ditch checks, inclusion of annual rye grass seed into the permanent seed mix, and placing silt fences along the road ROW where needed; and ensuring that roads to be constructed are located as far from the streambeds as practical (preferably along ridges) (FW-851). Timber management activities are not apt to adversely affect Louisiana pearlshell mussels because SHPZS are classified as not suitable for timber production (FW-511). Any herbicide use within SHPZS and RAPZS requires District ID team input to ensure protection of aquatic species such as the Louisiana pearlshell mussel (FW-651). Wilderness "management" would result in late successional habitat types which would benefit mussels (MA-13-19, MA-13-20, and MA-13-58). Lastly, Catahoula Ranger District and Evangeline Unit are tasked with managing habitat for the Louisiana pearlshell mussel by complying with conservation measures addressed in the Louisiana Pearlshell Recovery Plan (1989), including: maintaining the beaver control program within the known range of this mussel; restricting the use of off-road vehicles near known pearlshell populations; ensuring that cattle and cattle grazing pose no threat to existing mussel beds; and maintaining high water quality in streams where this species is known to occur (FW-850).

Implementation of the *Revised Land and Resource Management Plan for Kisatchie National Forest* is not likely to adversely affect the Louisiana pearlshell mussel.

SUMMARY OF DETERMINATIONS

Based on the goals, objectives, desired future conditions, standards, and guidelines proposed in the *Revised Land and Resource Management Plan for Kisatchie National Forest*, significant beneficial effects are anticipated for the species evaluated. Land allocations and management direction will ensure the maintenance or improvement of the Forest's native biological diversity at ecosystem, landscape, and community levels. Streamside and riparian zone management will provide corridors between habitat components within the home range of a variety of species and serve as important travel routes during migration of other species. Overall, the Plan will provide for biologically diverse ecosystems which potentially support viable populations of all native and desirable non-native wildlife and fish species and conserve threatened, endangered, and rare species. Therefore:

Implementation of the *Revised Land and Resource Management Plan for Kisatchie National Forest* is not likely to adversely affect the Louisiana black bear.

Implementation of the *Revised Land and Resource Management Plan for Kisatchie National Forest* is not likely to adversely affect the Bald Eagle.

Implementation of the *Revised Land and Resource Management Plan for Kisatchie National Forest* may affect the Red-cockaded Woodpecker.

Implementation of the *Revised Land and Resource Management Plan for Kisatchie National Forest* is not likely to adversely affect the American alligator.

Implementation of the *Revised Land and Resource Management Plan for Kisatchie National Forest* is not likely to adversely affect the Louisiana pearlshell mussel.

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/s/ KEN DANCAK

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CONSULTATION WITH OTHERS

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U. S. FISH AND WILDLIFE SERVICE BIOLOGICAL OPINION

United States Department of the Interior

FISH AND WILDLIFE SERVICE
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July 6, 1999

Ms. Elizabeth Estill
Regional Forester, Southern Region
U.S. Forest Service
1720 Peachtree Road, NW
Atlanta, Georgia 30367

Dear Ms. Estill:

This document transmits the U.S. Fish and Wildlife Service's (Service) biological opinion based on our review of the U.S. Forest Service's (Forest Service) proposed Revised Land and Resource Management Plan (Plan) and accompanying Final Environmental Impact Statement (FEIS) for the Kisatchie National Forest (KNF) located in Claiborne, Grant, Natchitoches, Rapides, Vernon, Webster, and Winn Parishes, Louisiana. The Service's opinion addresses the Plan's effects on the red-cockaded woodpecker (*Picoides borealis*; RCW), Louisiana pearlshell mussel (*Margaritifera hembeli*), the Louisiana black bear (*Ursus americanus luteolus*) and the bald eagle (*Haliaeetus leucocephalus*) in accordance with section 7 of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 et seq.). The American alligator (*Alligator mississipiensis*) in Louisiana is classified as "Threatened due to Similarity of Appearance" for law enforcement purposes. Alligators are biologically neither endangered nor threatened, and therefore, will not be considered in this opinion. Your April 5, 1999, request for formal consultation was received in this office on April 12, 1999.

This biological opinion is based on information provided in the April 1999 biological assessment, the Plan and FEIS, telephone conversations, and other sources of information. A complete administrative record of this consultation is on file in this office.

Consultation History

On August 4, 1993, the Forest Service issued a Notice of Intent to prepare an EIS for the Plan. In a letter dated September 30, 1993, the Service recommended the following be addressed in the EIS: the presence of sensitive and rare communities; the extent and management of streamside zones; impacts to fish and wildlife resources resulting from silvicultural practices; and how management decisions will be made and implemented on an ecosystem level.

On November 28, 1995, Service biologists met with Forest Service staff in Pineville, Louisiana, regarding the status of the Plan, the delineation process for RCW habitat management areas (HMA), and derivation of RCW population objectives by HMA. Considerations for other

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Federally listed species were also discussed.

On August 9, 1996, Forest Service biologists met with Service biologists in Lafayette, Louisiana, to review and discuss proposed standards and guidelines for management strategies for threatened and endangered species.

In a letter dated June 16, 1997, the Service provided comments in response to a May 19, 1997, Forest Service letter regarding the Federally listed species that should be considered in the EIS for the Plan.

On January 7, 1998, a Service biologist attended a public meeting in Baton Rouge, Louisiana, where the Forest Service presented the proposed Plan.

In a letter dated January 28, 1998, the Service provided comments on the November 1997 draft Plan and attendant draft EIS.

On March 18, 1998, Forest Service staff met with Service staff in the Lafayette Field Office to discuss how each Service comment had been addressed in the Plan.

On March 9, 1999, Forest Service staff met with the Service in Lafayette to review final changes to the EIS and the Plan and to discuss the biological assessment. A copy of the FEIS and the final Plan were delivered to the Service at that time.

BIOLOGICAL OPINION

DESCRIPTION OF PROPOSED ACTION

The proposed action is the implementation of the Land and Resource Management Plan for the Kisatchie National Forest. That Plan establishes management directions for the KNF for the next 10 to 15 years including: (1) forest-wide goals; (2) desired future conditions, objectives, and standards and guidelines for the forest as well as for management and sub-management areas; (3) implementation direction; and (4) monitoring and evaluation procedures. The Plan's standards and guidelines address how the KNF will manage : (1) timber supplies; (2) biological diversity; (3) land use; (4) minerals development; (5) range and grazing; (6) RCWs; (7) recreation; (8) riparian zones; (9) forest roads; (10) prescribed burning; and (11) silviculture. Chapter 2 of the Plan contains detailed descriptions of the actions that will be used to achieve the forest objectives for Federally listed threatened and endangered species. Those actions are referred to as forestwide guidelines (FW) and are numbered FW-711 through FW-850. The action area includes approximately 603,769 acres consisting of 5 Ranger Districts: Catahoula, Calcasieu, Kisatchie, Winn, and Caney. These districts are located within Claiborne, Grant, Natchitoches, Rapides, Vernon, Webster, and Winn Parishes of west-central and northwestern Louisiana.

Management actions for red-cockaded woodpeckers described in the Plan's forestwide guidelines

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FW-711 through FW-846 are in accordance with the Forest Service's Final Environmental Impact Statement for the Management of the Red-cockaded Woodpecker and its Habitat on National Forests in the Southern Region (RCW-FEIS; U.S. Forest Service 1995). Those actions establish RCW habitat management areas (HMA), RCW population objectives and HMA management intensity levels (MIL). Additional actions address: management of RCW clusters; replacement and recruitment stands; cutting of trees; midstory vegetation control; artificial cavities; translocation; motorized heavy equipment and concentrated human use; cavity tree protection during prescribed burning; nesting season disturbance; construction rights-of-way; southern pine beetle (SPB) suppression; cluster status and database management; cluster and foraging habitat management; future nesting habitat; prescribed burning; SPB hazard reduction; clearing; thinning; balanced, even-aged and uneven-aged silviculture; pine restoration; pine regeneration; and monitoring. Tentative HMAs and RCW population goals were identified in RCW-FEIS using a value of one RCW group per 200 acres (Table 1).

Table 1. Comparison of Habitat Management Area (HMA) acreages and red-cockaded woodpecker population objectives for the RCW-FEIS and KNF Plan.

HMA	RCW-FEIS		KNF Plan	
	Acres	RCW Objective	Acres	RCW Objective
Catahoula	63, 734	328	73,000	317
Evangeline	46,298	231	46,400	231
Kisatchie	59,267	296	60,200	292
Winn	56,297	281	59,400	263
Vernon	64,243	321	63,800	302
Totals	291,839	1,457	302,800	1,405

Final RCW population objectives (established according to the RCW-FEIS) differed from the RCW-FEIS due to a thorough analysis of suitable and potentially suitable habitat in each HMA and the differing capability of individual landscape types (i.e., longleaf pine, shortleaf pine, pine-hardwood, etc.) to produce suitable RCW habitat (Table 1).

The Service, in a non-jeopardy opinion on the management strategies established in the RCW-FEIS (Costa 1995), determined those strategies promote RCW recovery by requiring implementation of a conservation strategy based, in part, on principles of ecosystem management. In general terms, the RCW-FEIS promotes practices that : (1) minimize landscape and habitat fragmentation; (2) retain suitable numbers of potential RCW cavity trees well distributed throughout the landscape; and (3) restore the original forest cover by re-establishing the appropriate pine species, primarily longleaf (Costa 1995). By adhering to the RCW-FEIS, the Plan also promotes RCW recovery. In addition, measures described in Appendix D, Attachment #6 of the Plan are specifically designed to reduce or avoid project impacts to RCWs that could result from potential oil and gas development. Those measures include well site location priorities, well site access, size of openings, and the distribution of well sites. Those measures are designed to minimize, and/or mitigate the cumulative effects of oil and gas development on RCW habitat in KNF at the landscape level.

Management actions for the Louisiana pearlshell mussel are described in the Plan's forestwide guidelines FW-850 and FW-851. Those actions establish protective management measures for pearlshell mussel and their habitat by controlling beavers within the known range of the mussel, restricting off-road vehicle use near known pearlshell populations, and ensuring that cattle and cattle grazing do not threaten known mussel populations. Additional guidance reduces sediment delivery into stream channels by the use of erosion control measures for roads, ditches, and oil and gas leases. Forestwide guidelines FW-510 through FW-519 set limitations on management activities within streamside and riparian zones which will provide additional protection for the Louisiana pearlshell mussel.

Management actions for the Louisiana black bear described in the Plan's forestwide guideline FW-849 will follow Louisiana Black Bear Recovery Plan (U.S. Fish and Wildlife Service 1995) conservation measures (within the constraints of other forestwide goals). Those actions include but are not limited to: maintaining forest diversity to provide preferred bear foods, preserving present and potential cavity trees as den sites, creating forested corridors along major drainages in hardwood and pine forests, and limiting construction of permanent all-weather roads into forested areas and gating or closing such roads when not in use. Approximately 81,000 acres of KNF will be designated and managed as old-growth forest patches. Another approximately 215,000 acres of forest will exhibit characteristics of unmanaged old-growth (e.g., wilderness areas, and streamside habitat and riparian area protection zones).

Management actions for the bald eagle nest and roost sites are described in the Plan's forest-wide guideline FW-848 and follow the Service's Habitat Management Guidelines for the Bald Eagle in the Southeast Region (U.S. Fish and Wildlife Service 1987).

STATUS OF THE SPECIES

Louisiana Pearlshell Mussel

Species description

The Louisiana pearlshell has a brown to black shell with a white nacre. It reaches a length of about 3.9 inches (in), is about 2.0 in high, and 1.2 in wide. The shell is generally elliptical with an angular posterior margin and obtuse undulations on the posterior slope.

The Service initially listed the Louisiana pearlshell as an endangered species on February 5, 1988. The endangered status was warranted because the mussel was known only to occur as fragmented populations in the Bayou Boeuf drainage in Rapides Parish, Louisiana. During a

1991 survey, the Louisiana pearlshell was discovered in the Bayou Rigolette drainage in Grant Parish, Louisiana. That discovery prompted a 1992 survey which increased the known range of this species to 9 streams in the Bayou Rigolette drainage and 11 streams in the Bayou Boeuf drainage (Hall 1992, Stewart 1992). Almost the entire known population of the Louisiana pearlshell occurs within areas administered by the U.S. Forest Service. Based on the discovery of additional populations and increased protection afforded them, the Service reclassified the Louisiana pearlshell from endangered to threatened (Federal Register, September 24, 1993). More recently, Johnson (1995) documented pearlshells in 11 streams in the Bayou Rigolette drainage in Grant Parish. It is likely that additional populations exist within the known range in streams on private lands which have not been surveyed. The recovery plan for the pearlshell was developed before the species was reclassified to threatened. In that plan, recovery was dependant on the full protection of existing mussel populations occurring in 8 streams in the Bayou Bouef drainage. The Louisiana pearlshell is limited to second order headwater systems which drain into the Red River in Rapides and Grant Parishes, Louisiana (Johnson 1995).

Life History

The life history of the Louisiana pearlshell is presumed to be similar to that of other unionid mussels (U.S. Fish and Wildlife Service 1989a). Mussels are dependent upon the water currents to bring food particles within the range of their siphons. Louisiana pearlshells may feed primarily on particulate detritus associated with or near bottom sediments (Brown and Johnson 1995). During the spawning period, males discharge sperm into the water and females collect the sperm by the siphoning process. Eggs are fertilized and held in the female's gills where they develop into larvae or glochidia. The glochidia are discharged in the water where they attach to a fish host, become encysted, and metamorphose into juvenile mussels that are capable of surviving if they fall to suitable substrate. In a study of museum specimens of Louisiana pearlshell, Smith (1988) concluded that oviposition of eggs and spawning of males occurs in late November to late December, with the release of larvae occurring in late December to January.

The fish host species for the Louisiana pearlshell remains unknown, although recent studies suggest that it may be the brown madtom (*Notorus phaeus*) (Johnson 1995). The size of the fish host population can significantly influence mussel reproductive success. The absence of appropriate fish hosts has caused the extirpation of unionaceans in a number of North American habitats (McMahon 1991).

The apparent preferred habitat for this species is flowing water between depths of 5 to 24 inches on stable sand and gravel substrates (Hall 1992, Johnson 1995, Louisiana Natural Heritage Program 1985). Sediment compaction and particle size are considered the most important elements in the prediction of suitable mussel habitat, with pearlshells selecting substratum having generally larger particle size (Johnson 1995). Preference for pebble/chert substrates is likely due to the increased stability of these areas (Johnson 1995). In streams where the substratum is not stable, only adults are found and appear to be in stress (U.S. Fish and Wildlife Service 1989a). Current velocity is also considered an important factor in the distribution and orientation of pearlshells. Louisiana pearlshells were rarely abundant in stagnant or fast-flowing water (Johnson 1995). Pearlshells are found in streams 7 to 13 feet wide (Johnson 1995), surrounded by a forest community of mixed pine-hardwood with a typical canopy closure of 75 to 100 percent (Hall 1992). Most of the stream sites are surrounded by old secondary or primary growth forest, but clear-cutting adjacent to the stream is common (Johnson 1995). No critical habitat has been designated for the pearlshell mussel.

Margaritifera prefer softer, cleaner water and more peculiar substrata than other unionids and are, therefore, more sensitive to environmental impacts (U.S. Fish and Wildlife Service 1989a). Louisiana pearlshells seem to be extremely sensitive to high silt loads in streams (Johnson 1995). Mussels can close their shells in response to sudden changes in water quality but cannot move out of undesirable areas. Movement or expansion of mussel beds between microhabitats has been noted, but these occurrences have not been widespread or covered large distances (Johnson 1995).

Hartfield (1993) has described the negative effects of headcutting on freshwater mussels. Headcutting is an upstream erosional process whereby a stream channel re-adjusts itself in response to activities such as channelization and mining. Additionally, sedimentation can smother adults and juveniles, and alter the substrate, thus making it unsuitable for juvenile settlement (U.S. Fish and Wildlife Service 1989a). Changes in water quality from increased sedimentation and runoff may alter the habitat quality for host fish species, thereby affecting mussel reproduction. Johnson (1995) observed streamside clear cuts where adjacent mussel beds remained intact; however, the diversity of the fish community had changed.

Population Dynamics

Little is known of the population dynamics of the pearlshell mussel. Johnson (1995) estimated the life span of pearlshells to range from 25 to 80 years. This was based on estimated growth rates of approximately 0.04 inches per year. Given the long life span and the potential disturbances that can affect juvenile recruitment, the presence of mussel beds does not necessarily indicate reproducing populations, since the beds may be primarily composed of older individuals. The long life span also suggests that short-term disturbances, such as floods or acute water quality problems, may not affect populations dynamics (Johnson 1995). Life history traits such as long life spans, low effective fecundities, reduced powers of dispersal, high habitat selectivity, and long turnover times make unionacean populations highly susceptible to human perturbations from which they are not able to rapidly recover (McMahon 1991). Johnson (1995) points out that conservation strategies for the Louisiana pearlshell should be aimed at maintaining long-term habitat stability.

Status and Distribution

The pearlshell was originally listed due to habitat loss and population fragmentation by impoundments, inundation by beaver dams, sedimentation and scouring of stream beds resulting

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from removal of streamside timber, sedimentation from gravel pits, and collecting. The 1991 discovery of additional populations in the Bayou Rigolette drainage prompted the most recent status assessment by the Service in 1992 and the subsequent reclassification to threatened in 1993. The most recent survey in Grant parish (Johnson and Brown 1994, Johnson 1995) documented Louisiana pearlshell beds in 11 streams in Kisatchie National Forest in the Bayou Rigolette drainage, with many beds having 100 or more individuals. This survey also identified several large beds on private lands. Shively and Vermilion (1998) identified 11 streams in Rapides parish containing pearlshell mussels. The Louisiana pearlshell remains classified as threatened because of potential habitat loss and population fragmentation by impoundments, sedimentation from gravel pits, and collecting. Shively and Vermilion (1998) ranked (in order of decreasing importance) beavers, all terrain vehicles, and detrimental forestry practices as the greatest current threats facing pearlshell mussels. Populations on National Forest lands appear to be stable; however, populations on private lands continue to be threatened by the above activities.

Analysis of Effects

According to the Plan, management activities will be restricted within Louisiana pearlshell watersheds to maintain stream water quality and protect mussel beds. Streamside management zones will be implemented and managed for water quality and wildlife. Timber harvest within those zones will be restricted to selective cutting for the purpose of wildlife habitat improvement. Additionally, beaver control programs will be implemented in streams containing pearlshell mussel populations. Based on information contained in the FEIS, biological assessment, and scientific literature, the Service concurs with the Forest Service's determination that the proposed action is not likely to adversely affect the Louisiana pearlshell mussel.

Louisiana Black Bear

Species description

The Louisiana black bear is one of 16 subspecies of the American black bear. The black bear is a large, bulky mammal with long black hair and a short, well-haired tail. The facial profile is blunt, the eyes are small and the nose pad is broad with large nostrils. The muzzle is yellowish brown with a white patch sometimes present on the lower throat and chest. Although weight varies considerably throughout their range, adult males weigh more than 300 pounds; adult females generally weigh less than 300 pounds.

The Louisiana black bear was listed as threatened in the Federal Register on January 7, 1992 (50 CFR Part 17), due to the reduction in population size resulting from extensive habitat loss (U.S. Fish and Wildlife Service 1992). Simultaneously, other free-living black bears within the historic range of the Louisiana black bear were listed as threatened due to their similarity of appearance to the Louisiana black bear. The Service proposed to designate critical habitat for the Louisiana black bear (Federal Register, December 2, 1993); however, no final rule has been issued. Proposed critical habitat included forested habitat within the Tensas River Basin, the Atchafalaya River Basin, and the Lower Iberia-St. Mary Parish area. The elements defined in the proposed rule as being critical to the bear's survival and recovery included bottomland forests with high species and age class diversity which contain essential escape cover, denning sites, and hard and soft mast supplies for supporting black bear populations. Large cypress or tupelo gum, with cavities, that are commonly found along water courses may be important for denning, given the history of flooding in the bottomlands of Louisiana. Suitable den trees are defined as bald cypress and tupelo gum with visible cavities, having a diameter at breast height (dbh) of 36 inches, and occurring in or along rivers, lakes, streams, bayous, sloughs, or other water bodies (U.S. Fish and Wildlife Service 1992).

The key habitat requirements of black bears are food, water, cover, and denning sites which are spatially arranged across sufficiently large, relatively remote blocks of land. The remaining subpopulations of Louisiana black bears typically inhabit bottomland hardwood communities; other habitat types may be utilized, including marsh, upland forested areas, forested spoil areas, and agricultural fields. Throughout its range, prime black bear habitat is characterized by relatively inaccessible terrain, thick understory vegetation, and abundant sources of food (Pelton 1982). Other important features of prime black bear habitat include dispersal corridors, protection from human-related disturbances, water, and denning sites.

Life History

Though classified as a carnivore by taxonomists, black bears are not active predators and only prey on vertebrates when the opportunity arises. Most meat eaten by black bears is consumed as carrion. Bears are best described as opportunistic feeders, as they eat almost anything that is available; thus, they are typically omnivorous. Their diet varies seasonally, and includes primarily succulent vegetation during spring, fruits and grains in summer, and hard mast such as acorns and pecans during fall. Bears utilize all levels of forest for feeding; they can gather foods from tree tops and vines, but also grub in fallen logs for insects. The growth rate, maximum size, breeding age, litter size, and cub survival of black bears are all correlated with nutrition.

Bear activity revolves mainly around the search for food, water, cover, and mates during the breeding season. Home range estimates for male bears in the Morganza population may be as high as 80,000 acres, while female home ranges are approximately 8,000 acres (Wagner 1995). Home ranges of bears, particularly females, also appears to be closely linked to forest cover (Marchinton 1995).

Black bears do not truly hibernate, but go through a dormancy period termed "carnivoran lethargy", a period of torpor which helps them survive food shortages and severe weather during the winter. In warmer climates, such as in Louisiana, bears can remain active all winter (Taylor 1971). Bears may enter dens between October and early January depending on latitude, available food, sex and age, and local weather conditions (Pelton 1982). Adult females generally enter the den first, followed by subadults and adult males. Females with cubs generally are the last to leave the den.

Female black bears become sexually mature at 3 to 5 years of age. Breeding occurs in summer and the gestation period for black bears is 7 to 8 months. Delayed implantation occurs in the black bear; blastocysts float free in the uterus and do not implant until late November or early December (Pelton 1982). Cubs are born in winter dens at the end of January or the beginning of February. The normal litter size is two, although litter sizes of three to four cubs do occur. Cubs stay with the sow through summer and fall and den with them the second winter. The young disperse in spring or summer, prior to the female's period of estrus (Pelton 1982).

Louisiana black bears use a variety of den types, including ground nests, hollow trees, and brush piles. Generally, adult males and subadults use ground dens with greater frequencies than adult females. Tree dens may be an important component for female reproductive success in areas subject to flooding (Hellgren and Vaughan 1989). Den trees located in cypress swamps would appear to increase the security (e.g., decrease the disturbance) of bears utilizing these dens compared to ground dens; however, the availability of den trees does not appear to be a limiting factor (Weaver and Pelton 1994). Trees large enough and sufficiently mature to contain usable cavities are almost always found in places inaccessible to logging (Marchinton 1995), or are left standing due to their low economic value. Brushpile nests and open nests were located in thick vegetation, usually in areas logged within the past 1 to 5 years. Brushpile dens are created by felled tops and other logging slash. Open ground nests and nests under brushpiles are scooped out depressions that are bare or lined with vegetation bitten off around the nest (Weaver et al. 1992).

Corridors providing cover may facilitate the movement of bears through agricultural lands in the Tensas Basin, particularly when bears reside in fragmented tracts of forest (Weaver et al. 1992). According to Marchinton (1995), telemetry locations and visual observations indicated that wooded drainages were important travel corridors for movements between forested tracts.

Remoteness is an important spatial feature of black bear habitat; in the southeastern United States remoteness is relative to forest tract size and the presence of roads. Examples of remoteness important for suitable black bear habitat include: a tract of timberland 0.5 mile from well-maintained roads and development (Rudis 1986) and a forested tract of more than 2,500 acres (Rudis 1986). Forest tract size and the number of roads reflect the likelihood of human disturbances which can limit habitat suitability and use (Brody and Pelton 1989).

High quality cover for bedding, denning, and escape is of great importance as forests become smaller and more fragmented, and as human encroachment and disturbance in bear habitat increases (Pelton 1986, Rogers and Allen 1987). Black bears are adaptable and opportunistic, and can survive in close proximity to humans if afforded areas of retreat that ensure little chance of close contact or visual encounters. The thick understory found in bottomland hardwood forests provides high-quality escape cover. Escape cover is considered especially critical because fragmented habitats put the bear populations in closer proximity to humans.

Black bears will forage close to human establishments for garbage, pet and livestock feed, and human foods, especially during times of low availability of natural food sources (Rogers 1976). Bears searching for food, particularly habituated bears, may destroy property or even enter houses or storage areas. Foraging for human food sources is most likely to occur soon after bears emerge from their dens in the spring because of the stress of the winter dormant period and the lack of natural foods. Nuisance activity is correlated to the availability of natural food sources; during years of hard mast failure nuisance activity may be more pronounced. Once a bear has become habituated to human food, particularly garbage, it becomes difficult, if not impossible, to control the nuisance behavior. The most effective mechanism to reduce nuisance behavior and human/bear conflicts is to eliminate attractants. In the long-term, this is also the most cost-effective approach.

Bear mortality has been attributed to natural and human causes. Natural causes include disease, cannibalism, drowning, poor maternal care, and climbing accidents. Human-induced mortality includes hunting, trapping, poaching, vehicle collisions, electrocution, depredation/nuisance kills, disturbance (causing den abandonment), and accidents associated with research activity. Road access can increase the chances of people or dogs disturbing maternal dens in winter (Rogers and Allen 1987). Cubs are dependent on the sow for warmth and food; human disturbance of denning females has resulted in cub mortality from abandonment (Elowe and Dodge 1989).

Population Dynamics

Currently no systematically derived population estimates exist for the Louisiana black bear; however, biologists estimate the Louisiana population at 200 to 300 animals (Pace et al. 1999). Those animals occur primarily in three areas: (1)the Tensas River basin; (2) the upper Atchafalaya River basin; and (3) the coastal area west of the Atchafalaya River delta. Black bears have relatively low reproductive potential; therefore, changes that influence reproduction can significantly impact population dynamics, an important management consideration. Population densities, as well as home range size, vary substantially among black bear populations (Pelton 1982). The most important natural factor regulating black bear populations appears to be variation in food supply and its effect on physiological status and reproduction (Rogers 1976).

Status and Distribution

The Louisiana black bear originally inhabited the forests of Louisiana, southern Mississippi, and eastern Texas, but extensive land clearing primarily for agricultural purposes has reduced its habitat by more than 80 percent. The species is now restricted to core populations in the Tensas River Basin, the upper Atchafalaya River Basin (including the Morganza Floodway and the upper reaches of the Atchafalaya Basin Floodway), and coastal St. Mary and Iberia Parishes in Louisiana. The remaining habitat has been reduced in quality by fragmentation and conversion to agriculture. Human related mortality continues to be an additional threat to the Louisiana black

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bear.

Analysis of Effects

Management activities proposed in the Plan will produce suitable potential bear habitat. Approximately 81,000 acres of KNF will be designated and managed as old-growth forest patches. Another approximately 215,000 acres of forest will exhibit characteristics of unmanaged old-growth. Based on information contained in the FEIS, biological assessment, and scientific literature, the Service concurs with the Forest Service's determination that the proposed action is not likely to adversely affect the Louisiana black bear.

Bald Eagle

Species Description

The bald eagle is a large raptor, with a wingspread about 7 feet. Its adult plumage is mainly dark brown with pure white head and tail. First year juveniles are dark brown and do not develop the white head and tail until their fifth or six year. The eagle is an opportunistic predator, feeding primarily on fish but also taking a variety of birds, mammals, and turtles (both live and as carrion) when fish are not readily available.

The bald eagle was classified as endangered throughout the 48 conterminous States except for the populations in Washington, Oregon, Minnesota, Wisconsin, and Michigan which are classified as threatened in 1978 (Federal Register, March 11, 1967; February 14, 1978). On July 12, 1995, the Service reclassified the bald eagle to threatened throughout the coterminous 48 States (Federal Register, July 12, 1995).

The bald eagle occurs from northern Alaska and Canada, south to southern California and Florida and is primarily associated with coasts, rivers, and lakes, usually nesting near bodies of water where it feeds. Breeding occurs throughout the same area. In the Southeast, nesting occurs in three primary areas: peninsular Florida, coastal South Carolina and coastal Louisiana; with sporadic breeding in the rest of the Southeastern States. Otherwise, bald eagles occur throughout the Southeast as migrating or over-wintering birds. (U.S. Fish and Wildlife Service 1989b).

Life History

Bald eagles mate for life or until their mate dies. The breeding seasons vary with latitude. The general tendency is for winter breeding in the South with a progressive shift toward spring breeding in northern locations. In the Southeast, nesting activities generally begin in early September; egg laying begins as early as late October and peaks in late December.

Selection of nesting sites varies depending on the species of trees growing in a particular area. In the Southeast, nests are constructed in dominant or co-dominant pines or bald cypress. Nests are usually constructed in living trees, but bald eagles will occasionally use a dead tree. There are certain general elements which seem to be consistent among nest site selection. These include (1) the proximity of water (usually within one-half mile) and a clear flight path to a close point on the water, (2) the largest living tree in a stand, and (3) an open view of the surrounding area.

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The proximity of good perching trees may also be a factor in site selection. An otherwise suitable site may not be used if there is excessive human activity in the area.

The female does most of the nest construction, but the male assists. The typical nest is constructed of large sticks lined with softer materials such as pine needles and grasses. Nests, which may be re-used by the same pair of eagles in successive years, may be up to 6 feet in width and weigh hundreds of pounds.

The average clutch size is two; however, the number of eggs laid may range from one to three. A second clutch may be laid if the first is lost. Incubation lasts 34 to 38 days. The young fledge 9 to 14 weeks after hatching but parental care may continue for another 4 to 6 weeks. Bald eagles reach sexual maturity at 4 to 6 years. Life span is not known, but based on observations of captive birds they may live up to 50 years.

Bald eagle wintering areas possess many of the same characteristics as nest sites. However, the birds are not as closely limited to shores at this time, with both adults and immatures gathering food where it is most easily available. Roost sites are an important component of wintering areas. Eagles may roost singly or in groups exceeding a hundred birds.

Population Dynamics

The earliest census of bald eagle breeding populations in the lower 48 states was in 1963 when less than 500 pairs were found (U.S. Fish and Wildlife Service 1999). Bald eagle populations have steadily increased since the 1978 listing. In 1998, approximately 5,748 eagle territories in the United States produced 6,710 young. In the Southeast, an estimated 1,485 territories produced 1,708 young during that same time period (U.S. Fish and Wildlife Service 1999).

Status and Distribution

The major factor leading to the decline of the bald eagle was lowered reproductive success following the introduction of the pesticide DDT in 1947. DDT residues caused eggshell thinning which reduced reproductive success (U.S. Fish and Wildlife Service 1989b). Use of DDT was suspended in 1972, and by the late 1970s eagle populations throughout its range began to show signs of recovery. Currently, the most significant factor affecting the recovery of the bald eagle in the Southeast is habitat destruction and disturbance by humans. Additional factors in the decline include shooting, electrocution, impact injuries, and lead poisoning.

Protective measures instituted include legal and regulatory measures, captive rearing, and habitat protection and improvement. Bald eagles are protected by Federal laws enforced by the Service and State Game Departments. Nests sites are protected under management programs on Federal lands.

Analysis of Effects

No eagles are currently known to nest on the KNF. According to the Plan, any eagle nests that might appear would be managed according to the Service's Habitat Management Guidelines for the Bald Eagle in the Southeast Region (U.S. Fish and Wildlife Service 1987). Based on

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information contained in the FEIS, biological assessment, and scientific literature, the Service concurs with the Forest Service's determination that the proposed action is not likely to adversely affect the bald eagle.

Red-cockaded Woodpecker

Species description

The RCW is a territorial, non-migratory, cooperative breeding species (Lennartz et al. 1987; Walters et al. 1988). It is unique in that it is the only North American woodpecker that exclusively excavates its roost and nest cavities in living pines. The Department of Interior identified the RCW as a rare and endangered species in 1968 (U.S. Bureau of Sport Fisheries and Wildlife 1968). In 1970, the RCW was officially listed as endangered (Federal Register 35:16047). In 1973, the RCW was listed as an endangered species under the Act. No critical habitat has been designated for the RCW. Historically, the RCW occupied a wide range throughout the pine belt of the southern United States. Although still widely distributed, the range of the RCW is now limited and fragmented as a result of past and present human and natural factors such as resources extraction activities, hurricanes, pine beetle outbreaks, and urban development. The remaining RCW populations exist primarily on Federal lands located in the Coastal Plain from North Carolina to Texas, the Piedmont of Georgia and Alabama, the Sandhills of North Carolina and South Carolina, and the interior highlands of Arkansas, Oklahoma, and Kentucky (Costa and Walker 1995).

Life History

The RCW has an advanced social system that revolves around family groups. A typical RCW group includes one pair of breeding birds, the current year's offspring (if any), and zero to four helpers, usually male offspring from previous breeding seasons (Ligon 1970, Lennartz et al. 1987, Walters et al. 1988). The RCW nesting season occurs from April to July. Incubation lasts approximately 10 days and the young fledge 24 to 26 days after hatching. Some juveniles disperse from their natal territory prior to the next breeding season (Hooper et al. 1980, U.S. Fish and Wildlife Service 1985). Others may remain and become helpers during subsequent nesting seasons. Helpers assist the breeding pair by incubating eggs, feeding the young, excavating cavities, and defending the territory (Lennartz and Harlow 1979). Juveniles disperse in an attempt to find vacant territories, or to establish their own. Most juvenile females disperse after fledging; however, some may remain with the group as helpers (Walters et al. 1988).

Each group of RCWs occupies a discrete territory consisting of its cavity trees, called a cluster, and adjacent foraging habitat (Walters 1990). The RCW requires mature (usually 80 or more years old), live pine trees to excavate its nesting and roosting cavities. A typical cluster contains between 1 and 20 cavity trees. The cavity trees are essential to the RCW because they provide shelter and a place to nest and raise young (Ligon 1970). Good cluster habitat consists of mature pine, is clear of midstory, and has 50 to 80 square feet of basal area per acre (U.S. Fish and Wildlife Service 1985). Once established, clusters are often utilized for many consecutive years or even decades (Walters 1990). Hardwood midstory lessens the habitat quality, eventually leading to cavity abandonment when the hardwood midstory reaches cavity height (Conner and O'Halloran 1987, Costa and Escano 1989). Cluster abandonment may also occur as a result of displacement by competing cavity dwellers, or stochastic events (Conner and O'Halloran 1987).

RCWs scale and probe bark on the trunks and limbs of living pine trees while foraging for insects. The amount of foraging area used by a group is dependant upon the quality of the habitat and population density. Research indicates the birds generally forage within one-half mile of the cluster (U.S. Fish and Wildlife Service 1985). RCW home ranges may vary seasonally, encompass 60 to 300 acres, and usually consist of open pine and/or pine/hardwood forests with trees 10 inches or more in diameter at breast height (dbh) for foraging. Groups may forage on pines scattered through hardwood stands, but pure hardwood stands are of little value to the RCW (Conner and O'Halloran 1987). The highest populations of the birds occur on areas with active prescribed burning programs that control hardwoods. Although in some habitats, RCWs will use smaller pine trees as foraging substrate (DeLottelle et al. 1987) they prefer pines greater than 10 inches dbh (U.S. Fish and Wildlife Service 1985). Determining the number of pines required to provide the arthropod biomass needed to meet their year-round dietary requirements continues to be a challenging research problem. Many complex and interrelated factors such as condition of the understory plant community, annual weather fluctuations, forest type, soils, physiographic province, season of the year, fire frequency and intensity are important in determining foraging habitat quality.

The RCW is territorial and defends its home range from adjacent groups (Hooper et al. 1982, Lignon 1970). Territories tend to be smaller in areas with few hardwoods, presumably because of higher quality habitat. Home range size is related to both habitat and demographic (e.g., group size and population density) variables (Hooper et al. 1982, Lennartz et al. 1987) and has been found to be inversely related to habitat quality (DeLotelle et al. 1987, 1995). A study by Hardesty et al. (1997) suggested that habitat structure, and not just the quantity of total resources, is an important determinant of home range size, territory quality, and reproductive success.

The availability and quantity of foraging habitat have been hypothesized to affect RCW cluster status, group size, home range size, and reproductive success (Connor and Rudolph 1991, DeLotelle et al. 1987, 1995, Hardesty et al. 1997). Other factors may also influence home range, group size, and reproductive success. Habitat quality had only a modest effect on fledging rate within the central Florida population (DeLotelle and Epting 1992). Average group size has been found to be correlated to size of the helper pool (Lennartz et al. 1987). Breeder experience has also been found to be an important factor in RCW nesting success and reproductive output ((DeLotelle and Epting 1992, Lennartz et al. 1987, Walters 1990). Fledgling production may also be related to fluctuations in prey availability resulting from environmental conditions (e.g., drought and extreme temperatures).

RCWs appear to be relatively resistant to disturbance from human activities. Data collected from military installations indicate that RCWs will occupy, colonize, and successfully raise young in proximity to heavily traveled roads and trails (U.S. Department of the Army 1996). Jackson (1983) indicated that the effects of human disturbance on RCW breeding success were probably related to the novelty and duration of the disturbance. RCWs seem to be able to habituate to disturbances; however, new disturbances introduced during critical periods (e.g., nesting) could temporarily affect RCWs through disruption of behavioral patterns (Timothy Hayden, Construction Engineering Research Laboratories, U.S. Army, personal communication, 1998). In general, moderate disturbances (e.g., vehicular traffic) greater than 200 feet from cavity trees do not seem to adversely affect RCWs (Ralph Costa, U.S. Fish and Wildlife Service, personal communication, 1998).

Population Dynamics

The recovery of the RCW is directly linked to the viability of discrete populations within selected southeastern states. A long-term viable population consists of 250 breeding groups (U.S. Fish and Wildlife Service 1985) or 400 to 500 total groups (Costa 1995). According to the Service's RCW Recovery Plan, the species could be downlisted to threatened when at least six viable populations are established in certain geographic areas throughout its range, and will be considered recovered when 15 viable populations are established.

Long-term viability of an RCW recovery or support unit, in genetic terms, depends on the presence of an adequate number of breeding individuals for the natural process that increase genetic variability (e.g., mutation and recombination) to offset the natural processes that decrease genetic variability (e.g., genetic drift and inbreeding). Additionally, any prediction of a population's viability should also consider the population's ability to survive population fluctuations due to demographic and environmental fluctuations (Koenig 1988) or environmental catastrophes. Reproductive rates, population density, and recolonization rates may influence RCW population variability more than mortality rates, sex ratios, and genetic viability. RCWs exhibit relatively low adult mortality rates; annual survivorship of breeding males and females is high ranging from 72 to 84 percent and 51 to 81 percent respectively (Lennartz and Heckel 1987; Walters et al. 1988; DeLotelle and Epting 1992).

Although the relationship between RCW population variability and density is not well understood, some aspects of population density as it relates to group size and population trend has been examined. Conner and Rudolph (1991) found that in sparse populations, as fragmentation increased, RCW group size and the number of active clusters decreased. Hooper and Lennartz (1995) suggested that populations with less than 4.7 active clusters within 1.25 miles on average had critically low densities that inhibited population expansion.

RCW populations can be increased dramatically because of their ability to "recolonize" unoccupied habitat, made suitable (assuming the other aspects of the habitat are suitable) by providing the limiting resource of cavity trees, via artificial cavities (Copeyon 1990, Allen 1991).

Status and Distribution

The RCW was listed as endangered due to its perceived rarity, documented declines in local populations, and presumed reductions in available nesting habitat. Until recently, most RCW populations (regardless of location or land ownership) were considered stable at best but more likely declining (Costa 1995). Costa and Escano (1989) documented RCW population declines in at least 10, and perhaps as many as 17, populations on national forests. More recently, James (1995) estimated that, the number of active clusters range-wide declined 23 percent between the early 1980's and 1990. Currently, there are an estimated 4,694 active RCW clusters range-wide (Costa and Walker 1995). Recently, numerous RCW populations have increased, particularly on Federal lands as a result of proven management techniques.

Analysis of Effects

Management actions described in the plan are in accordance with the RCW-FEIS for which the Service issued a no jeopardy biological opinion (Costa 1995). Those actions will have an overall beneficial effect on KNF red-cockaded woodpecker populations. The implementation of prescribed burning, while it has an important net beneficial effect, could occasionally result in the loss (i.e., direct death or cavity enlargement) of suitable RCW cavity trees (Costa 1995). Accordingly, the Forest Service has determined that the proposed action may adversely impact RCWs. Based on information contained in the FEIS, biological assessment, and scientific literature, the Service concurs with the Forest Service's determination that the proposed action is likely to adversely affect red-cockaded woodpecker. Because the RCW is the only species addressed in this opinion to which that determination applies, only the RCW will be addressed further in this opinion.

ENVIRONMENTAL BASELINE

Status of the species within the action area

Small RCW populations are present on private and public land in the East Gulf Coastal Plain of Louisiana; however, the majority of RCWs in Louisiana occur in the West Gulf Coastal Plain and are found in the action area (KNF) and the adjacent Fort Polk Military Reservation. Land ownership patterns have effectively fragmented Louisiana's RCW population into disjunct and separate subpopulations. About 75 percent of Louisiana's extant RCW population is found on the KNF, which includes four Ranger Districts (Districts). The Winn and Catahoula Districts harbor one population, while the Kisatchie District and the Vernon and Evangeline Units of the Calcasieu District each support separate populations. RCWs have been extirpated from the Caney District (Costa and Escano 1989).

Current estimates for the Louisiana populations are 365 active clusters on KNF (Catahoula District, 29; Winn District, 14; Evangeline Unit, 68; Kisatchie District, 56; and Vernon Unit, 198) (U.S. Forest Service 1999), 71 active clusters on Fort Polk (44 on Fort Polk and 27 on Peason Ridge) (Stephanie Stephens, pers. comm. 1998), 10 to 13 active clusters on national wildlife refuges, and 43 active clusters on state and private lands (Smith and Martin 1995). Population trends in the action area have generally been increasing (i.e., 174 active clusters in 1991 to 365 active clusters in 1998).

Data in the RCW Monitoring Report for 1998 for the Evangeline and Vernon RCW populations (U.S. Forest Service, unpublished report, January 1999) indicated that there are 3 to 5 active cavity trees per cluster and an average number 3 eggs (or nestlings) produced per nest.

The Vernon Unit RCW population serves as a RCW donor population. A donor population is one that consists of at least 100 RCW groups and has a stable or increasing population trend. Juvenile male RCWs are translocated when at least one male helper or potential helper would be left at the cluster. Juvenile females are generally available for translocation as they typically would disperse naturally. Approximately 20 to 30 juvenile RCWs (18 in 1997, 28 in 1996) are translocated annually from the Vernon Unit to augment other Forest Service populations, and state populations in Louisiana, Texas, Oklahoma, and Arkansas. RCWs translocated from the Vernon Unit directly contribute to the recovery of RCW populations in Louisiana, Texas, Arkansas, and Oklahoma.

Factors affecting the species' environment within the action area

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Before 1990, timber management practices generally negatively impacted both the quantity and quality of RCW nesting and foraging habitat on all Forest Service lands (Costa 1995) including the action area. With the adoption of Forest Service interim RCW management standards and guidelines in 1990, RCW habitat within 3/4 mile of active and inactive clusters was protected and negative impacts from timber harvest decreased. Protection for RCW habitat outside the 3/4 mile boundaries was implemented with the RCW-FEIS 1995 management strategy for national forests (U.S. Forest Service 1995) which has resulted in increasing RCW populations in the action area. Military personnel from the adjacent Fort Polk currently utilize KNF lands on the Vernon Unit for high and low intensity training. Oil and gas exploration overlaying the geologic formation known as the Austin Chalk has occurred on private leases and inholdings within the KNF. These activities have undergone Section 7 consultation with subsequent modifications to avoid adverse impacts to RCWs.

EFFECTS OF THE ACTION

Factors to be considered

The proposed action (i.e., implementation of the Plan) will occur over the next 10 to 15 years on all districts of KNF. Some management actions (e.g., installation of artificial cavities, translocation, and midstory control in clusters) will have direct and immediate effects on RCWs. Other actions (e.g., prescribed burning, pine regeneration, thinning, and establishment of recruitment clusters) will indirectly affect RCWs in that these actions promote the long term development of RCW populations and habitat. The seasonal timing of most management activities occurs during the non-nesting season or is designed to reduce or eliminate potential disturbance to nesting RCWs. Prescribed burns would be conducted at the landscape level within RCW habitat on a 2 to 5 year cycle with increased emphasis on growing season burns. Approximately 10 to 20 percent of prescribed burns take place during the RCW nesting season.

Analyses for effects of the action

The Plan (through incorporation of RCW-FEIS management guidelines) includes management strategies that benefit RCWs and promote RCW recovery. Those guidelines were developed in coordination with the Service and have undergone formal consultation at the regional level. Fire is the most important factor in the natural establishment, growth and development of the southern pines (longleaf in particular), i.e., the nesting and foraging habitat substrate that RCWs must have to survive (Costa 1995). Prescribed burning, especially when conducted during the growing season, has a positive effect on RCWs by eliminating and controlling hardwood midstory. The burning frequency to be implemented in the proposed action should maintain the open, park-like characteristic needed for RCWs to thrive. Prescribed burning, however, while providing an important overall benefit for RCWs, could indirectly affect RCWs by killing and/or injuring cavity trees and making them immediately or eventually unsuitable for RCWs (Costa 1995). Prescribed burning can also eliminate, usually through enlarging the cavity, active cavities without killing the cavity tree (Costa 1995). Once enlarged, such cavities are generally not used by RCWs; the resident bird may be more vulnerable to exposure and predation if it must roost outside as it constructs a new cavity. In the last 5 years of prescribed burning on KNF, approximately 5 active cavity trees were scorched (not destroyed) during prescribed burns (Cindy Dancak, U.S. Forest Service, personal communication, 1999). Most of that damage occurred during the last year and averaged approximately one tree per year per district.

Species' response to a proposed action

As stated above, prescribed burning will have important beneficial effects on RCWs at the population level by improving and sustaining suitable nesting and foraging habitat throughout the action area. RCW responses would be evidenced by increased reproductive success, and stabilization or growth of existing populations. In response to the loss of a cavity tree RCWs may occasionally use dead cavity trees for roosting or nesting (Hooper 1982); however, the loss of an active cavity tree would more likely cause the resident RCW to roost outside while it constructs a new cavity and thus becomes vulnerable to exposure and increased predation. RCWs will readily accept artificial cavities as nesting and roost sites (Copeyon 1990, Allen 1991); if artificial cavities are provided immediately following the damage or loss of a cavity tree, negative impacts can be minimized. The loss of a nest tree during prescribed burning could result in the loss of 3 eggs or 3 nestlings and possibly an adult depending on the time of year. That loss would likely result from fire reaching the cavity itself. The cavity could be replaced by the installation of an artificial cavity, which could be utilized by any adult RCW that had escaped before the fire reached the cavity. It is likely, however, that the lost eggs or juveniles would not be replaced during that breeding season.

CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

Any state or private activities not addressed in the proposed action that might occur within the action area and affect listed species would require the Forest Service to issue a special use permit and require Section 7 consultation with the Service. Timber management practices on private lands surrounding the KNF are the most significant non-Federal actions affecting RCWs today. Those practices negatively affect RCWs through the destruction of suitable nesting and foraging habitat. The majority of lands surrounding the KNF are either in agriculture or are managed as short-rotation pine plantations which results in the loss of older trees necessary for RCW nesting. Increased demands for pulpwood in the near future will likely result in the harvest of those timber lands that are currently managed on longer rotations. Oil and gas exploration on private lands overlaying the geologic formation known as the Austin Chalk has resulted in the long-term removal of pine habitat for well pads and associated pipelines in the area surrounding the KNF. This has resulted in additional loss of nesting and/or foraging habitat for RCWs.

CONCLUSION

After reviewing the current status of the RCW, the environmental baseline for the action area, the effects of the proposed action and the cumulative effects, it is the Service's biological opinion that the implementation of the Plan, as proposed, is not likely to jeopardize the continued existence of the RCW. No critical habitat has been designated for this species; therefore, none will be affected.

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Currently, RCW populations in the action area are generally stable to increasing. The beneficial effects of the proposed action, especially prescribed burning, are expected to result in RCW population growth (i.e., increased reproductive success and stabilization or growth of existing populations) in the action area. While it is anticipated that up to five adult RCWs and three RCW eggs or juveniles could be taken each year (for the next 15 years) as a result of the proposed action, that take is not expected to prohibit RCW survival and recovery due to the overall beneficial effects of the proposed action on RCW populations.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulations pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The measures described below are non-discretionary, and must be undertaken by the Forest Service for the exemption in section 7(o)(2) to apply. The Forest Service has a continuing duty to regulate the activity covered by this incidental take statement. If the Forest Service (1) fails to assume and implement the terms and conditions or (2) fails to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the Forest Service must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement. [50 CFR §402.14(I)(3)]

AMOUNT OR EXTENT OF TAKE ANTICIPATED

The Service anticipates 5 adult RCWs and three RCW eggs or nestlings could be taken forestwide each year as a result of this proposed action. The duration of the proposed action is 15 years. The take is expected to be in the form of harm through habitat destruction of 5 active cavity trees each year, of which only one may be a nest tree, during prescribed burning activities. The Service anticipates the incidental take of RCWs identified above will be difficult to detect because finding a dead or injured specimen is unlikely after prescribed burning activities. The above estimates of incidental take were based on data supplied by KNF in annual monitoring reports and personal communications. That data was used to estimate the average number of active cavity trees per cluster (estimated as 5), the average number of active cavity trees damaged during prescribed burning activities, the amount of prescribed burning occurring during the nesting season (10-20 percent), and the average number of eggs or nestlings per nest (estimated as 3).

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EFFECT OF THE TAKE

In the accompanying biological opinion, the Service determined that this level of anticipated take is not likely to result in jeopardy to the species.

REASONABLE AND PRUDENT MEASURES

The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize impacts of incidental take of RCWs:

1. Protect all active cavity trees from fire during prescribed burning operations. Protection may involve any number of methods including, but not limited to: (1) raking around or back firing from the base of the tree, (2) using a "wet" line or foam line around the tree or entire cluster, and (3) mechanically removing vegetation.

2. Ensure all active cavity trees lost or any active cavities destroyed by prescribed fire will be replaced within 48 hours by installing the appropriate number of artificial cavities within suitable trees, weather permitting.

TERMS AND CONDITIONS

In order to be exempt from the prohibitions of section 9 of the Act, the Forest Service must comply with the following terms and conditions, which implement the reasonable and prudent measures described above and outline required reporting/monitoring requirements. These terms and conditions are non-discretionary.

1. Conduct post-burn evaluations within 48 hours of a prescribed burn to inspect for damage to RCW cavity trees. Within two weeks of that evaluation, provide the Service's Lafayette Field Office with a written report of any cavity trees or cavities damaged, any known losses of nest cavities, eggs, nestlings, and/or adults, and remediation actions taken.

2. By January 31 of each year report to the Service's Lafayette Field Office the total number of active clusters affected by the prescribed burn by Unit and/or District. The number of active cavity trees and active cavities destroyed by prescribed burning will also be reported, along with any known losses of nest cavities, eggs, nestlings, and/or adults. The number of artificial cavities installed to replace the losses will also be reported. If all of the above-mentioned data are contained within the annual monitoring report KNF supplies to the Service's RCW recovery coordinator each year, a copy of that report could be forwarded to the Lafayette field office in lieu of a separate report.

3. Upon locating a dead, injured, or sick individual of an endangered or threatened species, initial notification must be made to the Fish and Wildlife Service according to the terms outlined in KNF's most current Endangered Species Act Section 10(a)(1)(A) permit. Care should be taken in handling sick or injured individuals and in the preservation of specimens in the best possible state for later analysis of cause of death or injury.

The reasonable and prudent measures, with their implementing terms and conditions, are designed

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to minimize the impact of incidental take that might otherwise result from the proposed action. The Service believes that no more than 5 active cavity trees, of which only one is a nest tree, will be incidentally taken each year. This totals 75 active cavity trees and 5 nest trees over the 15 year life of the proposed action. Based on Service estimates of RCW occupancy, death or injury is anticipated for no more than 5 RCW adults and 3 RCW nestlings or eggs annually. Over the 15 year life of the proposed action this totals 75 adult RCWs and 45 RCW nestlings or eggs. If, more than 5 active cavity trees or 1 active nest tree are taken in one year, such incidental take represents new information requiring reinitiation of consultation and review of the reasonable and prudent measures provided. The Federal agency must immediately provide an explanation of the causes of the taking and review with the Service the need for possible modification of the reasonable and prudent measures.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

As part of the annual monitoring and evaluation process the KNF evaluates whether management measures designed to achieve long-term RCW population goals have been successful. The main intent of that evaluation is to ensure RCW population goals are being achieved. If, however, monitoring and evaluation indicate that RCW populations respond more favorably to management than initially estimated and could potentially exceed the population objectives designated in the Plan, the Service recommends KNF re-evaluate forestwide RCW population goals and adjust them upwards accordingly.

In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefitting listed species or their habitats, the Service requests notification of the implementation of any conservation recommendations.

REINITIATION NOTICE

This concludes formal consultation on the proposed action outlined in the April 5, 1999, request for formal consultation. As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Forest Service involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the Forest Service action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the Forest Service action is subsequently modified in a manner that causes an effect to listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation of consultation.

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The Service greatly appreciates the cooperation of the Forest Service during this consultation. If you have any questions regarding this opinion please contact Deborah Fuller of this office at 318/291-3124.

Sincerely,

David W. Frugé
Field Supervisor

cc: FWS, Atlanta, GA (AES/TE)
FWS, Atlanta, GA (GARD-I)
FWS, Clemson, SC (ES)
USFS, Pineville, LA

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Appendix J

Species Viability Analysis Summary

INTRODUCTION

Appendix J summarizes the results of the species viability analysis. This analysis evaluates the likelihood of persistence of selected species in the planning area of the Kisatchie National Forest. This complies with planning regulations at 36 CFR 219.19 (viability) and 36 CFR 219.26 (diversity). Threatened, endangered, sensitive, and conservation species (TESC) were selected from a longer list of evaluated species. Species were excluded from TESC listing for two reasons. Some were found to be too common to list based on global and State population status ranking codes. Others were addressed in the viability assessment but not listed as TESC species because they are not expected to occur on Forest Service lands. The evaluation of each species considered habitat associations, population status, habitat status, relationship of population to habitat, risk factors, provisions in the Forest Plan, viability finding, and references.

The following definitions are used to indicate species viability :

▶ High: Used for species which seem to be tending toward delisting, but have not reached that point. Such species may occur at numerous sites with new sites being discovered on a regular basis, species that were poorly known on and off Forest Service lands in the past, but appear to be more abundant than previously thought, etc.

▶ Moderate: Used for species with expected continued listing and existence on Forest Service lands. Such species occur at several (3-100+) locations on Forest Service lands, but continued listing is anticipated. In most situations, sites for such species have more than adequate Forest Plan standard and guideline protection and extirpation from the Forest is not expected. On the other hand, the species are not expected to be delisted; this can be the result of the absence of the species on private lands, threats to the species on private lands, or general difficulties expanding the range on public lands such as when few new sites are being found during surveys.

▶ Low: Used for species with few (perhaps 1-6) known locations on Forest Service lands and species subjected to some type of threat, such as elimination by fire supression, collection by the public, or damage to known habitat by human activities which seem to be beyond Forest Service control, etc. Also includes historic species and species where some evidence exists that they likely occur on Forest Service lands, and for species which may be threatened with extirpation from Forest Service lands. Historic species are defined as those species which have not been sighted on Forest Service lands for more than 20 years. Species not occurring, or not suspected to occur, within the administrative boundary were not considered further for listing.

The process records for the revised Forest Plan contain the viability assessment, and documentation for each species. Table J-1 provides a summary of the viability analysis. Table J-2 displays the findings of species with a low viability finding. These findings were due in large part to the fact that either there are no known populations on the Forest, or that the known populations are very small.

TABLE J–1, VIABILITY ANALYSIS SUMMARY

Common Name-Species	Designation/Viability	Habitat / Forest Occurrence
PLANTS		
Ferns, mosses, and primitive plants		
Alabama lip-fern*-*Cheilanthes alabamensis*	C/Low	Limestone outcrops
Black-stemmed spleenwort*-*Asplenium resiliens*	C/Low	Limestone outcrops
Hairy lip-fern-*Cheilanthes lanosa*	C/Low	Rock outcrops in upland woodlands
Maidenhair spleenwort*-*Asplenium trichomanes*	C/Low	Limestone outcrops
Nodding clubmoss-*Palhinhaea cernua*	C/Low	Hillside bogs and longleaf pine flatwood savannahs
Purple cliff-brake fern*-*Pellaea atropurpurea*	C/Low	Limestone outcrops
Riddell's spikemoss-*Selaginella arenicola riddellii*	C/High	Sandy woodlands and sandstone glades and barrens
Dicots		
American pinesap-*Monotropa hypopithys*	C/Moderate	Calcareous forests, mesic slopes, bottomland forests
Awl-shaped scurf-pea-*Psoralea subulata*	C/Low	Sandy woodlands
Barbed rattlesnake root-*Prenanthes barbata*	S/Moderate	Mesic slopes and bottomland forests
Broad-leaved Barbara's buttons-*Marshallia trinervia*	S/Low	Sandy banks of large streams
Broomrape-*Orobanche uniflora*	C/Low	Upland longleaf pine forest
Calyciphilic flame flower-*Talinum calycinum*	C/Low	Sandstone glades and barrens
Clammy weed-*Polanisia erosa*	C/Moderate	Sandy woodlands
Climbing magnolia-*Schichandra coccinea*	S/Moderate	Mesic slopes and bottomland forests
Cupleaf beardtongue-*Penstemon murrayanus*	C/Low	Sandy woodlands
Drummond's nailwort-*Paronychia drummondii*	C/Moderate	Sandy woodlands
Feverwort-*Triosteum perfoliatum*	C/Low	Deciduous or mixed woods and openings
Grass-of-parnassus-*Parnassia grandifolia*	S/Low	Pine-hardwwod forest ravine seep
Ground-plum-*Astragalus crassicarpus trichocalyx*	C/Moderate	Calcareous prairies
Long-leaved wild buckwheat-*Eriogonum longifolium*	C/Low	Sandy woodlands
Louisiana bluestar-*Amsonia ludoviciana*	S/High	Mesic slopes and bottomland forests
Louisiana squarehead-*Tetragonotheca ludoviciana*	C/Moderate	Sandy woodlands
Narrow-leaved milkweed-*Asclepias stenophylla*	C/Low	Calcareous prairies
October jointweed-*Polygonella polygama*	C/Low	Sandy woodlands
Prairie redroot-*Ceanothus herbaceus*	C/Low	Bottomland forests
Purple bluet-*Hedyotis purpurea calycosa*	C/Moderate	Calcareous prairies
Purple coneflower-*Echinacea purpurea*	C/Low	Calcareous prairies
Robbin's phacelia-*Phacelia strictiflora*	C/Low	Sandy woodlands
Sabine coneflower-*Rudbeckia scabrifolia*	S/High	Hillside bogs and bayhead swamps
Shooting star-*Dodecatheon meadia*	C/Low	Mesic slopes, bottomland forests, and calcareous woodlands
Slender gay-feather-*Liatris tenuis*	S/Low	Upland longleaf pine forest
Slender heliotrope-*Lithospermum tenellum*	C/Moderate	Calcareous prairies
Small-flowered flame flower-*Talinum parviflorum*	C/Low	Sandstone glades and barrens
Southern jointweed-*Polygonella americana*	C/Low	Sandy woodlands
Soxman's milkvetch-*Astragalus soxmanorium*	S/Low	Sandy woodlands
Staggerbush-*Lyonia mariana*	C/Low	Swamps, flatwoods, creek bottoms
Viperina-*Zornia bracteata*	C/Low	Sandy woodlands
Wedge-leaved Whitlow grass-*Draba cuneifloia*	C/Low	Sandy woodlands
Wild geranium-*Geranium maculatum*	C/Low	Bottomland forests
Yellow pimpernel-*Taenidia integerrima*	C/Moderate	Calcareous forest streamsides
Yellowroot-*Xanthorhiza simplicissima*	C/Low	Mesic slopes and bottomland forests

TABLE J-1, VIABILITY ANALYSIS SUMMARY

Monocots	**Designation/Viability**	**Habitat / Forest Occurrence**
Bearded grass-pink-*Calopogon barbatus*	C/Low	Hillside bogs
Black snakeroot-*Zigadenus densus*	C/Moderate	Hillside bogs and bayhead swamps
Bog button-*Lachnocaulon digynum*	S/High	Hillside bogs and longleaf pine flatwood savannahs
Bog moss-*Mayaca aubletii*	C/Moderate	Bayhead swamps
Carolina purpletop-*Tridens carolinianus*	S/Low	Upland longleaf pine forests
Comb's redtop panic grass-*Panicum rigidulum combsii*	C/Low	Upland longleaf pine forests
Crested coral-root-*Hexalectris spicata*	C/Low	Mesic slopes and bottomland forests
Drummond's yellow-eyed grass-*Xyris drummondii*	S/High	Hillside bogs and longleaf pine flatwood savannahs
Epiphytic sedge-*Carix decomposita*	S/Low	Cypress stumps in swamps and beaver ponds
False Solomon's seal*****-*Smilacina racemosa*	C/Low	Mesic slopes
Great Plains ladies'-tresses-*Spiranthes magnicamporum*	C/Moderate	Calcareous prairies
Harper's yellow-eyed grass-*Xyris scabriflora*	S/Moderate	Hillside bogs and longleaf pine flatwood savannahs
June grass-*Koeleria macrantha*	C/Low	Calcareous prairies
Kentucky lady's slipper-*Cypripedium kentuckiense*	S/Low	Mesic slopes and bottomland forests
Large beakrush-*Rhynchospora macra*	S/High	Hillside bogs and longleaf pine flatwood savannahs
Mead's sedge-*Carex meadii*	C/Moderate	Sandstone glades and barrens and calcareous prairies
Millet beakrush-*Rhynchospora miliacea*	C/Low	Seeps
Mohlenbrock's umbrella sedge-*Cyperus grayioides*	S/Moderate	Sandy woodlands
Mohr's bluestem-*Andropogon liebmanii*	C/Low	Hillside bogs
Nodding pogonia-*Triphora trianthophora*	C/Low	Mesic slopes and bottomland forests
Northern burmannia-*Burmannia biflora*	C/Moderate	Baygalls and bayhead swamps
Oklahoma grass-pink-*Calopogon oklahomensis*	S/Moderate	Hillside bogs, mesic pine and oak forests
Ozark dropseed-*Sporobolus ozarkanus*	C/Low	Calcareous prairies
Pineland yellow-eyed grass-*Xyris stricta*	C/Low	Wet forests
Prairie cordgrass-*Spartina pectinata*	C/Low	Salt flats
Roughhair panic grass*****-*Panicum strigosum leucoblepharis*	C/Low	Upland longleaf pine forests
Sessile-leaved bellwort-*Uvularia sessilifolia*	C/Low	Mesic slopes and bottomland forests
Shortbeak baldsedge-*Psilocarya scirpoides*	C/Low	Lakebank and adjacent salt mines
Small-toothed sedge-*Carex microdonta*	C/High	Calcareous prairies
Texas sunnybell-*Schoenolirion wrightii*	S/Moderate	Sandstone glades and barrens
Tussock sedge*****-*Carex stricta*	C/Low	Wetlands
White-fringed orchid-*Platanthera blephartiglottis*	C/Low	Hillside bogs and longleaf pine flatwood savannahs
Wild coco-*Pteroglossapis ecristata*	S/Low	Upland longleaf pine forests
Wild hyacinth-*Camassia scilloides*	C/Moderate	Calcareous forest streamsides
Wiry witch grass-*Panicum flexile*	C/Moderate	Calcareous prairies

Designation key*: C = conservation species; S = sensitive species;* ******= indicates historic species, not seen on the Forest for at least 20 years.*

TABLE J–1, VIABILITY ANALYSIS SUMMARY

Common Name-Species	Designation/Viability	Habitat/Forest Occurrence
ANIMALS		
Birds		
Bald Eagle-*Haliaeetus leucocephalus*	Threatened/Low	Near large bodies of water
Red-cockaded Woodpecker-*Picoides borealis*	Endangered/High	Mature southern pine forests with old trees
Bachman's Sparrow-*Aimophila aestivalis*	S/Low	Open pine woods, old brushy fields, cutover areas
Cooper's Hawk-*Accipiter cooperii*	C/Low	Mature open coniferous, mixed, or deciduous forest
Worm-eating Warbler-*Helmitheros vermivorus*	C/Low	Wooded hillsides; damp, rich woods
Louisiana Waterthrush-*Seiurus motacilla*	C/Low	Deciduous and mixed woods near flowing streams; favors rocky streams
White-breasted Nuthatch-*Sitta carolinensis*	C/Low	Open mature deciduous and mixed forests
Warbling Vireo-*Vireo gilvus*	C/Low	Open mature hardwoods along rivers and large streams
Mammals		
Louisiana black bear-*Ursus americanus luteolus*	Threatened/Low	Forests and swamps
Rafinesque's big-eared bat-*Corynorhinus rafinesquii*	C/Moderate	Limestone caves; forested areas
Big brown bat-*Eptesicus fuscus*	C/Low	Varied; cities to wilderness
Long-tailed weasel-*Mustela frenata*	C/Low	Farmlands, prairies woodlands, swamps
Hispid pocket mouse-*Perognathus hispidus*	C/Low	Grassy areas with sandy soil
Reptiles		
American alligator-*Alligator mississippiensis*	Threatened (SA)/High	Usually near water, ponds, swamps and rivers
Louisiana pine snake-*Pituophis melanoleucus ruthveni*	S/Low	Dry, sandy pinewoods
Amphibians		
Louisiana slimy salamander-*Plethodon kisatchie*	S/Low	Riparian areas
Southern red-backed salamander-*Plethodon serratus*	C/Low	Under logs and stones in forests and fields; associated with sandstone outcroppings

TABLE J–1, VIABILITY ANALYSIS SUMMARY

Common Name-Species	Designtion/Viability	Habitat/Forest Occurrence
FISH		
Western sand darter-*Etheostoma clarum*	S/Low	Large streams, slight-to-moderate current over sandy bottom, also gravel or silt. May coexist with scaly sand darter, Ouachita darter, speckled chub, or Sabine shiner.
Blue sucker-*Cycleptus elongatus*	C/Low	Large rivers and impoundments.
Bluehead shiner-*Pteronotropis hubbsi*	S/Low	Quiet backwater areas of small-to-medium sluggish streams and oxbow lakes over mud or sand bottom.
Sabine shiner-*Notropis sabinae*	C/Moderate	Closely restricted to substrate of fine, silt-free sand in smaller streams and rivers with slight to moderate current.
Paddlefish-*Polyodon spathula*	C/Low	Large silty rivers, oxbow, and floodplain lakes.
Bigscale logperch-*Percina macrolepida*	C/Low	Streams with moderate to swift current and with gravel raceways.
MUSSELS		
Louisiana pearlshell mussel-*Margaritifera hembeli*	Threatened/High	Small, clear, shallow streams with moderate current.
Southern hickorynut-*Obovaria jacksonian*	S/Low	Large rivers with sand or gravel bottoms.
Southern creekmussel-*Strophitus subvexus*	S/Low	Small-to-large streams with mud or gravel-mud bottoms in flowing water.
Squawfoot-*Strophitus undulatus*	C/Low	Small-to-large streams with mud or gravel-mud bottoms in flowing water.
INSECTS		
Yellow brachycercus mayfly-*Brachycerus flavus*	S/Low	Stable streambanks
Caddisfly-*Diplectrona rossi*	C/Low	Streams
Schoolhouse Springs stonefly-*Leuctra szczytkoi*	S/Low	Small, clear, shallow streams with moderate current
CRUSTACEANS		
Teche painted crawfish- *Orconectes hathawayi*	C/Low	Streams
Kisatchie painted crawfish- *Orconectes maletae*	C/Low	Streams

TABLE J–2, SPECIES WITH LOW VIABILITY FINDINGS

PLANTS

The following provisions in the Forest Plan include the general guidance on rare plant site management, directly or indirectly: FW - 008, FW - 009, FW - 018, FW - 020, FW - 071, FW - 095, FW - 124, FW - 126, FW - 127, FW - 138, and FW - 664 to 676. Additional guidelines affecting specific species are cited below.

C-Conservation species.
S-Sensitive species

PTERIDOPHYTA

C- BLACK-STEMMED SPLEENWORT
Asplenium resiliens L.

Additional provisions in Forest Plan: None
Viability finding: Continued viability of Black-stemmed Spleenwort is low. This single Louisiana occurrence for this species (from private lands within the administrative boundary of the Winn District) has been extirpated.

C- MAIDENHAIR SPLEENWORT
Asplenium trichomanes L.

Additional provisions in Forest Plan: None.
Viability finding: Continued viability of Maidenhair Spleenwort is low. This single Louisiana occurrence for this species (from private lands within the administrative boundary of the Winn District) has been extirpated.

C- ALABAMA LIP-FERN
Cheilanthes alabamensis (Buckl.) Kunze

Additional provisions in Forest Plan: None.
Viability finding: Continued viability of Alabama Lipfern is low. This single Louisiana occurrence for this species (from private lands within the administrative boundary of the Winn District) has been extirpated.

C- HAIRY LIP FERN
Cheilanthes lanosa (Michx.) D. C. Eaton

Additional provisions in Forest Plan: FW - 699 to 700
Viability finding: Viability on the Kisatchie National Forest is low since the species could easily be eliminated at the single site by overcollecting, roadside work, and/or prescribed or wild fire. Prevention of scientific and other collections of the species is critically important. During the next planning period, no scientific collecting should be permitted to allow recovery from previous collecting activities. The plant reaches the southern limit of its range in Louisiana and is secure globally.

TABLE J–2, SPECIES WITH LOW VIABILITY FINDINGS

C- NODDING CLUBMOSS
Palhinhaea cernua (L.) Vasconcellos & Franco

Additional provisions in Forest Plan: FW - 380 to 381, 677 to 689.
Viability finding: Viability of Nodding Clubmoss on the Kisatchie National Forest is low primarily because only one site exists. This site lies in a protected Registry Natural Area, which is managed to maintain the habitat for this species. Nodding Clubmoss is globally secure.

C- PURPLE CLIFF-BRAKE FERN
Pellaea atropurpurea (L.) Link.

Additional provisions in Forest Plan: None.
Viability finding: Continued viability of Purple Cliff-brake Fern is low. This single Louisiana occurrence for this species (from private lands within the administrative boundary of the Winn District) has been extirpated.

MONOCOTS

C-BEARDED GRASS-PINK
Calopogon barbatus (Walt.) Ames

Additional provisions in Forest Plan: FW - 252 to 283, 677 to 686.
Viability finding: Viability of Bearded Grass-pink on the Kisatchie National Forest is low since currently only a single site has been confirmed on the Kisatchie National Forest (after the publication of the description of *C. oklahomensis*). This species is globally secure.

S-CAROLINA PURPLETOP
Tridens carolinianum (Steud.) Henr.

Additional provisions in Forest Plan: None.
Viability finding: Continued viability of Carolina Purpletop is low since only one occurrence is known on the Kisatchie National Forest.

C-COMB'S REDTOP PANIC GRASS
Panicum rigidulum Nees var. *combsii* (Scribn. & Ball) LeLong

Additional provisions in Forest Plan: FW - 544 to 584 and 677 to 689.
Viability finding: Viability of Comb's Redtop Panic Grass is low because only one occurrence is known on the Kisatchie National Forest (and in Louisiana), although the species is globally secure.

C-CRESTED CORAL ROOT
Hexalectris spicata (Walt.) Barnh.

Additional provisions in Forest Plan: None.

TABLE J–2, SPECIES WITH LOW VIABILITY FINDINGS

Viability finding: Viability of Crested Coral Root on the Kisatchie National Forest is low. This finding is based on known status. The species is secure globally.

C-EPIPHYTIC SEDGE
a.k.a. Cypress-knee Sedge, Large Panicled Sedge, Log Sedge
Carex decomposita Muhl.

Additional provisions in Forest Plan: None.
Viability finding: Viability of Epiphytic Sedge on the Kisatchie National Forest is low since only one occurrence lies on Kisatchie National Forest land. The plant is secure globally, but occurs infrequently. It often forms very large, but sometimes very isolated, colonies.

C-FALSE SOLOMON'S SEAL
Smilacina racemosa (L.) Desf.

Additional provisions in Forest Plan: None.
Viability finding: Viability of False Soloman's Seal is low on the Kisatchie National Forest. This historic species has not been found since 1966 despite extensive searches by various botanists. The collection may have been a waifed plant. If so, the chance of finding another population or relocating the historic population would be extremely low. The species reaches the southern limit of its range in Louisiana, and is common elsewhere, so global viability is not a concern.

C-JUNE GRASS
Koeleria macrantha (Ledeb.) Schult.

Additional provisions in Forest Plan: FW - 455 to 484, and 693 to 696.
Viability finding: Viability of June Grass is low since only one site is known on the Kisatchie National Forest but does lie within a protected area, the Kieffer Prairie Special Interest Area. June Grass is secure globally.

S-KENTUCKY LADYSLIPPER
Cypripedium kentuckiense C. F. Reed

Additional provisions in Forest Plan: FW - 252 to 256, 257 to 283, 380 to 381, 507 to 509, and 510 to 536.
Viability finding: Viability of Kentucky Ladyslipper on the Kisatchie National Forest is low since little reproduction is occurring, since reproduction is only asexual and since collectors present a severe risk to the few plants occurring on the Forest. Kentucky Ladyslipper is widespread but rare and under similar risks in the eastern United States, its global range.

C- MILLET BEAKSEDGE
Rhynchospora miliacea (Lam.) Gray

Additional provisions in Forest Plan: None.
Viability finding: Continued viability of this beaksedge (Rhynchospora miliacea) on the Kisatchie National Forest is low since only one site is known within the administrative boundary for this species.

TABLE J–2, SPECIES WITH LOW VIABILITY FINDINGS

C-MOHR'S BLUESTEM
Andropogon liebmannii Hack. var. *pungensis* (Ashe) Campbell

Additional provisions in Forest Plan: FW - 677 to 689.
Viability finding: Continued viability of Mohr's Bluestem is low because there is currently only one known occurrence on the Kisatchie National Forest. The species is globally secure.

C-NODDING POGONIA
Triphora trianthophora (Sw.) Rydb.

Additional provisions in Forest Plan: FW - 252 to 256, 257 to 283, 382 to 396, 455 to 484, 507 to 509, and 510 to 536.
Viability finding: Viability of Nodding Pogonia is low since only two sites are known on the Forest and relocation of sites may prove difficult. Nevertheless, protection of riparian zones outlined in the Forest Plan should provide adequate protection for undiscovered sites in general. Global viability is not a concern.

C-OZARK DROPSEED
Sporobolus ozarkanus Fern.

Additional provisions in Forest Plan: FW - 693 to 696.
Viability finding: Viability of Ozark Dropseed is low since the status of the populations is poorly studied. This is an obscure plant, not seen by the casual observer or botanist. Global viability is not a concern.

C-PINELAND YELLOW-EYED GRASS
Xyris stricta Chapm.

Additional provisions in Forest Plan: None.
Viability finding: Viability of Pineland Yellow-eyed Grass is low since only one site is known within the administrative boundary for this species. Global viability is not a concern.

C-PRAIRIE CORDGRASS
Spartina pectinata Link

Additional provisions in Forest Plan: None.
Viability finding: Continued viability of Prairie Cordgrass is low because there is only one site within the administrative boundary of the Kisatchie National Forest, on private lands.

C-ROUGHHAIR PANIC GRASS
Panicum strigosum Muhl. var. *leucoblepharis* (Trin.) LeLong

Additional provisions in Forest Plan: None.
Viability finding: Viability of Roughhair Panic Grass is low because the two records on the KNF have not been observed in over 40 years. Outside Louisiana viability is not a concern.

TABLE J–2, SPECIES WITH LOW VIABILITY FINDINGS

C-SESSILE-LEAVED BELLWORT
Uvularia sessilifolia L.

Additional provisions in Forest Plan: FW - 252 to 256, 257 to 283, 510 to 536.
Viability finding: Viability of Sessile-leaved Bellwort is low since only one confirmed, but well protected, site is currently known on the Kisatchie National Forest. Additional sites are likely. Global viability is not a concern.

C- SHORTBEAK BALDSEDGE
Psilocarya scirpoides (Vahl) Wood (Cyperaceae)

Additional provisions in Forest Plan: None.
Viability finding: Continued viability of shortbeak baldsedge on the Kisatchie National Forest is low since only one site is known within the administrative boundary for this species.

C-TUSSOCK SEDGE
Carex stricta Lam.

Additional provisions in Forest Plan: FW - 510 to 536.
Viability finding: Viability of Tussock Sedge is low since it has not been seen since 1936, and is not expected to be found easily at other Louisiana locations. Tussock Sedge reaches the southern edge of its range in Louisiana and is globally secure.

C-WHITE-FRINGED ORCHID
Platanthera blephartiglottis (Willd.) Lindl.

Additional provisions in Forest Plan: FW - 380 to 381, and FW - 677 to 689.
Viability finding: Viability of White-fringed Orchid is low since only three plants are known and those from a single bog complex. Global viability is not a concern.

S-WILD COCO
Pteroglossaspis ecristata (Fern.) Rolfe

Additional provisions in Forest Plan: None.
Viability finding: Viability of Wild Coco on the Kisatchie National Forest is low, considering extensive searches over the flowering season from 1994 to 1998 have failed to relocate plants at the single known site. Dr. Charles Allen (pers. commun. 1998) believes it may appear only in years and at the time of year when weather conditions are appropriate and it may remain dormant in other years. Viability is also a concern globally due to a limited number of known sites despite its occurrence in only North Carolina, Florida, Louisiana, and Cuba.

TABLE J–2, SPECIES WITH LOW VIABILITY FINDINGS

DICOTS

C-AWL-SHAPED SCURF-PEA
Pediomelum hypogaeum (Nutt. ex Torr. & Gray) Rydb. var. *subulatum* (Bush) J. Grimes

Additional provisions in Forest Plan: FW - 699 to 700.
Viability finding: Continued viability of Awl-shaped Scurf Pea is low since there is a single site on the Forest and six sites in Louisiana. Global viability is not a concern.

S-BROAD-LEAVED BARBARA'S BUTTONS
Marshallia trinervia (Walt.) Trel. ex Bran. & Cov.

Additional provisions in Forest Plan: FW - 510 to 536.
Viability finding: Continued viability of Broad-leaved Barbara's Buttons is low because only a single site occurs on the Forest. This species is on the western limits of its range which covers Virginia, Tennessee, and Louisiana and south in the southeastern United States. Viability is a concern range wide.

C-BROOMRAPE
Orobanche uniflora L.

Additional provisions in Forest Plan: FW - 252 to 256, 257 to 283, and 380 to 381.
Viability finding: Continued viability of Broomrape is low since only two sites exist on the Kisatchie National Forest. Global viability is not a concern.

C-CALYCIPHILIC FLAME FLOWER
Talinum calycinum Engelm.

Additional provisions in Forest Plan: FW - 380 to 381, and 699 to 700.
Viability finding: Continued viability of this Flame Flower is low because there is only one known occurrence on the Forest. Recently discovered on the Kisatchie National Forest. It will be addressed as more information becomes available. Global viability is not a concern.

C-CUPLEAF BEARDTONGUE
Penstemon murrayanus Hook.

Additional provisions in Forest Plan: FW - 507 to 536 and 699 to 700.
Viability finding: Continued viability of Cupleaf Beardtongue is low since only one occurrence is known on the Kisatchie National Forest.

TABLE J–2, SPECIES WITH LOW VIABILITY FINDINGS

C- FEVERWORT
Triosteum perfoliatum L.

Additional provisions in Forest Plan: None.
Viability finding: Continued viability of Feverwort on the Kisatchie National Forest is low since only one site is known within the administrative boundary for this species.

C-GRASS-OF-PARNASSUS
Parnassia grandifolia DC.

Additional provisions in Forest Plan: None.
Viability finding: Continued viability of Grass-of-Parnassus is low because it occurs in only site in Louisiana. This site was recently discovered on the Winn District. Global viability is not a concern.

C-GROUND-PLUM
Astragalus crassicarpus Nutt.
var. *trichocalyx* (Nutt.) Barneby

Additional provisions in Forest Plan: FW - 693 to 696.
Viability finding: Continued viability of Ground-plum is low since only three populations are known on the Kisatchie National Forest. Ground-plum is globally secure.

C-LONG-LEAVED WILD BUCKWHEAT
Eriogonum longifolium Nutt.

Additional provisions in Forest Plan: FW - 507 to 536 and 697 to 698.
Viability finding: Continued viability of Long-Leaved Wild Buckwheat is low since only two occurrences are known on the Kisatchie National Forest. Global viability is not a concern.

C-NARROW-LEAVED MILKWEED
Asclepias stenophylla Gray

Additional provisions in Forest Plan: FW - 693 to 696.
Viability finding: Continued viability of Narrow-leaved Milkweed is low since only one occurrence is known on the Kisatchie National Forest. The species is globally secure.

C-OCTOBER JOINTWEED
Polygonella polygama (Vent.) Engelm. & Gray

Additional provisions in Forest Plan: FW - 697 to 698.
Viability finding: Continued viability of October Jointweed is low since only one occurrence is known on the Kisatchie National Forest. Global viability is not a concern.

TABLE J–2, SPECIES WITH LOW VIABILITY FINDINGS

C-PRAIRIE REDROOT
Ceanothus herbaceus Raf.

Additional provisions in Forest Plan: FW - 455 to 484 and 693 to 696.
Viability finding: Continued viability of Prairie Redroot on the Kisatchie National Forest is low since only one occurrence is known on the Kisatchie National Forest. Global viability is not a concern.

C-PURPLE CONEFLOWER
Echinacea purpurea (L.) Moench

Additional provisions in Forest Plan: FW - 693 to 696.
Viability finding: Continued viability of Purple Coneflower is low because only a single occurrence on private lands, within the administrative boundary is known on the Kisatchie National Forest. The genus *Echinacea* is under heavy collecting pressure globally for medicinal use of the plants; this includes this species, although generally this species is globally secure for now.

C-ROBBIN'S PHACELIA
Phacelia strictiflora (Engelm. & Gray) Gray var. *robbinsii* Constance

Additional provisions in Forest Plan: FW - 697 to 698.
Viability finding: Continued viability of Robbin's Phacelia is low because only one occurrence is known on the Kisatchie National Forest. This occurrence lies on private land within several meters of Forest Service lands. Global viability is not a concern.

C-SHOOTING STAR
Dodecatheon meadia L.

Additional provisions in Forest Plan: None.
Viability finding: Continued viability of Shooting Star is low since only one occurrence exists on the Kisatchie National Forest. Global viability is not a concern.

S-SLENDER GAY-FEATHER
Liatris tenuis Shinners

Additional provisions in Forest Plan: None.
Viability finding: Continued viability of Slender Gayfeather is low because the single occurrence has not been relocated on over 30 years.

C-SMALL-FLOWERED FLAME FLOWER
Talinum parviflorum Nutt.

Additional provisions in Forest Plan: FW - 380 to 381, and 699 to 700.
Viability finding: Continued viability of Small-Flowered Flame Flower is low. Global viability is not a concern.

TABLE J–2, SPECIES WITH LOW VIABILITY FINDINGS

C-SOUTHERN JOINTWEED
Polygonella americana (Fisch. & Mey.) Small

Additional provisions in Forest Plan: FW - 507 to 536 and 697 to 698.
Viability finding: Continued viability of Southern Jointweed is low since only one occurrence is known on the Kisatchie National Forest. Global viability is not a concern.

S-SOXMAN'S MILKVETCH
Astragalus soxmaniorum Lundell

Additional provisions in Forest Plan: FW - 252 to 256, 257 to 283, and 697 to 698.
Viability finding: Continued viability of Soxman's Milkvetch is low since only one occurrence is known on the Kisatchie National Forest. Soxman's Milkvetch is a West Gulf Coastal Plain endemic, with a range restricted to east Texas and west Louisiana. Little is known about this plant, and with the low number of sites, global viability is a concern.

C-STAGGERBUSH
Lyonia mariana (L.) D. Don

Additional provisions in Forest Plan: FW - 252 to 256, 257 to 283, 510 to 536.
Viability finding: Continued viability of Staggerbush is low because there is only one occurrence on the Kisatchie National Forest, and this site has not been relocated in several years. Global viability is not a concern.

C-VIPERINA
Zornia bracteata (Walt.) Gmel.

Additional provisions in Forest Plan: FW - 697 to 698.
Viability finding: Continued viability of Viperina is low since one occurrence is known on the Kisatchie National Forest. It occurs within a few meters of Forest Service land at Saline Bayou near Goldonna. Global viability is not a concern.

C-WEDGE-LEAVED WHITLOW GRASS
Draba cuneifolia Nutt. ex T. & G.

Additional provisions in Forest Plan: FW - 697-700
Viability finding: Continued viability of Wedge-leaved Whitlow Grass is low because only a single occurrence on private lands, within the administrative boundary is known on the Kisatchie National Forest.

C-WILD GERANIUM
Geranium maculatum L.

Additional provisions in Forest Plan: None.
Viability finding: Continued viability of Wild Geranium is low since only one occurrence exists on the Kisatchie National Forest. Global viability is not a concern.

TABLE J–2, SPECIES WITH LOW VIABILITY FINDINGS

C-YELLOWROOT
Xanthorhiza simplicissima Marsh.

Additional provisions in Forest Plan: FW - 510 to 536.

Viability finding: Continued viability of Yellowroot is low since there is only one occurrence in Louisiana and this occurrence is located in the IUA - Vernon Unit of the Calcasieu District. Global viability is not a concern.

TABLE J–2, SPECIES WITH LOW VIABILITY FINDINGS

ANIMALS

C-Conservation Species
S-Sensitive Species
T-Threatened Species

BIRDS

T-Bald Eagle
Haliaeetus leucocephalus

Provisions in Forest Plan: Potential Bald Eagle habitat would be found primarily in riparian areas. Management activities impacting riparian areas will be greatly restricted (FW-515 through FW-519). Prescribed burns will be allowed to burn naturally into RAPZS from adjacent areas, but RAPZS will not be prescribe burned, per se (FW-067, FW-071, FW-080). Riparian areas will have priority for land acquisition (FW-192). The integrity of riparian ecosystems is being enhanced: sand and gravel pits are prohibited, timber production is curtailed, oil/gas development is prohibited, and the impact of roads, trails, and crossings will be minimized (FW-515 through FW-531). The cattle-grazing program is being curtailed to a seasonal program (April to October only) (FW-287); cattle utilization of forage will be limited (FW-288) and cattle will be attracted from streamside and riparian areas by the placement of feeding troughs, salt, and mineral blocks (FW-295); these factors will serve to reduce damage to potential eagle habitat. Recreational events will be authorized after environmental analyses (FW-298 and FW-337). Impacts on wildlife habitat resulting from road location and road construction / reconstruction will be reduced as much as possible (FW-563). Timber management activities will be greatly restricted in SHPZS, RAPZS, and wetland areas which will be greatly beneficial to eagles (FW-510 through FW-531). Management activities in general will be restricted in SHPZS, RAPZS, and wetland areas which will be greatly beneficial to eagles (FW-510 through FW-536). Wilderness "management" would result in late successional habitat types which would benefit eagles (MA-13-19, MA-13-20, and MA-13-58). Nesting and roosting eagles that are discovered on the Kisatchie National Forest would be protected by adherence to the USFWS's Habitat Management Guidelines for the Bald Eagle in the Southeast Region (FW-848).

Viability finding: Viability of the Bald Eagle on the Kisatchie National Forest is low based on the State population status ranking code (the non-breeding population is imperiled in the State because of rarity; the breeding population is rare or uncommon in the State). The species is apparently secure globally.

S-Bachman's Sparrow
Aimophilia aestivalis

Provisions in Forest Plan: General provisions include Forestwide Goal 2, Objectives 2-1 through 2-4 which address the restoration and maintenance of biologically diverse ecosystems and habitat conditions for viable populations of all native and desirable nonnative plant, wildlife, fish, and aquatic species. Forestwide guidelines FW-008, FW-009, FW-062, FW-066, FW-342, FW-344, FW-345, FW-601, FW-702, and FW-703 address environmental analysis and documentation requirements; prescribed fire timing, spacing, distribution, and disruption during the nesting season; off-road vehicle restrictions; mechanical site preparation restrictions; and wildlife habitat improvement activities. Due to their open-canopied conditions and thick grass-forb understory, the Bachman's Sparrow is most closely associated with landtype associations (LTAs) 1, 2, 5, and 6 (FEIS, page 3-42). These LTAs cover extensive portions of the Vernon and Evangeline Units of the Calcasieu District, and

TABLE J–2, SPECIES WITH LOW VIABILITY FINDINGS

the Kisatchie, Catahoula and Winn Districts (FEIS, pages 3-118 to 3-119). Management areas 3, 5, 6 and 9 goals, desired future conditions, and standards and guidelines would provide additional general guidance regarding the management of the areas in which this species occurs most frequently.

Viability finding: Viability of the Bachman's Sparrow on the Kisatchie National Forest is low based on the State population status ranking code (rare or uncommon in the State). The species is globally vulnerable to extinction throughout its range.

C-Cooper's Hawk
Accipiter cooperii

Provisions in Forest Plan: General provisions include Forestwide Goal 2, Objectives 2-1 through 2-4 which address the restoration and maintenance of biologically diverse ecosystems and habitat conditions for viable populations of all native and desirable nonnative plant, wildlife, fish, and aquatic species. Forestwide guidelines FW-008, FW-009, FW-062, FW-066, FW-702, and FW-703 address environmental analysis and documentation requirements; prescribed fire timing, spacing, distribution, and disruption during the nesting season; and wildlife habitat improvement activities. Due to their relatively open-canopied mixed pine-hardwood communities, the Cooper's Hawk is most closely associated with mid-to-late successional habitats in landtype associations (LTAs) 3, 8, and 9 (FEIS, page 3-43). These LTAs cover portions of the Kisatchie, Catahoula and Winn Districts, and all of the Caney District (FEIS, pages 3-118 to 3-119). Management areas 2, 3, 5, and 11 goals, desired future conditions, and standards and guidelines would provide additional general guidance regarding the management of the areas in which this species occurs most frequently.

Viability finding: Viability of the Cooper's Hawk on the Kisatchie National Forest is low based on the State population status ranking code (critically imperiled in the State). The species is apparently secure globally.

C-Worm-eating Warbler
Helmitheros vermivorus

Provisions in Forest Plan: General provisions include Forestwide Goal 2, Objectives 2-1 through 2-4 which address the restoration and maintenance of biologically diverse ecosystems and habitat conditions for viable populations of all native and desirable nonnative plant, wildlife, fish, and aquatic species. Forestwide guidelines FW-008, FW-009, FW-062, FW-066, FW-067, FW-342 through FW-345, FW-510 through FW-519, FW-601, FW-702, and FW-703 address environmental analysis and documentation requirements; prescribed fire timing, spacing, distribution, disruption during the nesting season, and frequency of fire in hardwood habitats; off-road vehicle restrictions; management restrictions in streamside and riparian area protection zones; mechanical site preparation restrictions; and wildlife habitat improvement activities. The Worm-Eating Warbler is most closely associated with large stream riparian habitats that are generally associated with large perennial streams with broad floodplains that include bottomland hardwood forests (FEIS, page 3-45). These areas are embedded within all landtype associations that occur on the Forest. Additional guidance regarding the management of the areas in which this species occurs most frequently is presented in the streamside habitat protection zone guidelines for all Management Areas.

Viability finding: Viability of the Worm-eating Warbler on the Kisatchie National Forest is low based on the State population status ranking code (critically imperiled in the State). The species is demonstrably secure globally.

TABLE J–2, SPECIES WITH LOW VIABILITY FINDINGS

C-Louisiana Waterthrush
Seiurus motacilla

Provisions in Forest Plan: General provisions include Forestwide Goal 2, Objectives 2-1 through 2-4 which address the restoration and maintenance of biologically diverse ecosystems and habitat conditions for viable populations of all native and desirable nonnative plant, wildlife, fish, and aquatic species. Forestwide guidelines FW-008, FW-009, FW-062, FW-066, FW-067, FW-342 through FW-345, FW-510 through FW-519, FW-523, FW-601, FW-702, and FW-703 address environmental analysis and documentation requirements; prescribed fire timing, spacing, distribution, disruption during the nesting season, and frequency of fire in hardwood habitats; off-road vehicle restrictions; management restrictions in streamside and riparian area protection zones; streambank protection; mechanical site preparation restrictions; and wildlife habitat improvement activities. The Louisiana Waterthrush is most closely associated with small stream riparian habitats that are generally associated with intermittent and smaller perennial streams with relatively narrow floodplains and including the associated mesic sideslope habitats (FEIS, page 3-45). These areas are embedded within all landtype associations that occur on the Forest. Additional guidance regarding the management of the areas in which this species occurs most frequently is presented in the streamside habitat protection zone guidelines for all Management Areas.

Viability finding: Viability of the Louisiana Waterthrush on the Kisatchie National Forest is low based on the State population status ranking code (imperiled in the State because of rarity). The species is demonstrably secure globally.

C-White-breasted Nuthatch
Sitta carolinensis

Provisions in Forest Plan: General provisions include Forestwide Goal 2, Objectives 2-1 through 2-4 which address the restoration and maintenance of biologically diverse ecosystems and habitat conditions for viable populations of all native and desirable nonnative plant, wildlife, fish, and aquatic species. Forestwide guidelines FW-008, FW-009, FW-062, FW-066, FW-067, FW-702, and FW-703 address environmental analysis and documentation requirements; prescribed fire timing, spacing, distribution, disruption during the nesting season, and frequency of fire in hardwood habitats; and wildlife habitat improvement activities. The White-breasted Nuthatch is most closely associated with relatively open-canopied hardwood communities within the mid-to-late successional habitats of LTAs 3, 4, 7, 8, and 9. These LTAs cover portions of the Kisatchie, Catahoula and Winn Districts, and all of the Caney District (FEIS, pages 3-118 to 3-119). Management areas 2, 3, 5, 7, and 11 goals, desired future conditions, and standards and guidelines would provide additional general guidance regarding the management of the areas in which this species occurs most frequently.

Viability finding: Viability of the White-breasted Nuthatch on the Kisatchie National Forest is low based on the State population status ranking code (rare or uncommon in the State). The species is demonstrably secure globally.

C-Warbling Vireo
Vireo gilvus

Provisions in Forest Plan: General provisions include Forestwide Goal 2, Objectives 2-1 through 2-4 which address the restoration and maintenance of biologically diverse ecosystems and habitat conditions for viable populations of all native and desirable nonnative plant, wildlife, fish, and aquatic species. Forestwide guidelines FW-008, FW-009, FW-062, FW-066, FW-067, FW-510 through FW-519, FW-702, and FW-703 address environmental analysis and documentation requirements; prescribed fire timing, spacing, distribution,

TABLE J–2, SPECIES WITH LOW VIABILITY FINDINGS

disruption during the nesting season, and frequency of fire in hardwood habitats; management restrictions in streamside and riparian area protection zones; and wildlife habitat improvement activities. The Warbling Vireo is most closely associated with large stream riparian habitats that are generally associated with large perennial streams with broad floodplains that include bottomland hardwood forests (FEIS, page 3-45). These areas are embedded within all landtype associations that occur on the Forest. Additional guidance regarding the management of the areas in which this species occurs most frequently is presented in the streamside habitat protection zone guidelines for all Management Areas.

Viability finding: Viability of the Warbling Vireo on the Kisatchie National Forest is low based on the State population status ranking code (critically imperiled in the State). The species is demonstrably secure globally.

MAMMALS

T-Louisiana black bear
Ursus americanus luteolus

Provisions in Forest Plan: The USFWS does not list the KNF for recovery of the Louisiana black bear. Currently, the USFWS considers the only bear-occupied habitat as the Tensas River basin (in northwestern Louisiana) and the Atchafalaya River basin (in southern and east-central Louisiana). Additionally, the KNF does not currently enter into the USFWS and BBCC's recovery equation for the Louisiana black bear (USFWS 1995).

KNF acreage is inadequate to support a viable population of Louisiana black bears. Excessive habitat fragmentation exists due to an extensive Forest road network and extensive private land in-holdings. Additionally, current, heavy recreation use diminishes the suitability of potential habitat for bears.

The management activities proposed in the revised Forest Plan generally will produce excellent potential bear habitat. Approximately 81,000 acres of the Forest will be designated and managed as old-growth forest patches, and another 215,000 acres of the Forest containing attributes characteristic of unmanaged old-growth (such as Kisatchie Hills Wilderness and Forest Streamside Habitat Protection Zones (SHPZS) and Riparian Area Protection Zones (RAPZS)) will exist on lands not considered appropriate for timber production. The prescribed fire frequencies will mimic historic landscape fire frequencies (Forestwide guideline FW-067).

Riparian areas will have priority for land acquisition (FW-192). The integrity of streamside, riparian, and wetland ecosystems is being enhanced: sand and gravel pits are prohibited, timber production is curtailed, oil/gas development is prohibited, and the impact of roads, trails, and crossings will be minimized (FW-510 through FW-531). An existing Special Use Permit Agreement between Fort Polk and KNF minimizes damage to potential bear habitat from military training on the Vernon Unit. The cattle-grazing program is being curtailed to a seasonal program (April to October only) (FW-287); cattle utilization of forage will be limited (FW-288) and cattle will be attracted from streamside and riparian areas by the placement of feeding troughs, salt, and mineral blocks (FW-295). These factors will serve to reduce damage to potential bear habitat. Recreational events will be authorized after environmental analyses (FW-298 and FW-337). Facilities, roads, and camp-grounds will be located outside 100-year floodplain boundaries, if possible; critical facilities will be located outside the 500-year floodplain (FW-532 and FW-533). New road construction will be minimized through improvement of existing roads (FW-556). Best Management Practices will be adhered to for road development and maintenance (FW-559). Short-term impacts of road construction / reconstruction on water quality will be reduced by monitoring and controlling construction / reconstruction activities within and immediately adjacent to water courses during periods of low flow and ensuring that effective erosion control measures are used during construction / reconstruction of major drainage structures and approaches (FW-563). Impacts on wildlife habitat resulting from road location and road construction / reconstruction will be reduced as much as possible; where options exist, road location will be chosen which minimizes loss of mast-producing vegetation (FW-563). Much of the Forest will be within a RCW HMA and timber-management activities will be

TABLE J–2, SPECIES WITH LOW VIABILITY FINDINGS

restricted in RCW HMA areas which will be beneficial to bears (FW-819 through FW-845).

Timber management activities will be greatly restricted in SHPZS, RAPZS, and wetland areas which will be greatly beneficial to bears (FW-510 through FW-513 and FW-515 through FW-518). Management activities in general will be restricted in SHPZ, RAPZS, and wetland areas which will be greatly beneficial to bears (FW-510 through FW-536). Wilderness "management" would result in late successional habitat types which would benefit bears (Management Area guidelines MA-13-19, MA-13-20, and MA-13-58).

Viability finding: Viability of the Louisiana black bear on the Kisatchie National Forest is low based on the State population status ranking code (imperiled in the State because of rarity). The species is demonstrably secure globally; the subspecies is vulnerable to extinction throughout its range.

C-Big brown bat
Eptesicus fuscus

Provisions in Forest Plan: General provisions include Forestwide Goal 2, Objectives 2-1 through 2-4 which address the restoration and maintenance of biologically diverse ecosystems and habitat conditions for viable populations of all native and desirable nonnative plant, wildlife, fish, and aquatic species. Forestwide guidelines FW-008, FW-009, FW-062, FW-066, FW-067, FW-342 through FW-345, FW-510 through FW-519, FW-523, FW-601, FW-702, FW-703, and FW-705 address environmental analysis and documentation requirements; prescribed fire timing, spacing, distribution, disruption during the nesting season, and frequency of fire in hardwood habitats; management restrictions in streamside and riparian area protection zones; and wildlife habitat improvement activities (including the creation of snags). The big brown bat is most closely associated with small stream riparian habitats that are generally associated with intermittent and smaller perennial streams with relatively narrow floodplains, including the associated mesic sideslope habitats. These areas are embedded within all landtype associations that occur on the Forest. Additional guidance regarding the management of the areas in which this species occurs most frequently is presented in the streamside habitat protection zone guidelines for all Management Areas.

Viability finding: Viability of the big brown bat on the Kisatchie National Forest is low based on the State population status ranking code (imperiled in the State because of rarity). The species is demonstrably secure globally.

C-Long-tailed weasel
Mustela frenata

Provisions in Forest Plan: General provisions include Forestwide Goal 2, Objectives 2-1 through 2-4 which address the restoration and maintenance of biologically diverse ecosystems and habitat conditions for viable populations of all native and desirable nonnative plant, wildlife, fish, and aquatic species. Forestwide guidelines FW-008, FW-009, FW-062, FW-066, FW-342, FW-344, FW-345, FW-601, FW-702, and FW-703 address environmental analysis and documentation requirements; prescribed fire timing, spacing, distribution, and disruption during the nesting season; off-road vehicle restrictions; mechanical site preparation restrictions; and wildlife habitat improvement activities. Due to their open-canopied conditions and thick grass-forb understory, the long-tailed weasel is most closely associated with landtype associations (LTAs) 1, 2, 5, and 6. These LTAs cover extensive portions of the Vernon and Evangeline Units of the Calcasieu District, and the Kisatchie, Catahoula and Winn Districts (FEIS, pages 3-118 to 3-119). Management areas 3, 5, 6 and 9 goals, desired future conditions, and standards and guidelines would provide additional general guidance regarding the management of the areas in which this species occurs most frequently.

TABLE J–2, SPECIES WITH LOW VIABILITY FINDINGS

Viability finding: Viability of the long-tailed weasel on the Kisatchie National Forest is low based on the State population status ranking code (imperiled in the State because of rarity). The species is demonstrably secure globally.

C-Hispid pocket mouse
Perognathus hispidus

Provisions in Forest Plan: General provisions include Forestwide Goal 2, Objectives 2-1 through 2-4 which address the restoration and maintenance of biologically diverse ecosystems and habitat conditions for viable populations of all native and desirable nonnative plant, wildlife, fish, and aquatic species. Forestwide guidelines FW-008, FW-009, FW-062, FW-066, FW-342, FW-344, FW-345, FW-601, FW-702, and FW-703 address environmental analysis and documentation requirements; prescribed fire timing, spacing, distribution, and disruption during the nesting season; off-road vehicle restrictions; mechanical site preparation restrictions; and wildlife habitat improvement activities. Due to their open-canopied conditions and thick grass-forb understory, the hispid pocket mouse is most closely associated with landtype associations (LTAs) 1, 2, 5, and 6. These LTAs cover extensive portions of the Vernon and Evangeline Units of the Calcasieu District, and the Kisatchie, Catahoula and Winn Districts (FEIS, pages 3-118 to 3-119). Management areas 3, 5, 6 and 9 goals, desired future conditions, and standards and guidelines would provide additional general guidance regarding the management of the areas in which this species occurs most frequently.

Viability finding: Viability of the hispid pocket mouse on the Kisatchie National Forest is low based on the State population status ranking code (imperiled in the State because of rarity). The species is demonstrably secure globally.

REPTILES

S-Louisiana pine snake
Pituophis melanoleucus ruthveni

Provisions in Forest Plan: General provisions include Forestwide Goal 2, Objectives 2-1 through 2-4 which address the restoration and maintenance of biologically diverse ecosystems and habitat conditions for viable populations of all native and desirable nonnative plant, wildlife, fish, and aquatic species. Forestwide guidelines FW-008, FW-009, FW-062, FW-066, FW-342, FW-344, FW-345, FW-601, FW-702, and FW-703 address environmental analysis and documentation requirements; prescribed fire timing, spacing, distribution, and disruption during the nesting season; off-road vehicle restrictions; mechanical site preparation restrictions; and wildlife habitat improvement activities. Due to their open-canopied conditions and thick grass-forb understory, the Louisiana pine snake is most closely associated with landtype associations (LTAs) 1, 2, 5, and 6. These LTAs cover extensive portions of the Vernon and Evangeline Units of the Calcasieu District, and the Kisatchie, Catahoula and Winn Districts (FEIS, pages 3-118 to 3-119). Management areas 3, 5, 6 and 9 goals, desired future conditions, and standards and guidelines would provide additional general guidance regarding the management of the areas in which this species occurs most frequently.

Viability finding: Viability of the Louisiana pine snake on the Kisatchie National Forest is low based on the State population status ranking code (rare or uncommon in the State). The species is vulnerable to extinction throughout its range.

TABLE J–2, SPECIES WITH LOW VIABILITY FINDINGS

AMPHIBIANS

S-Louisiana slimy salamander
Plethodon kisatchie

Provisions in Forest Plan: General provisions include Forestwide Goal 2, Objectives 2-1 through 2-4 which address the restoration and maintenance of biologically diverse ecosystems and habitat conditions for viable populations of all native and desirable nonnative plant, wildlife, fish, and aquatic species. Forestwide guidelines FW-008, FW-009, FW-062, FW-066, FW-067, FW-342 through FW-345, FW-510 through FW-519, FW-601, FW-702, and FW-703 address environmental analysis and documentation requirements; prescribed fire timing, spacing, distribution, disruption during the nesting season, and frequency of fire in hardwood habitats; off-road vehicle restrictions; management restrictions in streamside and riparian area protection zones; mechanical site preparation restrictions; and wildlife habitat improvement activities. The Louisiana slimy salamander is most closely associated with small stream riparian habitats that are generally associated with intermittent and smaller perennial streams with relatively narrow floodplains and including the associated mesic sideslope habitats (FEIS, page 3-45). These areas are embedded within all landtype associations that occur on the Forest. Additional guidance regarding the management of the areas in which this species occurs most frequently is presented in the streamside habitat protection zone guidelines for all Management Areas.

Viability finding: Viability of the Louisiana slimy salamander on the Kisatchie National Forest is low based on the State population status ranking code (critically imperiled in the State). The species is vulnerable to extinction throughout its range.

C-Southern red-backed salamander
Plethodon serratus

Provisions in Forest Plan: General provisions include Forestwide Goal 2, Objectives 2-1 through 2-4 which address the restoration and maintenance of biologically diverse ecosystems and habitat conditions for viable populations of all native and desirable nonnative plant, wildlife, fish, and aquatic species. Forestwide guidelines FW-008, FW-009, FW-062, FW-066, FW-342, FW-344, FW-345, FW-601, FW-702, and FW-703 address environmental analysis and documentation requirements; prescribed fire timing, spacing, distribution, and disruption during the nesting season; off-road vehicle restrictions; mechanical site preparation restrictions; and wildlife habitat improvement activities. Due to the presence of pine and hardwood forested hills with sandstone outcropping, the southern red-backed salamander is most closely associated with landtype association (LTA) 2 (FEIS, page 3-129). This LTA covers extensive portions of the Kisatchie District (FEIS, page 3-119). Management areas 3, 5, 11 and 13 goals, desired future conditions, and standards and guidelines would provide additional general guidance regarding the management of the areas in which this species occurs most frequently.

Viability finding: Viability of the southern red-backed salamander on the Kisatchie National Forest is low based on the State population status ranking code (critically imperiled in the State). The species is demonstrably secure globally.

TABLE J–2, SPECIES WITH LOW VIABILITY FINDINGS

FISH

S-Western sand darter
Etheostoma clarum

Provisions in Forest Plan: General provisions include Forestwide Goals 1 and 2, Objectives 1-2, 2-2, 2-3, 2-5, and 2-6 which address the protection and conservation of water resources and the restoration and maintenance of biologically diverse ecosystems and habitat conditions for viable populations of all native and desirable nonnative plant, wildlife, fish, and aquatic species. Forestwide guidelines FW-008, FW-009, FW-067, FW-071, FW-077, FW-079, FW-080, FW-083, FW-084, FW-093 through FW-102, FW-342, FW-344, FW-345, FW-452, FW-454, FW-510 through FW-536, FW-560, FW-561, FW-601, FW-633, FW-651, and FW-847 address environmental analysis and documentation requirements; prescribed fire frequency, fireline construction and placement in streamside and riparian areas, use of fire in wetland areas; management of aquatic species and communities; off-road vehicle restrictions; protection or improvement of water quality; management restrictions in streamside, riparian, and wetland areas; road construction and reconstruction requirements; mechanical site preparation restrictions; herbicide use restrictions; and habitat improvement activities. The western sand darter is most closely associated with large stream riparian habitats that are generally associated with large perennial streams with broad floodplains and may include bottomland hardwood forest and cypress swamps (FEIS, page 3-45). These areas are embedded within all landtype associations that occur on the Forest. Additional guidance regarding the management of the areas in which this species occurs most frequently is presented in the streamside habitat protection zone guidelines for all Management Areas.

Viability finding: Viability of the western sand darter on the Kisatchie National Forest is low based on the State population status ranking code (imperiled in the State because of rarity). The species is vulnerable to extinction throughout its range.

C-Blue sucker
Cycleptus elongatus

Provisions in Forest Plan: General provisions include Forestwide Goals 1 and 2, Objectives 1-2, 2-2, 2-3, 2-5, and 2-6 which address the protection and conservation of water resources and the restoration and maintenance of biologically diverse ecosystems and habitat conditions for viable populations of all native and desirable nonnative plant, wildlife, fish, and aquatic species. Forestwide guidelines FW-008, FW-009, FW-067, FW-071, FW-077, FW-079, FW-080, FW-083, FW-084, FW-093 through FW-102, FW-342, FW-344, FW-345, FW-452, FW-454, FW-510 through FW-536, FW-560, FW-561, FW-601, FW-633, FW-651, and FW-847 address environmental analysis and documentation requirements; prescribed fire frequency, fireline construction and placement in streamside and riparian areas, use of fire in wetland areas; management of aquatic species and communities; off-road vehicle restrictions; protection or improvement of water quality; management restrictions in streamside, riparian, and wetland areas; road construction and reconstruction requirements; mechanical site preparation restrictions; herbicide use restrictions; and habitat improvement activities. The blue sucker is most closely associated with large stream riparian habitats (and impoundments) that are generally associated with large perennial streams with broad floodplains and may include bottomland hardwood forest and cypress swamps (FEIS, page 3-45). These areas are embedded within all landtype associations that occur on the Forest. Additional guidance regarding the management of the areas in which this species occurs most frequently is presented in the streamside habitat protection zone guidelines for all Management Areas.

TABLE J–2, SPECIES WITH LOW VIABILITY FINDINGS

Viability finding: Viability of the blue sucker on the Kisatchie National Forest is low based on the State population status ranking code (rare or uncommon in the State). The species is apparently secure globally.

S-Bluehead shiner
Notropis hubbsi

Provisions in Forest Plan: General provisions include Forestwide Goals 1 and 2, Objectives 1-2, 2-2, 2-3, 2-5, and 2-6 which address the protection and conservation of water resources and the restoration and maintenance of biologically diverse ecosystems and habitat conditions for viable populations of all native and desirable nonnative plant, wildlife, fish, and aquatic species. Forestwide guidelines FW-008, FW-009, FW-067, FW-071, FW-077, FW-079, FW-080, FW-083, FW-084, FW-093 through FW-102, FW-342, FW-344, FW-345, FW-452, FW-454, FW-510 through FW-536, FW-560, FW-561, FW-601, FW-633, FW-651, and FW-847 address environmental analysis and documentation requirements; prescribed fire frequency, fireline construction and placement in streamside and riparian areas, use of fire in wetland areas; management of aquatic species and communities; off-road vehicle restrictions; protection or improvement of water quality; management restrictions in streamside, riparian, and wetland areas; road construction and reconstruction requirements; mechanical site preparation restrictions; herbicide use restrictions; and habitat improvement activities. The bluehead shiner is most closely associated with small stream riparian habitats (and oxbow lakes) that are generally associated with intermittent and smaller perennial streams with relatively narrow floodplains and include the associated mesic sideslope habitats (FEIS, page 3-45). These areas are embedded within all landtype associations that occur on the Forest. Additional guidance regarding the management of the areas in which this species occurs most frequently is presented in the streamside habitat protection zone guidelines for all Management Areas.

Viability finding: Viability of the bluehead shiner on the Kisatchie National Forest is low based on the State population status ranking code (imperiled in the State because of rarity). The species is vulnerable to extinction throughout its range.

C-Paddlefish
Polyodon spathula

Provisions in Forest Plan: General provisions include Forestwide Goals 1 and 2, Objectives 1-2, 2-2, 2-3, 2-5, and 2-6 which address the protection and conservation of water resources and the restoration and maintenance of biologically diverse ecosystems and habitat conditions for viable populations of all native and desirable nonnative plant, wildlife, fish, and aquatic species. Forestwide guidelines FW-008, FW-009, FW-067, FW-071, FW-077, FW-079, FW-080, FW-083, FW-084, FW-093 through FW-102, FW-342, FW-344, FW-345, FW-452, FW-454, FW-510 through FW-536, FW-560, FW-561, FW-601, FW-633, FW-651, and FW-847 address environmental analysis and documentation requirements; prescribed fire frequency, fireline construction and placement in streamside and riparian areas, use of fire in wetland areas; management of aquatic species and communities; off-road vehicle restrictions; protection or improvement of water quality; management restrictions in streamside, riparian, and wetland areas; road construction and reconstruction requirements; mechanical site preparation restrictions; herbicide use restrictions; and habitat improvement activities. The paddlefish is most closely associated with large stream riparian habitats (and oxbow and floodplain lakes) that are generally associated with large perennial streams with broad floodplains and may include bottomland hardwood forest and cypress swamps (FEIS, page 3-45). These areas are embedded within all landtype associations that occur on the Forest. Additional guidance regarding the management of the areas in which this species occurs most frequently is presented in the streamside habitat protection zone guidelines for all Management Areas.

TABLE J–2, SPECIES WITH LOW VIABILITY FINDINGS

Viability finding: Viability of the paddlefish on the Kisatchie National Forest is low based on the State population status ranking code (imperiled in the State because of rarity). The species is apparently secure globally.

C-Bigscale logperch
Percina macrolepida

Provisions in Forest Plan: General provisions include Forestwide Goals 1 and 2, Objectives 1-2, 2-2, 2-3, 2-5, and 2-6 which address the protection and conservation of water resources and the restoration and maintenance of biologically diverse ecosystems and habitat conditions for viable populations of all native and desirable nonnative plant, wildlife, fish, and aquatic species. Forestwide guidelines FW-008, FW-009, FW-067, FW-071, FW-077, FW-079, FW-080, FW-083, FW-084, FW-093 through FW-102, FW-342, FW-344, FW-345, FW-452, FW-454, FW-510 through FW-536, FW-560, FW-561, FW-601, FW-633, FW-651, and FW-847 address environmental analysis and documentation requirements; prescribed fire frequency, fireline construction and placement in streamside and riparian areas, use of fire in wetland areas; management of aquatic species and communities; off-road vehicle restrictions; protection or improvement of water quality; management restrictions in streamside, riparian, and wetland areas; road construction and reconstruction requirements; mechanical site preparation restrictions; herbicide use restrictions; and habitat improvement activities. The bigscale logperch is most closely associated with small stream riparian habitats that are generally associated with intermittent and smaller perennial streams with relatively narrow floodplains and include the associated mesic sideslope habitats (FEIS, page 3-45). These areas are embedded within all landtype associations that occur on the Forest. Additional guidance regarding the management of the areas in which this species occurs most frequently is presented in the streamside habitat protection zone guidelines for all Management Areas.

Viability finding: Viability of the bigscale logperch on the Kisatchie National Forest is low based on the State population status ranking code (critically imperiled in the State). The species is apparently secure globally.

MUSSELS

S-Southern hickorynut
Obovaria jacksoniana

Provisions in Forest Plan: General provisions include Forestwide Goals 1 and 2, Objectives 1-2, 2-2, 2-3, 2-5, and 2-6 which address the protection and conservation of water resources and the restoration and maintenance of biologically diverse ecosystems and habitat conditions for viable populations of all native and desirable nonnative plant, wildlife, fish, and aquatic species. Forestwide guidelines FW-008, FW-009, FW-067, FW-071, FW-077, FW-079, FW-080, FW-083, FW-084, FW-093 through FW-102, FW-342, FW-344, FW-345, FW-452, FW-454, FW-510 through FW-536, FW-560, FW-561, FW-601, FW-633, FW-651, and FW-847 address environmental analysis and documentation requirements; prescribed fire frequency, fireline construction and placement in streamside and riparian areas, use of fire in wetland areas; management of aquatic species and communities; off-road vehicle restrictions; protection or improvement of water quality; management restrictions in streamside, riparian, and wetland areas; road construction and reconstruction requirements; mechanical site preparation restrictions; herbicide use restrictions; and habitat improvement activities. The southern hickorynut is most closely associated with large stream riparian habitats that are generally associated with large perennial streams with broad floodplains and may include bottomland hardwood forest and cypress

TABLE J–2, SPECIES WITH LOW VIABILITY FINDINGS

swamps (FEIS, page 3-45). These areas are embedded within all landtype associations that occur on the Forest. Additional guidance regarding the management of the areas in which this species occurs most frequently is presented in the streamside habitat protection zone guidelines for all Management Areas.

Viability finding: Viability of the southern hickorynut on the Kisatchie National Forest is low based on the State population status ranking code (critically imperiled in the State). The species is critically imperiled; especially vulnerable to extinction.

S-Southern creekmussel
Strophitus subvexus

Provisions in Forest Plan: General provisions include Forestwide Goals 1 and 2, Objectives 1-2, 2-2, 2-3, 2-5, and 2-6 which address the protection and conservation of water resources and the restoration and maintenance of biologically diverse ecosystems and habitat conditions for viable populations of all native and desirable nonnative plant, wildlife, fish, and aquatic species. Forestwide guidelines FW-008, FW-009, FW-067, FW-071, FW-077, FW-079, FW-080, FW-083, FW-084, FW-093 through FW-102, FW-342, FW-344, FW-345, FW-452, FW-454, FW-510 through FW-536, FW-560, FW-561, FW-601, FW-633, FW-651, and FW-847 address environmental analysis and documentation requirements; prescribed fire frequency, fireline construction and placement in streamside and riparian areas, use of fire in wetland areas; management of aquatic species and communities; off-road vehicle restrictions; protection or improvement of water quality; management restrictions in streamside, riparian, and wetland areas; road construction and reconstruction requirements; mechanical site preparation restrictions; herbicide use restrictions; and habitat improvement activities. The southern creekmussel is associated with small-to-large stream riparian habitats that are associated with small-to-large perennial streams with relatively narrow to broad floodplains and may include mesic sideslope habitats, bottomland hardwood forest, and cypress swamps. These areas are embedded within all landtype associations that occur on the Forest. Additional guidance regarding the management of the areas in which this species occurs most frequently is presented in the streamside habitat protection zone guidelines for all Management Areas.

Viability finding: Viability of the southern creekmussel on the Kisatchie National Forest is low based on the State population status ranking code (critically imperiled in the State). The species is imperiled and very vulnerable to extinction throughout its range.

C-Squawfoot
Strophitus undulatus

Provisions in Forest Plan: General provisions include Forestwide Goals 1 and 2, Objectives 1-2, 2-2, 2-3, 2-5, and 2-6 which address the protection and conservation of water resources and the restoration and maintenance of biologically diverse ecosystems and habitat conditions for viable populations of all native and desirable nonnative plant, wildlife, fish, and aquatic species. Forestwide guidelines FW-008, FW-009, FW-067, FW-071, FW-077, FW-079, FW-080, FW-083, FW-084, FW-093 through FW-102, FW-342, FW-344, FW-345, FW-452, FW-454, FW-510 through FW-536, FW-560, FW-561, FW-601, FW-633, FW-651, and FW-847 address environmental analysis and documentation requirements; prescribed fire frequency, fireline construction and placement in streamside and riparian areas, use of fire in wetland areas; management of aquatic species and communities; off-road vehicle restrictions; protection or improvement of water quality; management restrictions in streamside, riparian, and wetland areas; road construction and reconstruction requirements; mechanical site preparation restrictions; herbicide use restrictions; and habitat improvement activities. The squawfoot is associated with small-to-large stream riparian habitats that are associated with small-to-large perennial streams with relatively narrow to broad floodplains and may include mesic sideslope habitats,

TABLE J–2, SPECIES WITH LOW VIABILITY FINDINGS

bottomland hardwood forest, and cypress swamps. These areas are embedded within all landtype associations that occur on the Forest. Additional guidance regarding the management of the areas in which this species occurs most frequently is presented in the streamside habitat protection zone guidelines for all Management Areas.

Viability finding: Viability of the squawfoot on the Kisatchie National Forest is low based on the State population status ranking code (imperiled in the State because of rarity). The species is demonstrably secure globally.

INSECTS

S-Yellow brachycercus mayfly
Brachycercus flavus

Provisions in Forest Plan: General provisions include Forestwide Goals 1 and 2, Objectives 1-2, 2-2, 2-3, 2-5, and 2-6 which address the protection and conservation of water resources and the restoration and maintenance of biologically diverse ecosystems and habitat conditions for viable populations of all native and desirable nonnative plant, wildlife, fish, and aquatic species. Forestwide guidelines FW-008, FW-009, FW-067, FW-071, FW-077, FW-079, FW-080, FW-083, FW-084, FW-093 through FW-102, FW-342, FW-344, FW-345, FW-452, FW-454, FW-510 through FW-536, FW-560, FW-561, FW-601, FW-633, FW-651, and FW-847 address environmental analysis and documentation requirements; prescribed fire frequency, fireline construction and placement in streamside and riparian areas, use of fire in wetland areas; management of aquatic species and communities; off-road vehicle restrictions; protection or improvement of water quality; management restrictions in streamside, riparian, and wetland areas; road construction and reconstruction requirements; mechanical site preparation restrictions; herbicide use restrictions; and habitat improvement activities. The yellow brachycercus mayfly is most closely associated with small stream riparian habitats that are generally associated with intermittent and smaller perennial streams with relatively narrow floodplains and include the associated mesic sideslope habitats (FEIS, page 3-45). These areas are embedded within all landtype associations that occur on the Forest. Additional guidance regarding the management of the areas in which this species occurs most frequently is presented in the streamside habitat protection zone guidelines for all Management Areas.

Viability finding: Viability of the yellow brachycercus mayfly on the Kisatchie National Forest is low based on the State population status ranking code (critically imperiled in the State; especially vulnerable to extirpation from the State). The species is possibly extinct; still hope of rediscovery.

C-Caddisfly
Diplectrona rossi

Provisions in Forest Plan: General provisions include Forestwide Goals 1 and 2, Objectives 1-2, 2-2, 2-3, 2-5, and 2-6 which address the protection and conservation of water resources and the restoration and maintenance of biologically diverse ecosystems and habitat conditions for viable populations of all native and desirable nonnative plant, wildlife, fish, and aquatic species. Forestwide guidelines FW-008, FW-009, FW-067, FW-071, FW-077, FW-079, FW-080, FW-083, FW-084, FW-093 through FW-102, FW-342, FW-344, FW-345, FW-452, FW-454, FW-510 through FW-536, FW-560, FW-561, FW-601, FW-633, FW-651, and FW-847 address environmental analysis and documentation requirements; prescribed fire frequency, fireline construction and placement in streamside and riparian areas, use of fire in wetland areas; management of aquatic species and communities; off-road vehicle restrictions; protection or improvement of water quality; management

TABLE J–2, SPECIES WITH LOW VIABILITY FINDINGS

restrictions in streamside, riparian, and wetland areas; road construction and reconstruction requirements; mechanical site preparation restrictions; herbicide use restrictions; and habitat improvement activities. The caddisfly is most closely associated with small stream riparian habitats that are generally associated with intermittent and smaller perennial streams with relatively narrow floodplains and include the associated mesic sideslope habitats (FEIS, page 3-45). These areas are embedded within all landtype associations that occur on the Forest. Additional guidance regarding the management of the areas in which this species occurs most frequently is presented in the streamside habitat protection zone guidelines for all Management Areas.

Viability finding: Viability of the caddisfly on the Kisatchie National Forest is low based on the State population status ranking code (critically imperiled in the State; especially vulnerable to extirpation from the State). The species is possibly in peril, but status is uncertain.

S-Schoolhouse Springs stonefly
Leuctra szczytkoki

Provisions in Forest Plan: General provisions include Forestwide Goals 1 and 2, Objectives 1-2, 2-2, 2-3, 2-5, and 2-6 which address the protection and conservation of water resources and the restoration and maintenance of biologically diverse ecosystems and habitat conditions for viable populations of all native and desirable nonnative plant, wildlife, fish, and aquatic species. Forestwide guidelines FW-008, FW-009, FW-067, FW-071, FW-077, FW-079, FW-080, FW-083, FW-084, FW-093 through FW-102, FW-342, FW-344, FW-345, FW-452, FW-454, FW-510 through FW-536, FW-560, FW-561, FW-601, FW-633, FW-651, and FW-847 address environmental analysis and documentation requirements; prescribed fire frequency, fireline construction and placement in streamside and riparian areas, use of fire in wetland areas; management of aquatic species and communities; off-road vehicle restrictions; protection or improvement of water quality; management restrictions in streamside, riparian, and wetland areas; road construction and reconstruction requirements; mechanical site preparation restrictions; herbicide use restrictions; and habitat improvement activities. The Schoolhouse Springs stonefly is most closely associated with small stream riparian habitats that are generally associated with intermittent and smaller perennial streams with relatively narrow floodplains and include the associated mesic sideslope habitats (FEIS, page 3-45). These areas are embedded within all landtype associations that occur on the Forest. Additional guidance regarding the management of the areas in which this species occurs most frequently is presented in the streamside habitat protection zone guidelines for all Management Areas.

Viability finding: Viability of the Schoolhouse Springs stonefly on the Kisatchie National Forest is low based on the State population status ranking code (critically imperiled in the State; especially vulnerable to extirpation from the State). The species is critically imperiled; especially vulnerable to extinction.

CRUSTACEANS

C-Teche painted crawfish
Orconectes hathaway

Provisions in Forest Plan: General provisions include Forestwide Goals 1 and 2, Objectives 1-2, 2-2, 2-3, 2-5, and 2-6 which address the protection and conservation of water resources and the restoration and maintenance of biologically diverse ecosystems and habitat conditions for viable populations of all native and

TABLE J–2, SPECIES WITH LOW VIABILITY FINDINGS

desirable nonnative plant, wildlife, fish, and aquatic species. Forestwide guidelines FW-008, FW-009, FW-067, FW-071, FW-077, FW-079, FW-080, FW-083, FW-084, FW-093 through FW-102, FW-342, FW-344, FW-345, FW-452, FW-454, FW-510 through FW-536, FW-560, FW-561, FW-601, FW-633, FW-651, and FW-847 address environmental analysis and documentation requirements; prescribed fire frequency, fireline construction and placement in streamside and riparian areas, use of fire in wetland areas; management of aquatic species and communities; off-road vehicle restrictions; protection or improvement of water quality; management restrictions in streamside, riparian, and wetland areas; road construction and reconstruction requirements; mechanical site preparation restrictions; herbicide use restrictions; and habitat improvement activities. The Teche painted crawfish is most closely associated with small stream riparian habitats that are generally associated with intermittent and smaller perennial streams with relatively narrow floodplains and include the associated mesic sideslope habitats (FEIS, page 3-45). These areas are embedded within all landtype associations that occur on the Forest. Additional guidance regarding the management of the areas in which this species occurs most frequently is presented in the streamside habitat protection zone guidelines for all Management Areas.

Viability finding: Viability of the Teche painted crawfish on the Kisatchie National Forest is low based on the State population status ranking code (rare or uncommon in the State; especially vulnerable to extirpation from the State). The species is vulnerable to extinction throughout its range.

C-Kisatchie painted crawfish
Orconectes maletae

Provisions in Forest Plan: General provisions include Forestwide Goals 1 and 2, Objectives 1-2, 2-2, 2-3, 2-5, and 2-6 which address the protection and conservation of water resources and the restoration and maintenance of biologically diverse ecosystems and habitat conditions for viable populations of all native and desirable nonnative plant, wildlife, fish, and aquatic species. Forestwide guidelines FW-008, FW-009, FW-067, FW-071, FW-077, FW-079, FW-080, FW-083, FW-084, FW-093 through FW-102, FW-342, FW-344, FW-345, FW-452, FW-454, FW-510 through FW-536, FW-560, FW-561, FW-601, FW-633, FW-651, and FW-847 address environmental analysis and documentation requirements; prescribed fire frequency, fireline construction and placement in streamside and riparian areas, use of fire in wetland areas; management of aquatic species and communities; off-road vehicle restrictions; protection or improvement of water quality; management restrictions in streamside, riparian, and wetland areas; road construction and reconstruction requirements; mechanical site preparation restrictions; herbicide use restrictions; and habitat improvement activities. The Kisatchie painted crawfish is most closely associated with small stream riparian habitats that are generally associated with intermittent and smaller perennial streams with relatively narrow floodplains and include the associated mesic sideslope habitats (FEIS, page 3-45). These areas are embedded within all landtype associations that occur on the Forest. Additional guidance regarding the management of the areas in which this species occurs most frequently is presented in the streamside habitat protection zone guidelines for all Management Areas.

Viability finding: Viability of the Kisatchie painted crawfish on the Kisatchie National Forest is low based on the State population status ranking code (imperiled in the State because of rarity). The species is imperiled and very vulnerable to extinction throughout its range.

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