United States
Department of
Agriculture

Forest Service
Southern Region

Final Environmental Impact Statement for the Revised Land and Resource Plan

National Forests in Alabama

Management Bulletin R8-MB 112B

January 2004

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National Forests in Alabama

Bankhead NF – Lawrence • Franklin •Winston

Conecuh NF - Covington • Escambia

Talladega NF – Cleburne • Clay • Talladega • Calhoun • Hale • Perry • Chilton • Bibb • Dallas • Tuscaloosa

Tuskegee NF – Macon

Responsible Agency: USDA Forest Service

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CHAPTER 1

Purpose and Need

The purpose of this action is to revise the *Land and Resource Management Plan for the National Forests in Alabama* (Forest Plan). The revised Forest Plan will guide all natural resource management activities on the National Forests in Alabama to meet the objective of Federal law, regulations, and policy. The action will also affect a wide range of socioeconomic factors, as they relate to natural resources. The existing Forest Plan for the National Forests in Alabama was approved March 10, 1986. As of December 1, 2002, there were 19 amendments to the existing Forest Plan. Revision of the Forest Plan is needed to satisfy regulation requirements and to address new information about the forest and its uses.

The regulations implementing the National Forest Management Act (NFMA) instruct the Regional Forester to make periodic revisions to forest plans and to provide the basis for any revision. The following section describes the need to change the 1986 Forest Plan and presents the basis for the changes within the context of the regulatory requirements.

The instructions to revise forest plans and the basis for revision, are found in the Code of Federal Regulations 36 CFR 219.10(g).

This Final Environmental Impact Statement (FEIS) describes the analysis of several alternatives for revising the Forest Plan and discloses the environmental effects of these alternatives. The FEIS is guided by the implementing regulations of the National Environmental Policy Act (NEPA) found in the Council of Environmental Quality Regulations, Title 40, Code of Federal Regulations (CFR), Part 1500. The companion document to this FEIS is the Revised Forest Land and Resource Management Plan—a detailed presentation of the selected alternative.

FOREST PLAN DECISIONS

National Forest System resource allocation and management decisions are made in two stages. The first stage is the Forest Plan, which allocates lands and resources to various uses or conditions by establishing management areas and management prescriptions for the land and resources within the plan area. The second stage is approval of project decisions.

Forest Plans do not compel the agency to undertake any site-specific projects; rather, they establish overall goals and objectives (or desired resource conditions) that individual national forests will strive to meet. Forest Plans also establish limitations on management actions and conditions, during project level decision-making and implementation.

The primary decisions made in a Forest Plan include:

- Establishment of the forest-wide multiple-use goals and objectives (36 CFR 219.11(b)).
- Establishment of forest-wide management requirements (36 CFR 219.13 to 219.27).
- Establishment of multiple-use prescriptions and associated standards and guidelines for each management area (36 CFR 219.11(c)).
- Determination of land that is suitable for the production of timber (16 U.S.C. 1604(k) and 36 CFR 219.14).
- Establishment of allowable sale quantity for timber within a time frame specified in the Plan (36 CFR 219.16).
- Establishment of monitoring and evaluation requirements (36 CFR 219.11(d)).
- Recommendation of roadless areas as potential wilderness areas (36 CFR 219.17).
- Where applicable, designate lands administratively available for oil and gas leasing and, when appropriate, authorize the Bureau of Land Management to offer specific lands for leasing (36 CFR 228.102 (d) and (e)).

The authorization of site-specific activities within a plan area occurs through project level decision-making, the implementation stage of forest planning. Project level decision-making must comply with NEPA procedures and must include a determination that the project is consistent with the Forest Plan.

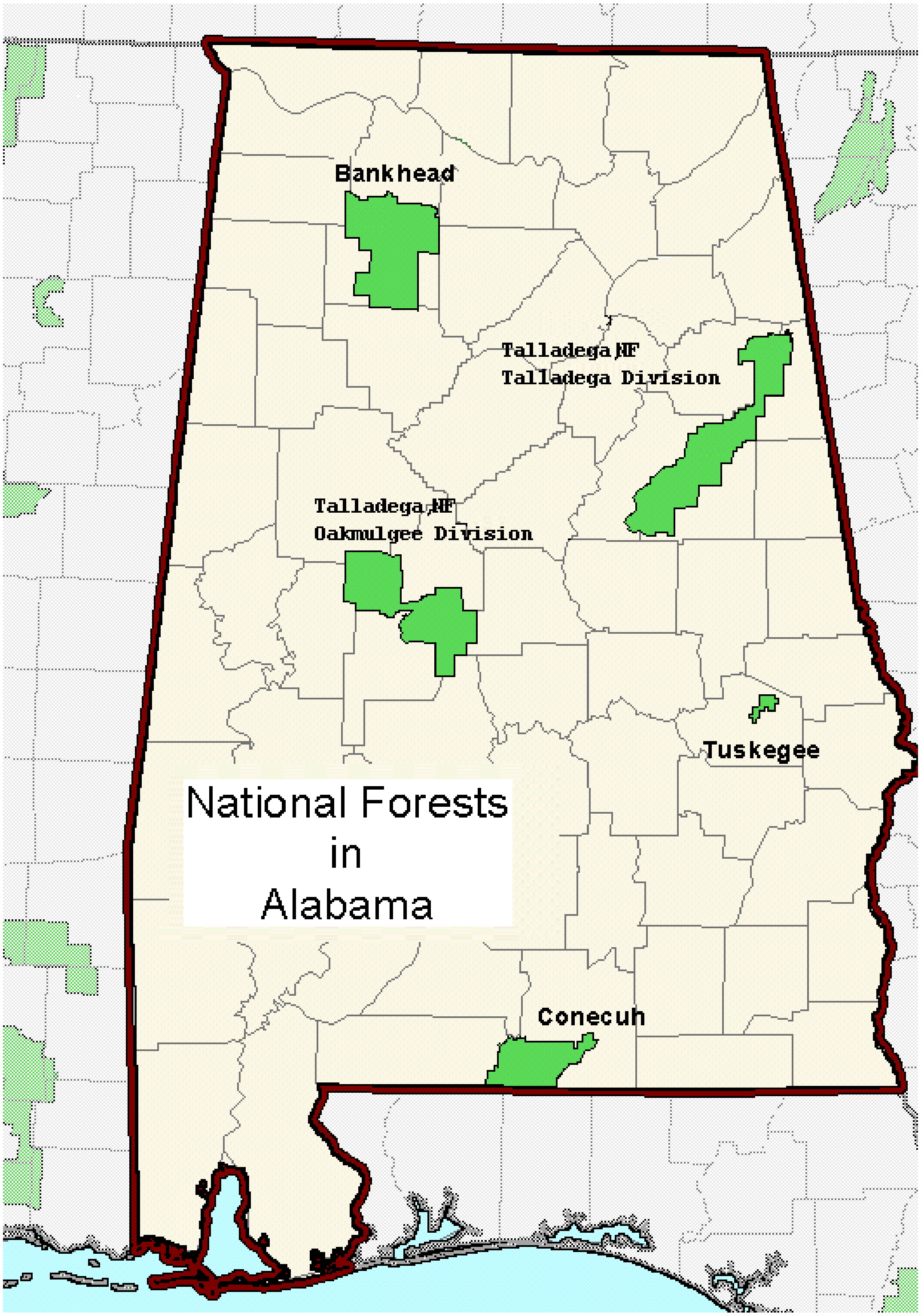
The following Environmental Impact Statements contain environmental analyses that are not repeated in this EIS, but provide supporting documentation for some of the forest plan decisions.

- *Final Environmental Impact Statement for the Management of the Red-cockaded Woodpecker and Its Habitat on National Forests in the Southern Region* (RCW EIS) (Atlanta, Georgia: USDA Forest Service, Southern Region, June 1995)
- *Final Environmental Impact Statement for the Suppression of the Southern Pine Beetle* (Atlanta, Georgia: USDA Forest Service, Southern Region, April 1987)
- *Final Environmental Impact Statement for Vegetation Management in the Appalachian Mountains* (Atlanta, Georgia: USDA Forest Service, Southern Region, February 1989) as Supplemented, October 2002
- *Final Environmental Impact Statement for Vegetation Management in the Coastal Plain/Piedmont* (Atlanta, Georgia: USDA Forest Service, Southern Region, February 1989) as Supplemented, October 2002
- *Final Environmental Impact Statement for Forest Service Roadless Area Conservation* (USDA Forest Service, Washington Office, November 2000)

FOREST PROFILE

The National Forests in Alabama consist of four National Forests, divided into six ranger districts. The **Bankhead National Forest** is located in the northwestern part of the state in Lawrence, Winston and Franklin Counties. The **Conecuh National Forest** is located in the southern part of the state along the Alabama/Florida line in Covington and Escambia Counties. The **Talladega National Forest** is divided into three Ranger Districts. The Oakmulgee District lies in the central part of the state, east of Tuscaloosa in Hale, Tuscaloosa, Bibb, Perry, Chilton and Dallas Counties. The Shoal Creek and Talladega Districts are located in the northeastern part of the state in Cherokee, Calhoun, Cleburne, Talladega, Clay and Coosa Counties. The **Tuskegee National Forest** is in the east central part of the state, west of Auburn, in Macon County. The Supervisor's Office is located in Montgomery, Alabama.

These six districts cover approximately 666,000 acres of National Forest System land and are spread across the Southern Appalachian Mountain, Cumberland Plateau, Piedmont and Coastal Plain physiographic regions. The National Forests in Alabama provide a wide variety of diverse habitats and forest conditions.


Bankhead
Talladega NF
Talladega Division
Talladega NF
Oakmulgee Division
Tuskegee
National Forests
in
Alabama
Conecuh

REASON FOR REVISION

The need to revise these plans is driven by the changing conditions identified in the Southern Appalachian Assessment (SAA) and in individual forest assessments, as well as the changing public values associated with these national forests. These conditions and values make it appropriate that all of these Southern Appalachian Forest Plan revisions be done simultaneously. The Forest and Rangeland Renewable Resources Planning Act (RPA), as amended by the National Forest Management Act of 1976 (NFMA), requires that each national forest be managed under a Forest Plan. The purpose of a Forest Plan is to provide an integrated framework for analyzing and approving future site-specific projects and programs. Regulations require that forest plans be revised on a 10-to-15-year cycle, or sooner if conditions or the areas covered by the plan change significantly.

In the Southern Appalachian area, an SAA has been completed. Also completed is the Analysis of the Management Situation (AMS) for the National Forests in Alabama, that identifies what decisions should be reanalyzed or changed in Forest Plan revision.

The main objective of the AMS has been to do the analysis leading to a proposal to change forest management direction. A key part of that analysis, for significant portions of each of the forests, is the SAA. The SAA is culminated in a final summary report and four technical reports, which are now available to the public. It was prepared by the USDA Forest Service (the Southern Region of the National Forest System and the Southern Forest Experiment Station) in cooperation with the other Federal and State agencies that are members of SAMAB (Southern Appalachian Man and the Biosphere) Cooperative. The SAA includes National Forest System lands and private lands in the George Washington/Jefferson, Nantahala-Pisgah, Cherokee, and Chattahoochee National Forests; and parts of the Sumter and Talladega National Forests. It also involves the National Park Service lands in the Great Smoky Mountains National Park, Shenandoah National Park, and Blue Ridge Parkway.

The SAA facilitates an interagency ecological approach to management in the Southern Appalachian area by collecting and analyzing broad-scale biological, physical, and socioeconomic data to facilitate better, more ecologically-based, forest-level resource analysis and management decisions. The SAA is organized around four themes: (1) Terrestrial (including Forest Health and Plant and Animal Resources), (2) Aquatic Resources, (3) Atmospheric Resources, and (4) Social/Cultural/Economic Resources (which includes the Human Dimension, Roadless Areas and Wilderness, Recreation, and Timber Supply and Demand). As the national forests in the Southern Appalachians were each conducting an AMS, they were also providing information for the larger-scale analysis in the SAA. The SAA supports the revision of the Forest Plans by describing how the lands, resources, people, and management of the national forests interrelate within the larger context of the Southern Appalachian area. The SAA, however, is not a “decision document,” and it did not involve the National Environmental Policy Act (NEPA) process. As broad-scale issues were identified at the subregional level (Southern Appalachian Mountain area) in the SAA, the individual national forest’s role in resolving these broad-scale issues becomes a part of the “need for change” at the forest level. Public involvement has been important throughout both of these processes. Continuing public involvement leading to formulation of alternatives for the Forest Plan revision was conducted through the "scoping" period that followed the issuance on August 1, 1996 of the Notice of Intent.

PLANNING PROCESS

Forest planning occurs within the overall framework provided by implementing the regulations of NFMA and NEPA. National, regional, and forest planning form an integrated three-level process. This process requires a continuous flow of information and management direction among three Forest Service administrative levels. Information from forest planning flows upward to the national level for use in the RPA program where, in turn, information flows back to the forest level. In this structure, regional planning is the principal process for conveying information between forest and national levels.

Planning actions required by the NFMA and used in this planning process are:

- Identification of issues, concerns, and opportunities
- Development of planning criteria
- Inventory of resources and data collection
- Analysis of the Management Situation
- Formulation of alternatives
- Estimation of effects of alternatives
- Evaluation of alternatives
- Recommendation of preferred alternative
- Approval and implementation
- Monitoring and evaluation

The results of planning steps 1-8 are described in this document. Refer to Appendix B "Description of the Analysis Process," for more detail on these steps.

This document will be used in future environmental analyses through tiering. Tiering means that environmental analyses and documents prepared for projects arising from the Forest Plan will refer to the Final Environmental Impact Statement.

SOUTHERN APPALACHIAN FOREST COORDINATION

The National Forests in the Southern Appalachian area have applied several efforts to begin their revisions. The main objective was to do the analysis leading to a proposal to change forest management direction. A key part of that analysis, for significant portions of each of the forests, has been the SAA. On February 24, 1995, a Notice of Intent was placed in the *Federal Register* (Vol. 60, No. 37) that identified the relationships between the SAA and the Forest Plan revisions of the National Forests in Alabama, Chattahoochee-Oconee National Forests, Cherokee National Forest, Jefferson National Forest, and Sumter National Forest. Since then, preparation of an Analysis of the Management Situation (AMS) for each forest has included updating resource inventories, defining the current situation, estimating supply capabilities and resource demands, evaluating the results of monitoring, determining the "need for change" (36 CFR 219.12(e)(5)), reviewing previous public comments, and participating in public meetings or other outreach.

PRELIMINARY ISSUES

Public involvement is a key part of the planning process. Providing for public comment helps identify what people want from the national forests in the form of goods, services, and environmental conditions. Issues submitted by the public, as well as from within the Forest Service, guided the need to change current management strategies. Some of the issues listed below were obtained from appeals of the Forest Plans. The public also submitted issues during public involvement efforts conducted by Forest Service personnel during the past 7 years.

In addition to the emerging issues, the need for change was identified through the Analysis of the Management Situation. This analysis also provides a basis for formulating a broad range of reasonable alternatives. A detailed account of the public involvement process is in Appendix A, "Summary of Public Involvement."

The SAA provided key information concerning those portions of the national forests that are within the SAA area that will be used in plan revisions. The SAA teams compiled existing regionwide information on resource status and trends, conditions, and impacts of various land management activities and resource uses that apply to portions of each of the national forests. Several preliminary issues are listed that are associated with the findings of the assessment.

SIGNIFICANT ISSUES

Public comments expressed in letters and appeals, the Chief's directives, and concerns of Forest Service professionals are contained in the 19 issues. These issues guide the direction of the Revised Forest Plan.

Southern Appalachian Forests

The following issues and planning questions were used to develop alternatives for the Forest Plan revision process. The first twelve issues are common to the five National Forests in the Southern Appalachian area that are working together through the revision process.

1. **Terrestrial Plants and Animals and Their Associated Habitats.** How should the national forests retain or restore a diverse mix of terrestrial plant and animal habitat conditions, while meeting public demands for a variety of wildlife values and uses?
2. **Threatened, Endangered, and Sensitive/Locally Rare Species.** What levels of management are needed to protect and recover the populations of federally listed threatened, endangered and proposed species? What level of management is needed for Forest Service sensitive and locally rare species?

3. **Old Growth.** The issue surrounding old growth has several facets, including: (1) How much old growth is desired? (2) Where should old growth occur? (3) How should old growth be managed?
4. **Riparian Area Management, Water Quality and Aquatic Habitats.** What are the desired riparian ecosystem conditions within national forests, and how will they be identified, maintained and/or restored? What management direction is needed to help ensure that the hydrologic conditions needed for the beneficial uses of water yielded by and flowing through National Forest System lands are attained? What management is needed for the maintenance, enhancement, or restoration of aquatic habitats?
5. **Wood Products.** The issue surrounding the sustained yield production of wood products from national forests has several facets, including: What are the appropriate objectives for wood product management? Where should removal of wood products occur, given that this production is part of a set of multiple use objectives, and considering cost effectiveness? What should be the level of outputs of wood products? What management activities associated with the production of wood product are appropriate?
6. **Aesthetics/Scenery Management.** The issue surrounding the management of the visual quality has two facets: What are the appropriate landscape character goals for the national forests? What should be the scenic integrity objectives for the national forests?
7. **Recreation Opportunities/Experiences.** How should the increased demand for recreational opportunities and experiences be addressed on the national forests while protecting forest resources? This includes considering a full range of opportunities for developed and dispersed recreation activities (including such things as nature study, hunting and fishing activities, and trail uses).
8. **Roadless Areas and Wilderness Management.** Should any of the roadless areas on National Forest System lands be recommended for wilderness designation? For any roadless areas not recommended for wilderness, how should they be managed? How should areas be managed that are recommended for wilderness designation? How should the patterns and intensity of use, fire, and insects and disease be managed in the existing wilderness areas?
9. **Forest Health.** What conditions are needed to maintain forest capacity to function in a sustainable manner as expected or desired? Of particular concern are the impacts of exotic or nonnative species, and the presence of ecological conditions with a higher level of insect and disease susceptibility.
10. **Special Areas and Rare Communities.** What special areas should be designated, and how should they be managed? How should rare communities, such as those identified in the Southern Appalachian Assessment, be managed?
11. **Wild and Scenic Rivers.** Which rivers are suitable for designation into the National Wild and Scenic Rivers System, and how should rivers that are eligible, but not suitable, be managed?
12. **Access and Road Management.** How do we balance the rights of citizens to access their national forests with our responsibilities to protect and manage the soil and water resources, wildlife populations and habitat, aesthetics, forest health, and desired vegetative conditions?

National Forests in Alabama

In addition to the 12 issues common to the Southern Appalachian forests, the following local issues were developed for the National Forests in Alabama.

13. **Role of Fire/Air Quality.** How will air quality be sustained while carrying out needed management activities such as prescribed fire, and what role will fire play in the ecosystems on each major division of land?
14. **Designated Communication Sites.** What locations should be designated as communication sites? What size tower(s) is/are needed to provide adequate service to the community?
15. **Tuskegee National Forest as a Demonstration Forest.** Should the Tuskegee National Forest be designated as a Demonstration Forest, and what ecosystem management principles and/or research should be emphasized here?
16. **Bankhead NF as a National Recreation Area.** Should the Bankhead National Forest be recommended as a National Recreation Area?
17. **Red-cockaded Woodpecker.** What is the appropriate size and location for habitat management areas (HMA) for the red-cockaded woodpecker (RCW) on each major division of land?
18. **Land Exchange and Land Acquisition.** Under what conditions should land exchange and land acquisition programs be conducted on each division of land?
19. **Minerals.** How will the mineral resources of the National Forests be managed considering public demand for a wide variety of minerals? What areas will be made available for the exploration and development of federal leasable minerals and mineral materials?

PLANNING PROCESS RECORDS

The Forest's Interdisciplinary Team is responsible for developing the revised Forest Plan. Efforts were made to provide detailed explanations of each step of the revision in the form of process (or planning) records. This FEIS contains summaries of the process records and includes references to the parent records. Process records are on file in the Forest Supervisor's Office. To review these records, contact:

Forest Supervisor's Office
National Forests in Alabama
2946 Chestnut Street
Montgomery, AL 36107
Telephone: (334) 832-4470

CHAPTER 2

ALTERNATIVES

This Chapter summarizes and compares the alternatives that were developed as potential management strategies for the National Forests in Alabama. It explains the alternative development process, provides reasons why some of these alternatives were later eliminated from detailed study, describes the alternatives that are considered in detail, and lastly, compares how the alternatives respond to the significant issues identified in Chapter 1.

ALTERNATIVE DEVELOPMENT

The alternative development process consisted of four different phases. The process involved a coordinated effort of the staffs of the five National Forests of the Southern Appalachian area, with frequent meetings that were open to the public.

Phase I identified different ways the significant issues could be addressed.

Phase II developed four alternative themes using the information developed in Phase I. These alternative themes were the “starting points” for developing alternatives. The four themes were:

A. Produce high levels of goods and services compatible with local economies and communities.
B. Priority is given to restoring natural resources and processes.
C. Nature operates in conjunction with minimal human intervention.
D. Provide vigorously growing trees, commercial wood products, and a variety of wildlife habitats in a generally naturally appearing setting.

Phase III involved mapping the four alternative themes and “Current Direction”. The Phase III maps showed the land allocations, with each allocation consisting of a management emphasis, desired condition, and applicable management direction.

The objectives of Phase IV of the alternative development process were to analyze the four alternative themes to determine whether modifications were needed, whether other alternatives needed to be developed, and whether there were any areas of consensus. Public participation in both Phases III and IV was extensive and critically important to the overall process of developing alternatives. A description of public meetings and public involvement activities is available in Appendix A.

Based on input from all five Southern Appalachian Forests and the public on the five forests, changes were made and additional alternatives were developed to address a variety of issues and to provide a spectrum of alternatives to analyze and consider. The original four alternative themes (with some modifications) became Alternatives A-

D. The Current Direction (No-Action) Alternative became Alternative F, and three new alternatives (Alternatives E, G and H) were developed.

Later, it was decided to develop a ninth alternative (Alternative I). A set of "design criteria" was developed for this alternative which incorporated those parts of Alternatives A-H where there appeared to be some general agreement from our publics. Also, as a part of the design of Alternative I, it was meant to "roll" through different iterations of coordinating efforts with our publics. As a result of this development strategy, this alternative was often referred to as the "Rolling Alternative".

Consistency Across Forests/State Lines

In an effort to have a consistent approach to the development of revised forest plans across the Southern Appalachian forests, various teams were assembled and actions taken. In addition to the individual Forest Interdisciplinary Teams (IDTs), the following teams comprised of individuals from the five forests worked on coordinating, developing, and analyzing the forest plan alternatives:

- The <u>Steering Team</u> is comprised of the Forest Supervisors of the five national forests and the Director of Planning. They provided oversight and direction to the overall planning effort.

- The <u>SAP (Southern Appalachian Planners) Team</u> included the Forest Planners from the five National Forests and the Regional Planners. This group held numerous meetings, most of which were open to the public, to develop and implement a coordinated approach to developing and analyzing the alternatives.

- The <u>FWRBE (Fisheries, Wildlife, Range, Botany, and Ecology) Team</u> was comprised of various specialists (wildlife, fisheries, etc.) from the Forests and the Region. This team developed a consistent approach to addressing those issues relating to terrestrial and aquatic species and their habitats including threatened, endangered, and sensitive species; species of viability concern; and rare communities. Most of these meetings were also open to the public.

- The <u>SARRWAG (Southern Appalachian Recreation, Rivers, Wilderness Advisory Group)</u> included recreation specialists from the forests and the region, and developed a consistent approach to addressing recreation-related issues, evaluating roadless areas, managing Wilderness areas, studying Wild and Scenic Rivers, and, where applicable, the management of the Appalachian Trail.

- The <u>Riparian Team</u>, comprised of hydrologists, soil scientists, and aquatic biologists, worked on developing a consistent approach to addressing water- and riparian-related issues.

In addition to the team efforts described above, some specific actions were taken to achieve a consistent approach to the planning process. They included:

- All the Forests working on the same schedule/timeline, starting with the issuance of a Notice of Intent to revise the forest plans for the five forests (on August 2, 1996), continuing on through the publication of Draft Environmental Impact Statements, and to include the publication of these Final Environmental Impact Statements.

- Developing a common set of significant issues, which are described in Chapter 1.

- Developing a common set of Management Prescriptions. A team of representatives from the five Forests and the Regional Office held a series of meetings, some of which were open to the public, to develop a common set of "generic" management prescriptions. First, different "categories" of prescriptions were identified and then "emphasis" statements were developed to address the various issues. Descriptions of the "desired conditions" that would result from implementing the management prescriptions were then developed. Later, the Forest IDTs took these "generic" descriptions of the management prescriptions and "localized" them to meet local conditions. The Management Prescriptions used on the National Forests in Alabama are listed in Table 2.2.
- A coordinated approach to developing the alternatives, which is described below.

ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED STUDY

Description of Alternative C

Alternative C would emphasize resource management with minimal human intervention to the natural resources. Active management would be for the protection of resources, for meeting legal requirements, and for maintaining current recreation opportunities.

Potential old-growth areas would, within a few decades, come to represent the majority of the forest as a result of minimal management activity. There would be no regular, periodic harvest of green timber; therefore, no "suitable" forest land. The landscape character would change, moving toward high scenic integrity. Emphasis would be on dispersed and non-motorized recreation opportunities. No new developed recreation facilities would be constructed.

All inventoried roadless areas would be recommended for wilderness designation. Risk of loss of critical habitat for threatened and endangered species, danger to forest visitors, risk of damage to private property through Forest Service inaction, or introduction of an exotic pest would be considered unhealthy forest conditions requiring human intervention. Human intervention would also be used to maintain or increase existing rare communities. The majority of the eligible wild and scenic rivers would be recommended for inclusion to the National Wild and Scenic Rivers System. Roads not needed for legal requirements and other resource needs would be closed or obliterated.

Reasons Alternative C Eliminated From Detailed Study

The Management Prescriptions applicable to this alternative were allocated and mapped, and some preliminary estimates of the impacts of this alternative were made. After considering this preliminary information, it was determined that Alternative C did not need to be further evaluated in detail in this EIS. The reasons are: 1) From further analyses it was determined that this alternative, as originally envisioned, would not meet all the legal requirements of the National Forest Management Act of 1976 (NFMA), the Multiple-Use Sustained-Yield Act of 1960 (MUSYA) and the Endangered Species Act of 1973 (ESA); 2) Alternative C only addresses some, but not all, of the forest planning issues that have been identified by the public; 3) Other alternatives considered in detail provide for relatively low levels of management activities; and 4) Alternative C is similar to the "Minimum Level Benchmark" discussed in Appendix B.

The 219 regulations specify that the planning team should "formulate a broad range of reasonable alternatives according to NEPA procedures" (36 CFR 219.12(f)). With respect to meeting NEPA procedures, the alternatives developed need to respond to the "purpose and need". The "purpose and need" of revising the forest plan is to address the changing conditions that were identified in the Southern Appalachian Assessment, the Forest's Analysis of the Management Situation, and the changing public values as represented by the 12 common issues and 7 local issues. Alternative C, with its emphasis on "minimal human intervention" would not address all these issues, and would not meet the "purpose and need" as required by NEPA.

Another expression of the "purpose and need" of the Forest Plans is in the NFMA regulations where it states that the "resulting plans shall 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" (36 CFR 219.1). The Multiple-Use Sustained Yield Act states that the Secretary of Agriculture should "develop and administer the renewable surface resources of the national forests for multiple use and sustained yield of the several products and services obtained there from" (Section 2). Again, with its focus on "minimal human intervention", Alternative C is not an alternative that would provide "for multiple use and sustained yield of goods and services".

Additionally, the requirement to "maintain viable populations of existing native and desired non-native vertebrate species in the planning area" (36 CFR 219.19) would not be met. When this alternative was originally developed, it was thought that relatively few acres would need to be "actively managed" in order to meet this requirement. However, after more analysis was conducted on the habitat needs of various species, it was determined that there are a number of species that depend on ecological communities that can only be maintained by frequent levels of disturbance. As is explained in Chapter 3 of this EIS, a significant level of management is needed (at least over the next 10 to 50 years) to restore and maintain these disturbance-dependant communities. A certain amount of "human intervention" is needed to get these communities into the desired conditions of composition and structure, so that in the future, natural disturbances along with appropriate prescribed fire levels could maintain these communities. However, the levels of management activities that would be needed over the next 10 to 50 years to create these conditions would be inconsistent with the overall goal of Alternative C to have "minimal human intervention".

To further illustrate the need for a certain level of active management, Chapter 4 of the Southern Forest Resource Assessment (Effects of Forest Management on Terrestrial Ecosystems) states:

- "The exact nature and condition of these forests and disturbance regimes are unknown, but the presence of large grazing herbivores and fire-adapted forest communities suggests that much of this forest land was relatively open and subject to regular disturbances" (p. 92).

- "Today there are more forested acres in the South than in the early 1900s. These forests, however, are greatly altered from forests encountered by European settlers. … The common theme for the last 10,000 years is that forests were managed to meet human needs, including those of Native Americans" (p. 93).

- "We should recognize, however, that removal of all human disturbances will have profound effects on the region's biota" (p. 93).

- "To avoid regional population declines and species losses, land managers must have the flexibility to promote active management. This region's biota does not thrive in a static system, and intentional neglect does nothing but promote additional extinctions and endangerment to species at risk… This flexibility should not extend to the other extreme of promoting intensive forestry for wildlife conservation, but it does suggest that some level of active management will be necessary to maintain many still extant but imperiled species, including many found on present or set-aside lands" (p. 93).

With respect to the agency's "Healthy Forests Initiative", a management emphasis of the agency is to change the situation where forests, overloaded with fuels, are vulnerable to severe wildland fires. Minimizing "human intervention" would increase susceptibility of the forest to insect and disease outbreaks, which would create increased fuel-loading problems, and increase the risks to other resources and to adjacent private lands. Alternative C would not address these problems and areas of concern.

While Alternative C would address some of the issues, there are other management issues that have been raised by the public that this alternative does not address. In addition to the forest health and wildlife habitat management concerns expressed above, Alternative C does not address the issue that there are demands for various forest products such as high-quality sawtimber, which are of limited supply from private lands, but are available from National Forest lands.

Lastly, the Minimum Level Benchmark is "the minimum level of management which would be needed to maintain and protect the unit as part of the National Forest System together with associated costs and benefits" (36 CFR 219.12(e)(1)(i)). This is essentially the same management emphasis as Alternative C and a further description of this level of management can be found in Appendix B.

As a result of all these factors, it was determined that further study of this alternative was not needed.

Alternative H

Description of Alternative H

Alternative H would provide for active resource management to achieve multiple-use objectives with all lands classified as unsuitable for timber production. There would be some timber harvest, but not under a sustainable harvest schedule as is done on suitable forest land. The active resource management would focus on providing a wide diversity of wildlife habitats. Small human-made openings would be made to mimic natural gap openings. Emphasis would be on area sensitive, interior species habitats and these areas would be managed for high to very high scenic integrity.

Old-growth allocation and management would be primarily on lands already withdrawn from the suitable timber base. Restoration of degraded watersheds would be emphasized to improve aquatic habitats and water quality. Highways and roads in the forests, trail and river corridors, and recreation-use areas would have forest stands with few, if any, broken views to support enhancements in tourism and local, rural economies. Recreation areas and opportunities would be increased throughout a variety of settings.

Inventoried roadless areas adjacent to existing wilderness would be recommended for wilderness designation. Exotic pests and/or undesirable species would be controlled. All wild and scenic rivers would be recommended for inclusion into the National Wild and Scenic Rivers System (WS&R) if they do not conflict with other resources. Eligible wild and scenic rivers not recommended for inclusion into the WS&R would be allocated to a management prescription that protects these rivers and manages them similarly to congressionally designated rivers. Public access (travelways, use corridors, waterways, and trails including off-highway vehicles) would be increased in high-use areas and/or improved to provide for more opportunities for recreation.

Reasons Alternative H Eliminated From Detailed Study

When the management prescriptions applicable to this alternative were allocated and mapped, there ended up being virtually no difference between this alternative and Alternative G. The allocations were essentially the same, and therefore, the environmental effects would be essentially the same. The only significant difference between Alternative G and Alternative H was that in Alternative G, the majority of those acres being managed through silvicultural harvesting methods were classified as acres "suitable for timber production", while in Alternative H, those same acres and same management activities would be classified as "unsuited for timber production". The timber harvesting levels planned for in Alternative H are close to the levels of harvesting planned for in Alternative G. Since the main difference is primarily an administrative classification change, and there would be no differences in the overall outputs and environmental effects, it was decided that this alternative did not need to be considered further in detail in this EIS.

Bankhead National Recreation Area

The ID Team seriously considered two national recreation area proposals. First, the entire Bankhead National Forest was considered, and second, all of the Bankhead north of Highway 278 was considered for National Recreation Area status. The area south of Highway 278 was dismissed, primarily because of projected management difficulty caused by fragmented ownership. The area of the forest north of Highway 278 was eliminated due to recent severe attacks of southern pine beetles and the over-riding need for ecosystem restoration in much of the area. The activities necessary for ecosystem restoration, plus the negative visual effects of the pine beetle activity, are not congruent with "show-place" recreation settings. There is a danger of diminished expectations. Much of the area north of Highway 278, not already included in the Sipsey Wilderness, was allocated to dispersed recreation emphasis in alternatives E and I, and this does address some of the concerns for recreation emphasis, but the timing is not right for this area to become a national recreation area.

ALTERNATIVES CONSIDERED IN DETAIL

Alternative A

Alternative A emphasizes production of goods and services beneficial to local economies and communities. Local communities include any community that benefits economically from forest visitors and forest products. Timber management would provide sustained yield of wood products with emphasis on high-quality sawtimber and public-demand species, including game and other species. Developed and dispersed recreation opportunities and high-quality scenery would be provided in a variety of settings—both natural and managed. These would include both commercial recreation and increased public access.

Alternative B

Alternative B is biologically driven, emphasizes restoring the natural resources and natural processes, and creating and maintaining diverse wildlife habitats. Emphasis is on restoration of natural ecological communities based on the ecological potential and capability of the land. Restoration activities would provide a mix of wildlife habitat conditions favorable for game and non-game species. When possible, restoration activities would be designed natural processes in a natural landscape pattern. Restoration activities could produce both large and small openings. Long-term restoration goals would be established for areas where technology is not currently available or for areas where restoration activities cannot be implemented or completed within the life of the revised Forest Plan. A variety of recreation settings would occur in areas where they would be compatible with restoration activities and in areas where restoration is not occurring.

The long-term goal is to provide old-growth conditions, by old-growth community types within the ecological province or section. Riparian ecosystems are managed to maintain water quality and aquatic ecosystems, and to restore degraded conditions. Timber production would be a byproduct of management to restore and maintain specific impaired or degraded resources, natural processes, communities, and wildlife habitats. In some areas of the forests, scenic resources would move gradually toward high and very high scenic integrity. Restoration of areas would result in short-term, low to moderate scenic integrity, but with a long-term goal of higher scenic integrity. A wide variety of recreation opportunities would be provided. Roadless areas with identified restoration needs or wildlife habitat needs in conflict with wilderness designation would not be recommended for wilderness; other roadless areas could be recommended for wilderness study. The role of native insects and disease would be accepted, except that epidemics would be suppressed to reduce large-scale catastrophic tree mortality. Exotics pests—such as beech scale, gypsy moth, hemlock wooly adelgid, Japanese privet, and kudzu—would be controlled. Any restoration needs would be made compatible with wild and scenic river classification and its outstandingly remarkable values. Access to degraded resources, areas in need of restoration, or areas where wildlife habitat needs occur, could be temporarily provided to maintain or restore desirable ecological conditions. Access would be reduced as needed to restore and protect aquatic systems, soils, and plant/animal communities.

Alternative D

The emphasis of Alternative D is to reach and maintain a balanced age class. All lands not meeting National Forest Management Act criteria as being unsuitable for sustained-yield timber management would be available for sustained-yield management. On suitable lands, each of the major forest groups—pine, mixed, and hardwood—would have a specific target “rotation age” or age at which it would be harvested and replaced with a new forest. There would be an approximately equal number of acres within each 10-year age class up to that rotation age. This “balance of age classes” would occur on lands identified as suitable and would be distributed in blocks throughout the lands being managed for sustained-yield timber production.

Pine, mixed, and hardwood forests older than the rotation age also would occur on large blocks of land already withdrawn from sustained-yield timber production. Production of both commercial wood products and creation of a variety of wildlife habitats would be emphasized. Developed and dispersed recreation opportunities would be provided in a variety of settings—both natural and managed. Water quality and riparian areas would be protected through BMPs, streamside management zones, and standards, and restored if needed. Streamside management zones would be included in the suitable timber base, with minimum widths based on applicable regulations.

Large and medium-sized blocks of old growth would be provided only on unsuitable land. Small blocks would occur scattered throughout the suitable lands on steep slopes, streamside management zones, or similar areas. The forests would appear highly variable in tree sizes, and openings in the canopy may be seen from roadways and vista points. Potential for roaded natural experiences would increase as access roads for timber harvest are built or improved. The semi-primitive experiences would be primarily on unsuited lands. Only those roadless areas that are already withdrawn from sustained-yield timber production by Congress, the Secretary of Agriculture, or the Chief of the Forest Service, are recommended as wilderness. Insects, diseases, and exotic plant and animal species on suitable lands would be actively controlled and prevented. Some of the eligible wild and scenic rivers could be recommended for inclusion to the National Wild and Scenic Rivers System. Access would be developed, maintained, and used as needed to meet the goal of balanced age classes, wildlife habitats, and production of timber products.

Alternative E

A natural setting and concentrated facilities would be provided that could attract a variety of recreation users. Active resource management would be concentrated in certain locations and would support recreation use and visual quality. Most areas would maintain a forested canopy. Large blocks of the forest would be maintained in a roadless condition to provide remote, backcountry recreation. Dispersed and developed recreation areas and opportunities would be increased. A variety of recreation experiences would occur including concentrated use and off-highway vehicle use. A variety of different wildlife habitats would be maintained in blocks across the landscape. Habitat for area-sensitive species would be accomplished through maintenance of a variety of successional classes in a manner that would be unnoticeable to most forest visitors. A substantial amount of the forest would be allocated to providing old growth for biological and aesthetic settings in large, medium, and small patches.

Riparian ecosystems and streamside management zones would be designated, through allocation or standards and guidelines, to provide water-quality protection and improvement. The overall long-term timber product objective would be large-diameter and high-quality sawtimber for species capable of reaching that objective. Highways and roads in the forests, trail and river corridors, viewsheds, and recreation-use areas would have forest stands with few, if any, broken views to support enhancements in tourism and local, rural economies. Many insect and disease impacts would be tolerated as part of a functioning natural ecosystem. Most wild and scenic rivers would be recommended for adding to the National Wild and Scenic Rivers System, with primary emphasis on protecting the resources. Public access (travelways, use corridors, waterways and trails, including off-highway vehicles) would be increased in high-use areas and/or improved to provide for more recreation opportunities.

Alternative F - No Action Alternative - Current Management

This is the existing Forest Plan, as amended with description of how we are or are not meeting it.

Alternative G

Alternative G would emphasize linking together, through land allocations, *movement corridors and large undisturbed areas*, T&E species, species reintroduction, and watershed restoration. National Forest System lands would provide habitat for area-sensitive species and a wide diversity of native plants and animals, particularly late-successional species. Habitats on private lands would be considered. Backcountry, late-successional wildlife species, and nature-oriented non-motorized recreation opportunities would be emphasized. Most roadless areas would be recommended for wilderness. Old-growth restoration areas around clusters of existing old-growth, and mature forests with old-growth characteristics would provide natural old-growth dynamics across the landscape of the Southern Appalachians. High-quality timber would be produced in long rotations in areas outside area-sensitive species habitat, movement corridors, and large undisturbed areas, and would be accessed from existing roads. Effects of native insects and diseases would be accepted. Emphasis would be on establishing a naturally resilient forest that would avoid large outbreaks of forest pests. Fire would be used to restore natural ecosystem processes. Road network mileage would be reduced through closure and obliteration of roads not needed for ecosystem stewardship or restoration.

Emphasis would be on inventory, monitoring, conservation, and recovery of proposed, threatened, endangered, sensitive, and locally rare species. Riparian areas would be maintained as old growth for habitat and connectivity. Riparian area protection and restoration would be emphasized through watershed assessments and establishment of riparian conservation areas and reference/refugia watersheds. Naturally evolving and naturally appearing landscapes would be predominant. Recreation would take place within a context set by habitat needs and ecosystem function. Semi-primitive, wildlife, and nature-oriented recreation opportunities would be emphasized. Developed facilities would occur where they do not detract from ecosystem function and landscape connectivity. Roadless areas would be maintained as un-fragmented wildlife habitat, landscape linkages, old-growth restoration, wilderness designation, and other management that would maintain their un-fragmented habitat and ecosystem function. Exotic pests would be controlled by means that least impact ecosystem function and un-fragmented habitat across the landscape. Eligible rivers that have outstanding botanical, ecological, fish, aquatic, or wildlife values would be recommended for inclusion to the National Wild and Scenic Rivers System.

Opportunities to provide for many of the desired conditions such as connected habitats, movement corridors, and large undisturbed areas, would be limited in the Piedmont and Coastal Plains due to landownership patterns and red-cockaded woodpecker management needs.

Alternative I - Selected Alternative

This alternative emphasizes management of forest ecosystems through restoration and maintenance, which ensures healthy watersheds; provides for sustainable and diverse ecosystems that support viable plant, wildlife, and fish populations; and provides for high quality, nature-based recreation opportunities, especially in non-motorized settings with high quality landscapes.

Healthy watersheds would be maintained and degraded watersheds would be restored to maintain or improve water quality and aquatic habitats. Riparian ecosystems would be essentially unchanged, except for any actions needed to restore riparian vegetation cover and riparian functions and values.

Habitats for those species needing large, contiguous, forested landscapes would be maintained or increased, and there would be suitable habitat conditions to maintain viable populations of those vertebrate species native to the planning area. Management actions would be taken where needed to conserve and recover threatened, endangered, sensitive, and locally rare species.

Inventoried roadless and un-roaded areas would be managed to retain their un-roaded character. Most of the inventoried roadless areas adjacent to or connected with existing wilderness areas would be recommended for wilderness in order to enlarge existing wilderness areas and consolidate their boundaries. Other inventoried roadless areas could be considered for wilderness recommendation. All rivers eligible for consideration as wild and scenic rivers would be managed to protect their "outstandingly remarkable values."

A spectrum of high-quality, nature-based recreation settings would be provided, and there would be an emphasis on providing those recreation opportunities that are not widely available on non-Federal lands. The acres of land providing semi-primitive and non-motorized recreation opportunities would remain the same or increase from the amount currently inventoried. The scenic and aesthetic values of the national forest lands would be protected or enhanced.

A variety of large, medium, and small old-growth patches would be managed to meet biological and social needs. All existing inventoried old growth would be protected, and there would be an adequate representation of old-growth patches of those communities found on national forest lands. The rare communities found on national forest lands would be protected or restored. All existing special management areas would continue with their existing management direction. Additional areas may be identified for special management land allocations.

Replacing off-site species, thinning overstocked stands, and restoring fire-dependent and fire-associated communities would improve the health of forest vegetation. Where appropriate and consistent with the values for which the forest is being managed, risks to forests from wildfire, insect and disease damage, and exotic or nonnative invasive plants would be reduced.

Where silvicultural activities are needed to achieve the desired composition, structure, and function of forest ecosystems, a result of such activities would be to provide a stable supply of wood products for local needs. Some of the best sites that are currently accessible could be managed to provide a supply of high-quality sawtimber. Other lands would provide a variety of products as a result of other management activities.

A minimum transportation system would be available that improves access for forest road users while protecting forest resources. Generally, access will be limited to those areas that can be accessed by maintaining or reconstructing existing system roads, or through the construction of temporary roads. New permanent roads would only be constructed in a few situations. The pace of decommissioning unneeded roads (both classified and unclassified) would be accelerated.

Changes to Alternative I between Draft and Final – Alternative I is essentially unchanged. Review of the released DEIS and Proposed Revised LRMP revealed editorial and other inconsistencies in the presentation of information. Comments on the DEIS and Proposed Revised LRMP also identified the need for several minor improvements to analysis and presentation. However, none of the information raised in the comments or that became available for the analysis resulted in changes to Alternative I. Specific changes to Alternative I are:

Streamside management zone direction - The proposed revised LRMP included references to SMZ direction, however the details including standards were not included. This forest-wide direction has been added to chapter 2 of the Revised LRMP.

Management Prescription 9.G – Chapter 3 of the Proposed Revised LRMP detailed the management prescription allocations and direction. Management prescription 9.G is shown on the accompanying maps however it was not described in Chapter 3 of the Proposed Revised LRMP. The description including emphasis and desired conditions has been added.

Other minor changes –In Chapter 2 of the Propose Revised LRMP a table displaying old growth was referred to and has now been added to the Revised LRMP. A summary table of MIS objectives was added to Chapter 2 of the Plan.

Conformance with RPA

The National Forest Management Act (NFMA) regulations at 36 CFR 219.12(f)(6) require the Forest Plans to respond to and incorporate the Renewable Resource Planning Act (RPA) Program objectives. The last RPA Program was developed in 1995. Currently the Forest Service Strategic Plan (2000 Revision) provides broad overarching national guidance for forest planning and national objectives for the Agency as required by the Government Performance and Results Act. All of the alternatives in this EIS incorporate these broad strategic objectives.

COMPARISON OF ALTERNATIVES

This section compares the management alternatives from several different perspectives. The acreage allocated to each management prescription for each alternative is shown. In this table and throughout the analysis, acres displayed are GIS acres that were input into various models. For information on minor discrepancies in acres, please see the GIS section of Appendix B. The issues identified in Chapter 1 are discussed in detail, and the impact of each alternative on the issue is summarized.

Table 2.1 Comparison of Alternatives by Management Prescription Allocation, National Forests in Alabama

Prescription	A	B	D	E	F	G	I
0.	1,108	616	498	616	616	616	2,023
0. Subtotal	**1,108**	**616**	**498**	**616**	**616**	**616**	**2,023**
1.A.	37,905	37,905	37,905	37,905	38,109	37,905	37,905
1.B.	11,519	5,398	954	11,918	-------	13,542	540
1. Subtotal	**49,425**	**43,303**	**38,859**	**49,823**	**39,085**	**51,447**	**38,445**
2.A.1.	5,084	5,084	5,084	5,084	5,084	5,084	5,084
2.A.2.	3,429	3,429	3,429	3,429	3,429	3,418	3,429
2.C.	931	931	931	931	-------	931	931
2. Subtotal	**9,444**	**9,444**	**9,444**	**9,444**	**8,513**	**9,434**	**9,444**
4.B.1	602	602	602	602	602	602	602
4.C.	74	74	74	74	74	74	74
4.D.	2,758	2,758	2,758	2,758	2,758	2,758	2,758
4.E.1.	14,504	14,504	14,504	14,504	14,504	14,504	14,504
4.E.2.	8	8	8	8	8	8	8
4.G.	10,518	-------	-------	-------	-------	-------	-------
4.I.	-------	-------	-------	-------	-------	-------	1,209
4.L.	-------	-------	-------	-------	-------	-------	4,623
4. Subtotal	**28,464**	**17,945**	**17,945**	**17,945**	**17,945**	**17,945**	**23,778**
5.A.	286	286	286	286	286	286	286
5.B.	5	5	5	5	5	5	5
5. Subtotal	**291**	**291**	**291**	**291**	**291**	**291**	**291**

Table 2.1 Comparison of Alternatives by Management Prescription Allocation, National Forests in Alabama

Prescription	A	B	D	E	F	G	I
7.A.	3,473	3,473	3,473	3,473	3,473	3,473	3,473
7.B.	7,780	13,843	287	12,029	287	5,746	10,863
7.C.	4,287	4,287	4,287	4, 287	3,724	4, 287	4, 287
7.D.	5,941	5,739	5,739	5,713	5,711	5,739	7,869
7.E.2.	58,172	2,714	2,751	156,032	183	12,603	124,753
7. Subtotal	**79,653**	**30,056**	**16,536**	**181,534**	**13,378**	**31,848**	**151,245**
8.A.1	-------	-------	-------	17,348	-------	72,722	-------
8.A.2.	-------	-------	-------	-------	-------	86,991	-------
8.B.	-------	-------	-------	188,568	-------	55,141	5,842
8.D.1.	196,391	145,487	175,368	127,162	3	302,393	161,415
8. Subtotal	**196,391**	**145,487**	**175,368**	**333,078**	**3**	**517,247**	**167,257**
9.C.3.	-------	130,239	-------	14,012	-------	-------	63,889
9.D.	23,142	145,376	-------	-------	-------	-------	84,077
9.D.1.	6,412	98,204	-------	31,257	-------	-------	93,057
9.F.	*	*	*	*	*	*	*
9.G.	-------	6,255	2,918	6,270	-------	6,270	10,380
9. Subtotal	**29,554**	**382,992**	**2,918**	**51,539**	**0**	**6,270**	**251,403**
10.A.	262,541	26,735	362,177	-------	569,068	18,523	-------
10.B.	-------	-------	39,649	-------	-------	-------	-------
10.D.	1,678	1,678	1,678	1,678	1,678	1,678	1,678
10. Subtotal	**264,219**	**28,413**	**403,504**	**1,678**	**570,746**	**20,201**	**1,678**
11.	112,387	112,387	112,387	112,387		112,387	112,387
11. Subtotal	112,387	112,387	112,387	112,387		112,387	112,387
12.A.	7,328	7,328	513	15,482	513	513	15,865
12.B.	-------	-------	-------	4,444	15,763	-------	4,444
12. Subtotal	**7,328**	**7,328**	**513**	**19,926**	**16,276**	**513**	**20,309**

* No acres estimate available for Prescription 9.F.

Table 2.2 Management Prescriptions used on National Forests in Alabama

Management Rx	Management Prescription Title
0.	CUSTODIAL MANAGEMENT
1.A.	DESIGNATED WILDERNESS
1.B.	RECOMMENDED WILDERNESS STUDY AREAS
2.A.1.	WILD RIVERS
2.A.2.	SCENIC RIVERS
2.C.	RIVERS ELIGIBLE AS WILD AND SCENIC RIVERS
4.B.1	EXISTING RESEARCH NATURAL AREAS
4.C.	GEOLOGIC AREAS
4.D.	BOTANICAL - ZOOLOGICAL AREAS

Table 2.2 Management Prescriptions used on National Forests in Alabama	
Management Rx	**Management Prescription Title**
4.E.1.	CULTURAL/HERITAGE AREAS
4.E.2.	NATIONAL REGISTER DISTRICTS AS SPECIAL AREAS
4.G.	EXPERIMENTAL FOREST
4.I.	NATURAL AREAS – FEW OPEN ROADS
4.L.	CANYON CORRIDORS
5.A.	ADMINISTRATIVE SITES
5.B.	DESIGNATED COMMUNICATION/ELECTRONIC SITES
7.A.	SCENIC BYWAY CORRIDORS
7.B.	SENSITIVE VIEWSHEDS
7.C.	OHV USE AREAS
7.D.	CONCENTRATED RECREATION ZONE
7.E.2.	DISPERSED RECREATION AREAS WITH VEGETATION MANAGEMENT
8.A.1	MID- TO LATE-SUCCESSIONAL FOREST HABITATS
8.A.2.	AREA SENSITIVE MID- TO LATE-SUCCESSIONAL HAB.
8.B.	MIX OF SUCCESSIONAL HABITATS - EARLY SUCCESSIONAL HABITAT EMPHASIS
8.D.1.	RED-COCKADED WOODPECKER MANAGEMENT AREAS
9.C.3.	SOUTHERN CUMBERLAND PLATEAU NATIVE ECOSYSTEM RESTORATION AND MAINTENANCE
9.D.	RESTORATION OF COASTAL PLAIN LONGLEAF PINE FORESTS
9.D.1.	SOUTHERN RIDGE AND VALLEY NATIVE ECOSYSTEM RESTORATION AND MAINTENANCE
9.F.	RARE COMMUNITIES
9.G.	MAINTENANCE AND RESTORATION OF UPLAND AND BOTTOMLAND HARDWOOD AND MIXED PINE FORESTS
10.A.	SUSTAINED YIELD TIMBER MANAGEMENT
10.B.	HIGH QUALITY FOREST PRODUCTS
10.D.	GRAZING AND FORAGE EMPHASIS AREAS
11.	RIPARIAN CORRIDORS
12.A.	REMOTE BACKCOUNTRY RECREATION—FEW OPEN ROADS
12.B.	REMOTE BACKCOUNTRY RECREATION – NONMOTORIZED

Comparison of Alternatives By Issue

This section compares how the alternatives address the issues identified in Chapter 1.

Issue 1 - Terrestrial Plants and Animals and Their Associated Habitats

In addressing this issue, management activities would strive to accomplish:

- Provide habitats to support desirable levels of selected species (e.g., species with special habitat needs such as large, contiguous forested landscapes; species commonly trapped/hunted; or species of special interest).

- Provide habitat conditions necessary to maintain viable populations of all species native to the planning area.

Table 2.3 shows the comparison of Issue 1 by alternative. This table shows differences in early/late successional habitats by alternative, and trends of MIS species.

Table 2.3. Issue 1 - Terrestrial Plants and Animals and Their Associated Habitats

Alternative/Units of Comparison	A	B	D	E	F	G	I
Successional Forest Habitats	**Percent of Forested Acres**						
Early Successional Habitat – 1st Decade	9	8	14	10	13	10	8
Early Successional Habitat – 5th Decade	7	7	8	8	8	8	6
Mid- to Late-Successional Habitat – 1st Decade	74	76	70	73	70	73	75
Mid- to Late-Successional Habitat – 5th Decade	79	81	76	79	76	81	83
Late Successional Habitat – 1st Decade	51	53	47	50	48	51	52
Late Successional Habitat – 5th Decade	61	65	52	59	53	63	67
MIS – Community Indicators	**Trends**						
Hooded Warbler							
+10 years	=	+	+	+	+	=	+
+50 years	–	=	–	-	–	=	=
Acadian Flycatcher							
+10 years	=	=	=	=	=	=	=
+50 years	-	=	-	-	–	+	=
Swainson's Warbler							
+10 years	-	=	+	-	+	–	++
+50 years	+	-	+	+	–	–	+
Scarlet Tanager							
+10 years	-	=	–	-	–	=	-
+50 years	+	+	-	+	+	+	+
Red-cockaded Woodpecker (Pine & Pine-Oak)							
+10 years	-	++	–	-	–	+	++
+50 years	–	++	-	-	+	-	++
Brown-headed nuthatch (Pine & Pine-Oak)							
+10 years	-	++	–	-	–	+	++
+50 years	–	++	-	-	+	-	++
Red-cockaded Woodpecker (Upland Longleaf)							
+10 years	-	+	-	-	-	+	=
+50 years	-	+	-	--	-	+	+
Brown-headed nuthatch (Upland Longleaf)							
+10 years	+	=	-	-	=	=	=

Table 2.3. Issue 1 - Terrestrial Plants and Animals and Their Associated Habitats							
Alternative/Units of Comparison	**A**	**B**	**D**	**E**	**F**	**G**	**I**
+50 years	-	++	-	-	-	++	++
Red-cockaded Woodpecker (Mountain Longleaf)							
+10 years	-	+	-	-	-	+	=
+50 years	-	+	-	--	-	+	+
Prairie Warbler							
+10 years	+	+	++	+	++	=	=
+50 years	=	-	+	=	+	--	=
Pileated Woodpecker							
+10 years	-	=	–	-	–	=	=
+50 years	+	++	+	+	+	++	++
Red-cockaded Woodpecker (Woodlands)							
+10 years	-	++	-	+	-	=	++
+50 years	-	++	-	-	–	+	+
Northern Bobwhite Quail (Woodlands)							
+10 years	-	++	-	+	-	=	++
+50 years	-	++	-	-	–	+	+
White-tailed deer (Demand)							
+10 years	+	+	=	+	=	-	+
+50 years	+	+	+	+	+	-	+
Eastern wild turkey (Demand)							
+10 years	+	+	-	+	-	+	+
+50 years	+	+	=	+	=	=	+
Northern bobwhite quail (Demand)							
+10 years	+	+	+	+	=	-	+
+50 years	+	+	-	+	=	-	+
Wood Thrush							
+10 years	-	=	-	=	=	=	+
+50 years	-	=	-	=	=	+	=

1 Population trend expressed as change from current levels: "++" = relatively large increase, "+" = increase, "=" = little to no change, "-" = decrease, "—" relatively large decrease.

Issue 2 - Threatened, Endangered, and Sensitive/Locally Rare Species

In addressing this issue, management activities would strive to accomplish:

- Conserve and recover threatened, endangered, and sensitive species and their habitats.

Table 2-4 Comparison of Issue 2 by alternatives. This table describes the differences in the levels of potential risk for loss of population viability of threatened, endangered, sensitive, and locally rare species.

Table 2.4. Issue 2 – Threatened, Endangered, and Sensitive/Locally Rare Species							
Alternative/Units of Comparison	**A**	**B**	**D**	**E**	**F**	**G**	**I**

Table 2.4. Issue 2 – Threatened, Endangered, and Sensitive/Locally Rare Species							
Alternative/Units of Comparison	**A**	**B**	**D**	**E**	**F**	**G**	**I**
Total Terrestrial Species Status Categories	**Number of Species/Habitat Relationships**						
Species/Habitat Relationships Rated as Very High Risk	236	175	261	176	267	155	172
Species/Habitat Relationships Rated as High Risk	339	319	330	388	320	384	382
Species/Habitat Relationships Rated as Moderately High Risk	315	364	299	317	306	319	325
Total	890	858	890	881	893	884	879
Aquatic Species Viability	**Number of Aquatic Species**						
Low Risk	=	+	=	=	59	+	+
Moderate Risk, FS May Positively Influence	=	-	=	=	11	-	-
Mod Risk, Little Opportunity for FS Influence	=	=	=	=	22	=	=
High Risk, FS May Positively Influence	=	-	=	=	7	-	-
High Risk, Little Opportunity for FS Influence	=	=	=	=	32	=	=
MIS – TES Species	**Trends**						
Red Cockaded Woodpecker (Pine & Pine Oak)							
+10 years	-	++	–	-	–	+	++
+50 years	–	++	-	-	+	-	++
Red Cockaded Woodpecker (Upland Longleaf)							
+10 years	-	+	-	-	-	+	=
+50 years	-	+	-	--	-	+	+
Red Cockaded Woodpecker (Mountain Longleaf)							
+10 years	-	+	-	-	-	+	=
+50 years	-	+	-	--	-	+	+
Red Cockaded Woodpecker (Woodlands)							
+10 years	-	++	-	+	-	=	++
+50 years	-	++	-	-	–	+	+

1 Trend expressed as change from current levels: "++" = relatively large increase, "+" = increase, "=" = little to no change, "-" = decrease, "—" relatively large decrease.

Issue 3 - Old Growth

In addressing this issue, management activities would strive to accomplish:

- A variety of large, medium, and small old growth patches will be managed (through restoration, protection, or maintenance activities) to meet biological and social needs. These patches could include stands of either "existing old growth" or "future old growth".

Table 2.5 shows the comparison of Issue 3 by alternative. This table shows the percent of each community that would be greater than 100 years old under the management of each alternative in 50 years. Large patches of possible old growth are represented by those areas unsuitable due to the current management prescription. They will likely become old growth when the stands/communities attain the defined age for that community.

Table 2.5. Issue 3 – Old Growth: Percent of Community greater than 100 years old in period 5 by alternative

Alternative/Units of Comparison	A	B	D	E	F	G	I
Community Type	Percent of Community						
Cedar Woodland	63	89	89	89	89	89	89
Conifer Northern Hardwood	85	88	88	85	88	88	78
Coastal Plain Upland Hardwoods	10	11	8	3	8	11	35
Cypress Tupelo	72	72	71	72	71	72	72
Dry and Mesic Oak	63	59	56	33	67	56	54
Dry and Dry Mesic Oak-Pine	9	17	8	21	6	20	18
Mixed Mesophytic	57	63	36	56	45	62	69
Mountain Longleaf	40	40	42	41	40	39	42
River Floodplain	60	65	40	61	39	61	59
Upland Longleaf Pine	18	31	14	24	33	29	35
Wet Pine	**18**	**31**	**14**	**24**	**33**	**29**	**35**
Xeric Pine / Pine Oak	**42**	**34**	**33**	**31**	**14**	**33**	**40**

*The percentages in the table are of those acres that were separated by community type for spectrum analysis, and include both suitable and some unsuitable acres. However, some unsuitable areas such as wilderness, were not separated by community type and are not included in these numbers.

Issue 4 - Riparian Area Management, Water Quality, and Aquatic Habitats

In addressing this issue, management activities would strive to accomplish:

- Watersheds are managed (and where necessary restored) to provide resilient and stable conditions to ensure the quality and quantity of water necessary to protect ecological functions and support intended beneficial water uses.
- Riparian ecosystems, wetlands and aquatic systems are managed (and where necessary restored) to protect and maintain their soil, water, vegetation, fish and wildlife associated resources.

Table 2-.6 shows the comparison of Issue 4 by alternative. This table shows percentage increase in sediment yield due to Forest Service activities, compared to existing (base) levels of sediment yield.

Table 2.6, Issue 4 – Riparian Area Management, Water Quality, and Aquatic Habitats

Alternative/Units of Comparison	A	B	D	E	F	G	I
Soil and Water	**Percent Increase**						
Average Percent Increase in Sediment Yields from FS Activities over Existing Levels Across 56 Watersheds	0.67	0.71	0.79	0.70	0.76	0.71	0.64

Table 2.6, Issue 4 – Riparian Area Management, Water Quality, and Aquatic Habitats							
Alternative/Units of Comparison	**A**	**B**	**D**	**E**	**F**	**G**	**I**
Acres in Watershed Restoration Prescriptions	**Acres in Thousands**						
Acres Allocated to Mgt. Pres. 9A's	0	0	0	0		0	0
Aquatic Habitat conditions	**Number of watersheds in aquatic species risk categories**						
Low risk	=	+	=	=	23	+	+
Moderate risk, FS may positively influence	=	-	=	=	0	-	-
Mod. Risk, little opportunity for FS influence	=	=	=	=	4	=	=
High risk, FS may positively influence	=	-	=	=	2	-	-
High risk, little opportunity for FS influence	=	=	=	=	16	=	=

1 Trend expressed as change from current levels: "++" = relatively large increase, "+" = increase, "=" = little to no change, "-" = decrease, "—" relatively large decrease.

Issue 5 – Wood Products

In addressing this issue, management activities would strive to accomplish:

- Where forest management activities are needed and appropriate to achieve the desired composition, structure, and function of forest ecosystems; a result of such activities will also be to provide a sustainable supply of wood products for local needs.
- Provide supplies of those wood products where the Forest Service is in a unique position to make an impact on meeting the demand for those products.

Table 2.7 shows the comparison of Issue 5 by alternative. This table shows differences, by alternative, in suitable acres, ASQ, and volume differences in timber sale quantity by alternative, and in time.

Table 2.7. Issue 5 – Wood Products							
Alternative/Units of Comparison	**A**	**B**	**D**	**E**	**F**	**G**	**I**
Timber Management	**Acres in Thousands**						
Land Classified as Suitable for Timber Production	402.071	398.812	465.523	392.414	459.152	406.883	389.480
	MMCF						
Allowable Sale Quantity (First Decade)	136.9	102.9	226.9	147.8	222.0	126.1	85.3
Timber Sale Program Quantity (Total First Decade	136.9	102.9	226.9	147.8	222.0	126.1	91.2
Timber Sale Program Quantity (Total Fifth Decade)	203.2	176.7	226.9	181.0	222.0	128.2	172.1

Issue 6 - Aesthetics/Scenery Management

In addressing this issue, management activities would strive to accomplish:

- Protect and enhance the scenic and aesthetic values of the National Forest lands in the Southern Appalachians.
- The National Forests will be managed to provide a variety of Landscape Character Themes with the predominant themes being Natural Appearing, Natural Evolving, and variations of these themes.

Table 2.8 shows the comparison of Issue 6 by alternative. This table shows differences, by alternative, in land allocated by Scenic Integrity Objective.

Table 2.8. Issue 6 – Aesthetics/Scenery Management							
Alternative/Units of Comparison	A	B	D	E	F	G	I
Scenic Integrity Objectives	Percent of Total Forest Acres						
Very High	8	7	7	9	9	9	8
High	9	10	8	11	8	11	11
Moderate	19	14	13	31	11	21	27
Low	63	69	72	50	72	59	54
Very Low	0	0	0	0	0	0	0

Issue 7 - Recreation Opportunities/Experiences

In addressing this issue, management activities would strive to accomplish:

- Provide a spectrum of high quality, nature-based recreation settings and opportunities that are not widely available on non-Federal lands.
- Strive to meet the following recreation needs within the capabilities of the land:
  - Hiking, biking, and equestrian trail systems, especially in non-motorized settings with high quality landscapes. Provide separate-use trails where necessary to reduce user conflicts or to improve the quality of recreation experiences.
  - Designated OHV routes (which will occur primarily in RN1 settings).
  - The high priority improvements, expansions, or additions of facilities providing developed recreation opportunities.
  - Hunting, fishing, and non-consumptive wildlife opportunities.
  - Improved interpretive opportunities or other special recreation needs locally identified.
- The National Forests will manage areas to provide for the "backcountry" (semi-primitive/remote) recreation experiences that are not available on other land ownerships.
- Although the opportunities for outdoor recreation are extensive and the public demand for these opportunities is seemingly endless, the Forest's capability to meet these demands is neither static nor endless. Visitor preferences can

shift over time, and both changing financial limitations and environmental impacts must be considered. In order to maximize value to the public with the limited resources available, the Forest will focus on providing those recreation opportunities that are unique or of exceptional long-term value in a manner that focuses on maximizing visitor satisfaction within financial and environmental limitations.

- A goal is to provide a spectrum of high quality nature-based recreation settings and opportunities that reflect the unique or exceptional resources of the Forest and the interests of the recreating public on an environmentally sound and financially sustainable basis. Adapt management of recreation facilities and opportunities as needed to shift limited resources to those opportunities.

Table 2.9 shows the comparison of Issue 7 by alternative. This table shows differences, by alternative, in recreation prescription land allocations, and ROS offerings by alternative. Increases/decreases in developed recreation facilities, including trails are not projected by this plan, but rather will be based, site specifically, on demand, and separate environmental analysis.

Table 2.9. Issue 7 – Recreation Opportunities/Experiences

Issue/Units of Comparison	A	B	D	E	F	G	I
Recreation Opportunity Spectrum	**Acres in Thousands**						
Primitive (Rx's 1A, 1B, & 2A1)	54.0	48.3	43.9	54.9	42.9	56.5	43.5
Semi-Primitive Non-Motorized	0	0	0	4.8	16.6	0	4.8
Semi-Primitive Motorized	19.8	19.8	19.8	30.4	18.9	19.8	36.9
Roaded Natural 1	584.7	591.0	595.5	569.1	580.8	582.9	572.4
Rural/Urban	6.0	6.0	6.0	6.0	6.0	6.0	7.5
Recreation Management Allocations	**Acres in Thousands**						
Acres with a Recreation Emphasis (Rx 7's)	79.963	30.404	16.885	181.892	13.725	32.158	150.676
Acres with a Backcountry Recreation Emphasis (Rx 12"s)	7.328	7.328	0.513	20.283	16.632	0.513	20.666
Developed/Dispersed Recreation	**Percent Increase (Range)**						
Estimated Increase in Capacity of Developed Recreation Areas	0	0	0	0	0	0	0
Estimated Increase in Non-Motorized Trails	0	0	0	0	0	0	0
Off-Highway Vehicle Roads and Trails	**Acres in Thousands**						
Acres of Off-Highway Vehicle Use Areas (Rx 7C)	4.685	4.685	4.685	4.685	4.121	4.685	4.685
	Percent Increase (Range)						
Estimated Change in Motorized Roads & Trails	0	0	0	0	0	0	0
MIS – Demand Species	**Trends**						
White–tailed Deer – 1st 10 years	+	+	=	+	=	-	+
Eastern Wild Turkey -1st 10 years	+	+	-	+	-	+	+
Northern Bobwhite Quail - 1st 10 years	+	+	+	+	=	-	+

1 Population trend expressed as change from current levels: "++" = relatively large increase, "+" = increase, "=" = little to no change, "-" = decrease, "—" relatively large decrease.

Issue 8 - Roadless Areas and Wilderness Management

In addressing this issue, management activities would strive to accomplish:

- Wilderness, roadless and other un-roaded areas are managed to provide their full range of social and ecological benefits.

Tables 2.10 and 2.11 show the comparison of Issue 8 by alternative. These tables show differences, by alternative, in acres recommended for wilderness designation.

Table 2.10. Issue 8 – Roadless Areas and Wilderness Management

Alternative/Units of Comparison	A	B	D	E	F	G	I
Wilderness/Roadless	Acres in Thousands						
Acres of Existing Wilderness	42.211	42.211	42.211	42.211	42.211	42.211	42.211
Recommended for Designation as WSAs	11.519	5.398	0.954	11.918	0	13.542	0.540
Roadless Character Maintained (percent)	100%	100%	13%	100%	43%	100%	100%

Table 2.11 - Issue 8 – Roadless Areas Recommended for WSAs

Alt.	Roadless Areas Recommended for Designation as Wilderness Study Areas
A	Oakey Mountain, Blue Mountain, Cheaha A, Cheaha B
B	Blue Mountain, Cheaha A, Cheaha B
D	Cheaha A, Cheaha B
E	Cheaha A, Cheaha B
F	None
G	Oakey Mountain, Blue Mountain, Cheaha A, Cheaha B
I	Cheaha A, and 42% of Cheaha B

Issue 9 - Forest Health

In addressing this issue, management activities would strive to accomplish:

- Forest ecosystems are managed, either through restoration or maintenance, to provide the desired composition (species mix), structure (age class distribution), function (resulting benefits), and productivity over time.
- Management activities will reduce the impacts from exotic or non-native invasive species.

Table 2.12 shows the comparison of Issue 9 by alternative. This table shows differences, by alternative, between pertinent forest health concerns, application of prescribed fire, and where restoration is emphasized.

Table 2.12. Issue 9 – Forest Health

Issue/Units of Comparison	A	B	D	E	F	G	I
Forest Health Concerns 1	**Ranking**						
Gypsy Moth	=	=	=	+	+	+	=
Southern Pine Beetle	-	-	-	+	-	=	-
Oak Decline	-	+	-	+	+	+	+
Non-native Invasive Plants	-	-	-	+	+	=	=
Dogwood Anthracnose	=	=	=	=	=	=	=
Prescribed Fire	**Acres in Thousands**						
Estimated Acres Prescribed Burned (Total)	64.8	90.0	64.8	86.8	64.8	86.8	90.0
Restoration	**Acres in Thousands**						
Acres with a Restoration Emphasis (Rx 9C, 9D, 9E, 9G, 9H)	29.554	382.676	2.918	51.539	N/A	6.270	103.519

1 Trend expressed as change from current levels,"+" = increase, "=" = little to no change, "-" = decrease.

Issue 10 - Special Areas and Rare Communities

In addressing this issue, management activities would strive to accomplish:

- Protect or restore the rare communities found on National Forest lands.
- Those areas with special geological, paleontological, botanical, zoological, cultural, or heritage characteristics will be managed (or where feasible restored) to protect those characteristics.

Table 2.13 shows the comparison of Issue 10 by alternative. This table shows differences, by alternative, in land allocations of the Special Area Management Prescription.

Table 2.13. Issue 10 – Special Areas and Rare Communities

Issue/Units of Comparison	A	B	D	E	F	G	I
Special Areas	**Acres in Thousands**						
Acres Allocated to Special Areas (RX 4's)	30.866	20.348	20.348	20.348	20.348	20.348	26.180
Rare Communities							
Rare Communities Managed According to the Rare Community Mgt. Pres. (9F)	Yes	Yes	Yes	Yes	No	Yes	Yes

Issue 11 - Wild and Scenic Rivers

In addressing this issue, management activities would strive to accomplish:

- Wild, Scenic and Recreation Rivers which are designated by Congress, recommended for designation, or are eligible for designation, will be managed to protect their outstandingly remarkable values.

Table 2.14 shows the comparison of Issue 11 by alternative. This table shows existing Wild and Scenic River acres, and acres allocated to Eligible Rivers, by alternative.

Table 2.14. Issue 11 – Wild and Scenic Rivers

Alternatives/Units of Comparison	A	B	D	E	F	G	I
Wild and Scenic Rivers	Acres						
Acres of River Corridors Currently Designated	8513	8513	8513	8513	8513	8513	8513
Acres of River Corridors Eligible	931	931	931	931	0	931	931
Acres of River Corridors Managed to Protect their Outstanding Remarkable Values (ORV's)	9444	9444	9444	9444	8513	9444	9444
Acres of River Corridors Recommended for W&SR Designation	0	0	0	0	0	0	0

Issue 12 - Access and Road (Travelway) Management

In addressing this issue, management activities would strive to accomplish:

- Provide a transportation system that supplies and improves access for all forest road users within the capabilities of the land.
- Accelerate the pace of decommissioning unneeded roads (classified and unclassified).
- Provide better quality access by upgrading highly used forest roads and any roads that are needed but are adversely affecting surrounding resource values and conditions.

Table 2.15 shows the comparison of Issue 12 by alternative. This table shows miles of current road system, maintenance levels 1 through 5, and that road/trail construction, re-construction, and decommissioning will occur on a site specific, project level analysis, not at this plan level.

Table 2.15. Issue 12 – Access and Road Management

Alternative/Units of Comparison	A	B	D	E	F	G	I
Transportation System	Miles						
Maintenance level 1 roads	304	304	304	304	304	304	304
Maintenance level 2 roads	868	868	868	868	868	868	868
Maintenance level 3 roads	500	500	500	500	500	500	500
Maintenance level 4 roads	107	107	107	107	107	107	107
Maintenance level 5 roads	31	31	31	31	31	31	31

Road decisions at project level	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Issues 13 through 19 were issues unique to the National Forests in Alabama, and were developed early in the issue development process.

Table 2.16 shows the comparison of these Issues, by alternative. This table shows differences in alternatives pertinent to the issue(s), as determined by the Interdisciplinary Team for Alabama.

Table 2.16 Comparison of Local Issues by Alternative, National Forests in Alabama

Issue/Units of Comparison	A	B	D	E	F	G	I
13. Role of Fire and Air Quality:							
Acres of Prescribed Burning	64,800	90,000	64,800	86,800	64,800	86,800	90,000
Differences in Air Quality							
14. Fixed Communication Sites:							
Allocations to Rx 5B – Acres	5	5	5	5	N/A	5	5
Additional Allocations Done Site Specifically	Yes	Yes	Yes	Yes	Yes	Yes	Yes
15. Tuskegee as a Demonstration Forest:							
Yes/No	Yes	No	No	No	No	No	No
16. Bankhead as a National Recreation Area:							
Yes/No	No	No	No	No	No	No	No
17. RCW Management:							
Acres Actively Managed (Rx 8.D.1)	196,391	145,487	175,368	127,162	0	302,393	225,372
18. Land Exchange/Acquisition:							
Emphasis for Acquisitions	Yes	Yes	Yes	Yes	Yes	Yes	Yes
19. Minerals:							
% Acres Available for Leasing	92.2	92.2	92.2	92.2	92.2	92.2	92.2
% Acres with Restrictions/Special Stipulations	32.2	32.1	28.3	35.1	9.4	30.8	34.4

CHAPTER 3

AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

The purpose of Chapter 3 is to describe the physical, biological, and social environments of the National Forests in Alabama. The analysis begins by reviewing the existing forest environment that could be affected by implementation of any of the management Alternatives described in Chapter 2.

The discussion in this chapter is arranged by the resource elements and is organized into four main sections: Physical Environment, Biological Environment, Resource Programs, and Social and Economic Environment. Public issues are addressed and discussed in each of the sections.

After a general discussion of the forest setting, each section presents the results of the effects analysis and compares the probable outcomes of each of the alternatives. Each resource or issue may be discussed at various scales, depending upon the issue. For example, socioeconomic factors may be discussed at the local, county, and state scales.

For more information, consult the individual specialist reports contained in the Process Records at the Forest Supervisor's Office in Montgomery, Alabama.

3.A Physical Elements

1.0 Soils

1.1 Affected Environment

Topography, Geology and Soils

The National Forests in Alabama lies within six physiographic areas: Cumberland Plateau, Piedmont, Ridge and Valley, Tennessee Valley, Lower Coastal Plain, and Upper Coastal Plain. Each physiographic area is both distinct and diverse in relation to topography, geology, and soil. Each National Forest contains entirely different topography, geology, and soils, with the exception of the Oakmulgee Division of the Talladega National Forest and the Tuskegee National Forest, both located in the Upper Coastal Plain. Topography of the Bankhead National Forest is moderate to strongly dissected with broad, nearly level, and narrow, strongly sloping ridges leading into steep gorges with rock bluffs. The Talladega Division of the Talladega National Forest is comprised of upland hills and low mountains with predominantly moderately steep slopes. Topography of the Coastal Plain forests, Conecuh and Tuskegee National Forest, and the Oakmulgee Division of the Talladega National Forest, consists of level to moderately sloping, broad ridges with stream terraces and broad floodplains. Geology ranges from sandstone, shale, and limestone found on the Bankhead National Forest to slate, shale, sandstone, and schist on the Talladega Division of the Talladega National Forest, to coastal plain marine sediments consisting of layers of gravel, coarse and fine sand, and clay found on the Conecuh and Tuskegee National Forests, and the Oakmulgee Division of the Talladega National Forest.

The diverse geology has weathered into ninety-eight soil series that can be found to date on the National Forests in Alabama. An Order 2 soil resource inventory has been conducted on all National Forests except the Oakmulgee Division of the Talladega National Forest, which has an Order 3 soil resource inventory. Currently, an Order 2 soil inventory is being conducted on the Oakmulgee Division. A total of 138 soil map units have been identified through soil resource inventories. Soil interpretations for land management practices have been developed based on each soil map unit. In turn, soil interpretations are used to develop standards to be applied to reduce or mitigate potential impacts to the soil resource.

Most of the soils on the National Forests are highly weathered, acidic, and have a low nutrient status. Soil productivity from a forest perspective is considered high. Forests use a relatively small nutrient pool compared to agriculture and other propagated crops. In addition, the relatively deep soils, moisture availability, and landscape positions aid in providing a good growing medium for forest vegetation. The relative productivity of a given soil is based on the physical and chemical components. The biological component of a soil is also an important part of soil productivity, but is contingent on the physical and chemical component. Changes in soil productivity result when one or more of the three components are altered. Most, if not all, forms of land management practices disturb the soil resource to some degree, usually with a reduction in soil productivity. Changes in soil productivity can be long term, in which case restoring soil productivity is difficult (i.e. construction of an asphalt parking area), or changes can be considered short term where, over a relatively short period of time, the soil will heal naturally, or use of soil ameliorates aid in the restoration of soil productivity (i.e., construction of a temporary road). The question to be asked is what can be reasonably expected from the soil resource after completion of a land management practice, and can the soil productivity be restored to meet that expectation. Land management practices on the National Forests in Alabama affect soil productivity primarily through nutrient removal, soil compaction, and soil erosion with loss of soil biota to a lesser extent. The primary land management practices on the National Forests in Alabama are vegetative management (involving cut and leave or cut and removal of trees, associated site preparation for tree planting, and tree planting), road (permanent and temporary) and trail construction, use of prescribed fire, construction of wildlife food plots, facility construction, and mineral exploration and extraction.

Management Area 1 - The Bankhead National Forest

The Pottsville Formation of the Pennsylvanian System composes the majority of the geology. The Pottsville Formation consists of shale, siltstone, sandstone and coal in cyclic sequence in the upper part, and sandstone containing shale, siltstone and thin discontinuous coal in the lower part. The predominant soils derived from this geology are Apison, Sipsey, Townley, and Tidings soil series. These four soils are moderately deep to deep, moderately well to well drained, slowly to moderately permeable with sandy surface textures, with sandy clay loam or silty clay loam subsoils. Apison soils are located on broad ridge tops, benches, and upper side slopes. Sipsey soils are located on narrow ridge tops and upper side slopes. Tidings soils are located on steep to very steep lower side slopes. Townley soils are located on broad ridges and upper side slopes. Natural fertility and organic matter are low. The surface landform is strongly dissected. Predominant terrain is either broad, rolling ridges with slopes of 4-20 percent, or steep to very steep side slopes having a range in slope of 30-60+ percent.

A minor geologic component is the Parkwood Formation of the Mississippian Period interbedded with the Pottsville Formation. The Parkwood Formation contains interbedded shale, sandstone, mudstone, and argillaceous limestone. Although similar to the Pottsville Formation containing shale and sandstone, the presence of limestone provides very different soils. Dominant soils derived from limestone are the Remlap and Talbott soil series. These two soils are moderately-deep to deep, well-drained, slowly to moderately permeable soils with sandy loam surfaces and silty clay loam to clay subsoils. Chert and fragments of carbonate rock can be found in the lower soil profile with limestone contact rather than sandstone, as found in the Pottsdale Formation. Both soils are found on lower side slopes and toe slopes. Natural fertility and organic matter are low.

Floodplain soils are limited. Predominant floodplains are narrow subject to flash flooding with constant shifting of sand substrate and deposits along stream banks. Broad floodplains are rare and contain soils that have a sandy loam to silt loam surface with silty clay loam to clay loam subsurfaces.

Future Trends

Soil erosion potential will continue to exist, particularly on steep slopes where soils are shallow over bedrock. Soil compaction potential exists on soil with clay loam to clay subsurface textures under moist conditions. Also, areas where surface erosion has occurred exposing subsurfaces will have an increased potential for soil compaction. Floodplains will continue to have the greatest potential for soil compaction. The current soil inventory needs to be updated.

Management Area 2 - The Conecuh National Forest

The western half of the forest geology derived during the Miocene age and is composed of thin bedded to massive fine and coarse sand, gravel, clay and sandy marine deposits. Primary soils forming in this geology are Benndale, Orangeburg, and Troup. These three soils are deep, well drained, and moderate to moderately rapid to rapidly permeable soils with sandy surface textures and sandy loam or sandy clay loam subsoils. These three soils are located on upland sites. The surface landform for these soils is upland ridges of low relief that have long side slopes ranging from 0-6 percent.

The eastern half of the forest geology derived from Eocene, Oligocene, and Miocene ages composed of sandy clay and residual clay with scattered layers of gravelly medium to coarse sand, fossiliferous chert and limestone. Primary soils formed from this geology are Dothan, Florala, Fuquay, and Rains. These four soils are deep, well drained, somewhat poorly drained and poorly drained, slow to moderately permeable soils with sandy surface textures and sandy loam to sandy clay loam subsoils. These soils are located on ridges with long slopes and on broad, nearly level to flat uplands of very low relief. Slopes range from 0-6 percent.

Floodplain geology is diverse. Holocene (recent geology) and present day fluvial deposits formed broad floodplains with large rivers. Tributaries are often braided forming multiple channels. Flooding is common as is the development of terraces. Primary soils derived are Bibb, Bigbee, Eunola, Muckalee, and Osier soil series. These five soils are deep, somewhat poorly to poorly drained, moderately well to excessively drained, moderately rapid to rapidly permeable soils with sandy surface textures and sandy, sandy loam, and clay loam subsoils. Slopes range from 0-3 percent.

The central portion of the forest contains bays that are usually wet throughout the year. Soils are deep, very poorly drained, moderately permeable, extremely acid with muck subsoils. Natural fertility is medium to high. Organic matter is very high. Anaerobic conditions exist. Soils are hydric (wetland soils). Besides bays, micro-sites exist across the forests that contain hydric soils, referred to as bogs. These sites have either a perched water table or a temporary water table that surfaces during the winter and spring months. These sites are acidic and contain diverse plant communities dependent on wet conditions.

Future Trends

The general landscape and slope is relatively low. Soil erosion potential is generally low under normal land management practices. Roads will continue to be the main source of soil loss. Soil compaction potential is very high for this forest on lower slopes and within bays and floodplains. Hydric soils will continue to present challenges. Newly acquired lands will need a soil inventory.

Management Area 3 – The Oakmulgee Division, Talladega National Forest

The primary geologic age is Upper Cretaceous. Three distinct formations, Coker, Eutaw, and Gordo, developed during the Upper Cretaceous period. The geology for this area is complex and intermingled. Each of the three formations overlap each other giving rise to repeating patterns of soils where one or two soils are dominant. The Eutaw Formation is generally located in the northwest, followed by the Gordo Formation located centrally, and the Coker Formation generally located in the south/southeast. Geology of the Eutaw Formation consists of marine sediments containing micaceous, fine to medium quartz sand interbedded with laminated sand and clay. Geology of the Gordo Formation consists of marine sediments containing massively bedded and mottled clay, sand, and gravel. Primary soils derived from both geologies are Luverne, Maubila, and Smithdale soil series. Smithdale soils and other loamy soils are dominant in the Eutaw Formation, with the clayey Luverne and Maubila soils dominating the Gordo Formation. These three soils are deep, well drained, slowly to moderately slowly to moderate permeability with sandy loam surface textures and sandy loam, clay loam, and clay subsoils. Luverne and Maubila soils are generally found on mid and lower slopes, with Smithdale soils located on ridge tops and upper slopes. The surface landform is highly dissected uplands of moderate relief with narrow ridge tops, steep side slopes of short and moderate lengths with narrow valleys. Terrain is strongly sloping to steep with average slopes ranging from 4 to 45 percent. Geology of the Coker Formation consists of marine sediments containing micaceous very fine to medium sand, crossed bedded sand, micaceous clay and a few thin gravel beds containing quartz and chert pebbles. Primary soils derived from this geology are the familiar Luverne and Smithdale soil series discussed above, and Troup with similar soils. Troup soils are deep, excessively well drained, and moderately permeable with thick sandy loam surface textures and loam to clay loam subsoils. Troup soils are located on ridges and side slopes. The surface landform is moderately dissected uplands with broad ridges of low relief. Terrain is gently sloping to moderately steep with slopes averaging 5 to 35 percent.

Big Sandy and Cahaba river floodplains developed during the Holocene geologic period. Primary soils formed within the floodplains are Cahaba, Iuka, Mantachie and Kirkville soil series. These four soils are deep, somewhat poorly drained to moderately well drained, moderately permeable soils with sandy loam surface textures and sandy loam and loam subsoils. Kirkville and Mantachie soils are hydric. Cahaba soils are located on stream terraces. Iuka, Kirkville, and Mantachie soils are located on level to nearly level floodplains subject to frequent flooding. Two other smaller but major floodplains along Oakmulgee and Elliott Creeks also developed during the Holocene period. Primary soils developed along these streams are Bibb, Johnston, and Mantachie soil series. Bibb and Johnston soils are very deep to deep, poorly to very poorly drained, moderately permeable soils with sandy loam and loam surface and subsurface textures. All three soils are hydric. Natural fertility and organic matter content are low.

Future Trends

Soil erosion potential is high resulting from sandy soils and steep terrain. Roads are particularly vulnerable. Soil compaction can be expected on soils with clayey subsoils near or at the surface during moist soil conditions. Sandy soils usually have a low soil compaction rating. Hydric soils will continue to present challenges. Currently an Order 2 soil inventory is on-going with completion expected over a 4-5 year period.

Management Area 4 - The Talladega Division, Talladega National Forest

Three geologic periods exist - Precambrian-Paleozoic, Cambrian, and Silurian-Devonian. The Precambrian-Paleozoic comprises the Piedmont portion located on the central east side along Shinbone valley. The Piedmont makes up a very small portion of the forest. Piedmont geology consists of residuum from acid, micaceous, metamorphic rock (mica schist) and residuum from basic crystalline rock (chloritic schist). Primary soils found are Louisa, Madison, and Rion soil series formed from crystalline rock with Mecklenburg and Wilkes soil series formed from basic rock. These soils are shallow to moderately deep, well drained, moderately rapid to moderately permeable soils with loamy surface textures and loamy subsoils. Soil reaction is higher in soils formed from basic rock (Mecklenburg-Wilkes), but not high enough to classify as non-acidic. These soils are located on ridges and side slopes. Surface landform is upland hills of moderately low relief, with undulating to very steep terrain with slopes averaging 4 to 50 percent. The Cambrian period geology consists of residuum from shale and sandstone. Soils derived from this geology are Allen, Montevallo, and Tidings. These three soils are shallow to deep, well drained, moderately permeable soils with sandy surface textures and loamy subsoils. Montevallo and Tidings soils are located on ridges and side slopes. Allen soils are located on lower slopes. These soils can be found on the northern section of the forest between the towns of Heflin and Fruithurst. Surface landform is low mountains with moderate relief, with undulating to very steep terrain with slopes ranging from 5 to 70 percent. The primary geologic age is the Silurian-Devonian period consisting of residuum from slate and phyllite and, to a minor extent, mica schist. This geology covers the lower two-thirds of the forest from the town of Heflin south to the town of Sylacauga. Primary soils developed from this geology are Fruithurst and Tallapoosa soil series. These soils are shallow to moderately deep, well drained, moderately permeable soils with loamy surface textures and silty clay to loamy subsoils. Both soils occupy ridges and side slopes. Surface landform is upland hills of moderately low to moderate relief, and nearly level to very steep terrain with slopes ranging from 2 to 65 percent. An isolated capping of Cambrian geology and Silurian-Devonian geology is found along a narrow corridor that basically has Cheha Mountain as the center. Remnant sandstone can be found forming a cap over Talladega Slate and Phyllite. Soils are similar to those found on the northern end of the forest. The Cheaha and Tidings soil series are primary. Tidings was discussed above. Cheaha soils are moderately deep, well drained, moderately permeable with loamy surface and subsurface textures. In addition, surfaces are stony to cobbly. All the soils on the forest are low in natural fertility and organic matter.

Future Trends

Soil erosion potential will continue to exist, particularly on steep slopes where soils are shallow over bedrock. Roads will continue to be vulnerable. Soil compaction potential exists on soil with clay loam to clay subsurface textures under moist conditions. Also, areas where surface erosion has occurred exposing subsurfaces will have an increased potential for soil compaction. Floodplains will continue to have the greatest potential for soil compaction.

Management Area 5 - The Tuskegee National Forest

This forest is split between two geologic periods, Upper Cretaceous, Tuscaloosa Group Formation, and Holocene. The Tuscaloosa Group consists of clayey, gravelly fine to coarse sand, sandy clays and loamy marine sediments. The predominant soils derived from this geology are Cowarts and Uchee soil series. These two soils are deep, well drained, moderately slowly to moderately permeable soils with sandy surface textures and sandy clay loam subsoils. These soils are located on broad ridges and side slopes. Surface landform is upland ridges of low relief that have short slopes. Predominant terrain is undulating to rolling with slopes averaging 5 to 15 percent. Natural fertility and organic matter are low. This forest has experienced severe erosion during the early 20th century. Approximately 50 percent of upland sites have had some form of restoration pre-1950s. Evidence of terracing can still be found, along with evidence of rill and gully erosion that has healed from reforestation, but the land scars are evident.

Holocene (recent geology) and present day fluvial deposits formed broad floodplains with large rivers. Tributaries are often braided forming multiple channels. Flooding is common as is the development of terraces. Primary soils derived are Behtera, Bibb, and

Eunola soil series. These three soils are deep, poorly to moderately well drained, slowly to moderately permeable soils with loam and sandy surface textures with sandy loam, sandy clay loam, and clay subsoils. Bethera soils are hydric. Eunola soils are located on stream terraces. Bibb and Bethera soils are located on level to nearly level floodplains subject to frequent flooding. Natural fertility is low to moderate and organic matter is moderate to high.

Future Trends

Soil erosion potential remains high for sandy soils and soils on steep slopes. The potential for re-activating healed rills and gullies exists. Roads are particularly vulnerable. Soil compaction can be expected on soils with clayey subsoils near or at the surface during moist soil conditions. Sandy soils usually have a low soil compaction rating. Hydric soils will continue to present challenges.

1.2 Effects Analysis on Soil Productivity

Management Activities That Affect Soil Productivity

The following management activities are those most likely to potentially affect the soil resource across the National Forests in Alabama. The management activities listed below are described in more detail in the following parts of this section. Any other activities not listed here have been determined to not individually or cumulatively affect the soil resource on the National Forests in Alabama and are not discussed in this section.

Management activities can reduce soil productivity by compaction, puddling, loss of nutrients by removal of vegetation or loss of organic matter, soil erosion, loss of soil biota, and decreased water infiltration from hot fires. Vegetative management (including timber removal and non-removal), developed recreation and other intensive land use (i.e. administrative sites), road and trail construction/reconstruction, and oil and gas development are the land management activities most likely to result in soil compaction, soil erosion, loss of nutrients, and loss of soil biota. Prescibed burn management activity and associated artificial fire breaks are most likely to result in soil erosion. Dispersed recreation and grazing are most likely to result in compaction and soil erosion. Wildlife opening construction and maintenance is most likely to result in loss of nutrients and soil erosion. Road and trail construction/reconstruction, oil and gas development, developed recreation and other intensive land use, associated temporary roads and skid trails used for vegetative management, and artificially constructed fire breaks are the activities most likely to reduce long term soil productivity.

Quantifying amounts of soil compaction, puddling, loss of nutrients, soil erosion, loss of soil biota, and decreases in water infiltration that might occur is subject to a wide range in variability, dependent on site specific data and project specific variables. The scale at which this land management plan is developed at makes it infeasible to quantify the impacts. However, impacts can be qualitatively described, and indications of the relative potential impacts on the soil resource quantitatively shown by comparing acres of management activities proposed.

Resource Protection Measures

Effects on the soil resource as a result of land management practices do not take into account the use of mitigative measures that have been developed to reduce and/or control impacts or in some cases improve soil conditions. Implementation of Forest standards, Alabama's "Best Management Practices" (BMPs) for forestry and construction sites, and R8-Southern Region Soil and Water Conservation Practices, will reduce impacts to the soil resource to within acceptable limits. Soil productivity will be maintained for short-term effects and improved in some cases for long-term effects.

Forest soil standards usually exceed Alabama's BMPs for forestry. Forest soil standards were developed specifically for land management practices commonly used by the National Forests in Alabama. Forest soil standards should meet the resource needs for all land management practices. There will be situations where new soil standards may need to be developed at a site-specific level or when new land management practices are introduced.

1.3 Direct and Indirect Effects

Direct effects can be the alteration of physical, chemical, and biological properties of the soil resulting from changes in soil organic matter content, erosion of the soil, soil compaction, and nutrient leaching and/or displacement. Indirect effects can be accelerated weathering of the soil, accelerated accumulation of soil in depression areas and/or loss to waterways as sediment, alteration of organic matter formation, and alteration of permeability/water infiltration. Soil productivity can be degraded as a result of direct effects. Key components for productivity of a soil lie within the organic matter layer and the surface soil layer, commonly referred to as topsoil. Loss of surface organic matter can reduce soil productivity significantly. Soil erosion of the surface soil layer and subsequent loss of organic matter content can also reduce soil productivity. Soil compaction affects soil productivity by reducing the air space, commonly referred to as soil porosity. Reduced soil porosity increases soil density, which affects the capability for plant roots to grow. In addition, water infiltration is reduced. A poor rooting system and reduced moisture results in poor plant growth. Puddling occurs when equipment operates on wet soils resulting in soil structure being altered and/or destroyed. Loss of nutrients occurs through loss of organic matter, soil erosion, removal of vegetation, and severe burns.

Effects of Vegetative Management

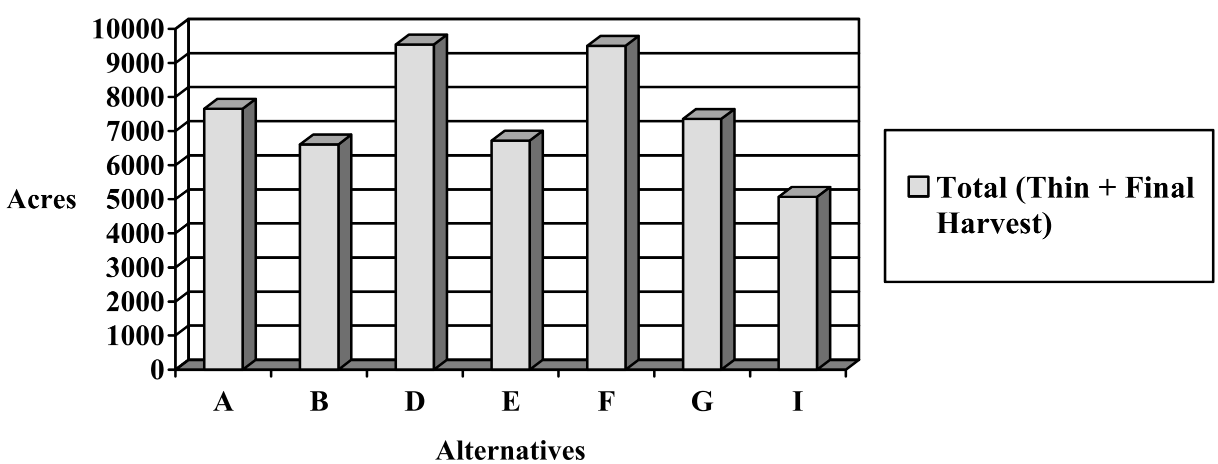
Vegetative management can affect soil productivity through nutrient removal from harvesting trees, soil erosion from the process of harvesting trees and associated temporary skid trails, temporary roads and loading decks, and compaction from use of equipment removing trees from the project site. Generally, a clearcut harvest area has 10% of the site placed in temporary roads, skid trails and loading decks. Limiting soil productivity reduction to 10% or less is considered acceptable. Temporary roads constructed or re-constructed are considered to be on land that is considered as "in a productive status". Other disturbances across the general project area are usually 5% or less. Thinning harvest areas usually involves fewer temporary roads, skid trials and loading decks. Thinning harvest usually impacts 10% of the area lasting three years. Soil productivity is therefore to be maintained or improved on these sites. Soil productivity is reduced on temporary roads, skid trails and loading decks primarily through loss of organic material and surface soil texture, soil compaction and soil erosion. In addition, reduced water infiltration from soil compaction can occur. Soil productivity can be restored through implementation of soil and water standards consisting of: application of fertilizer, discing the soil, and re-vegetation. Forest standards are applied to mitigate the effects of reduced soil productivity. Nutrient loss and soil compaction are easily mitigated through ripping the soil and applying lime and fertilizer. Re-vegetating sites assists with controlling soil erosion and initiates the replenishment of organic matter. Reductions in soil productivity on these sites are considered short-term, three years, when Forest standards are applied to mitigate the effects. However, organic matter replacement will be long-term.

Whole tree harvesting removes greater amounts of nutrients than harvesting only the stem, leaving branches and leaves/needles on site. Temporary roads and skid trails are sites of the greatest nutrient loss because organic matter is removed and the surface soil can be eroded. Soil compaction affects bulk density of the soil that can be explained as a measurement of the amount of pore space within a soil. Soil compaction is dependent on soil texture, organic matter, and soil moisture. Lighter textured soils (sand) have a higher range in bulk density before affecting soil productivity than heavier textured soils (clay). Soil organic matter reduces bulk density. Soil moisture content has a pronounced effect on compaction as it influences soil porosity. Harvest technique also affects soil compaction. Single trips over the ground under dry soil conditions result in acceptable soil compaction. Multiple trips, as few as three, can lead to unacceptable soil compaction. Normally this is limited to haul roads and skid trails. The potential for soil erosion resulting from tree harvesting is greatest on temporary roads, skid trails and loading decks. These are the areas where 90% or more soil exposure takes place. Soil exposure within the general management site is usually less than 5% and scattered, keeping soil erosion and soil loss to a minimum.

Post-treatment of a timber stand usually involves some form of site preparation. Methods currently used are site preparation burn, chemical, and mechanical. Site preparation burns have the potential to consume organic matter, alter the surface physical properties of the soil, and reduce soil biota through heating at high temperatures. Loss of organic matter can lead to soil erosion. Site preparation burns are normally light to moderate burns, resulting in dispersed areas of exposed soils. Exposed soils usually occupy 20% or less of the burned area. Impacts are expected to last three years. Organic matter remains intact with loss of surface litter. Nutrient budgets remain neutral or increase. Severe burns (equivalent to a wildfire) have the potential to have negative nutrient budgets, reduce soil biota, and consume organic matter. Severe burns usually result in soil erosion and reduced water infiltration from temporary, and in some cases permanent, changes to the soil surface physical properties. Chemical use results in little to no soil erosion potential. Exposed soils are expected to be less than 2%. Soil biota is not expected to be affected since ground-applied chemicals are not used. Chemicals used are foliar sprays or injected into a plant. Mechanical site preparation methods can result in soil erosion and compaction. Currently mechanical site preparation involves use of a rolling drum chopper or shear blade. Use of a drum chopper pulled by a dozer normally has little to no effect on the soil resource when conducted under low soil moisture conditions. Compaction is minimal if soil moisture is low and there is a presence of surface debris and/or organic matter. The action of the chopper blade creating shallow indentations also assists in reducing soil compaction and increasing water infiltration. Exposed soils are usually less than 10%. Impacts are expected to last three years. Mechanical site preparation using a blade to shear vegetation and pile it into windrows can have minimal effects on the soil resource, when properly done. Improper use can result in just the opposite with severe effects on the soil resource. Use of the shear blade where the blade is placed into the soil results in large areas of exposed soils that in turn results in high probabilities for soil erosion. Piling vegetative debris into windrows can further increase soil exposure from the action of pushed debris scouring the surface, particularly if over large distances (i.e. 100 feet or more). Nutrients are concentrated within the windrows, particularly if soil and organic matter are contained within the windrows. This form of nutrient displacement reduces the soil productivity between windrows and increases soil productivity within windrows. Application of forest standards limiting shear operations to slopes less than 5 percent and limiting windrows to less than 100 feet, as well as good project administration, can limit soil erosion to acceptable limits. Approximately 20% or less of the area is impacted, lasting from three to five years.

Reforestation has no effect on the soil resource when using hand methods for re-establishing vegetation. Minimal potential for soil erosion and compaction exists when mechanical means of re-vegetation are used. Mechanical means involves one pass over the site. Minimal soil exposure and displacement can occur from equipment tread.

Figure 3A-1: Total Forest Vegetation Mgmt.
Short Term Soil Effects by Alternative



Comparison of alternatives for the National Forests in Alabama (figure 3A-1) for the fifty-year average finds Alternative D to have the greatest potential for effects to the soil resource with alternative F being very similar. Alternative I has the least potential for effects to the soil resource. Alternative I has approximately 47% less potential for soil disturbance compared to Alternatives D and F. Alternatives A and G have approximately

31% less potential for soil disturbance compared to Alternatives D and F, with Alternatives B and E having approximately 21% less potential for soil disturbance.

A slightly different scenario exists when comparing alternatives by Management Area for vegetation management.

Management Area 1 – Bankhead NF has the greatest amount of thinning occurring in Alternatives A and F with the lowest acreage to be thinned in Alternatives G and E. Restoration management is greatest in Alternative D with the lowest occurring in Alternative B, followed closely by Alternative G. The remaining Alternatives, A, E, F, and I, are similar.

Management Area 2 – Conecuh NF has the greatest amount of thinning occurring in Alternative G, followed closely by Alternative D, then Alternative F. Alternative B has the lowest acreage to be thinned. Alternatives A, E, and I are similar. Restoration management is greatest in Alternatives A and B, with the lowest occurring in Alternative I, followed by Alternative E. The remaining Alternatives, D, F, and G, are similar.

Management Area 3 – Oakmulgee Division, Talladega NF has the greatest amount of thinning occurring in Alternative F, followed closely by alternative D. Alternative I has the lowest acreage to be thinned. Alternatives A and G are very similar. Restoration management is greatest in Alternative F, followed closely by Alternative D, with the lowest occurring in Alternative I.

Management Area 4 – Talladega Division, Talladega NF has the greatest amount of thinning occurring in Alternative G followed closely by alternative B. Alternative A has the lowest acreage to be thinned, followed closely by Alternative I. Restoration management is greatest in Alternative D, with the lowest occurring in Alternative E. All other Alternatives are similar.

Management Area 5 – Tuskegee NF has no vegetation management scheduled under Alternative A. Alternatives G and E have the greatest amount of thinning. The lowest amount of thinning occurs in Alternative B. Restoration management is greatest in Alternative D, followed closely by Alternative F, with the lowest occurring in Alternative B. All other Alternatives are similar.

Effects of Roads and Recreational Trails

Permanent roads and recreational trails are considered to be in a non-productive state. Soil productivity is not an issue on these sites since the land base they occupy is no longer in a productive use status. Permanent roads with proper scheduled maintenance and applied standards result in low levels of soil erosion. Fines from the road base, such as aggregate, cut road banks, and un-vegetated road ditches, are sources for soil erosion. Roads that have no surfacing (gravel, blacktop) and are not maintained, or are maintained improperly, provide the greatest source of soil erosion. Recreational trails are also a primary source for soil erosion since, unlike roads, they are usually built on steeper grades. Hiking trails result in minimal soil erosion. These trails are narrow, involving foot travel. Horse, bicycle, and ORV trails are the primary sources for soil erosion from a trail network. Tread paths are wider than hiking trails. Horse use tends to cut trails down the center, including mitigating standards such as waterbars, under heavy use. ORV trails tend to widen under heavy use, along with rutting and down-cutting trail tread. Required maintenance has been limited in the past due to constrained budget funding. As trails age, the tendency is to become entrenched, making it difficult to control surface runoff and soil erosion. Soil erosion from all permanent roads and recreational trails can be expected on a yearly basis. The greatest amount of soil erosion across each National Forest in Alabama results primarily from permanent and temporary roads. Recreational trails follow at a distant second.

Currently system roads occupy 1% or less of the land base in Management Areas 1, 2, 3, and 4. System roads in Management Area 5 occupy just under 3%. Alternatives A thru I for all management areas do not plan for construction of new roads. Existing miles of roads are constant throughout the planning horizon. Reconstruction of roads is also not included in any of the management alternatives; however, re-construction of roads can be expected. Reconstruction can involve re-locating road segments to improve drainage and maintenance, replacement of culverts, and re-surfacing, for example. Application of Alabama State "best management practices' for construction sites and Forest Plan standards will assist in mitigating soil erosion. Site-specific soil and water standards may need to be developed on a case-by-case basis depending on site conditions. Continued road inventory and road usage will assist with determining roads that can be obliterated and returned to the general forest. Reducing the miles of forest roads with restoration of their corridors, and applying seasonal and year-round closures with access for administrative purposes will provide the greatest opportunity to reduce soil erosion on the Forest landscape.

Alternatives A thru I for all management areas, except #5, the Tuskegee National Forest, do not plan for the construction of new trails. Existing miles of all types of trails remain constant throughout the planning horizon. Management Area 5 plans to construct four miles of mountain bike trail under all alternatives. Mountain bike use is currently along the Bartram Trail. A section of the Bartram Trail is located within the riparian area of Choctafaula Creek. Impacts to soil, water, and botanical resources have been occurring. The four miles of new trail construction will be re-located out of the riparian area. The existing four miles impacted within the riparian area will be restored to encourage the return of native vegetation with a trail tread remaining for hiking use only. The possibility for construction of new trails does exist for the future based on funding, particularly funding for maintenance. Management Area 5 has the largest forest land base occupied by all forms of trails, which equates to less than one-quarter percent. The potential for soil erosion will be localized. A very small overall effect from soil erosion can be expected from trails within each Management Area. Mitigating the effects to the soil resource from trail construction can be accomplished by implementation of Forest soil standards, landscape location, and coordination with Forest soil and water specialists.

Effects of Dispersed Recreation

Effects to the soil resource are the same as discussed for trails. The use of off-road vehicles and horses is restricted to permanent trails and forest roads. Dispersed recreation is more in the form of hiking, which results in minimal soil erosion. There may be localized use resulting in soil erosion that affects other resources. The overall impacts to the soil resource from hiking trails and associated localized uses under dispersed recreation are very limited and not considered a threat to soil productivity since less than ¼ percent of the total forest land base is occupied by all forms of trails. Alternative E provides for the greatest acreage designated to dispersed recreation. All other alternatives provide for some acreage of dispersed recreation. Although there are differences in acreage, the effects to the soil resource under all alternatives are not considered to result in an overall reduction in soil productivity. Impacts are expected to be less than two percent lasting three years.

Effects of Prescribed Fire

Prescribed burning has the equivalent potential to affect soil productivity as discussed earlier under site preparation burns. Normally, prescribed burns are light burns designed to reduce fuel loading and/or improve wildlife habitat. This type of fire use is usually accomplished in winter/early spring with a slight effect on soil productivity. Prescribed burning is also used during summer to ensure control of non-fire tolerant plants. This type of burn is usually a moderate burn resulting in moderate effects on the soil resource with localized severe effects possibly occurring. Light and moderate burns are considered to be short-term with effects lasting three years. The potential for a severe burn from wildfires or prescribed burn can occur. Severe burns can be expected to have a long-term effect on soil productivity. Severe burns can result in high soil erosion occurrences. Alteration of soil physical properties can also result with loss of soil porosity, water holding capacity, and infiltration. Soil biota can be destroyed. Light burns have been found to have positive nitrogen budgets, moderate burns to have neutral nitrogen budgets, and severe burns to have negative nitrogen budgets. Losses of less mobile nutrients, i.e., phosphorus, have been found to be negligible. Soil texture and surface properties are usually not affected by light to moderate burns. Fire lines in the recent past and those currently being constructed are intended for use on a permanent basis. Similar to trails and narrow roads, the susceptibility to soil erosion is high. Construction on side slopes, out-sloping the fire line where possible, and applying standards for water control structures and re-vegetation where needed, will reduce the high potential for soil erosion. Use of natural and artificial firebreaks to the extent possible reduces the need for constructed fire lines, thus reducing impacts to the soil resource.

Management Area 1, Bankhead National Forest, has scheduled annual prescribed burning of 7,000 acres, or 4% of the Forest's land base, under Alternatives A, D, E, F, and G. Alternatives B and I have 9,500 acres, or 5% of the Forest's land base, scheduled to be prescribed burned annually. A 1% increase in prescribed burn acreage will have a very minor potential for increases in effects to soil productivity. The effects can be considered relatively equal across all alternatives.

Management Area 2, Conecuh National Forest, has scheduled annual prescribed burning of 18,000 acres, or 21% of the Forest's land base, under Alternatives A, D, and F. Alternatives B, E, G, and I have 26,000 acres, or 31% of the Forest's land base, scheduled to be prescribed burned annually. A 10% increase in prescribed burn acreage will have a potential for slight increase in effects to the soil resource

Management Area 3, Oakmulgee Division, Talladega National Forest, has scheduled annual prescribed burning of 18,000 acres, or 11% of the Forest's land base, under Alternatives A, D, and F. Alternatives B, E, G, and I have scheduled 22,000 acres, or 14% of the Forest's land base, to be prescribed burned annually. A 3% increase in prescribed burn acreage will have a potential for minor increases in effects to the soil resource.

Management Area 4, Talladega Division, Talladega National Forest, has scheduled annual prescribed burning of 20,000 acres, or 9% of the Forest's land base, under Alternatives A, D, and F. Alternatives B, E, G, and I have scheduled 30,000 acres, or 13% of the Forest's land base, to be prescribed burned annually. A 4% increase in prescribed burn acreage will have a potential for minor increases in effects to the soil resource.

Management Area 5, Tuskegee National Forest, has scheduled annual prescribed burning of 1,800 acres, or 16% of the Forest's land base, under Alternatives A, D, E, F, and G. Alternatives B and I have scheduled 2,500 acres, or 22% of the Forest's land base, to be prescribed burned annually. A 6% increase in prescribed burn acreage will have a potential for very slight increases in effects to the soil resource.

Localized soil erosion can be primarily expected from constructed firebreaks. Increases in the amount of prescribed burn acreage usually results in increases of constructed firebreaks. Selection of acres that do not require additional constructed firebreaks would greatly reduce the potential effects to the soil resource. Application of Forest soil and water standards for prescribed burning and associated constructed firebreaks will mitigate effects to the soil resource within acceptable limits.

Effects of Wildlife Management

Wildlife management practices involving construction and maintenance of food plots can affect soil productivity. Food plots are usually 1-2 acres in size. Preparing the soil through plowing and disking results in the loss of surface soil and organic matter from tillage methods, exposure to soil erosion, and changes in soil moisture content. The overall effects to soil productivity are small due to use of fertilizer and re-vegetation. Soil exposure is short-term and limited to the time from tillage till vegetation is established. Plots are usually vegetated for most of the time. Soil erosion should be minimal. Impacts are expected to occur annually.

Currently the total acreage in wildlife openings across the National Forests in Alabama is 2,026 or 0.3 percent of the land base. The greatest amount of acreage in wildlife openings, 750 acres or 0.4 percent of the land base, can be found In Management Area 1 – Bankhead NF. Management Area 3 – Oakmulgee Division, Talladega NF has the lowest acreage in wildlife openings, 164 acres or 0.3 percent of the land base. Effects to soil productivity are very low and not considered a threat to soil productivity, considering the overall land base occupied is 0.3 percent.

Effects of Facility Construction

Facility construction, like roads and trails, is considered to be in a non-productive state. Soil productivity is not an issue on these sites. The greatest effect is to other resources resulting from soil erosion. Facility site construction has a broad range in size and can result in large areas of soil exposure. The potential for off-site soil loss can be high. Implementation of best management practices for construction sites can greatly reduce off-site soil loss.

Alternatives A thru I for all management areas do not plan for construction of developed recreation sites, nor upgrading or renovations. Existing acreage of developed recreation sites is constant throughout the planning horizon. No other facilities such as offices, work centers, or other administrative sites are scheduled. In the event that funding and decision level results in the construction of a new facility or renovating an existing facility, application of Alabama State "best management practices" for construction and Forest soil and water standards should mitigate most impacts to the soil and water resource. Site-specific soil and water standards may need to be developed on a case-by-case basis, depending on site conditions.

Effects of Mineral Activities

Mineral exploration and extraction potentially can have minor to major impacts to soil productivity. Recreational panning, rock collecting, and similar recreational past time use is relatively low on the National Forests in Alabama. Soil erosion is the primary concern. This type of activity is usually not concentrated in one area, but is dispersed. The effects to soil productivity are considered minor. Commercial exploration and extraction result in long-term reductions in soil productivity. Oil and gas wells and related facilities usually occupy five acres or less. These sites are similar to construction sites where the soil resource is heavily manipulated. Use of best management practices and Forest standards in leasing permits can mitigate soil erosion and pollutants from this type of site. Abandoned sites are restored but the effects on soil productivity can last for 20 years or more.

Recreational mining occurs primarily on the Talladega Division of the Talladega National Forest. Primary activities are gold panning and rock collecting. Past history has been very low for these types of activities. Future activities are not expected to differ from past uses. Effects to the soil resource are considered to be minor. Past history for mineral exploration has usually been directed at Management Area 2, the Conecuh National Forest. Exploration for oil occurs somewhat frequently, averaging once every five to seven years. Based on exploration findings, wells are drilled, most of which result in dry holes or non-producing wells. Currently the Conecuh NF has four producing wells and two saltwater injection wells. These sites occupy an average of three acres. Initial drilling occupies an average five acres. Dry wells are restored after drilling is completed. Active wells are reworked to occupy an average three acres with mitigating measures taken to contain point sources of pollution on site. Active well sites are considered to be out of productivity for vegetation; therefore, site productivity is not an issue. Since mitigative standards are in place to contain potential pollution on-site, soil erosion is contained. The two wells used for depositing saltwater from the four producing wells involve transporting the saltwater through a network of pipelines. The Forest monitors the pipelines frequently. In the past, two incidents occurred where leaks were discovered. The frequent Forest monitoring greatly assisted in keeping the incidents very small. In the event mitigative standards are breached resulting in off-site movement of pollutants, the site is handled as a point source of pollution that requires involvement of Alabama State agencies (Department of Environmental Management and the Oil and Gas Board).

Management Area 3, the Oakmulgee Division of the Talladega National Forest, currently has no mineral activity. Recent past history had the potential for gas exploration with over one hundred producing wells expected. This did not materialize. Market conditions were not conducive and therefore made gas exploration infeasible. The possibility does exist for gas exploration to occur in the future but the probability is considered very low.

Effects of Livestock Grazing

Primary potential impacts of livestock grazing on soil productivity are erosion and compaction. Overgrazing resulting in loss of plant cover is the major cause of soil erosion. Adding slope to the grazing allotment increases the erosion potential. Soil compaction is localized rather than widespread. Soil compaction occurs primarily along stock paths and holding pens. The greatest potential for soil compaction occurs within riparian areas where soils are usually moist. Stock paths usually access waterways. Soil compaction in riparian areas usually results in soil erosion reaching waterways as sediment. Application of riparian standards in the future will assist in mitigating soil compaction and erosion within riparian areas. Erosion control on stock paths and holding pens, similar to permanent roads and trails, will assist in reducing soil erosion as long as applied standards are maintained. Impacts are usually 5% or less of the area. Impacts are expected annually.

Range allotments exist only in Management Area 2, the Conecuh National Forest. Alternatives A thru I do not have any differences in the range allotment acreage. Current range allotment acreage is constant throughout the planning horizon.

Soil and Water Improvement

Soil and water improvement projects involve the restoration of actively eroding sites. Examples are abandoned roads and trails, rills and gullies, large areas (one acre or more) with sheet erosion, and fertilization to improve vegetative cover. Over the last fifteen years, an average of fifty acres per year have had watershed improvement work accomplished. Currently, the National Forests in Alabama have treated all known actively eroding rills and gullies. Those remaining rills and gullies on inventory involve private land where investing in erosion work will not be successful without private land making improvements. Recent years' watershed improvement work concentrated on abandoned roads and trails. This form of watershed project needs can be expected in the future. Other areas to be assessed and added to the watershed improvement inventory are riparian areas. Watershed improvement projects seek to improve soil productivity, water quality, and overall watershed health.

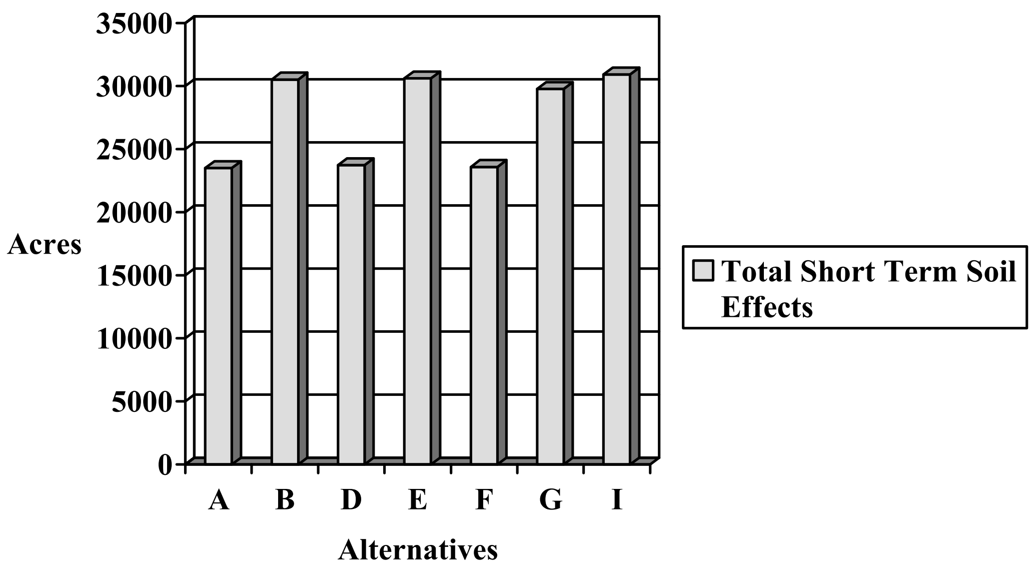
1.4 Cumulative Effects

Soils are sedentary. Effects to the soil resource are in-situ. Conditions from one area have little effect on adjacent areas. The area of consideration for cumulative effects on the soil resource consists of the National Forest System lands managed by the National

Forests in Alabama. Cumulative effects are changes in soil productivity. Changes in productivity can be adverse or beneficial. Changes in organic matter, soil surface texture (erosion), soil fertility, water storage capacity and water infiltration are indicators of cumulative effects to soil productivity. Cumulative effects are discussed in other sections of this chapter.

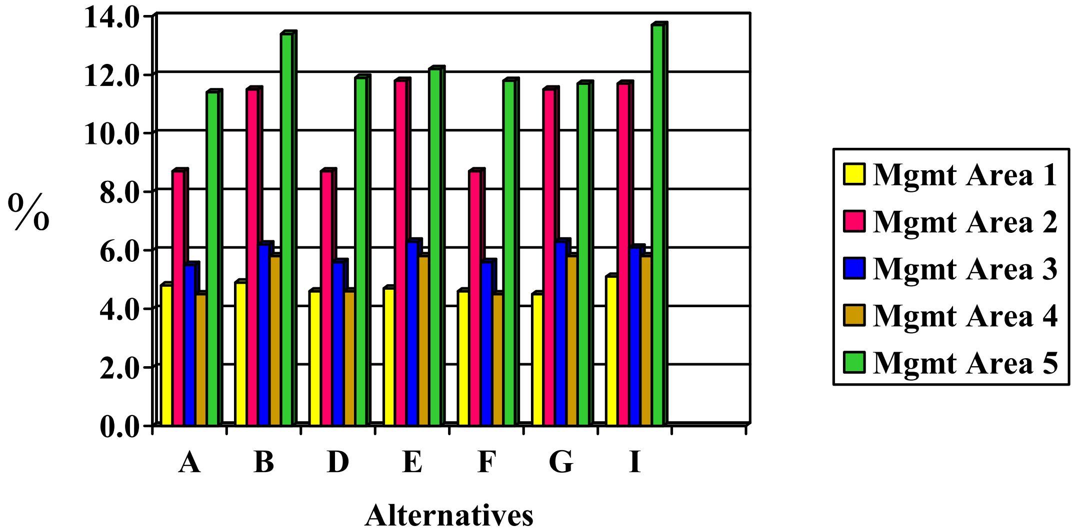
The cumulative effects for soils are summarized by management area in Tables 3A-1 through 3A-5. The effects are similar for all alternatives. As shown in each table, the estimated amount of land with long term soil commitment thru the fifty- year planning horizon is anticipated to range from a low of 1.4 % on Management Area 2, Conecuh NF, to a high of 4.7% on Management Area 5, the Tuskegee NF. The average for all the forests is 2.3%.

Figure 3A-2: Total Forest Short Term Soil Effects by Alternative



The estimated percent of land with potential for short term soil effects thru the fifty-year planning horizon for the National Forests in Alabama is anticipated to range from a low of 4.6% under Alternatives A and F, to a high of 6.1% under Alternative I. This equates to a 1.5% or less difference in the amount of land with potential for short-term effects to the soil resources across all Alternatives. Figure 3A-2: Total Forest Short Term Soil Effects by Alternative compares the differences in acres. Tables 3A-1 thru 3A-5 list the short-term annual soil effects by Management Area.

Figure 3A-3: Cumulative Soil Effects By Management Area



Total cumulative effects to the soil resource can be found in Tables 3A-1 thru 3A-5 and are illustrated graphically in Figure 3A-3. Management Areas 1, 3, and 4 have very little variation among alternatives. Management Area 2 shows approximately a 3% difference between Alternatives A, D, and F and Alternatives B, E, G, and I. Management Area 5 shows approximately a 1.5% to 2.3% difference between Alternatives B and I and Alternatives A, D, E, F, and G. Looking at the Forest level, Alternative I has the greatest total estimated impacts to the soil resource at 43,817 acres or 6.6%. Alternative A has the lowest total estimated impacts to the soil resource at 36,395 acres or 5.4%. Localized differences in effects would exist, but from a forest-wide perspective, the impacts of the alternatives on the soil resource are not significantly different among the alternatives. The anticipated effects are projected to meet soil quality standards established in the Forest Service Manual through implementation of Forest standards designed to mitigate effects to the soil resource. Findings from monitoring-implemented Forest standards that result in soil quality standards not being met will require implementing soil improvement measures to restore the soil. Monitoring results will also assist with improving and/or developing new Forest standards as needed to meet soil quality standards.

Table 3A-1: Estimated Cumulative Soil Effects For Management Area 1.

Management Area 1			Estimated	Cumulative	Soil Effects		
Bankhead NF – 184,608 acres			Acres by Alternative				
Indicator	Alt A	Alt B	Alt D	Alt E	Alt F	Alt G	Alt I
Long-Term Commitment System Roads	1,663	1,663	1,663	1,663	1,663	1,663	1,663
Hiking Trails	6	6	6	6	6	6	6
Horse Trails	14	14	14	14	14	14	14
OHV Trails	10	10	10	10	10	10	10
New Trails (all types)	0	0	0	0	0	0	0
Oil & Gas Development	0	0	0	0	0	0	0
Developed Recreation	3,336	3,336	3,336	3,336	3,336	3,336	3,336
Admin Sites	201	201	201	201	201	201	201
TOTAL ACRES	5,230	5,230	5,230	5,230	5,230	5,230	5,230
Percent of Forest with Long-Term Soil Commitment	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%	2.8%
Short-Term Annual Effects							
Vegetation Mgmt-Restoration 1	203	124	182	168	191	95	159
Vegetation Mgmt-Thinning 2	105	41	89	42	111	37	76
Site Preparation 3	271	166	243	225	255	127	212
Prescribed Fire 4	2,100	2,850	2,100	2,100	2,100	2,100	2,850
Dispersed Recreation 5	229	0	0	286	0	0	273
Wildlife Openings 6	750	750	750	750	750	750	750
TOTAL ACRES	3,658	3,931	3,364	3,571	3,407	3,109	4,320
Percent of Forest with Short-Term Soil Commitment	2%	2.1%	1.8%	1.9%	1.8%	1.7%	2.3%
TOTALS							
Total Soil Commitment	5,230	5,230	5,230	5,230	5,230	5,230	5,230
Total Short-Term Annual Impacts	3,658	3,931	3,364	3,571	3,407	3,109	4,320
Total Estimated Impacted Soils	8,888	9,161	8,594	8,801	8,637	8,339	9,550
Percent of Forest with Soil Impacts	4.8%	4.9%	4.6%	4.7%	4.6%	4.5%	5.1%

Assumes short-term soil impacts occur on 15 percent of the acres treated.
Assumes short-term soil impacts occur on 10 percent of the acres treated.
Assumes short-term soil impacts occur on 20 percent of the acres treated.
Assumes short-term soil impacts occur on 30 percent of the area is burned.
Assumes short-term soil impacts occur on .05 percent of the acres designated for use.
Assumes short-term soil impacts occur on 100 percent of the acres treated.

Table 3A-2: Estimated Cumulative Soil Effects For Management Area 2.

Management Area 2			Estimated Cumulative Soil Effects				
Conecuh NF - 83,991 acres			Acres by Alternative				
Indicator	Alt A	Alt B	Alt D	Alt E	Alt F	Alt G	Alt I
Long-Term Commitment							
System Roads	613	613	613	613	613	613	613
Hiking Trails	3	3	3	3	3	3	3
Horse Trails	0	0	0	0	0	0	0
OHV Trails	0	0	0	0	0	0	0
New Trails (all types)	0	0	0	0	0	0	0
Oil & Gas Development	20	20	20	20	20	20	20
Developed Recreation	502	502	502	502	502	502	1,679
Admin Sites	17	17	17	17	17	17	17
TOTAL ACRES	1,155	1,155	1,155	1,155	1,155	1,155	1,155
Percent of Forest with Long-Term Soil Commitment	1.4%	1.4%	1.4%	1.4%	1.4%	1.4%	1.4%
Short-Term Annual Effects							
Vegetation Mgmt-Restoration 1	48	39	58	41	55	45	38
Vegetation Mgmt-Thinning 2	47	46	60	35	51	64	34
Site Preparation 3	64	53	77	55	73	60	50
Prescribed Fire 4	5,400	7,800	5,400	7,800	5,400	7,800	7,800
Dispersed Recreation 5	0	0	0	192	0	0	192
Grazing 6	84	84	84	84	84	84	84
Wildlife Openings 7	508	508	508	508	508	508	508
TOTAL ACRES	6,151	8,510	6,167	8,715	6,151	8,541	8,686
Percent of Forest with Short-Term Soil Commitment	7.3%	10.1%	7.3%	10.4%	7.3%	10.1%	10.3%
TOTALS							
Total Soil Commitment	1,155	1,155	1,155	1,155	1,155	1,155	1,155
Total Short-Term Annual Impacts	6,151	8,510	6,167	8,715	6,151	8,541	8,686
Total Estimated Impacted Soils	7,306	9,665	7,322	9,870	7,306	9,696	9,841
Percent of Forest with Soil Impacts	8.7%	11.5%	8.7%	11.8%	8.7%	11.5%	11.7%

Assumes short-term soil impacts occur on 15 percent of the acres treated.
Assumes short-term soil impacts occur on 10 percent of the acres treated.
Assumes short-term soil impacts occur on 20 percent of the acres treated.
Assumes short-term soil impacts occur on 30 percent of the area is burned.
Assumes short-term soil impacts occur on .05 percent of the acres designated for use.
Assumes short-term soil impacts occur on 5 percent of the acres treated.
Assumes short-term soil impacts occur on 100 percent of the acres treated.

Table 3A-3: Estimated Cumulative Soil Effects for Management Area 3.

Management Area 3			Estimated	Cumulative	Soil Effects		
Oakmulgee Division - 157,700 acres			Acres by Alternative				
Indicator	Alt A	Alt B	Alt D	Alt E	Alt F	Alt G	Alt I
Long-Term Commitment System Roads	1,477	1,477	1,477	1,477	1,477	1,477	1,477
Hiking Trails	0	0	0	0	0	0	0
Horse Trails	0	0	0	0	0	0	0
OHV Trails	0	0	0	0	0	0	0
New Trails (all types)	0	0	0	0	0	0	0
Oil & Gas Development	0	0	0	0	0	0	0
Developed Recreation	1,007	1,007	1,007	1,007	1,007	1,007	1,007
Admin Sites	25	25	25	25	25	25	25
TOTAL	2,509	2,509	2,509	2,509	2,509	2,509	2,509
Percent of Forest with Long-Term Soil Commitment	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%
Short-Term Annual Effects							
Vegetation Mgmt-Restoration 1	146	138	210	151	230	168	53
Vegetation Mgmt-Thinning 2	184	153	224	171	225	180	34
Site Preparation 3	195	183	280	202	307	224	71
Prescribed Fire 4	5,400	6,600	5,400	6,600	5,400	6,600	6,600
Dispersed Recreation 5	14	14	14	175	0	14	155
Wildlife Openings 6	164	164	164	164	164	164	164
TOTAL	6,103	7,252	6,332	7,463	6,326	7,350	7,077
Percent of Forest with Short-Term Soil Commitment	3.9%	4.6%	4.0%	4.7%	4.0%	4.7%	4.5%
TOTALS							
Total Soil Commitment	2,509	2,509	2,509	2,509	2,509	2,509	2,509
Total Short-Term Annual Impacts	6,103	7,252	6,332	7,463	6,326	7,350	7,077
Total Estimated Impacted Soils	8,612	9,761	8,841	9,972	8,835	9,859	9,586
Percent of Forest with Soil Impacts	5.5%	6.2%	5.6%	6.3%	5.6%	6.3%	6.1%

Assumes short-term soil impacts occur on 15 percent of the acres treated.
Assumes short-term soil impacts occur on 10 percent of the acres treated.
Assumes short-term soil impacts occur on 20 percent of the acres treated.
Assumes short-term soil impacts occur on 30 percent of the area is burned.
Assumes short-term soil impacts occur on .05 percent of the acres designated for use.
Assumes short-term soil impacts occur on 100 percent of the acres treated.

Table 3A-4: Estimated Cumulative Soil Effects For Management Area 4.

Management Area 4			Estimated	Cumulative	Soil Effects		
Talladega Division – 231,134 acres			Acres by Alternative				
Indicator	Alt A	Alt B	Alt D	Alt E	Alt F	Alt G	Alt I
Long-Term Commitment							
System Roads	2,135	2,135	2,135	2,135	2,135	2,135	2,135
Hiking Trails	25	25	25	25	25	25	25
Horse Trails	12	12	12	12	12	12	12
OHV Trails	8	8	8	8	8	8	8
New Trails (all types)	0	0	0	0	0	0	0
Oil & Gas Development	0	0	0	0	0	0	0
Developed Recreation	1,268	1,066	1.066	1,066	1,060	1,066	1,066
Admin Sites	23	23	23	23	23	23	23
TOTAL	3,471	3,471	3,471	3,471	3,471	3,471	3,471
Percent of Forest with Long-Term							
Soil Commitment	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%
Short-Term Annual Effects							
Vegetation Mgmt-Restoration 1	139	148	248	127	173	168	157
Vegetation Mgmt-Thinning 2	73	116	97	81	110	120	78
Site Preparation 3	185	197	330	169	230	245	210
Prescribed Fire 4	6,000	9,000	6,000	9,000	6,000	9,000	9,000
Dispersed Recreation 5	50	0	0	248	0	50	0
Wildlife Openings 6	393	393	393	393	393	393	393
TOTAL	6,840	9,854	7,068	10,018	6,906	9,976	9,838
Percent of Forest with Short-Term							
Soil Commitment	3.0%	4.3%	3.1%	4.3%	3.0%	4.3%	4.3%
TOTAL							
Total Soil Commitment	3,471	3,471	3,471	3,471	3,471	3,471	3,471
Total Short-Term Annual Impacts	6,840	9,854	7,068	10,018	6,906	9,976	9,838
Total Estimated Impacted Soils	10,311	13,325	10,539	13,489	10,377	13,447	13,309
Percent of Forest with Soil Impacts	4.5%	5.8%	4.6%	5.8%	4.5%	5.8%	5.8%

Assumes short-term soil impacts occur on 15 percent of the acres treated.
Assumes short-term soil impacts occur on 10 percent of the acres treated.
Assumes short-term soil impacts occur on 20 percent of the acres treated.
Assumes short-term soil impacts occur on 30 percent of the area is burned.
Assumes short-term soil impacts occur on .05 percent of the acres designated for use.
Assumes short-term soil impacts occur on 100 percent of the acres treated.

Table 3A-5: Estimated Cumulative Soil Effects For Management Area 5.

Management Area 5			Estimated	Cumulative	Soil Effects		
Tuskegee NF – 11,211 acres			Acres by Alternative				
Indicator	Alt A	Alt B	Alt D	Alt E	Alt F	Alt G	Alt I
Long-Term Commitment							
System Roads	308	308	308	308	308	308	308
Hiking Trails	2	2	2	2	2	2	2
Horse Trails	5	5	5	5	5	5	5
OHV Trails	0	0	0	0	0	0	0
New Trails/Mountain Bike	4	4	4	4	4	4	4
Oil & Gas Development	0	0	0	0	0	0	0
Developed Recreation	169	169	169	169	169	169	169
Admin Sites	43	43	43	43	43	43	43
TOTAL	527	527	527	527	527	527	527
Percent of Forest with Long-Term Soil Commitment	4.7%	4.7%	4.7%	4.7%	4.7%	4.7%	4.7%
Short-Term Annual Effects							
Vegetation Mgmt-Restoration 1	0	6	18	13	17	13	13
Vegetation Mgmt-Thinning 2	0	2	8	9	8	9	7
Site Preparation 3	0	8	25	17	23	17	17
Prescribed Fire 4	540	750	540	540	540	540	750
Dispersed Recreation 5	0	0	0	53	0	0	6
Wildlife Openings 6	211	211	211	211	211	211	211
TOTAL	751	977	802	843	799	790	1,004
Percent of Forest with Short-Term Soil Commitment	6.7%	8.7%	7.2%	7.5%	7.1%	7.0%	9.0%
TOTALS							
Total Soil Commitment	527	527	527	527	527	527	527
Total Short-Term Annual Impacts	751	977	802	843	799	790	1,004
Total Estimated Impacted Soils	1,278	1,504	1,329	1,370	1,326	1.317	1,531
Percent of Forest with Soil Impacts	11.4%	13.4%	11.9%	12.2%	11.8%	11.7%	13.7%

Assumes short-term soil impacts occur on 15 percent of the acres treated.
Assumes short-term soil impacts occur on 10 percent of the acres treated.
Assumes short-term soil impacts occur on 20 percent of the acres treated.
Assumes short-term soil impacts occur on 30 percent of the area is burned.
Assumes short-term soil impacts occur on .05 percent of the acres designated for use.
Assumes short-term soil impacts occur on 100 percent of the acres treated.

2.0 Water

2.1 Affected Environment (by Management Area)

The National Forests in Alabama for purposes of this EIS have been divided into five management areas. The Bankhead Management Area comprised solely of the Bankhead National Forest, The Conecuh Management Area comprised solely of the Conecuh National Forest, The Oakmulgee Management Area comprised of the Oakmulgee Division of the Talladega National Forest, The Tuskegee Management Area comprised solely of the Tuskegee National Forest and the Talladega Management Area comprised of the Talladega and Shoal Creek Divisions of the Talladega National Forest. The National Forests in Alabama has ownership within 9 major drainage basins, 18 fourth level HUCS and 56 fifth level HUCS. The Bankhead Management area lies with 3 Basins: the Black Warrior, the Tennessee, and the Upper Tombigbee. Ownership on the Bankhead is within 18 fifth level HUCS over 6 fourth level HUCS. The Conecuh Management Area lies within the Perdido-Escambia Basin. Ownership on the Conecuh is within 9 fifth level HUCS over 4 fourth level HUCS. The Oakmulgee Management Area lies within 3 Basins: the Alabama, the Black Warrior, and the Cahaba. Ownership on the Oakmulgee is within 12 fifth level HUCS over 3 fourth level HUCS. The Tuskegee Management Area lies within the Tallapoosa Basin. Ownership on the Tuskegee is within 2 fifth level HUCS over 1 fourth level HUC. The Talladega Management Area lies within 2 Basins: the Coosa and the Tallapoosa. Ownership on the Talladega is within 15 fifth level HUCS over 5 fourth level HUCS. Specific information on the relationship between Basins and 4th and 5th level HUCS as well as ownership are found in Table 3A-6.

Table 3A-6: Management Area HUC Information

MGT AREA	BASIN	HUC4 NAME	HUC4	HUC5 NAME	HUC5	FSOWN	PVTOWN	ACRES
BK	Black Warrior	Mulberry	03160109	Splurge Creek	03160109120	0.13	99.87	62061
BK	Black Warrior	Mulberry	03160109	Blackwater Creek	03160109130	0.13	99.87	91618
BK	Black Warrior	Sipsey Fork	03160110	Upper Sipsey Fork	03160110010	86.66	13.34	84661
BK	Black Warrior	Sipsey Fork	03160110	Upper Brushy Creek	03160110030	82.26	17.74	56429
BK	Black Warrior	Sipsey Fork	03160110	Upper Rock Creek	03160110080	6.43	93.57	56327
BK	Black Warrior	Sipsey Fork	03160110	Right Fork of Clear Creek	03160110050	0.20	99.80	53850
BK	Black Warrior	Sipsey Fork	03160110	Lower Brushy Creek	03160110040	35.68	64.32	32982
BK	Black Warrior	Sipsey Fork	03160110	Lower Sipsey Fork	03160110020	32.23	67.77	55417
BK	Black Warrior	Sipsey Fork	03160110	Lower Rock Creek	03160110100	1.11	98.89	39514
BK	Black Warrior	Sipsey Fork	03160110	Clear Creek	03160110060	13.81	86.19	23799
BK	Black Warrior	Sipsey Fork	03160110	Lewis Smith	03160110070	10.97	89.03	50168

MGT AREA	BASIN	HUC4 NAME	HUC4	HUC5 NAME	HUC5	FSOWN	PVTOWN	ACRES
BK	Tennessee	Bear	06030006	Upper Bear Creek	06030006010	2.22	97.78	183917
BK	Tennessee	Pickwick Lake	06030005	Town Creek	06030005040	2.12	97.88	160803
BK	Tennessee	Pickwick Lake	06030005	Big Nance Creek	06030005010	0.30	99.70	128799
BK	Tennessee	Wheeler	06030002	Lower Flint Creek	06030002350	0.04	99.96	93091
BK	Tennessee	Wheeler	06030002	West Flint Creek	06030002360	15.99	84.01	75712
BK	Tennessee	Wheeler	06030002	Crowdabout Creek	06030002340	1.50	98.50	31277
BK	Upper Tombigbee	Sipsey	03160107	New River	03160107010	0.08	99.92	49014
CN	Perdido-Escambia	Blackwater	03140104	Blackwater River	03140104010	47.97	52.03	96090
CN	Perdido-Escambia	Blackwater	03140104	Sweetwater Creek	03140104100	12.80	87.20	36735
CN	Perdido-Escambia	Lower Conecuh	03140304	Lower Conecuh River	03140304010	3.50	96.50	127396
CN	Perdido-Escambia	Upper Conecuh	03140301	Upper Conecuh River	03140301050	2.76	97.24	105093
CN	Perdido-Escambia	Yellow	03140103	Five Runs Creek	03140103080	21.36	78.64	78773
CN	Perdido-Escambia	Yellow	03140103	Yellow River	03140103050	2.30	97.70	52097
CN	Perdido-Escambia	Yellow	03140103	North Creek	03140103070	14.03	85.97	19340
CN	Perdido-Escambia	Yellow	03140103	Lower Yellow River	03140103090	9.59	90.41	55314
CN	Perdido-Escambia	Yellow	03140103	Big Horse Creek	03140103110	1.49	98.51	13002
OK	Alabama	Upper Alabama	03150201	Lower Mulberry Creek	03150201220	7.78	92.22	108061
OK	Alabama	Upper Alabama	03150201	Valley Creek	03150201250	0.49	99.51	43866
OK	Black Warrior	Lower Black Warrior	03160113	Elliotts Creek	03160113060	40.35	59.65	23583
OK	Black Warrior	Lower Black Warrior	03160113	Gabriel Creek	03160113070	0.01	99.99	43273
OK	Black Warrior	Lower Black Warrior	03160113	Big Brush Creek	03160113120	1.66	98.34	127046
OK	Black Warrior	Lower Black Warrior	03160113	Big Sandy Creek	03160113030	30.10	69.90	113246
OK	Black Warrior	Lower Black Warrior	03160113	Fivemile Creek	03160113090	26.52	73.48	70655
OK	Cahaba	Cahaba	03150202	Sixmile Creek	03150202090	0.04	99.96	75858
OK	Cahaba	Cahaba	03150202	Rocky Branch	03150202130	24.04	75.96	59037

MGT AREA	BASIN	HUC4 NAME	HUC4	HUC5 NAME	HUC5	FSOWN	PVTOWN	ACRES
OK	Cahaba	Cahaba	03150202	Oakmulgee Creek	03150202160	24.83	75.17	152113
OK	Cahaba	Cahaba	03150202	Cahaba River	03150202140	10.52	89.48	93011
OK	Cahaba	Cahaba	03150202	Haysop Creek	03150202120	24.48	75.52	97653
TK	Tallapoosa	Lower Tallapoosa	03150110	Chewacla Creek	03150110050	0.50	99.50	95074
TK	Tallapoosa	Lower Tallapoosa	03150110	Uphapee Creek	03150110070	9.84	90.16	109348
TL	Coosa	Lower Coosa	03150107	Tallasseehatchee_SC Creek	03150107010	21.98	78.02	128814
TL	Coosa	Lower Coosa	03150107	Upper Hatchet Creek	03150107110	11.14	88.86	97657
TL	Coosa	Lower Coosa	03150107	Weogufka Creek	03150107140	0.65	99.35	83219
TL	Coosa	Middle Coosa	03150106	Cheaha Creek	03150106260	35.27	64.73	73056
TL	Coosa	Middle Coosa	03150106	Tallasseehatchee_TL Creek	03150106170	1.24	98.76	97601
TL	Coosa	Middle Coosa	03150106	Upper Choccolocco Creek	03150106240	70.90	29.10	60443
TL	Coosa	Middle Coosa	03150106	Middle Choccolocco Creek	03150106250	23.13	76.87	150961
TL	Coosa	Middle Coosa	03150106	Talladega Creek	03150106330	22.19	77.81	112310
TL	Coosa	Upper Coosa	03150105	Hurricane Creek	03150105240	6.24	93.76	35129
TL	Coosa	Upper Coosa	03150105	Upper Terrapin Creek	03150105220	25.86	74.14	106538
TL	Tallapoosa	Lower Tallapoosa	03150108	Cahulga Creek	03150108120	35.97	64.03	16150
TL	Tallapoosa	Upper Tallapoosa	03150108	Chulafinnee Creek	03150108140	20.60	79.40	31222
TL	Tallapoosa	Upper Tallapoosa	03150108	Ketchepedrakee Creek	03150108150	32.28	67.72	34727
TL	Tallapoosa	Upper Tallapoosa	03150108	Cane Creek	03150108090	19.25	80.75	40079
TL	Tallapoosa	Upper Tallapoosa	03150108	Muscadine Creek	03150108060	2.26	97.74	20393

Water Quality

Alabama is a well-forested state and this is reflected in the land use patterns of the watersheds. Forest cover is the predominant land use. Agriculture was the next leading land use practice, with urbanization (which includes commercial and industrial areas) a distant third. The quality of the waters flowing from National Forests lands is typically high. The state's highest use designations cover many of the streams coming from National Forest lands within many watersheds. The highest state use designation, Outstanding National Resource Waters, was applied to streams entirely on National Forest lands. Point sources of pollution are generally downstream of National Forest lands and are relatively unaffected by Forest Service management. The Middle Choccolocco Watershed seems to be plagued by the most point sources. None of the streams on National Forest lands are listed as impaired and those downstream of National Forest lands are impaired for reasons beyond Forest Service influence (i.e. organic enrichment and pathogens from pastures). (Kopaska-Merkel and Moore, 2000.)

The leading contributor to water quality degradation within the watersheds with Forest Service ownership is sedimentation. Forestry and agricultural practices are the leading causes for erosion and thereby, sedimentation. The Alabama Department of Environmental Management has developed, in cooperation with the Forest Service, Best Management Practices (BMPs) to mitigate the sedimentation caused by these activities. The Forest Service meets or exceeds all of the State's BMPs, through the use of forest wide standards.

Table 3A-7: Alabama Water Use Designations

MgtAre	Basin	5th HUC	Name	Stream	Classification
BK	Tennessee River	06030005040	Town Creek	Town Creek	F&W
BK	Tennessee River	06030006010	Upper Bear Creek	Bear Creek	F&W
BK	Warrior River	03160110060	Clear Creek	Clear Creek	PWS/F&W
BK	Warrior River	03160110070	Lewis Smith	Lake Lewis Smith	S/F&W
BK	Warrior River	03160110070	Lewis Smith	Clear Creek	PWS/F&W
BK	Warrior River	03160110040	Lower Brushy	Lake Lewis Smith	S/F&W
BK	Warrior River	03160110020	Lower Sipsey Fork	Sipsey Fork	F&W*
BK	Warrior River	03160110020	Lower Sipsey Fork	Lake Lewis Smith	S/F&W
BK	Warrior River	03160110020	Lower Sipsey Fork	Sandy Creek	F&W
BK	Warrior River	03160110020	Lower Sipsey Fork	Curtis Mill Creek	PWS/F&W
BK	Warrior River	03160110080	Upper Rock	Rock Creek	F&W
BK	Warrior River	03160110010	Upper Sipsey Fork	Sipsey Fork	F&W*
CN	Blackwater River	0314010401	Blackwater	Blackwater River	F&W
CN	Blackwater River	0314010401	Blackwater	Rock Creek	F&W
CN	Blackwater River	0314010401	Blackwater	Boggy Hollow Creek	F&W
CN	Blackwater River	0314010410	Sweetwater	Sweetwater Creek	F&W
CN	Conecuh River	0314030401	Lower Conecuh	Conecuh River	S/F&W
CN	Conecuh River	0314030105	Upper Conecuh	Conecuh River	S/F&W

MgtAre	Basin	5th HUC	Name	Stream	Classification
CN	Yellow River	0314010308	Five Runs	Five Runs Creek	F&W
CN	Yellow River	0314010308	Five Runs	Five Runs Creek	F&W
CN	Yellow River	0314010308	Five Runs	Blue Lake	S/F&W
CN	Yellow River	0314010309	Lower Yellow	Yellow River	F&W
CN	Yellow River	0314010309	Lower Yellow	Open Pond	S/F&W
CN	Yellow River	0314010309	Lower Yellow	Dowdy Pond	S/F&W
CN	Yellow River	0314010307	North	Yellow River	F&W
CN	Yellow River	0314010305	Yellow River	Yellow River	F&W
OK	Cahaba River	0315020212	Affonee Creek	Affonee Creek	S
OK	Cahaba River	0315020212	Affonee Creek	Blue Outtee Creek	S
OK	Cahaba River	0315020212	Affonee Creek	Cahaba River	OAW/S
OK	Cahaba River	0315020214	Cahaba River	Cahaba River	OAW/S
OK	Cahaba River	0315020213	Gully Creek	Cahaba River	OAW/S
OK	Cahaba River	0315020216	Little Oakmulgee	Oakmulgee Creek	S
OK	Cahaba River	0315020216	Little Oakmulgee	Little Oakmulgee Creek	S
OK	Warrior River	0316011306	Elliots Creek	Elliots Creek	F&W
OK	Warrior River	0316011309	Fivemile Creek	Five Mile Creek	F&W
OK	Warrior River	0316011309	Fivemile Creek	Payne Lake	S
TK	Tallapoosa River	03150110070	Uphapee Creek	Uphapee Creek	F&W
TL	Coosa River	0315010809	Cane Creek	Cane Creek	F&W
TL	Coosa River	0315010626	Cheaha Creek	Kelly Creek	S/F&W
TL	Coosa River	0315010626	Cheaha Creek	Cheaha Creek	S/F&W
TL	Coosa River	0315010626	Cheaha Creek	Lake Chinnabee	S/F&W
TL	Coosa River	0315010626	Cheaha Creek	Cheaha Creek	F&W
TL	Coosa River	0315010815	Ketchpedrakee Creek	Cave Creek	F&W
TL	Coosa River	0315010625	Middle Choccolocco Creek	Hillabee Lake	PWS/S/F&W
TL	Coosa River	0315010625	Middle Choccolocco Creek	Salt Creek	S/F&W
TL	Coosa River	0315010633	Talladega Creek	Talladega Creek	PWS/F&W

MgtAre	Basin	5th HUC	Name	Stream	Classification
TL	Coosa River	0315010633	Talladega Creek	Mump Creek	PWS/F&W
TL	Coosa River	0315010701	Tallasseehatchee_TL	Tallasseehatchee Creek	PWS/F&W
TL	Coosa River	0315010624	Upper Choccolocco Creek	Choccolocco Creek	F&W
TL	Coosa River	0315010624	Upper Choccolocco Creek	Coleman Lake	S/F&W
TL	Coosa River	0315010624	Upper Choccolocco Creek	Shoal Creek	S/F&W
TL	Coosa River	0315010624	Upper Choccolocco Creek	Sweetwater Lake	PWS/S/F&W
TL	Coosa River	0315010624	Upper Choccolocco Creek	High Rock Lake	S/F&W
TL	Coosa River	0315010711	Upper Hatchet	Hatchet Creek	OAW/PWS/S/F&W
TL	Coosa River	0315010522	Upper Terrapin Creek	Terrapin Creek	PWS/F&W
TL	Coosa River	0315010714	Weogufka Creek	Weogufka Creek	S/F&W
TL	Tallapoosa River	0315010812	Cahulga Creek	Cahulga Creek	PWS/F&W

OAW - Outstanding Alabama Water

PWS –Public Water Supply

S – Swimming and Other Whole Body Water – Contact Sports

F&W – Fish and Wildlife

*** - Special Designation of Outstanding National Resource Water**

Groundwater

The groundwater on the National Forest is found in multiple aquifer systems. The yields of these various aquifers range from poor to high, depending upon the geology of the management area. The water taken from these aquifers is generally safe to drink with little or no treatment. Generally, groundwater is not used by the National Forest.

The groundwater on the Bankhead is contained in the Appalachian Plateaus aquifer system. The majority of the ground water can be found within sandstone and limestone fractures. Yields are generally low (10gpm) with only a few areas of high yields in fracture areas. Sandstone units generally provide adequately for domestic supply. Limestone formations provide sufficiently for some municipal and industrial supplies. Most water is suitable for most uses, but is highly mineralized. (Miller, 1990.)

The groundwater on the Conecuh is contained in a complex structure of aquifer systems. The Southeastern Coastal Plain aquifer system is the surface aquifer in the northern part of the Conecuh sloping away towards the Gulf of Mexico and becoming the underlying aquifer system for the all other aquifer systems. The next surface aquifer system, moving from north to south across the Conecuh, is the Floridan, which also slopes away to the Gulf and overlying the Southeastern Coastal Plain aquifer system. A confinement layer is present at the surface in areas on the Conecuh sloping away to the Gulf and overlying the Floridan and Southeastern Coastal Plain aquifer systems. The Surficial aquifer system and the Sand and Gravel aquifer systems are the surface aquifers across the lower portions of the Conecuh, with the Surficial system on the west and the Sand and Gravel system to the east. Both of these systems are over the confinement layer, the Floridan system, and the Southeastern Coastal Plain respectively. There is hydrologic communication between these various systems and the surface, creating bogs, sinkhole ponds, springs, and perched water tables providing for various water-related rare communities. All of these aquifer systems are highly productive and suitable for municipal or industrial development (150gpm). (Miller, 1990.)

The groundwater on the Oakmulgee and the Tuskegee is contained in Southeastern Coastal Plain aquifer system. The majority of the groundwater can be found within sand and gravel formations. This aquifer system can best be described as extremely stratified by silt and clay confinement layers. This aquifer system has lateral communication with the surface. The productivity of this aquifer system is generally good. (Miller, 1990.)

The groundwater on the Talladega is contained in the Piedmont and Blue Ridge aquifer system, as well as the Valley and Ridge aquifer system. The majority of the ground water in the Piedmont and Blue Ridge aquifer system can be found in fractures within the metamorphic rock. The majority of the groundwater in the Valley and Ridge aquifer system can be found in sandstone, limestone and dolomite formations. Both systems have some lateral communication with the surface. The productivity of the Piedmont and Blue Ridge aquifer system varies with fracture size, but is generally inadequate for municipal supply. The productivity of the Valley and Ridge aquifer system is generally good. (Miller, 1990.)

Water Quantity

Alabama is blessed with an abundance of surface water due to our abundance of annual precipitation. Precipitation averages about 56 inches per year with runoff rates averaging about 22 inches per year (Miller, 1990.). Much of the precipitation flows directly into rivers and streams as overland runoff or indirectly as baseflow from discharging aquifers where the water has been stored for a short time. Some of the precipitation that falls is returned to the atmosphere by means of evapotranspiration and evaporation from surface-water bodies such as lakes and marshes, and transpiration from plants. However, a substantial part of the precipitation is available for aquifer recharge.

Table 3A-8: Precipitation and Runoff by Mgt. Area

Management Area	Precipitation	Runoff
Bankhead	56	22
Conecuh	60	22
Oakmulgee	54-56	20-22
Talladega	54	22
Tuskegee	54	22

Floods and Droughts

The watersheds of the National Forests in Alabama experience extreme flow events. Flooding is one of the most severe water-related problems. The chief cause of flooding is heavy spring rain falling on previously saturated soils. Consequently, the majority of floods occur in the spring. A lesser significant cause of flooding is tropical storms and hurricanes. Tropical storms and hurricanes occur in Alabama in the late summer and fall. Floods in the Coastal Plains of Alabama spread out over large alluvial plains, discharging slowly and tending to cause less erosion. Floods in the Piedmont, Ridge and Valley, and Plateau regions tend to cause greater erosion because of the steepness of slope producing rapid runoff.

Droughts are defined as a deficiency in precipitation for an extended period of time. Major droughts affected Alabama in 1954, 1968, 1980-91, 1986, and 1988. The drought of 1986, which affected much of the southeastern United States, is considered to be the most severe drought in the area in more than 100 years of record.

Low flows typically occur during the late summer and early fall when precipitation is low and soil moisture is utilized by growing vegetation. Water in the stream represents the release of water from groundwater and soil storage. Peak flows typically occur during late winter and spring. The deep soils of the Coastal Plain moderate peak flows and sustain low flows. The relatively shallow soils of the higher regions are very responsive and do less for moderating peak flows and sustaining low flows.

Consumptive and Non-Consumptive Use

The current annual surface water yield from the Forest is over 1 million acre-feet. This water is withdrawn to supply the needs of seven municipalities. Five municipalities have surface water intakes within the National Forests in Alabama Proclamation Boundary. The intakes of other public and private water systems are located outside the Forest Boundary, but some portion of the water yield obtained originates from watersheds managed by the Forest Service. Of these, the most significant include Birmingham and Sipsey. Birmingham, for example, has two surface water intakes located at the Lewis Smith Reservoir. The Forest Service manages 25% of the watershed upstream from the Reservoir. (Nicolo, 1982).

In addition to surface water withdrawn for consumptive use, groundwater is withdrawn from 8 wells across the Forest. The wells are located at administrative sites and recreation areas, and supply water for uses such as drinking, toilets, and showers. Currently the Forest service has decommissioned or is in the process of decommissioning these wells and switching to municipal water supplies where available. (Nicolo, 1982).

The non-consumptive water uses on the Forest include instream needs for recreation activities, fisheries management, and aesthetic appeal. Recreation uses include swimming, boating and fishing. Although there is an abundance of water on an annual basis to support these uses, yield problems can develop that are related to the timing of the flow. (Nicolo, 1982).

The National Forest has approximately 7,700 miles of streams and 3,100 acres of surface water. Stream channels exhibiting evidence of scouring accounted for 4,900 miles of the total streams. Streams that flow only 2 to 3 months a year, usually only during rain events, are considered ephemerals and are comprised of order 1 and 2 streams. Ephemeral streams are not generally mapped on 1:24000 USGS topographic maps. These streams were digitized from 1:24000 USGS topographic maps using natural depressions along or leading to higher order streams. Ephemeral streams are usually headwater streams.

Streams that flow 6 to 10 months, usually drying during drought events, are considered intermittent and are comprised of order 3 streams. Generally, intermittent streams are detailed on USGS topographic maps as dashed blue lines.

Orders 4 and above generally flow continuously year round, except during periods of extended droughts. These are considered perennial. Perennial streams are represented on USGS topographic maps as solid blue lines.

A brief explanation of stream orders is as follows. Where two first order streams join, the continuing stream is a second order stream; and where two second order streams join, the continuing stream is a third order, etc. All stream orders are based upon USGS 1:24000 topographic maps. Minimum in-stream flows for channel stability and beneficial uses have not been determined. The approximate breakdown of streams by order and stream densities is as follows in Table 3A-9.

Table 3A-9: Streams by Order and Density

Order	BK	CN	OK	TL	TK	Total
1	1942	488	2647	3132	99	8309
2	684	191	932	1144	45	2997
3	344	114	469	542	21	1491
4	163	58	222	278	10	729
5	103	45	140	211	4	503
6	61	15	83	73	10	243
7	34	6	46	38	2	125
8	15	0	0	0	0	15
99	5	0	7	22	0	33
Total	3350	917	4545	5440	191	14444

Stream orders in miles. 99 = un-classed streams

Riparian Areas, Riparian Corridors and Streamside Zones

Riparian Areas are areas with three-dimensional ecotones of interaction that include terrestrial and aquatic ecosystems, that extend down into the groundwater, up above the canopy, outward across the floodplain, up the near-slopes that drain the water, laterally into the terrestrial ecosystem, and along the watercourse at a variable width. A riparian corridor is an administrative zone applied to both sides of a stream or alongside a pond, lake, seep or spring. The riparian corridor is a fixed width by stream type that may fall within or beyond the true riparian area. Perhaps one of the best ways of delineating riparian areas is by soils. Soils found in riparian areas are usually associated with the 100-year floodplain. Soils within the 100-year floodplain are relatively young to very recent, depending on flooding activity and fluvial deposition. Floodplain soils are diverse and reflect the sediments transported by the river network. Coastal plain sediments normally produce sandy or loamy soils, whereas sediments from Piedmont and Mountain physiographic areas produce loamy to clayey soils. Soils also vary as distance from the river channel increases. Sandy soils are usually found in close proximity to the river channel, followed by loamy soils and then silty or clayey soils. The size of the river or stream also factors into the formation of floodplain soils. Narrow floodplains tend to have one to maybe two different soil types, compared to large broad floodplains that tend to have multiple soil types with a full range in soil textures. Depth to water table plays an important role in determining whether a soil is aerobic (oxygenated) or anaerobic (de-oxygenated). Anaerobic soils, termed hydric, are considered wetlands. Not all floodplain soils are wetlands just as not all wetlands are associated with floodplains. Although riparian areas are usually associated with rivers, freshwater swamps and bays are also included. Floodplain soils are normally higher in nutrient content and organic matter and are more poorly drained than upland soils. They act as filters and depositories during periods of flooding, absorbing and storing nutrients from floodwaters. The Forest uses these soil characteristics, as well as a minimum buffering distance of 100 feet, to define the riparian corridor. The Forest further provides protection for scoured first order streams and second order streams in the way of streamside management zones (SMZs). Before the application of riparian corridors, Alabama used SMZs on all order streams and ponds, seeps, bogs and springs. These SMZs were put into place to protect water quality along with aquatic species. The riparian corridor expanded these areas of protection by some 62,000 acres to include terrestrial and aquatic ecosystems. SMZs are applied under alternatives D and F, while Riparian and SMZs are applied to all other alternatives.

Table 3A-10: Protections under Riparian and SMZ (Acres)

Mgt/area	Riparian	Order 1 w/scour	Order 2	Total
BK	22,062	12360	5804	40226
CN	23,557	1035	1622	26215
OK	39,372	7836	5395	52603
TL	25,337	19930	9710	54976

Mgt/area	Riparian	Order 1 w/scour	Order 2	Total
TK	2,059	422	380	2861
Total	112,387	41583	22911	176881

Table 3A-11: Protections Under SMZ Only (Acres)

Order	BK	CN	OK	TL	TK	Total
1w/scour	12360	444	7836	19930	422	40992
1 wo/scour	1766	3106	3358	2847	181	11258
2	5804	1622	5395	9710	380	22911
3	4171	971	4041	6570	255	16008
4	2759	699	2511	4714	162	10845
5	1740	542	1399	3586	75	7341
6	1038	184	408	1247	164	3041
7	573	67	222	645	30	1537
8	253	0	0	0	0	254
99	85	0	156	366	1	607
Total	30548	7636	25326	49614	1669	114794

Current Conditions

The management plan is to be implemented on all five management areas of the National Forests in Alabama. There exists the potential to have impacts on all fifty-six 5th Level HUCS considered within the study area. These potential impacts could cause chemical, physical or biological degradation of the water resource, thereby influencing beneficial uses as well as aquatic habitat.

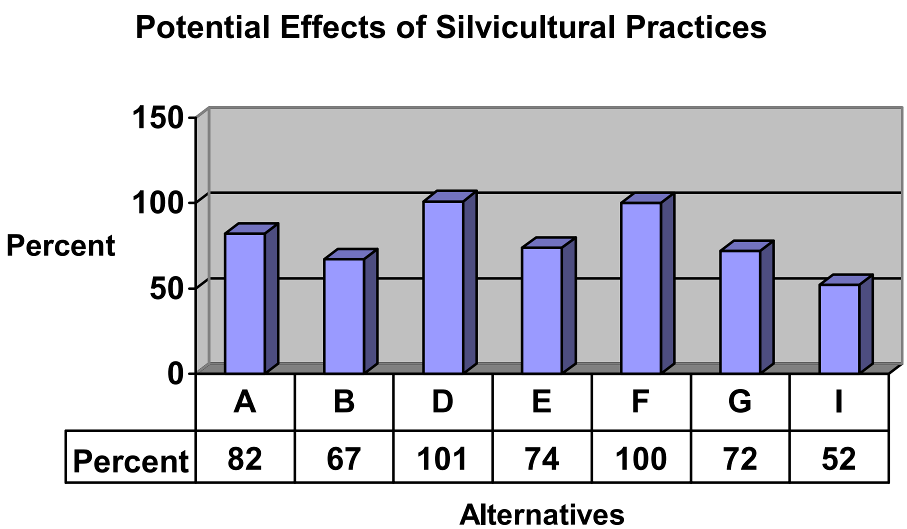
2.2 Direct and indirect effects

Silvicultural practices (restoration and thinning) are known to potentially affect water quality, water quantity, channel morphology, and downstream beneficial uses.

Cutting and thinning have the potential to cause the following direct effects: erosion, changes in ground cover condition, and changes in stand composition of streamside forest communities (Golden et al., 1984: Ursic, 1991; Belt et al., 1992; Brown and

Binkley, 1994). Indirect effects could include sedimentation, changes in stream nutrient levels (particularly nitrates) increases in water yield, and changes in stream flow behavior (Golden et al., 1984; Brown and Binkley, 1994). Using Alternative F or Current Management as a baseline (100%) to compare Alternatives, Alternative I has the lowest potential for effects, as it has 48% less potential for effects than Alternative F. Alternative D has the highest potential for effects as it has a 1% greater potential for effects than Alternative F. Potential effects for all alternatives as compared to Alternative F are as follows:

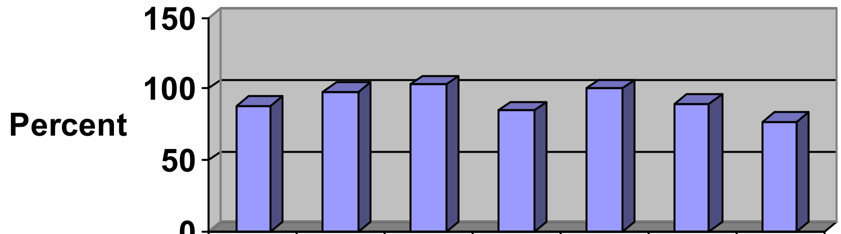
Figure 3A-4



Direct effects from heavy mechanical site preparation (drum chopping, shear and windrowing) are: potential changes in ground cover, increased exposure of soil, surface soil compaction from equipment, and exposure of subsurface soil layers as a result of shearing operation (Blackburn et al., 1985). Indirect effects are potential increases in sediment, storm flows, nutrient levels in the water column, and surface storage of runoff water (VM EIS IV-112). Drum chopping typically causes little to no adverse effects upon the water, while shear and windrowing may. Using Alternative F or Current Management as a baseline (100%) to compare Alternatives, Alternative I has the lowest potential for effects as it has 23% less potential for effects than Alternative F. Alternative D has the highest potential for effects as it has a 3% greater potential for effects than Alternative F. Potential effects for all alternatives as compared to Alternative F are as follows:

Figure 3A-5

Potential Effects of Site Prep



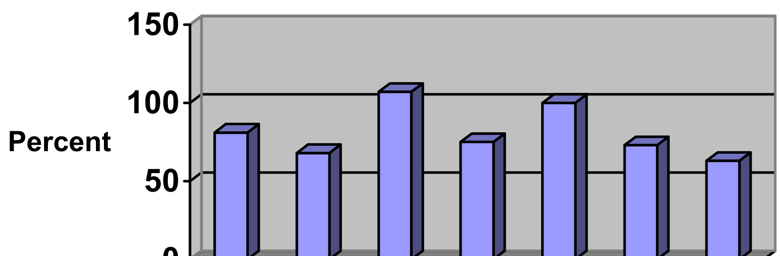
	A	B	D	E	F	G	I
Percent	88	98	103	85	100	90	77

Alternatives

Hand or mechanical planting of young trees has no direct effect upon the water resource. Indirect effects (after a period of years) are potential decreases in water yield and changes in the composition of streamside forest communities. Using Alternative F or Current Management as a baseline (100%) to compare Alternatives, Alternative I has the lowest potential for effects, as it has 37% less potential for effects than Alternative F. Alternative D has the highest potential for effects as it has a 7% greater potential for effects than Alternative F. Potential effects for all alternatives as compared to Alternative F are as follows:

Figure 3A-6

Potential Effects of Planting Small Trees

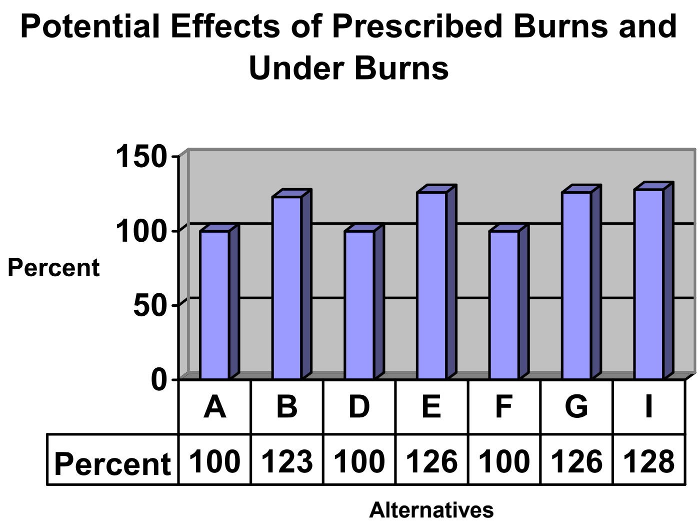


	A	B	D	E	F	G	I
Percent	81	68	107	75	100	73	63

Alternatives

Direct effects from prescribed burning and under burns are potential changes in ground cover and increase in the hydrophobicity (water repellency) of a soil, as well as erosion from plowed firelines (VM EIS, Appendix B; Shahlaee et al., 1991). The severity of indirect effects depends on the intensity of the fire. Indirect effects are potential increase in sediment, storm flows, and nutrient levels in the water column (VM EIS, IV-114). Using Alternative F or Current Management as a baseline (100%) to compare Alternatives, Alternatives A, D, and F have the lowest potential for effects. Alternative I has the highest potential for effects as it has a 28% greater potential for effects than Alternative F. Potential effects for all alternatives as compared to Alternative F are as follows:

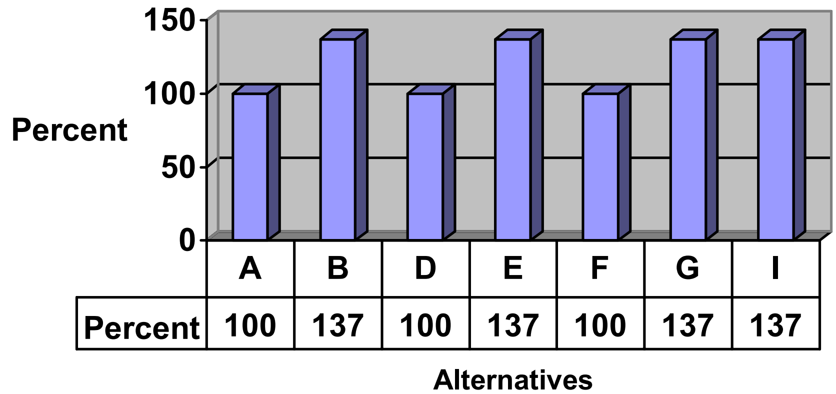
Figure 3A-7



Water pollution by an herbicide can occur during storage, transport, application, clean up and/or container disposal. Direct effects of herbicide application are potential chemical contamination of surface waters and ground waters (Michael and Neary, 1993; VM EIS IV-103). Indirect effects are potential increases in sediment and water yield (VM EIS IV-103). Slight increases in stream nutrients, particularly nitrated (Neary et al., 1993), may also occur as an indirect effect. Herbicide site prep treatment is planned only on the Talladega and Oakmulgee Management Areas. Using Alternative F or Current Management as a baseline (100%) to compare Alternatives, Alternatives A, D, and F have the lowest potential for effects. Alternatives B, E, G, and I have the highest potential for effects as they have a 37% greater potential for effects than Alternative F. Potential effects for all alternatives as compared to Alternative F are as follows:

Figure 3A-8

Potential Effects of Herbicide Use



2.3 Cumulative Effects

The analysis of cumulative impacts is a requirement of the National Environmental Policy Act (NEPA). A cumulative impact analysis should consider incremental impacts of actions when added to past, present and reasonably foreseeable future actions. The analysis includes all actions regardless of who undertakes the actions. Cumulative impact can result from individually minor but collectively significant actions taking place over time.

"A cumulative effect is the impact on the environment which results from the incremental impact of the 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. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time" (40 CFR 1508.7).

Sediment is an appropriate measure to determine the effects of management activities on water quality and its associated beneficial uses on forested lands (Coats and Miller, 1981). Sediment increases can adversely affect fish productivity and diversity (Alexander and Hansen, 1986, degrade drinking water and affect recreational values). There may be other cumulative impacts, such as increases in water yield as a result of harvesting methods. However, water yield models do not characterize the impacts of all management activities, such as road construction, and the increase in water yield is generally less than the natural variability. Changes in water nutrients or nutrient fluxes within streams as a result of management activities are minor and not an appropriate consideration of cumulative effects at the forest plan level. This model uses predicted sediment yields as the surrogate for determining cumulative impacts for water quality.

Changes in land use and disturbance are modeled with respect to estimated increases in sediment and predicted impacts are summarized by alternative. The significance of predicted impacts is related to criteria designed to determine levels of watershed health, Watershed Condition Rank (WCR), as described in a following section of this paper.

Bounding the Effects Analysis

A valid cumulative effects analysis must be bounded in space and time. For the purposes of this exercise in forest planning, 5^{th}-level watersheds are the appropriate spatial bounds for cumulative effects. The implementation period for a forest plan is 5 to 15 years; however, the appropriate time period captured for the sediment model is 5 decades (50 years).

Modeling Sediment Yield

A detailed description of data sources and steps can be found in Data Sources and Manipulation. Following is a summary of the process:

- Using the National Land use Classification Data (NLCD), Digital Elevation Models (DEM), and Ecoregions data layers, a determination of combinations of land use, slope class, and physiographic zone was made for 30-meter grids. These values were tabulated for each watershed including non-Forest Service lands. Results were used to identify estimated erosion values for entire watersheds.
- Tiger Census Roads data, Forest Service ATV trails, and Ecoregions were used to determine road surface type, physiographic zone and length. This information was used to estimate sediment values for each watershed.
- Using a combination of Early Forest Succession values (from Forest Service prescriptions), slope class, and physiographic zones, these values were tabulated for each watershed and alternative.
- Forest Service personnel provided values for the following categories;
  - The number of acres of prescribed fire planned by alternative and period (by alternative and physiographic zone),
  - Miles of dozer fireline per acre burned,
  - Miles of temporary and permanent road constructed per acre regenerated,
  - Urban growth,
  - The rotation period on other forested lands, and
  - Other changes in land use activities or disturbances that individual forests felt were important, such as oil and gas exploration, pasture conversion, or strip mining.
- Coefficients for erosion were taken from the average and high erosion rates found in Dissmeyer and Stump (1978) for the appropriate physiographic zone. Recovery rates were determined from studies on the Ouachita National Forest. These recovery rates were determined through field observations and provide a realistic recovery value for the Southeast and are appropriate for this level of analysis. It should be recognized that the high erosion rates would yield overestimations of erosion for most Forest Service activities and should be viewed as a worst-case scenario. The high rates were used to account for steep slopes and management practices on other lands that may not have the same standards as Forest Service lands.

- Erosion values (from land use) were multiplied by a sediment delivery coefficient based on watershed size determined from Roehl (1962). Sediment values from roads are part of the WEPP calculation. WEPP only assumes that sediment values are delivered to the nearest channel. This model sums the total number of sediment tons from roads and calculates sediment from erosion delivered to the mouth of the watershed.
- Road (by surface type), fireline, and ATV sediment values were determined from field surveys using the WEPP model to determine sediment values. These values were converted to coefficients by physiographic zone (process to be described by later in this paper), and multiplied by the number of miles of road (by surface type), fireline or ATV trail.
- All values were summarized in a spreadsheet by watershed for the baseline sediment yield and current sediment yield (Forest Service and private).
- The values from SPECTRUM (total number of acres per planning period by physiographic zone, early succession class and slope class) are placed in the sediment spreadsheet for each alternative and period.
- In addition, the spreadsheet summarizes predicted management activities by watershed, alternative, and planning period.

This allows for a discussion of past, present and future activities for public and private lands by watershed for a time period of 50 years.

Data Interpretation

The summary worksheet of the sediment model calculates the baseline, current, and predicted sediment values for each watershed by alternative and period. To determine the potential cumulative effects of water quality and associated beneficial uses, these sediment values are expressed as a percent increase over the baseline. The baseline assumes an undisturbed forest floor with no roads. It should be recognized that using such a baseline results in a high percentage increase since baseline values can indicate little to no erosion or sediment. The percentage values are only used as a mathematical index and should not be viewed as an indication of effects or impairment. This becomes clearer when the interpretation of this information is captured in a process called the Watershed Condition Rank (WCR) as described below.

Watershed Condition Rank

Watershed Condition Rank (WCR) is a measure that characterizes the condition of 5^{th-} level watersheds with respect to current and future sediment load increases.

In order to establish WCRs, the current sediment average annual yield is determined and expressed as a percent above the baseline conditions. This provides a relative measure to determine changes within watersheds. The next step in this process is determined by using the relative abundance of locally adapted species with respect to predicted sediment increases to create a species-sediment load relationship or index (SSI). This score is modified by a weighted average where the watershed occurs in more than one physiographic zone. Watershed condition is generalized into three categories: excellent, average, and below average. The SSI, however, does not necessarily translate into an excellent or poor watershed, but broadly categorizes the watersheds based on the sediment prediction/aquatic viability relationship. The SSI is a relatively large-scale coarse filter developed to evaluate alternatives in Forest Plans and to establish priority work at the planning scale. Therefore, further detailed analyses of the watershed will be conducted at the project level.

From the WCR a series of determinations can be made that determine or assign additional Forest Objectives. The following section details the outcome of the WCR with respect to adverse effects on aquatic biota as they are related to forest management:

> Where a watershed SSI is *excellent*, the probability (or potential) is low for adverse effects to aquatic species. If the results of forest alternatives remain within this range, there should be no adverse effect on water quality with respect to beneficial uses (fish communities). Forest Service objectives would be to maintain or improve aquatic health through the implementation of riparian prescriptions.
>
> Where a watershed SSI is *average,* the potential to adversely affect beneficial uses is moderate. Additional forest objectives should be considered. Examples of these additional objectives would be conducting watershed assessments during project planning to identify the source of the problem, and monitoring prior to project implementation to determine actual health of the biota.
>
> Where a watershed with a SSI is *below average*, the potential to adversely affect beneficial uses is high. In addition to objectives listed above, Forest objectives at the project level would seek to maintain or restore watershed health and aquatic systems where the Forest Service can make meaningful contributions to watershed health. Apply prescriptions in the revised forest plan to correct the unhealthy situation.

The results of the WCR and other information can also be used to develop partnerships with other landholders or managers to improve overall watershed condition and improve aquatic health. This is one advantage of analyzing entire watersheds. Not only can Forest Service activities and contributing effects be isolated, but other watershed effects can be identified as well.

Assumptions, uncertainties, and limitations

Many assumptions are made throughout the sediment model and the WCR. Every effort has been made to describe those assumptions and minimize misrepresentation. With that in mind, the application of the sediment model and associated WCR should not be taken as absolutes, but as a method that can describe the effects from the range of alternatives and suggest where a greater risk with respect to water quality and aquatic biota exists. This process is developed for the Forest Plan level.

Watershed condition is an accumulation of disturbance across the entire watershed, and is expressed at the outfall of that watershed. Sub-watersheds within a 5th-level watershed will have a range of watershed conditions. The conditions of sub-watersheds and the determination of effects will occur at the project level.

Table 3A-12: Conclusions of SSI

MGTARE	HUC5 NAME	HUC5	FSOWN	A	B	D	E	F	G	I
BK	Splurge Creek	03160109120	0.13	E	E	E	E	E	E	E
BK	Blackwater Creek	03160109130	0.13	E	E	E	E	E	E	E
BK	Upper Sipsey Fork	03160110010	86.66	E	E	E	E	E	E	E
BK	Upper Brushy Creek	03160110030	82.26	E	E	E	E	E	E	E
BK	Upper Rock Creek	03160110080	6.43	E	E	E	E	E	E	E
BK	Right Fork of Clear Creek	03160110050	0.20	E	E	E	E	E	E	E
BK	Lower Brushy Creek	03160110040	35.68	E	E	E	E	E	E	E
BK	Lower Sipsey Fork	03160110020	32.23	E	E	E	E	E	E	E
BK	Lower Rock Creek	03160110100	1.11	E	E	E	E	E	E	E
BK	Clear Creek	03160110060	13.81	E	E	E	E	E	E	E
BK	Lewis Smith	03160110070	10.97	E	E	E	E	E	E	E
BK	Upper Bear Creek	06030006010	2.22	E	E	E	E	E	E	E
BK	Town Creek	06030005040	2.12	A	A	A	A	A	A	A
BK	Big Nance Creek	06030005010	0.30	BA	BA	BA	BA	BA	BA	BA
BK	Lower Flint Creek	06030002350	0.04	BA	BA	BA	BA	BA	BA	BA
BK	West Flint Creek	06030002360	15.99	E	E	E	E	E	E	E
BK	Crowdabout Creek	06030002340	1.50	E	E	E	E	E	E	E
BK	New River	03160107010	0.08	BA	BA	BA	BA	BA	BA	BA
CN	Blackwater River	03140104010	47.97	E	E	E	E	E	E	E
CN	Sweetwater Creek	03140104100	12.80	E	E	E	E	E	E	E
CN	Lower Conecuh River	03140304010	3.50	E	E	E	E	E	E	E
CN	Upper Conecuh River	03140301050	2.76	E	E	E	E	E	E	E
CN	Five Runs Creek	03140103080	21.36	E	E	E	E	E	E	E
CN	Yellow River	03140103050	2.30	A	A	A	A	A	A	A
CN	North Creek	03140103070	14.03	E	E	E	E	E	E	E
CN	Lower Yellow River	03140103090	9.59	E	E	E	E	E	E	E

MGTARE	HUC5 NAME	HUC5	FSOWN	A	B	D	E	F	G	I
CN	Big Horse Creek	03140103110	1.49	E	E	E	E	E	E	E
OK	Lower Mulberry Creek	03150201220	7.78	E	E	E	E	E	E	E
OK	Valley Creek	03150201250	0.49	E	E	E	E	E	E	E
OK	Elliotts Creek	03160113060	40.35	E	E	E	E	E	E	E
OK	Gabriel Creek	03160113070	0.01	E	E	E	E	E	E	E
OK	Big Brush Creek	03160113120	1.66	E	E	E	E	E	E	E
OK	Big Sandy Creek	03160113030	30.10	E	E	E	E	E	E	E
OK	Fivemile Creek	03160113090	26.52	E	E	E	E	E	E	E
OK	Sixmile Creek	03150202090	0.04	E	E	E	E	E	E	E
OK	Rocky Branch	03150202130	24.04	E	E	E	E	E	E	E
OK	Oakmulgee Creek	03150202160	24.83	E	E	E	E	E	E	E
OK	Cahaba River	03150202140	10.52	E	E	E	E	E	E	E
OK	Haysop Creek	03150202120	24.48	E	E	E	E	E	E	E
TK	Chewacla Creek	03150110050	0.50	A	A	A	A	A	A	A
TK	Uphapee Creek	03150110070	9.84	A	A	A	A	A	A	A
TL	Tallasseehatchee Creek	03150107010	21.98	BA	BA	BA	BA	BA	BA	BA
TL	Upper Hatchet Creek	03150107110	11.14	E	E	E	E	E	E	E
TL	Weogufka Creek	03150107140	0.65	E	E	E	E	E	E	E
TL	Cheaha Creek	03150106260	35.27	E	E	E	E	E	E	E
TL	Tallasseehatchee Creek	03150106170	1.24	BA	BA	BA	BA	BA	BA	BA
TL	Upper Choccolocco Creek	03150106240	70.90	E	E	E	E	E	E	E
TL	Middle Choccolocco Creek	03150106250	23.13	BA	BA	BA	BA	BA	BA	BA
TL	Talladega Creek	03150106330	22.19	A	A	A	A	A	A	A
TL	Hurricane Creek	03150105240	6.24	E	E	E	E	E	E	E
TL	Upper Terrapin Creek	03150105220	25.86	E	E	E	E	E	E	E
TL	Cahulga Creek	03150108120	35.97	E	E	E	E	E	E	E
TL	Chulafinnee Creek	03150108140	20.60	E	E	E	E	E	E	E
TL	Ketchepedrakee Creek	03150108150	32.28	E	E	E	E	E	E	E

MGTARE	HUC5 NAME	HUC5	FSOWN	A	B	D	E	F	G	I
TL	Cane Creek	03150108090	19.25	E	E	E	E	E	E	E
TL	Muscadine Creek	03150108060	2.26	E	E	E	E	E	E	E

E - Excellent

A - Average

BA – Below Average

The SSI values did not change by time period or alternative. That is to say a watershed that ranked as Excellent under Current Condition stayed Excellent across all time periods and all alternatives. This is due in part to the disturbance activities being nearly equal between activities and time periods. That being said, the following conclusions from the SSI are applicable across all alternatives and time periods.

The Bankhead management area has three watersheds with below average SSI. All three watersheds have less than 0.5% Forest Service ownership. Sedimentation from the Forest Service is negligible. Two of the below average watersheds are Big Nance (6030005010) and Lower Flint (6030002350). Both are located in the Tennessee Valley and are impaired from a sediment standpoint due to intensive agriculture. New River (3160107010) is located on the southeastern end of the district. Strip mining is the primary cause of excessive sedimentation. Town Creek (6030005040) is the only watershed with an average SSI. Forest Service ownership is about 2%. This watershed is located in the Tennessee Valley and has intensive agriculture. All other watersheds on the Bankhead management area are ranked as excellent by the SSI.

The Conecuh management area has only 1 watershed that is ranked as average. Forest Service ownership is 2.3%, and the primary cause of sedimentation is intensive agriculture on private land. All other watersheds on the Conecuh management area are ranked as excellent by the SSI.

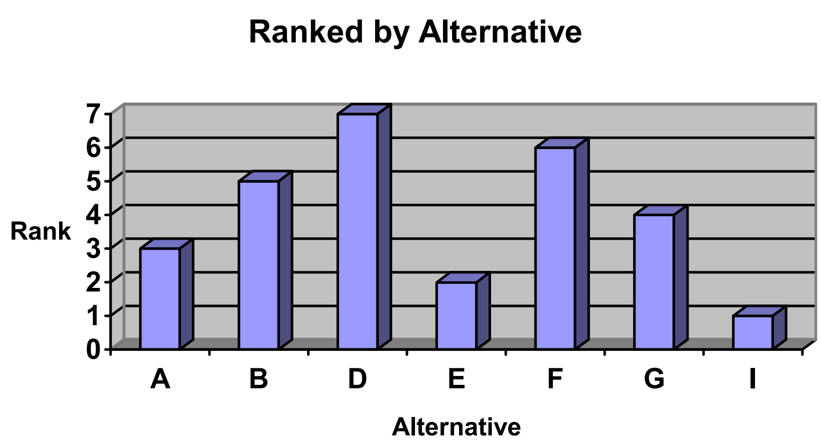
All watersheds on the Oakmulgee management area are ranked as excellent by the SSI.

The Tuskegee management area falls within only 2 watersheds, the Uphapee Creek (3150110070) and the Chewacla Creek (3150110050). Forest Service ownership is 9.8% and 0.5% respectively. These watersheds rank only average because of urbanization and agricultural, particularly sod farming.

The Talladega management area has 3 below average watersheds, the Tallaseehatchee_SC (315010617), Tallaseehatchee_TL (315010701) and the Middle Choccolocco (315010701). Forest service ownership is 1.2%, 22%, and 23.1% respectively. Forest Service ownership is located in the headwaters of these watersheds, which is not contributing excessive sedimentation. Excessive sedimentation is introduced at lower elevation through agricultural land use practices. The Talladega management area has 1 watershed ranking as average, Talladega Creek (315010633). Forest Service ownership is 22%. All other watersheds on the Talladega management area are ranked as excellent by the SSI.

Overall, the Forest Service has 45 watersheds ranked as excellent by the SSI, 5 watersheds ranked as average, and 6 watersheds ranked as below average. Of the 6 watersheds ranked as below average, 4 have a low percentage of National Forest ownership. It is unlikely that any additional combination of forest activities would have a measurable positive or negative effect. It is important to remember that these rankings take the entire watershed into account, not just the Forest Service lands. The following is a chart ranking from highest to lowest, the cumulative WCR by Alternative based on percent increase over baseline. Alternative I is ranked as first because it has the lowest potential for effects. Alternative D is ranked as seventh because it has the greatest potential for effects.

Figure 3A-9



3.0 Air Quality Management

3.1 Affected Environment

"Protection and management of the National Forests in Alabama" covers many items, including some that relate to air quality. The level of knowledge regarding those air quality items varies, ranging from substantial (e.g., the regulatory framework), to moderate (e.g., the actual air quality within/near the Forest), to somewhat less (e.g., quantifying the impact that air pollution currently has on Forest resources and their enjoyment), to least (e.g., the changes we might see in the Forest due to changing air quality).

The Clean Air Act (CAA) is a major part of the regulatory framework that drives Forest Service participation in air quality management within or outside the National Forest. The CAA created National Ambient Air Quality Standards (NAAQS), which established regulatory minimums for air quality, and it created a program to prevent significant deterioration (PSD) of air quality in areas in areas where good air quality (not falling below the NAAQS minimums) still existed. While the Environmental Protection Agency (EPA) and the States lead these programs, roles have been identified for industry, commerce, land managers, other levels of government, and the public.

Areas known (or assumed) to be attaining NAAQS are allocated to one of three PSD "classes". These classes identify the level of effort that must be expended to maintain good air quality where it already exists. Class I Areas (certain wilderness areas and national parks designated by Congress) can receive only small amounts of additional pollution. Further, where it can be shown that the resources of Class I Areas are already suffering adverse impacts from air pollution, there is a process to make reasonable progress toward returning the area to its natural condition.

PSD - Class II areas can receive moderate increments of additional air pollution, as long as neither a NAAQS violation nor a significant deterioration of resources is anticipated. Class III areas can be designated to receive larger increments of additional pollution, enough to bring attainment areas all the way down to (but not below) NAAQS. Except for the 156 congressionally designated Class I Areas, all of the United States is designated as Class II.

The air inventory and monitoring efforts lead by the States and EPA have identified a number of areas, mostly centered on metropolitan areas, where it is known that NAAQS are not being attained. While there have been some successes at bringing NAAQS non-attainment areas into attainment, it is apparent that many factors associated with economic growth will make NAAQS attainment increasingly difficult. Non-attainment areas must be brought into attainment before they come under the PSD program. While there is a process to redesignate the PSD class of an area, no effort has been made to change any of the original Class I or Class II designations.

Air Pollution Originating Outside the National Forests in Alabama

If resources within the National Forest suffer impairment from air pollution, it matters little whether the pollutant comes from activity outside the Forest or within. It is important to note, however, that the overwhelming bulk of pollutants of concern (e.g. sulfur, nitrogen, fine particulates & volatile organics) can stay suspended in the atmosphere for days. Such gases or fine particles may originate hundreds of miles from the Forest. Discrete plumes of air pollution often seem to vanish overnight. Much of this pollution is not removed, but merely dispersed into the regional atmospheric soup.

The regulatory framework, specifically the CAA, provides the greatest distinction regarding air quality that exists among the Forest's land units. The Sipsey Wilderness is a Class I Area. The balance of the Forest is designated Class II. Except for the persistent non-attainment designation at Birmingham, all of the State is attaining NAAQS and, therefore, is Class II. Air pollution control (emission reduction) efforts aimed at bringing the Birmingham area back into attainment have not formally required any changes in management of the National Forest.

The process for determining if current air pollution (or proposed new increments of air pollution) might cause adverse impact on resources of the Sipsey Class I area began with identification of what those specific resources are. Congress labeled these resources as "air quality related values" (AQRVs). Congress also determined that "visibility" should be one of them. The other Sipsey AQRVs, "terrestrial habitats", "aquatic habitats" and "odor", were determined from records of public input when the Wilderness was originally established.

Visibility. As an AQRV, visibility is described as the ability of an air mass to convey landscape images. It is often reported in terms of standard visual range (SVR), the distance at which one can discern large contrasting images on the horizon. Natural background visual range throughout the eastern United States is estimated to vary throughout the year from 60 to 125 miles. Visibility at Sipsey now seldom reaches into that range.

In its Final Report (SAMI, 2002), the Southern Appalachian Mountain Initiative summarized visibility data from the Sipsey IMPROVE monitor (yrs.1991-1995). It showed that the mean annual SVR at Sipsey was then only 18.5 miles. The primary air pollutants causing this impact, in order of their magnitude, are: sulfur oxides (~ 70%, SOx), volatile organic compounds (VOCs), nitrogen oxides (NOx), soot and soil/dust (IMPROVE, 2002). SAMI also projected that, with regulations currently enacted, SVR at Sipsey will continue a mild decline to 18.0 mi. through the year 2010 before showing improvement to 21.2 mi. by the year 2040. Further regulations that should soon be under development to resolve problems with regional haze and NAAQS non-attainment, might reverse that early decline and bring the 2040 SVR to near 25.0 miles.

Terrestrial habitats. Concerns regarding this AQRV have so far been focused on the impact that acid deposition might have on soils, and the impact that tropospheric ozone might have on vegetation. SOx and NOx pollution provide acid deposition in the form of sulfate and nitrate anions. As water moves these anions through the soil, they remove certain essential plant nutrients (e.g. dissolved cations of calcium, potassium, sodium & magnesium).

On isopleth maps (period = 1997 – 1999) available at their website, the National Atmospheric Deposition Program (NADP) estimates that wet sulfate deposition at Sipsey ranges from 5.7 to 7.0 kg/ha/yr, as S (NADP, 2000). Dry deposition is commonly assumed to be nearly equal to wet deposition in this area. Total sulfate deposition at Sipsey is therefore estimated to lie between 11 and 14 kg/ha/yr, as S. Available information indicates that typical forested watersheds in the southern Appalachian region can accommodate no more than 60 kg/ha/yr of sulfate (20 kg/ha/yr, as S) deposition without adverse impact on terrestrial ecosystems.

For the same period, NAPD also estimates that wet nitrate deposition at Sipsey ranges from 2 to 2.9 kg/ha/yr, as N (NADP, 2000). It is commonly assumed that dry deposition nearly equals wet deposition in this area. Total nitrate deposition at Sipsey is therefore estimated to lie between 4 and 5.9 kg/ha/yr, as N. The information available indicates that typical forested watersheds in the southern Appalachian region can accommodate no more than 44 kg/ha/yr of nitrate (10 kg/ha/yr, as N) deposition without adverse impact on terrestrial ecosystems.

In its Final Report (SAMI, 2002), SAMI projected that there will be substantial sulfate deposition reductions and small nitrate deposition reductions in this area through the year 2040. This is good news, but remember that the effects of acid deposition on soils are cumulative. Even though the loss of soil cation nutrients has been slowed, it has not been stopped.

Ozone is a secondary pollutant that forms in the atmosphere from the effect ultraviolet (UV) light has on oxygen. Although there should be little UV light energy at the earth's surface, certain air pollutants (NOx & VOCs), in the presence of high temperatures, accelerate the formation of ozone. While accelerated ozone formation commonly occurs at mid-day southeastern summertime temperatures, it is often limited in rural/suburban areas by availability of NOx. Hence, ozone pollution is closely tied to NOx emissions.

Summertime ozone concentrations near Sipsey are now high enough to register an occasional exceedance of the revised (8 – hour) NAAQS ozone standard. This level of ozone exposure is unhealthy for some people and some plants. At Sipsey, injury has been observed on the foliage of indicator plants known to be ozone sensitive. Computer simulations (SAMI, 2002) have shown that a slight growth reduction is occurring in young loblolly pine stands in parts of northern Alabama due to tropospheric ozone. While the SAMI simulations did not show an overall reduction in forest growth at Sipsey, a concern remains that particularly sensitive species may be suffering selective decline. SAMI's projections for NOx emission reductions show that regulations recently enacted will substantially reduce ozone exposure and may resolve concerns regarding potential growth loss.

Aquatic habitats. Concerns regarding this AQRV have focused on the impact acid deposition might have on water chemistry and aquatic organisms. If sulfate and nitrate deposition occur with sufficient magnitude and time, the anions can deplete a watershed of nutrient cations. When nutrient cations become less available in the soil/rock complex, anions moving with water begin to dislodge other harmful cations (e.g. aluminum and hydrogen) and transport them to aquatic habitats.

The status of Sipsey's aquatic ecosystems regarding acid deposition is discussed in Effects of Acidic Deposition on Aquatic Resources In the Southern Appalachians, With Special Focus on Class I Areas (Herlihy et.al., 1996). Those few streams within Sipsey that rise in sandstone watersheds might be vulnerable to the effects of acid deposition. Sandstone geology provides little natural buffering and it is not surprising that these streams show pH values as low as 6.0, and acid neutralizing capacities as low as 41 ueq/l. Persistent values below these might signal a decline in aquatic organism diversity. Since the bulk of Sipsey Wilderness lies over limestone geology, the acid neutralizing capacity of limestone minimizes the apparent threat. This neutralizing effect was so overwhelming that SAMI chose not to study potential effects of acid deposition on Sipsey's aquatic habitats as it completed its evaluation of southern Appalachian Class I Areas.

So far, the discussion of AQRVs has been limited to the Sipsey Class I Area. There is a broader view, however. While visibility may receive less consideration on PSD-Class II parts of the National Forest, the health of aquatic and terrestrial ecosystems certainly remains important. Ecosystems, keystone organisms, and T&E species that might be sensitive to air pollution are not confined to Class I areas. Similarly, whatever forms of air pollution may be found within Sipsey are just as likely to occur elsewhere throughout the

Forest and surrounding areas. For example, the greatest levels of acid deposition (about 10% greater than Sipsey) occurring in the State are found in the NE part. Lesser amounts (almost 60% of Sipsey) are found near the coast.

Air Pollution Originating from National Forest Management Activity

The only management activity regularly pursued on the National Forests that causes a notable amount of air pollution is prescribed fire. Recently, the total annual amount of prescribed burning on the Forest, for all purposes, has averaged 75,000 acres.

Fire has always been a natural part of the ecosystems contained within the Forest. Spatially and temporally, it is an ephemeral feature on the landscape. Under natural circumstances, airborne emissions from fire are not considered harmful to forest resources. By themselves, airborne emissions from woodland fires can, however, have localized adverse impact on local public health and welfare. Cumulatively, these emissions may also aggravate existing problems that occur on a broader scale.

In the southeastern U.S., a regional problem with haze and NAAQS attainment is becoming more evident with the passing of each year. While forest fire emissions are a very small contributor to this problem, forest managers will have to recognize this issue in their plans to use fire as a management tool.

Criteria pollutants. The NAAQS standards cover six "criteria" airborne pollutants: lead, sulfur dioxide, carbon monoxide, nitrogen oxides, ozone and particulate matter. These were specifically mentioned in the CAA. The lead and sulfur content of forest fuels is negligible, so these two forms of air pollution are not a consideration here.

Forest fires do emit some carbon monoxide (CO), from 20 to 500 lb. per ton of fuel consumed. This could be a concern if there were other persistent large CO sources in a fire's immediate vicinity. CO is a reactive pollutant, however, and its impact is soon dissipated by dispersion and oxidation when there is no atmospheric confinement.

Ozone. Forest fires emit moderate amounts of VOCs and small amounts of NOx. Fire related emissions become important only when other persistent and much larger pollution sources already present a substantial base load of these ozone precursors.

Historically, the state of Alabama has had little trouble in attaining the NAAQS ozone standard. This is changing, however, as recent revisions to that standard are proving to be more difficult to meet. The new ozone standard provides that attainment occurs when the average of the fourth-highest 8-hour running average values for three consecutive years does not exceed 0.08 ppm.

For the years 2000 - 2002, the Alabama Department of Environmental Management (ADEM) reported the results of 21 ozone monitors. Summary data indicate that 8 of 15 monitored counties will have some problem meeting the new ozone standard. Perhaps one-fifth of Alabama's counties would show a problem meeting the NAAQS ozone standard, if all were monitored. If ozone non-attainment occurs at that scale, much of the National Forest would become involved in programs to control emissions and restore

NAAQS attainment. Figure 3A-10 (map) and Table 3A-13 show the breadth and depth of the problem.

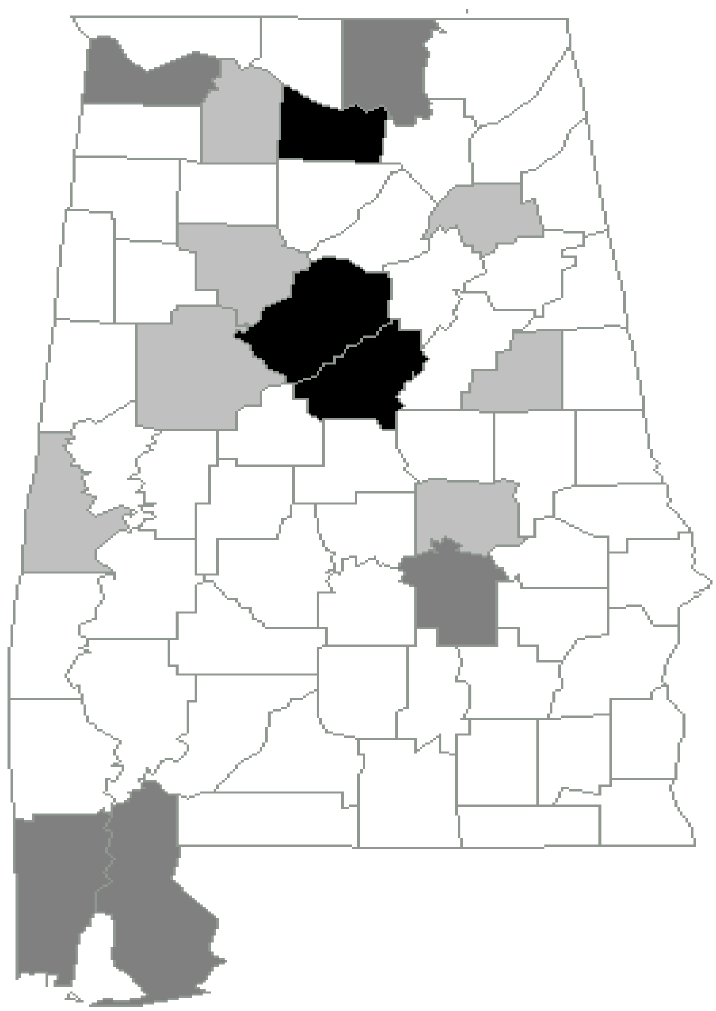
Particulate matter (PM). Forest fires also emit moderate amounts of particulate matter. Most of this is in the form of fine particulates (PM2.5), made up of solid particles and droplets of condensed organic gases, nearly all with a diameter at or below 2.5 microns. These small particles have a persistent impact on air quality because they are relatively non-reactive and remain suspended in the air for long periods. There are many sources of fine particulate emissions. While fire related emissions are ephemeral, they become important when other larger and more continuous PM2.5 sources already present a substantial base load.

Historically, the state of Alabama has had little trouble in attaining the NAAQS standard for particulate matter. This, too, is changing as recent revisions to the standard that redirected its focus from small particulates (PM10) to fine particulates (PM2.5) are proving more difficult to meet. The new PM standard provides that attainment occurs when: 98% of the 24-hour samples show a PM2.5 concentration not exceeding 65 micrograms per cubic meter (ug/m3), *and* the annual average of these 24-hour sample values does not exceed 15 ug/m3, over a running 3-year period.

During the years 2000 - 2002, ADEM reported the results of 34 PM2.5 monitors. Summary data indicate that 16 of 18 monitored counties will have some problem meeting the new PM2.5 standard. Perhaps one-third of Alabama's counties would show a problem meeting the NAAQS PM2.5 standard, if all were monitored. If PM2.5 non-attainment occurs at that scale, again, much of the National Forest would become involved in programs to control emissions and restore NAAQS attainment. Figure 3A-11 (map) and Table 3A-14 show the breadth and depth of the problem.

Statewide Trends in Ozone and PM2.5. A quick look at the information in Tables 3A-13 and 3A-14 indicates a possible trend. Because ozone concentrations are heavily dependent on summertime weather, it's difficult to infer any trend in that short period of the ozone record. The PM2.5 monitors may, on the other hand, indicate an improving trend. Most of the PM2.5 monitors were installed in 1999 so we'll have to wait a few more years to see if this is a lasting trend or an anomaly.

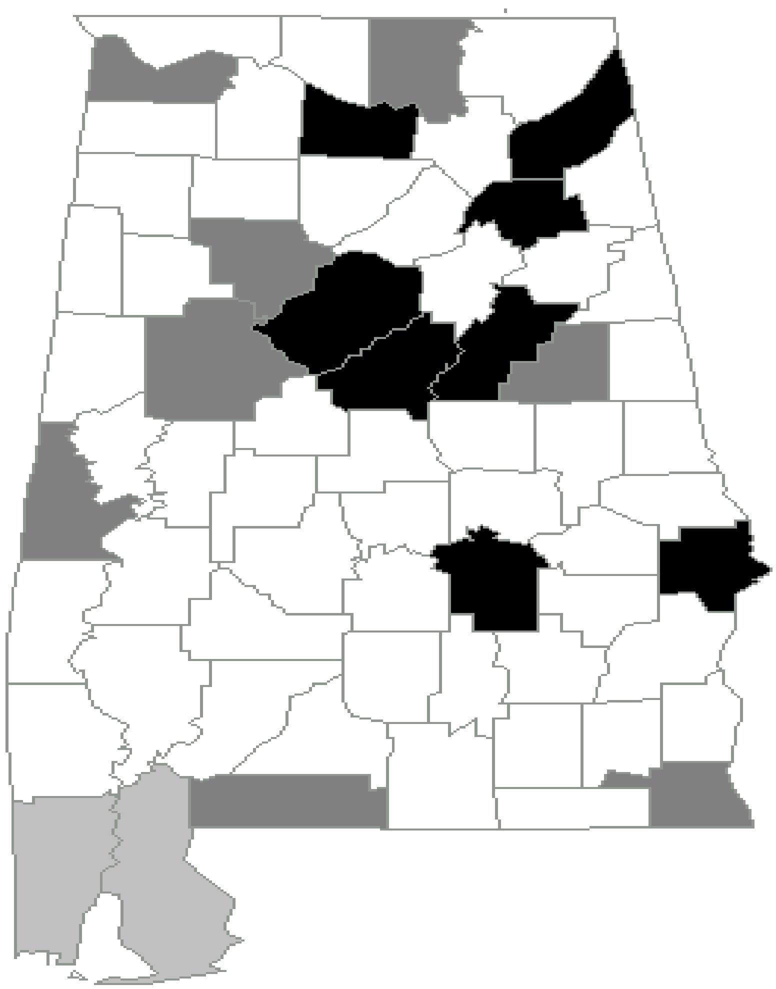
Revised (8-hour) Ozone Standard: To attain the standard, the 3-year mean of the fourth highest daily maximum 8-hour (running) average of continuous ambient air monitoring data, over each year, must not exceed 0.08 parts per million (EPA, 2002)



COUNTIES WHERE NO MONITORING DATA WERE REPORTED (2000 – 2002).	COUNTIES WHERE MONITORING DATA DID NOT SHOW A SIGNIFICANT THREAT OF OZONE NON-ATTAINMENT.
COUNTIES WHERE THE ANNUAL 4TH HIGHEST 8–HOUR OZONE CONCENTRATION EXCEEDS 0.08 PPM FOR AT LEAST 1 OF 3 YEARS, EVEN THOUGH THE 3-YEAR AVERAGE DID NOT EXCEED THAT VALUE.	COUNTIES WHERE NON-ATTAINMENT THREATENS BECAUSE THE 3-YEAR AVERAGE OF THE ANNUAL 4TH HIGHEST OZONE CONCENTRATION EXCEEDS 0.08 PPM.

FIGURE 3A-10. Summary map of **OZONE** monitoring reported by the State of Alabama (2000 – 2002), from statistics in Table 3A-13.

Revised Particulate Matter (PM2.5) Standard: This standard has two parts. One covers the maximum value of the individual 24-hour samples collected during the year. The other covers the annual mean of the 24-hour samples. To attain the 24-hour part of the standard, the 98th percentile of the distribution of 24-hour concentrations, for a period of 1 year, averaged over 3 years, must not exceed 65 ug/m3. To attain the annual mean part, the annual mean, averaged over 3 years (from population oriented monitors) must not exceed 15.0 ug/m3. (EPA, 2002).



COUNTIES WHERE NO MONITORING DATA WERE REPORTED (2000 – 2002).

COUNTIES WHERE MONITORING DATA DID NOT SHOW A SIGNIFICANT THREAT OF PM2.5 NON-ATTAINMENT.

COUNTIES WHERE THE MEAN ANNUAL PM2.5 CONCENTRATION EXCEEDED 15.0 UG/M3 FOR AT LEAST 1 OF 3 YEARS, EVEN THOUGH THE 3-YEAR AVERAGE DID NOT EXCEED THAT VALUE.

COUNTIES WHERE NON-ATTAINMENT THREATENS BECAUSE THE 3-YEAR AVERAGE OF THE MEAN ANNUAL PM2.5 CONCENTRATIONS EXCEEDS 15.0 UG/M3.

FIGURE 3A-11. Summary map of **PM2.5** monitoring reported by the State of Alabama (2000 – 2002), from statistics in Table 3A-14.

COUNTY	**SUMMARY STATISTICS** of **Maximum Daily 8-Hour OZONE** Concentrations Reported for each Year (unit = parts per million)									**3 - Year Average of 4th Highest Daily Maximum**
	2000			**2001**			**2002**			
	1st Highest Daily Maximum	4th Highest Daily Maximum	No. of Days with Maximum 8-Hour Value Exceeding Standard (0.08)	1st Highest Daily Maximum	4th Highest Daily Maximum	No. of Days with Maximum 8-Hour Value Exceeding Standard (0.08)	1st Highest Daily Maximum	4th Highest Daily Maximum	No. of Days with Maximum 8-Hour Value Exceeding Standard (0.08)	
BALDWIN	0.110	0.097	13	0.089	0.078	2	0.072	0.072	0	0.082
CLAY	0.096	0.080	1	0.091	0.083	2	0.092	0.083	3	0.082
COLBERT							0.092	0.084	3	*
ELMORE	0.092	0.084	3	0.087	0.077	1	0.091	0.080	2	0.080
ETOWAH							0.084	0.083	0	*
JEFFERSON	0.103	0.092	7	0.093	0.086	4	0.098	0.086	6	0.088
LAWRENCE	0.094	0.083	2	0.076	0.071	0	0.085	0.080	1	0.078
MADISON	0.100	0.088	6	0.081	0.080	0	0.092	0.078	2	0.082
MOBILE	0.100	0.089	6	0.089	0.076	1	0.077	0.075	0	0.080
MONTGOMERY	0.103	0.086	6	0.085	0.077	1	0.087	0.081	3	0.081
MORGAN	0.100	0.091	8	0.093	0.077	1	0.095	0.087	4	0.085
SHELBY	0.118	0.099	16	0.104	0.089	8	0.110	0.090	11	0.093
SUMTER	0.084	0.080	0	0.091	0.072	1	0.097	0.078	1	0.077
TUSCALOOSA				0.102	0.081	1	0.092	0.083	2	*
WALKER							0.092	0.083	3	*
AVERAGE	*0.100*	*0.088*	*6*	*0.090*	*0.079*	*2*	*0.090*	*0.082*	*3*	*0.083*

<u>TABLE 3A-13</u>. Summary of <u>OZONE</u> monitoring reported by the State of Alabama (2000 – 2002). The summary data for specific years are from EPA web page "www.epa.gov/air/data", as of 10/3/2003 (EPA, 2003). The 3-year averages (far right column w ere calculated by the author. The following information is helpful in understanding the data presented above. Ozone monitors operate continuously, generally from mid-spring through mid-fall, recording a mean concentration for each hour. As the data presented above are 8-hour <u>running</u> averages (calculated from the hourly base data), there are still 24 values for each day. Only one value per day (the maximum) is used for evaluating attainment of this standard. The data presented in this table represent only the 1st and 4th highest of roughly 245 values generated per year. The 4th highest value for each year and the 3-year average of those values (all highlighted) are critical for evaluating attainment of NAAQS. *Asterisk indicates insufficient data to calculate a statistic.

COUNTY	SUMMARY STATISTICS of 24-HOUR PM2.5 Concentrations Reported for each Year (unit = micro-grams per cubic meter)									3 - Year Average	
	2000			2001			2002			Annual 98th Percentile	Annual Mean
	98 th Percentile	Annual Mean	Number of Samples	98 th Percentile	Annual Mean	Number of Samples	98 th Percentile	Annual Mean	Number of Samples		
BALDWIN	36	14.5	85	22	10.6	116	23	10.4	113	27	11.8
CLAY	43	16.4	105	29	12.8	111	27	13.2	118	33	14.1
COLBERT	32	15.6	106	29	12.8	100	34	12.8	96	32	13.7
DEKALB	51	17.2	94	31	14.7	112	32	14.4	107	38	15.4
ESCAMBIA	39	16.8	115	24	12.5	110	25	11.9	117	29	13.7
ETOWAH	51	19.5	83	34	15.3	94	34	14.8	107	40	16.5
HOUSTON	35	15.4	94	27	14.0	108	27	13.0	104	30	14.1
JEFFERSON	53	22.3	352	43	19.1	352	38	17.5	356	45	19.6
MADISON	42	16.3	120	30	14.6	121	34	13.8	116	35	14.9
MOBILE	33	14.8	114	26	12.9	118	24	12.1	105	28	13.3
MONTGOMERY	42	17.2	111	29	14.4	112	28	14.6	116	33	15.4
MORGAN	44	18.3	83	32	17.6	54	31	13.1	112	36	16.3
RUSSELL	42	18.5	109	34	15.6	111	35	15.1	99	37	16.4
SHELBY	39	16.7	112	30	14.7	119	33	13.6	116	34	15.0
SUMTER	37	15.3	107	27	12.1	117	26	11.8	113	30	13.1
TALLADEGA	45	18.2	106	31	14.7	108	30	14.1	113	35	15.7
TUSCALOOSA	38	16.3	105	22	11.5	16*	19	10.4	12*	*	*
WALKER	36	18.0	65				25	11.8	28*	*	*
AVERAGE	*41*	*17.1*		*30*	*14.3*		*30*	*13.5*		*34*	*15.0*

TABLE 3A-14. Summary of PM2.5 monitoring reported by the State of Alabama (2000 – 2002). Entries for each year are from EPA web site "www.epa.gov/air/data", as of 10/3/2003 (EPA, 2003). The 3-year averages of annual means and 98th percentiles (2 far right columns) were calculated by the author. The following information is helpful in understanding the data: **a)** PM2.5 monitors run for continuous 24-hr periods, generally every 3rd day, for the entire year. Monitors set up with this schedule can provide approximately 122 values per year. Some monitors operate every 6th day, providing about 60 samples per year. Yet a few others are set up to operate daily, giving up to 365 values per year. **b)** While there are no problems with the 98th percentiles part of the PM2.5 standard, the data do show problems with the annual mean part. Columns containing these critical values are shaded. *Asterisk indicates insufficient data to calculate a statistic.

3.2 Direct, Indirect and Cumulative Effects

An analysis reported in the Southern Appalachian Assessment (SAMAB, 1996) indicates that smoke from forest fires in the southern Appalachian area may contribute as little as 1.5% to the regional airborne fine particulate budget. This may seem improbable, especially with the dramatic appearance of smoke plumes as they rise above the forest. The National Wildfire Coordinating Group reports, however, that the bulk of those plumes is made up of water vapor and carbon dioxide (~ 90%, by mass) (NWCG, 1985). Next comes carbon monoxide (~ 5%), then total particulates (~ 3%) (USFS, 1976). NWCG also reports that roughly 90% of total woodland fire particulate emissions are fine particulates (solid particles & droplets of condensed organic gasses, all with a diameter at or below 2.5 microns).

The earlier discussion on visibility, a Sipsey AQRV, credited sulfur related fine particulates with 70% of the impact on visibility. Soot and condensed organics cause about 20% of the impact. Now consider that forest fires are only one of many sources of soot and condensed organics. It no longer seems improbable that forest fires may contribute as little as 1.5% to the regional airborne fine particulate budget.

Recently the total annual amount of prescribed burning on the National Forest, for all purposes, has averaged 75,000 acres. The Alternatives presented in the Plan call for prescribed burning that might increase that average up to 95,000 ac/yr or reduce it to 69,000 ac/yr. Regardless of the Alternative, the proposal represents only a moderate change in an emissions source that is a small part of the regional emissions budget. Emissions changes contemplated in the Plan are unlikely to drive any county into NAAQS non-attainment, unless conditions in that county are already ripe for non-attainment.

While management activities contemplated in this Plan have low potential to drive counties into NAAQS non-attainment, we must not conclude that prescribed burning projects can be done without concern for air quality. Current guidelines for individual projects or programs must still be followed. In addition, if a nearby county falls into NAAQS non-attainment, Forest personnel must participate in the effort to resolve the problem.

If counties containing National Forest acreage go into ozone non-attainment status, the FS must participate in resolution of the problem. The ozone problem will likely be one of individual bad days, generally in the summer. If the Forest (or the burning community as a whole) can continue at its relatively low rate of emissions, it will deal with the situation by accepting burning restrictions on the bad days.

If counties containing National Forest acreage go into PM2.5 non-attainment, again the Forest must participate in resolution of the problem. This, however, is not a problem of individual bad days. The PM2.5 problem is with the annual mean part of the standard. Where non-attainment occurs, FS must participate in development of plans to return counties to attainment status. If the Forest does not obtain an allocation of PM2.5 emissions when county emissions budgets are developed, provisions already existing under the NEPA process (plus some that will be developed under the CAA) can preclude the Forest from conducting prescribed burning projects.

4.0 Minerals

4.1 Affected Environment

The National Forests in Alabama encourage, facilitate, and administer the exploration, development, and production of mineral resources, while providing for the conservation and protection of surface resources. Mineral activities are encouraged in accordance with various mining and mineral leasing acts, and applicable federal and state statutes governing protection of the environment. This includes air and water quality standards applicable to these activities.

The majority of the National Forest lands in Alabama were acquired through land purchase or exchange. In some instances, the minerals were outstanding at the time the U.S. acquired the surface, in other cases, the landowner reserved the minerals as a condition of sale or exchange. As a result, the United States has varying degrees of control over surface operations related to mineral extraction, depending on the mineral ownership. There are about 665,731 acres of surface estate owned by the federal government, and administered by the National Forests in Alabama. About 24,893 acres, or 3.7%, of the Alabama National Forests have Public Domain (PD) surface and mineral status. These lands have never been conveyed out of federal ownership, and were later reserved for national forest purposes. The U.S acquired, through purchase or exchange, the remaining 640,838 acres, or 96.3% of the National Forest.

Total federal mineral ownership under the federal surface estate is 585,394 acres, which is about 87.9% of the Forest area. An additional 4,677 acres of federal mineral ownership lie under privately owned lands within the national forest boundaries. This is the result of the U.S. reserving the federal mineral interests when the lands were exchanged. Responsibility for management of these reserved federal mineral interests lies with the Department of Interior, Bureau of Land Management (BLM), as the Forest Service is no longer the surface managing agency. There are 90,414 acres of federal surface within the Forests that are subject to privately owned mineral interests. This comprises about 13.5% of the forest area. Of this, 80,337 acres, or 12.1% of the federal surface, are subject to 100% private mineral ownership. The mineral interests under the remaining 10,077 acres of federal surface, or about 1.5% of the Forest, are split between federal and private ownership, with the U.S. owning some fractional mineral interest under these 10,077 acres.

Private mineral rights can be categorized two ways: 1) outstanding rights (85,628 acres), which are mineral rights held by a third party at the time the Forest Service purchased the land from the surface owner; and, 2) reserved rights (4,786 acres), which are mineral rights reserved by the property owner at the time the surface was conveyed to the Forest Service.

Currently there are 31,650 acres (46 leases) that are leased for oil and gas, and one 40-acre preference right lease authorizing the removal of clay.

Table 3A-15 lists the ownership, surface and mineral status, and leased acres for each National Forest.

Table 3A-15

	Bankhead NF	Conecuh NF	Talladega NF	Tuskegee NF
Total federal surface acres	181,156	83,857	389,466	11,252
Acquired	159,349	83,574	386,663	11,252
Public domain	21,807	283	2,803	0
Federal minerals/federal surface acres[1]	160,216	81,862	332,622	11,239
Federal minerals/private surface acres[2]	393	2,713	1,558	13
Private minerals/federal surface acres[1]	21,020	4,563	64,511	320
Reserved minerals	1,188	1,283	1,995	320
Outstanding minerals	19,832	3,280	62,516	0
Leased acres	0	31,650	40	0

[1] Due to shared minerals ownership, the sum of the federal and private mineral acres may not equal the total surface acres.
[2] Responsibility for management of these reserved federal mineral interests lies with the Dept. of Interior, Bureau of Land Management, as the Forest Service is no longer the surface managing agency.

The geologic setting of the Forests provides a diversity of energy and non-energy mineral resources. Since approval of the 1986 Land Management Plan, minerals from the Forests, including natural gas, oil, coal, and mineral materials, have been used to meet the basic needs of the public, such as providing fuel for transportation and heating homes, and road surfacing/maintenance materials. Development of the federal and private minerals underlying the National Forests in Alabama stimulates the local and national economies by making available the raw materials needed for continued economic development, resulting in increased jobs and spending. The sustainability of the forests depends on the continued use of mineral resources to meet the public's demand for food, fuels, building materials, etc. The role of mineral resources is fundamental to viability of human ecosystems.

The State of Alabama contains portions of five different physiographic provinces: Low Plateaus Province in the extreme northwest corner, Appalachian Plateau in the north-central area, Valley and Ridge Province in the center of the state, the Piedmont Plateau northeast of Montgomery, and the Gulf Coastal Plain which encompasses the southern half of Alabama. The geologic age of rock exposed within the state borders range from Precambrian metamorphic and crystalline rocks to recent alluvium deposited along river channels. For a more detailed report on the physiographic provinces and the geology of each of the Alabama forests, see the RFD scenarios available for review in the Process Record at the Forest Supervisor's Office.

Legal and Administrative Framework

Statutory and regulatory direction separates mineral resources in the publicly owned lands of the United States into three categories: locatable, leasable, and salable. Forest Service policy governing the exploration and development of mineral activities on National Forest System lands is guided by statutes, regulations, and Executive Orders. Statutory and regulatory direction for mineral resources on the Alabama National Forest can be found in Appendix A of the Plan.

Lands Statutorily Unavailable for Mineral Leasing or Permit

1. Subject to valid existing rights, the minerals in lands designated under the Wilderness Act of September 3, 1964, are withdrawn from all forms of disposition under all laws pertaining to mineral leasing. The National Forests in Alabama have three congressionally designated wildernesses, Sipsey and Sipsey Addition (25,002 acres); and Cheaha and Cheaha Addition (7,245 acres); and Dugger Mountain (9,200 acres), for a total of 41,447 acres, which are statutorily withdrawn from leasing. Currently, there are no issued federal mineral leases, or permits, within the Forests' three designated wilderness areas.

2. Subject to valid existing rights, the minerals in federal lands, which constitute the bed or bank, or are situated within ¼-mile of the bank of any river designated a "Wild River" under this Act, are withdrawn from operation of the mineral leasing laws. This restriction does not apply to those segments of a Wild and Scenic River that are designated as "scenic" or "recreational."

   The National Forests in Alabama have one river, the Sipsey Fork, West Fork, which was designated for inclusion in the Wild and Scenic River system in 1988. The majority of the lands adjacent to the river falls within the boundaries of the Sipsey and Sipsey Addition Designated Wilderness, and as such, is already unavailable for lease in accordance with the Wilderness Act of 1964. However, portions of the "wild" segments of the river fall outside the designated wilderness. There are 900 acres of land, which fall outside the wilderness boundary, but within "the one-quarter mile of the bank" corridor of the wild segments of the river. These lands are statutorily withdrawn from mineral leasing in accordance with the Wild & Scenic River Act.

Federal Minerals Management

Locatable minerals

The General Mining Law of 1872 (U.S. Mining Laws, Act of May 10, 1872) applies to all mineral deposits in National Forest System lands reserved from the public domain. The mining laws do not apply to public domain lands situated in Minnesota, Michigan, Wisconsin, Alabama, Missouri, Kansas, and certain lands in Oklahoma, nor does it apply to those public domain lands that have been formally withdrawn. No authority exists to explore for, or develop, locatable minerals on public domain lands within the states listed above.

Minerals, such as metallic minerals, that would be locatable minerals on public domain lands are hard-rock leasable minerals on acquired lands. As a result, leasable minerals on the Forest include oil, gas, and coal, in addition to hardrock minerals such as iron, manganese, silver, and gold. Leasing act minerals such as oil, gas, gilsonite, oil shale, coal and other leasing act minerals, and mineral materials, including, but not limited to, sand and gravel are regulated by different laws and regulations.

Leasable minerals

National Forest System lands are generally available for exploration and mining unless specifically precluded by an act of Congress or other formal withdrawal. Which mineral leasing act applies depends on the type of lands and minerals involved. The Revised Forest Plan identifies those areas, which are available and unavailable for energy and non-energy exploration and leasing. For non-energy leasable minerals, public scoping and a site-specific analysis are completed by the FS upon the Bureau of Land Management's (BLM) receipt of a permit or preference right lease application. This is done prior to issuance of the permit or lease. The BLM cannot issue a permit or lease on hardrock leasable minerals without the consent of the Regional Forester.

For energy leasable minerals (oil, gas and coal), the Revised Forest Plan makes both the land availability decision and the decision to lease. Lands where the minerals are statutorily withdrawn from leasing are identified in the Revised Forest Plan. Public scoping and site-specific analysis of proposed actions under a lease will be completed when the BLM and the Forest Service receive a Notice of Staking (NOS) or an Application for Permit to Drill (APD).

All leases and permits will be administered to standard in accordance with Washington Office policy. The Alabama National Forests will, at a minimum, annually document the lessee/permittee's on-the-ground activities in compliance/non-compliance with the approved surface use plan of operations or terms of the permit.

Non-energy (Hard-rock) Leasable Minerals

On acquired lands, the exploration and development of hardrock minerals, such as gold and silver, are authorized by a federal prospecting permit or preference right lease issued by the Bureau of Land Management (BLM), Department of Interior. A party desiring a prospecting permit makes an application to the appropriate BLM office, which is then forwarded to the Forest Service, along with a request for consent to issuance of the permit. The Forest will do a mineral ownership determination, then contact the applicant to get a detailed exploration plan to complete the scoping and environmental analysis of the project. Based on the review of the Forest Plan and NEPA analysis, the Regional Forester either consents or denies consent to issuance of the prospecting permit by the BLM. Hardrock prospecting permits have an initial term of two years, with the option of a four-year renewal.

If the permittee believes that a valuable deposit exists, he/she may apply to the BLM for a 20-year preference right lease. The BLM will make an independent economic analysis to verify the commercial potential of the deposit. If the BLM believes the deposit can be mined, milled, and sold at a net profit, they will request Forest Service consent to issuance of the preference right lease. At this point, the Forest Service will complete another environmental assessment of the proposed mining operation. Even though a valuable deposit of minerals has been found, the Forest Service could deny consent to issuance of the preference right lease, based on the environmental analysis and other factors.

The National Forests in Alabama have only one non-energy clay lease, ALES-3467 that was issued to Dickey Clay Company in 1970. A low level, but continuous, mining of clay has taken place from this site on the Talladega National Forest. In 1990, this lease was renewed for another term. The BLM production reports show that the mine has produced approximately 150,000 tons of clay, with an estimated reserve of another 160,000 tons remaining to be mined. Clay produced from this mine is trucked 50 miles to a plant located in McCalla, Alabama for processing and bagging.

Energy Leasable Minerals (Oil, Gas, and Coal)

Through the passage of the 1920 Mineral Leasing Act, Congress established a program to provide for oil, gas, and coal development on public domain lands, including the National Forests reserved from the public domain. The Act authorized the Secretary of the Interior to issue leases for the disposal of certain minerals, including coal, phosphate, sodium, potassium, oil, oil shale, gilsonite, and gas. The Mineral Leasing Act for Acquired Lands of August 7, 1947 extends the provisions of the mineral leasing laws to acquired National Forest System lands, and requires the consent of the Secretary of Agriculture prior to leasing. The National Forest System lands on the Alabama National Forests are 96.3 % acquired lands. The purpose of this Act is “to promote the mining of coal, phosphate, sodium, potassium, oil, oil shale, gas, and sulphur on lands acquired by the United States.” The Surface Mining Control and Reclamation Act of 1977 prohibits surface (strip) mining of coal on any Federal lands within the boundaries of any National Forest east of the 100th Meridian. Deposits of coal can only be mined by underground methods. There is an estimated 500 acres of known deposits of mineable coal remaining on the National Forests in Alabama, subject to exchange. The likelihood of these deposits being mined is low, based on the fact that adjacent private lands have been strip-mined.

The Energy Security Act of June 30, 1980 directs the Secretary of Agriculture to process applications for leases and permits to explore, drill, and develop resources on National Forest System lands, notwithstanding the current status of the Land and Resource Management Plan (“Forest Plan”). The federal oil and gas leases issued on the Alabama National Forests after 1980 were a response to this congressional direction, as well as to public demand for energy resources. In accordance with the Energy Security Act, energy leases and permits will continue to be processed, notwithstanding the current status of the Revision of the 1986 Forest Plan. As part of the Federal Onshore Oil and Gas Leasing Reform Act of 1987, Congress again recognized the Forest Service's role in regard to leasing and administration of surface operations during oil and gas development. The implementing regulations for this Act (36 CFR 228, Subpart E) provide the basis for the analysis of alternatives and decisions on federal oil and gas leasing in the Revised Forest Plan.

Executive Order 13212 (Actions to Expedite Energy-Related Projects) of May 18, 2001 states "executive departments and agencies shall take appropriate actions, to the extent consistent with applicable law, to expedite projects that will increase the production, transmission, or conservation of energy." The Executive Order 13212 requires that: "For energy-related projects, agencies shall expedite their review of permits or take other actions as necessary to accelerate the completion of such projects, while maintaining safety, public health, and environmental protections."

The federal oil and gas leasing program helps supply the nation with critical energy minerals, and provides a source of revenue to the local, state, and federal governments. Oil and gas leases are issued primarily through a competitive bid sale process, which generates revenue from bonus bids of not less than $2.00 per acre, as well as the annual rental fees of not less than $1.50 per acre per year for the first through fifth years of the lease, and not less than $2.00 per acre per year for each year thereafter. If a well is drilled which produces oil and gas from lands covered by a federal lease, the federal government receives a 12.5% royalty payment based on the amount or value of the production removed or sold from the lease. There are instances where the normal 12.5% royalty rate could be higher (an increase in the royalty rate is a condition of reinstatement of a federal lease where rental was not paid timely and the federal lease terminated), or it could be lower if the well meets the very narrow guidelines under the federal Royalty Reduction Act.

The Minerals Management Service (MMS) of the Dept. of Interior collects all minerals revenues generated from federal leases and permits. The MMS distributes 25% of the energy mineral revenues generated from acquired lands to the State of Alabama under the authority of *P.L. 60-136, 25 Percent Fund Act of 1908*. In addition, the non-energy mineral receipts are distributed by the Forest Service under one of two public laws, *P.L. 60-136, 25 Percent Fund Act of 1908*, or *P.L. 106-393, Secure Rural School and Community Self-Determination Act of 2000*, depending on the election made by each county. In those cases where the leases involve public domain minerals, 50% of the mineral revenues are distributed by the MMS to the State of Alabama.

The Forest Plan makes two decisions related to federal oil and gas: 1) availability of lands for future leasing *(36 CFR 228.102(d))*, and 2) consent to lease the available lands *(36 CFR 228.102(e))*, subject to standard lease terms, and in some instances, subject to additional constraints (stipulations), as required by the prescription for a specific management area. The Forest Plan analyzes those areas of the Forest with leasing interest or mineral potential using the "Reasonable Foreseeable Development Scenario" (RFD) developed by the BLM geologists. This study looked at the long term (10 years) potential for oil and gas development in the study area, and projected the number of wells they anticipated would be drilled during the 10-year period. Under the Revised Forest Plan, the BLM can proceed to issue oil and gas leases in areas where the Plan makes both the availability and the consent decision. The Plan's environmental analysis and documentation for federal oil and gas is more detailed than it is for other leasable minerals because of the two oil and gas lease decisions which are made in the Plan.

Once an oil and gas lease is issued, a second round of NEPA is required prior to the lessee staking the drill site, occupying the surface, and drilling an exploratory well. Onshore Oil and Gas Order No. 1 outlines the necessary requirements for the approval of all proposed exploratory, development, and service wells. The lessee must apply to the BLM for an Application for Permit to Drill (APD), per direction in Onshore Oil and Gas Order No. 1. The APD contains two parts: the Surface Use Plan of Operations (SUPO), and the technical "downhole" Drilling Plan. The Forest Service, in cooperation with the BLM, completes an environmental analysis, including public involvement, of the proposed roads, wells, and any other ground disturbance activities proposed in the SUPO portion of the APD. The BLM is responsible for the review and approval of the Drilling Plan. After the environmental analysis and public involvement, the Forest Service would decide: 1) whether to approve the surface use plan of operations portion of the APD; 2) if so, where (assuming the proposed location has been amended to accommodate other resource needs); and, 3) the specific *Conditions of Approval (COA).* A critical part of the approved SUPO is the required reclamation plan. Each operator proposing to develop federal minerals must post a bond with the BLM to insure compliance with the operating and reclamation requirements. The Forest Service should review the current bond and/or bond to be furnished to ensure that the bond amount is adequate for the protection of federal lands under the jurisdiction of the Forest Service. If at any time prior to or during the conduct of operations, the authorized Forest Service officer determines the financial instrument held by the BLM is not adequate to ensure complete and timely reclamation and restoration, a request to increase the bond amount, including supporting documentation, shall be submitted to the Regional Forester. The Regional Forester will review and request that the BLM increase the bond amount to ensure proper reclamation and restoration. If the BLM is unable to increase the bond amount, the authorized Forest Service officer will notify the operator that a separate bond instrument must be filed with the Forest Service in the amount deemed adequate by the authorized Forest Service officer to ensure reclamation and restoration. The authorized Forest Service officer shall notify the BLM of the separate bond instrument filed with the Forest Service.

Under the terms of a federal lease, the lessee is granted the exclusive right to drill for, mine, extract, remove, and dispose of all the leased resources, together with the right to build and maintain necessary improvements on the leasehold. Federal oil and gas leases contain standard lease terms (SLTs) (see Appendix I), which provide that the operations must be conducted in a manner that minimizes, to the extent possible, adverse impacts to the land, air, and water; to cultural, biological, and visual and other resources; and to other land uses or users. Federal environmental protection laws such as the Clean Air Act, Clean Water Act, Endangered Species Act, and Historic Preservation Act, apply to all proposed activities.

In addition, based on the management prescription for a specific area contained in the Forest Plan, the lease may have been issued subject to a stipulation 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 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 different nationally approved stipulation forms. They are:

- No surface occupancy (NSO) – Used when surface occupancy of certain lands is prohibited.

- Timing/season – Used to prohibit surface occupancy of certain lands during specific times, such as for protection during nesting or calving season.

- Controlled surface use (CSU) – Used when restrictions will apply to occupancy, such as requiring additional mitigation to resolve potential conflicting uses or to meet visual quality objectives.

A lease may also be issued subject to a lease notice (LN). A notice does not contain any new restrictions. It simply puts the lessee on "notice" that his operations must be in compliance with the applicable statute(s), such as the Endangered Species Act, if applicable at the time surface occupancy is proposed.

In addition to the two lease stipulations used by the Alabama National Forests (CSU and NSO), two LNs can be used:

- LN #3, which indicates all or part of the leased lands may contain animal or plant species protected under the Endangered Species Act.

- LN #4, which indicates all or part of the leased lands may be classified as wetlands and floodplains that will require special protection.

Issued leases are reviewed on the Forest to ensure inclusion of two basic stipulations. One Notice to Lessee (NTL) from the BLM, Department of 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 the terms of the deed severing the subsurface from the surface estate, applicable state and federal laws (i.e. Endangered Species Act), and cooperation and negotiations with the operator.

In the early to mid 1990s, there were 160 Federal oil and gas leases issued on the Alabama National Forests, covering 70,585 acres. Six (6) of the leases had commercial production. Currently there are 46 oil and gas leases totaling 31,560 acres. Of these, only 3 leases contain 4 producing wells, and all are located on the Conecuh National Forest.

Mineral Materials

The Mineral Materials Act of July 31, 1947 authorized the disposal of mineral and vegetative materials through a sale system on public lands of the United States. The act also provides for free use of these materials by federal or state agencies, municipalities, or nonprofit associations as long as those materials are not for commercial, industrial, or resale purposes. The Act was amended by the Multiple Use Mining Act of July 23, 1955. This act defined what common variety mineral materials are and distinguished them from rare varieties (uncommon variety mineral material). Uncommon varieties of mineral materials may be locatable in certain states under the 1872 Mining Law.

Mineral materials or “common variety” minerals are commodities having a low unit value/ton and include sand, gravel, crushed stone, riprap, clay, and fill dirt. These materials are used in road construction, landscaping, and as building materials. They can be sold to individuals or companies through negotiated or competitive bidding or give as free use to public agencies (e.g., county and state highway departments) for public purpose use. Any sale of mineral materials must be made at no less than fair market value as determined by an appraisal. Sale of mineral materials is at the discretion of the Forest and it can choose not to do so as determined by the District Ranger. Currently there is one lease for clay totaling 40 acres.

4.2 Direct and Indirect Effects

The BLM developed two Reasonable Foreseeable Development (RFD) Scenarios for solid minerals and oil & gas for the Alabama National Forests. These reports address the mineral potential of the Forest, the anticipated development during the next ten years, and the associated environmental effects. The original 1996 reports have been revisited and updated by BLM. Based on that review and consultation with BLM, the RFD Scenarios for both solid minerals and oil and gas have been incorporated in this section. The RFD scenarios are available for review and can be found in the Process Record in the Forest Supervisor's Office.

Locatable Minerals – Since the 1872 Mining Law does not apply to the Forest, there can be no impacts *(1872 Mining Law is only applicable in Louisiana, Mississippi, Arkansas and Florida)*.

Leasable Minerals/Non-Energy – The only non-energy leasable mineral activity to occur on the Alabama National Forests is the continued operation of the clay lease, ALES-3467. The Alabama Piedmont has received extensive exploration interest for base and precious metals since the early 1800s. There have never been any significant finds. All of the little known production occurred outside of the Forest boundary. In 1995, an individual made an application for a prospecting permit to explore for copper. However, he never provided the Forest with any specific prospecting information, and later withdrew his application. Gold was prospected for in both lode and placer deposits in the region near the Talladega Forest. There has never been any production from the Forest, although there is some interest by the public in recreational gold panning. The BLM does not foresee any new prospecting permit applications being issued in the next 10 years.

Impacts resulting from recreational gold panning are minimal. The hobbyist uses a small shovel to scoop up 5-6 cubic inches of sediment from the streambed and places it into the gold pan. Current Forest policy is to allow taking of material only from the streambed, not the stream banks. The pan is then immersed in water and rotated in a swirling motion. There would be some negligible sediment sloshing out of the gold pan as the water winnows the lighter sands and gravels away from the pan, leaving the heavier black sands and gold, if any, in the bottom of the pan.

Leasable Minerals/Energy – The BLM's reasonable foreseeable development (RFD) scenario for oil and gas is a model or projection of anticipated oil and gas exploration and/or development activity (leasing, exploration, development, production, and abandonment) in a defined area for a specified time period (usually 10 years). The scenario is based primarily on the subsurface geology, past development history, current activity, anticipated future demand with consideration of other significant factors, such as economics, technology, physical limitations on access, existing or anticipated infrastructure, and transportation. It is divided into a forecast for the Bankhead, Talladega (Talladega and Oakmulgee), and Conecuh National Forests. The Tuskegee Forest is small and has had no previous leasing or development interest. In determining the oil and gas potential of the Alabama National Forests, the rating system outlined in BLM Fluid Minerals Handbook H-1624-1 was used. The ratings used had four levels: High, Moderate, Low, and No Potential. These are defined as:

- High: 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); inclusion in an oil and gas play as defined by the USGS national assessment, or in the absence of a play designation by USGS, the demonstrated existence of: source rock, thermal maturation, and reservoir strata possessing permeability and/or physical evidence or documentation in the literature.

- Moderate: Geophysical or geological indications are favorable for the occurrence of undiscovered oil and/or gas resources. Evidence exists that one of the following may be absent: source rock, thermal maturation, and reservoir strata possessing permeability and/or porosity and traps. Geologic indication is defined by geological inference based on indirect evidence.

- Low: The geologic, geochemical, and geophysical characteristics do not indicate a favorable environment for the accumulation of oil and/or gas resources. Specific indications that one or more of the following may not be present: source rock, thermal maturation, or reservoir strata possessing permeability and/or porosity, and traps.

- No Potential: Demonstrated absence of 1) source rock, 2) thermal maturation, 3) reservoir rock that precludes the occurrence of oil and/or gas. Demonstrated absence is defined by physical evidence or documentation in the literature.

As stated in the RFD, the forests have various oil and gas potentials. The Bankhead, Conecuh, and the northern townships (Tuscaloosa County portion) of the Oakmulgee Division are rated high potential. The rest of the Oakmulgee Division is rated moderate potential, and the Talladega and Tuskegee National Forests are rated low potential.

In the next ten years, the RFD (updated Reasonable Foreseeable Development Scenario) predicts that one oil/gas well will be drilled on the Bankhead Forest, one on the Talladega Forest, and 10 (one per year) on the Conecuh Forest. During the past ten years, there have been no wells drilled on either the Bankhead or Talladega Forests and 11 wells (about one /year) on the Conecuh Forest.

To adequately disclose what environmental impacts are associated with this projected activity, the drilling process needs to be itemized and analyzed.

Typical Drilling Scenario

Historically, wells in Alabama are drilled on 40 – 640 acre spacing. The number of wells drilled is dependent on the oil and gas market values and the perceived impact of the lease stipulations by the oil and gas industry.

In this geographic area, the standard approach is to drill vertical holes from a single drill pad down to the target formation. The deeper the suspected oil/gas bearing rock layer lies, the larger the drill rig must be and, consequently, the larger the drill pad must be to accommodate it. Since the known producing zones lie relatively shallow, less than 4,000 with deeper plays to 6,000 feet, smaller/larger drill rigs and pads are needed. Once the APD has been obtained from the BLM, the operator will construct an access road to the drill site and smooth out a pad to erect the derrick on.

As stated in the RFD scenario, preparation for the drilling process includes construction of a drilling pad and reserve pit. Construction procedures must conform to the approved surface use plan of operations. Typically, one to two acres are cleared and graded level for construction of the well pad. However, depending on the topography of the well site and access area, this construction may require the creation of cut slopes and fill areas that may disturb additional area. The excavated reserve pit is usually about five feet deep and is lined with bentonite clay. Plastic or butyl liners (or its equivalent) that meet state standards for thickness and quality are used on occasions when soils are determined incapable of holding pit fluids. Constructed access roads normally have a running surface (width) of approximately 30 feet; the length is dependent upon the well site location in relation to existing roads or highways. The average length of road construction will be about 1/3 of a mile (approximately 1-acre disturbance).

Because the cost of rig time in drilling a well is usually several thousand dollars a day, drilling is conducted 24 hours a day, 7 days per week when possible. Wells are usually drilled in 7 to 30 days depending on the depth of the hole; the number and degree of mechanical problems; if a well is a dry hole or a producer; etc. Wells will be drilled by rotary drilling rig using mud as the circulating medium. Mud pumps would be used to force mud down the drill pipe, thereby forcing the rock cuttings out of the wellbore. Water used in the drilling process would normally be from a well drilled on the site, however, water could be pumped to the site from a local pond, stream, or lake through pipe laid on the surface. Water could also be hauled to the site by the use of water tanker trucks.

Approximately 500 barrels of drilling mud will be kept on the location. Mud will also be needed for some down hole logging programs. Water production will be expected during the life of the field, separation, dehydration, and other production processing may be necessary. Construction of facilities off Federal lands may be needed to handle this processing. Some processing or temporary storage may be necessary on site usually in the form of tanks.

Material used in construction of the pads and access road (i.e., rock, shale, or gravel fill) shall be obtained from pre-approved sources. Shale and/or gravel used in construction of the drilling pad shall be stockpiled when restoring the area. For all surface-disturbing activities, the topsoil to be removed will be stockpiled for redistribution over the disturbed area prior to fertilizing and reseeding of the site. Surface soil material stockpiles should be located to avoid mixing with other subsurface materials during construction and reclamation. Stockpile locations should be located so wind and water erosion are minimized and reclamation potential is maximized. In areas where excavation will be extensive or extreme, or where bedrock will be encountered, existing topsoil shall be replaced. Restoration of the area will include reseeding of the area with natural grasses as determined by the authorized Forest officer. If drilling results in a producing well, the drilling pad must be reduced to a maximum area of 10,000 square feet (0.23 acres) and the remainder shall be restored to blend into the natural terrain. For a producing well, the operator will either install tanks on site to hold the oil and any produced water or else a pipeline will be hooked up to the wellhead and the product transported off site. A producing gas well will have a pipeline connected to the wellhead or “Christmas tree,” and the gas will then be pumped off through these gathering lines. Either way, the amount of space required for these facilities is considerably less than the original pad size and will be reclaimed around the unneeded edges.

Pipelines and/or flow lines will be constructed in conjunction with the construction of the access roads whenever possible to minimize additional disturbance. Pipeline right-of-way shall not exceed 30 feet in width. Exact right-of way widths may be set by ground conditions. Whenever possible, pipeline when buried must be at a depth of at least 48 inches. Any deviation from the 48-inch depth must be approved by the appropriate Forest Service officer prior to any surface disturbing activity taking place. When possible, a common point of collection shall be established to minimize the number of production sites. All pipeline designs, construction, operation, and maintenance shall comply with Federal Safety Standard for Gas Lines, Code of Federal Regulations, Part 192, Title 49, unless requirements that are more stringent are required by the State of Alabama.

If the well is a dry hole, or cannot produce commercial quantities of oil/gas, then it will be closed off by plugging and capping the top of the pipe in the hole. All equipment will be removed from the site and the drill pad area will be re-sloped and seeded with a mixture of native plants.

The BLM estimates that only 20% of the total wells drilled on the Alabama Forests will produce commercial amounts of oil/gas. That is, of the 12 wells projected to be drilled over the next 10 years, only two (2) to three (3) wells would be producers. The rest will be reclaimed within a month of building the drill pad.

With an average of three (3) acres of disturbance for each well (1 acre for the access road and 2 acres for the drill pad), about six (6) acres total each year would be disturbed throughout the National Forests in Alabama for oil and gas development. About 67% of this surface disturbance will be reclaimed within a month, and in about every other year when all the wells drilled are dry holes or non-producers, all of the disturbed area would be reclaimed.

Specific impacts to air quality include fugitive dust from vehicle traffic on the access road and during construction of the drill pad. There will be tailpipe emissions from the vehicles transporting the rig and pipe to the site as well as from diesel motors for running the on site engines. In the few cases that natural gas may be encountered, some gas will be flared to the atmosphere in the production tests.

Water quality may be locally degraded by sedimentation resulting from air borne dust settling out on streams and lakes and from erosion of the access road and drill pad. A small fraction of the stockpiled topsoil from the site could be washed into the local drainage by storm runoff in the 7 to 30-day window that drilling is taking place.

Soil impacts include displacement and compaction. There will be an average of three acres per drill site (one acre of new road and two acres for the drill pad) of soil disturbance. The surface of the road and drill pad will be compacted by the use of vehicles and machinery. Since virtually all of the projected well drilling activity will occur on the Gulf Coastal Plain of the Conecuh Forest, there will be less chance for the creation of temporary highwalls than in the more hilly regions of the Talladega or Bankhead Forests. This will result in less chance of soil exposure and erosion. When reclaiming the access road and drill pad, it is standard procedure to use a ripper to relieve compaction prior to recontouring, spreading the topsoil over the disturbed area, and seeding with native species.

Vegetation occupying the areas to be disturbed for road and pad will be uprooted and destroyed. Any commercial timber will be sold ahead of road and pad building. Wildlife will be displaced from the immediate area of surface disturbance, and the noise, lights, and activity of men and machines could disturb wildlife in the surrounding environs. However, some species will be benefited by the creation of vegetative edge effects and early serial habitat creation. Aquatic animals could be impacted by airborne dust settling on the nearby streambeds and pond bottoms. Sediment washed down from the disturbed sites would also adversely impact aquatic life.

Species on the Threatened or Endangered List will not be adversely impacted by drilling activity. Habitat areas containing these plant and wildlife species are inventoried and special stipulation(s) will be included in the leases that are issued. Even if a new T&E species or the new location of an existing one is found subsequent to a lease being issued, the standard terms of an oil/gas lease require that a survey for T&E species be completed in any proposed drilling location. If any T&E species is found, accommodation for it, up to and including completely moving the drill site, must be done before surface activity can be permitted.

It is possible that oil/gas drilling will cause some adverse impact on recreational activities such as bird watching or hunting. These will, however, be short in duration and very localized in effect. There could also be an increase in habitat created for some game animals thus making the local population larger and the hunting experience more successful.

Based on the topography of the Forest, most visual impacts will be subtle and easily screened from most viewsheds. Some visual contrast will be added through small open spaces in areas that were at one time completely forested.

As with T&E species, cultural resource surveys must be done of all proposed access roads and drill pad locations to insure no heritage resources are disturbed or lost. Depending on the sensitivity of the cultural resource and its susceptibility to disturbance, the road/drill site location can be moved. In a few cases, the oil/gas operator may choose to pay for complete excavation and curation of the cultural site in order to keep the proposed drill location in its original place.

There will be a positive economic effect on the local economy in areas close to drill sites. The drilling operation will rely on local merchants for food, fuel, and supplies (see Cumulative Impacts).

Salable (Common Variety) Minerals – Common varieties of mineral materials include aggregate, landscaping rock, riprap, flagstone, and other earthen construction materials. Mineral materials are not federal leasable minerals. The Forest uses mineral materials for a variety of purposes such as roads, maintain trails, campgrounds; to control erosion and sedimentation; to restore riparian and aquatic habitat; and to repair flood damage. Most of the mineral materials used by the Forest Service are extracted from areas off-Forest. Congress gave the Forest Service authority to sell mineral materials to the public for both commercial and non-commercial purposes, similar to Forest Service sales of wood for commercial and non-commercial purposes. The Forest issues mineral material authorizations to the public, state, and county road departments.

No new mineral material sites are being proposed in the current planning period. However, if a new pit were to be developed, the environmental effects of establishing it would include scraping off and stockpiling the topsoil for later use in reclamation of the site. There will be some soil loss from wind and rain runoff. A localized decrease in air quality will result from dust released from the mining of the material as well as vehicle traffic to and from the pit. Vehicle emissions will also temporarily lower the local air quality. Wildlife and vegetation will be displaced from the pit site itself. Noise associated with operating equipment, vehicle, and people in and around the pit and access road could disturb some nearby fauna. Depending on the site-specific location, visual quality may be impaired. However, vegetative screening can usually mitigate this to a large degree. Prior to any surface disturbance of the site, the mandatory surveys for threatened and endangered species and cultural resources will have been done. If any of these resources are present and mitigating measures will not be adequate to protect them, then the site will not be developed.

4.3 Private Mineral Rights (Reserved and Outstanding Mineral Rights)

The authority for the administration of mineral reservations is 36 CFR 251.15 or previously issued Secretary of Agriculture's rules and regulations that govern the exercise of mineral rights reserved in conveyances to the United States. The appropriate rules and regulations in effect at the time of the mineral reservation were incorporated as part of the deed by which the United States acquired the surface. Forest Service direction for the administration of reserved and outstanding rights is found in Chapter 2830 of Forest Service Manual 2800.

The exercise of private-mineral rights produces both mineral exploration and mineral development in various areas of the Alabama National Forests. The purpose of this section is to discuss how the Forest Service manages mineral exploration and development on reserved and outstanding rights (ROR) under federal surface. In recent years, the Forest has been administering private plans of operations on federal surface for oil & gas activities

An important difference in the administration of ROR is that the development of private minerals is a right of the mineral owner. Reserved mineral rights are subject to State laws and Secretary's Rules and Regulations, which were made part of the severance deed when the land was purchased by the United States. The 1911, 1938, and 1939 versions of the Secretary's Rules and Regulations did not require the operator to obtain a permit from the Forest Service. Later versions (1937, 1947, 1950 and 1963) did require a permit. In reserved mineral cases under SR&R 1937, 1947, 1950, and 1963, the operator must submit an operating plan. If the operating plan is acceptable, the Forest Supervisor will issue a "Reserved Minerals Permit". If the operating plan is not acceptable, the Forest Service shall meet with the mineral owner or lessee to negotiate modifications needed to make the plan acceptable. For outstanding minerals, the mineral owner or lessee provides the Forest Service a proposed operating plan. The Forest Service reviews the plan and negotiates the operating conditions for mitigation of surface disturbance with the operator, and has no recourse to disallow the project, except through acquisition of the mineral estate. The Forest will document their approval with a "Letter of Concurrence" (FSM 2832.1), for outstanding mineral rights and for reserved mineral rights under SR&R 1911, 1938, and 1939.

The following discusses two interrelated potential effects relating to outstanding and reserved mineral rights on the Alabama National Forests: 1) The potential effects of the Revised Forest Plan Alternatives on the exercise of private mineral rights on NFS lands, and 2) The potential effects of private mineral rights operations on NFS lands.

The exercise of private mineral rights to explore and develop privately owned minerals on NFS lands is a private decision, not a federal decision. There are 90,414 acres on the Alabama National Forests that were acquired subject to these private mineral rights. All Forest Plan Alternatives are subject to these existing private rights (outstanding and reserved mineral rights). The U.S. is bound by the terms of the mineral reservation. The development and operation of the reserved mineral rights is subject to the terms of the deed to the U.S., mineral reservation conditions (the Secretary's Rules and Regulations attached to the deed to the U.S.), and state law. For outstanding mineral rights, the U.S. is bound by the terms of the prior legal transaction, which separated the mineral and surface ownerships, and the development and operation of outstanding mineral rights is subject to state rules and regulations and case law.

A Comptroller General Report to Congress (GAO/RCED-84-101; July 26, 1984) found that the Forest Service in the eastern U.S. failed to provide Congress with information about private mineral rights and their potential effect on wilderness management. The GAO recommendation to the Secretary of Agriculture was: "Because the Forest Service did not analyze the potential problems or costs associated with private mineral rights when it developed its 1979 wilderness recommendations, GAO recommends that the Secretary direct the Forest Service's southern and eastern regional offices to do this type of analysis when reevaluating its wilderness recommendations. This analysis should include for each area consideration of private mineral development potential, the government's ability to control mineral development if it occurs, the need to acquire private mineral rights, and a range of acquisition costs."

These problems (management conflicts, litigation, and high costs) apply not only to Wilderness, but to: 1) any highly restrictive designation that conflicts with exercise of private mineral rights on National Forest System lands, and 2) management prescriptions that impose severe restrictions on use of the surface or prohibit certain activities such as road construction or mining. Examples include Special Biological Areas, Wild & Scenic River designations, Wilderness Study Areas, or backcountry recreation areas.

The fifth Amendment to the U.S. Constitution provides that private property shall not be taken for public use without just compensation. In addition to designation or prescriptions that prohibit mineral development or are de facto prohibitions on mineral development, a "taking" can have other forms. For example, the time required to process private mineral activities under the Forest Plan's framework might result in unreasonable delays that amount to a "taking" of the mineral rights. Partial takings are also possible. Executive Order 12630 "Government Actions and Interference with Constitutionally Protected Property Rights" was sighed in 1988. E.O. 12630 requires federal decision-makers to 1) evaluate carefully the effect of their administrative actions on private property rights, and 2) to show due regard to these 5th amendment rights and to reduce the risk of undue or inadvertent burdens on the federal treasury. Concern about government "takings" of private property rights is a national issue.

Steps for processing private mineral rights are: 1) Receipt of Proposal; 2) Forest Service to identify course of action[1]; 3) negotiate for acceptable terms; and, 4)

[1] Forest Service course of action includes: 1) review of deed: reserved or outstanding, 2) verify operator right to conduct the operation, 3) complete plan of operation, 4) establish whether or not the

document via a Letter of Concurrence for outstanding and reserved mineral rights under Secretary's Rules and Regulations 1911, 1938, and 1939 and for reserved mineral rights under Secretary's Rules and Regulations 1937, 1947, 1950, and 1963, issuance of a Reserved Minerals Permit. Forest Service direction on Reserved and Outstanding Mineral Rights can be found in Forest Service Manual (FSM) 2800, Chapter 2830. For disturbances off private mineral estate, a Special Use Permit/Road Use permit would be required.

4.4 Determination of Effects

The determination of effects on the mineral resources of the Alabama National Forests is measured by availability of the lands for mineral leasing and development and the restrictions placed on development within each prescription area by alternative. There are 585,394 acres of federal minerals under Forest administration, of which the Wilderness Act and the Wild & Scenic Rivers Act statutorily withdrew 42,327 acres (or 7.23%), leaving 543,047 acres (or 92.77%) of minerals available for leasing.

Of the 543,047 acres of lands available for lease, there are three levels of restrictions on mineral development: 1) lands leased subject to standard lease terms; 2) lands leased subject to a Controlled Surface Use (CSU) stipulation; and 3) lands leased subject to a No Surface Occupancy (NSO) stipulation. The following table lists the acres and percentage of lands available subject to each level of restriction, under each plan alternative:

Table 3A-16: (Acres Subject to Restriction/% of Lands Available based on 543,047 acres)

Alternative	Leasing with Standard Lease Terms (Acres/% Lands Avail.)	Leasing with CSU Stipulation (Acres/% of Lands Avail.)	Leasing with NSO Stipulation (Acres/% of Lands Avail.)
A	368,196 / 67.80	163,401 / 30.09	11,450 / 2.11
B	368,934 / 67.94	162,643 / 29.95	11,470 / 2.11
D	389,606 / 71.74	144,169 / 26.55	9,272 / 1.71
E	352,271 / 64.87	166,351 / 30.63	24,425 / 4.50
F	492,286 / 90.65	29,987 / 5.52	20,774 / 3.83
G	375,701 / 69.18	162,691 / 29.96	4,655 / 0.86
I	356,186 / 65.59	157,430 / 28.99	29,431 / 5.42

When considering the total acreage (665,731 acres) of the National Forests in Alabama, the following applies for each alternative evaluated in the EIS/Plan: 80,337 acres or 12.07% of the Forests are 100% private mineral rights, and 42,327 acres or

proposed activity requires approval of operations outside of the private mineral ownership area, 5) consult appropriate FSM, 6) if reserved minerals, examine the reservation for you "decision base", and 7) review any applicable Forest Plan direction.

6.36% of the Forests are acres designated as Wilderness and/or Wild & Scenic River, which are withdrawn from any type of mineral development.

The direct effect of each alternative would be to decrease the amount of minerals available for lease with standard stipulations from 73.95% under alternative F to a low of 52.91% with alternative E. By adopting the preferred alternative, the minerals available for lease with standard stipulations would decrease by 20.4% to 53.5%. The total acreage available for lease would remain virtually the same.

The acreage added to the restricted category will indirectly make mineral operations on the Forests more difficult and potentially more expensive for the lessee but it would allow for increased resource protection on the Forests. In addition, these restrictions could force companies off National Forest lands onto lands with reserved or outstanding mineral reservations where the Forest would have less control over surface disturbing activities.

4.5 Cumulative Effects

The only cumulative effects anticipated to result from mineral activity on the Alabama National Forests over the next ten years would be associated with oil and gas development. It is projected that there will be twelve (12) oil and gas wells drilled on the Forests, with two to three being commercially productive. The rest would be dry holes and the sites would be reclaimed. For each of the two to three producing well sites, the area needed for production would be less than was needed for the drilling phase. The size of the drill pad would decrease from two acres of disturbance down to about one acre with the unneeded portion being reclaimed. Thus, there would be a residual of two acres per new producing well (one acre for the access road and one acre containing the pump jack and ancillary tanks or pipelines) not reclaimed. The BLM's reasonably foreseeable development scenario puts the expected number of producing wells at two to three. At two acres per new producing well, that would mean that there would be four (4) to six (6) acres of new, unreclaimed area over the 10-year Plan period. The average surface disturbance over the term of the Forest Plan would approximately be one-half (.5) acre per year.

When looking at potential cumulative impacts to air quality, water quality (hydrology), aquatic habitat, wildlife, T&E species, soils, and visuals over the life of this plan, the impacts would be negligible. There are positive economic impacts resulting from oil and gas exploration and development activities. Lessees/operators usually contract locally for road and drill pad construction. They purchase food, fuel, lodging, and other supplies from local sources and may subcontract certain parts of the operation to local well servicing companies. Most of the salaries paid to workers are spent in the local area. The estimated dollars that an average drill rig generates per day is over $200 per worker. A typical well drilling operation will have an average of 10 to 20 workers. This translates into about $2,000 to $4,000/day spent in the local area. Since the average well in Alabama take 7 days to complete, $14,000 to $28,000 per well goes into the economy.

3.B Biological Elements

1.0 Major Habitat Groups

The closest measure of community types the Forest Service maintains is an inventory of forest types. This inventory has been cross-walked to the community types described in the *Guidance for Conserving and Restoring Old-Growth Forest Communities on National Forests in the Southern Region* (USDA 1997). In order to evaluate management effects to wildlife habitats, forest types and communities have been categorized into habitat groups. Habitat groups represent a niche or condition relevant to wildlife species. An analysis of trends among habitat groups allows the potential effects of management on wildlife to be assessed. The following tables display the composition of each of the National Forests in Alabama's management units.

Table 3B-1: Relationship of Community to Forest Type and Major Habitat Group and Composition by Management Area

Management Area 1 - Bankhead

Community	% of Forested Acres	Forest Types	% of community	Major Habitat Group
Dry and Dry-Mesic Oak-Pine Forest	49%	shortleaf/oak (12) yellow pine (25) loblolly pine (31) southern red oak/yellow pine (44) white oak/black oak/yellow pine (47) northern red oak/yellow pine (48)	<1 3 80 3 2 16	Oak and Oak Pine
Dry Mesic Oak Forest	26%	post oak/bear oak (51) chestnut oak (52) white oak/red oak/hickory (53) white oak (54), scarlet oak (59) chestnut oak/scarlet oak (60)	<1 <1 98 <1 <1	Oak and Oak Pine
Xeric Pine and Pine-Oak Forest and Woodland	11%	loblolly pine/hardwood (13) Virginia pine/oak (16) shortleaf pine (32) Virginia pine (33) chestnut oak/scarlet oak/yellow pine (45) bear oak/southern scrub oaks/yellow pine (49)	45 9 <1 33 10 1	Pine and Pine Oak
Mixed Mesophytic Forest	8%	white pine-upland hardwood (10) cove hardwoods-white pine-hemlock (41) upland hardwoods-white pines (42) yellow poplar (50) yellow poplar-white oak-Northern Red Oak (56) beech-magnolia (69) sycamore-pecan-American elm (75) black birch (83) American chestnut (95) brush species (99)	<1 15 <1 <1 82 <1 <1 <1 <1 <1	Mesic Deciduous
River Floodplain Hardwood Forest	2%	bottomland hardwood/yellow pine (46) sweet gum/yellow poplar (58) sweet gum/nuttall oak/willow oak (62)	86 12 2	Mesic Deciduous

Community	% of Forested Acres	Forest Types	% of community	Major Habitat Group
		sugarberry/American elm/green ash (63) laurel oak/willow oak (64) sweet bay/swamp tupelo/red maple (68)	<1 <1 <1	
Upland Longleaf Pine Forests and Woodland	1%	longleaf pine (21) longleaf pine/hardwood (26)	94 6	Upland Longleaf
Cedar Woodlands	1%	eastern red cedar/hardwood (11) eastern red cedar (35) oak/eastern red cedar (43)	66 11 23	Cedar Woodlands
Conifer Northern Hardwood Forest	1%	eastern white pine (3) hemlock/hardwoods (8) white pine/cove hardwood (9)	16 82 2	Eastern Hemlock Forests

Management Area 2 – Conecuh

Community	% of Forested Acres	Forest Types	% of community	Major Habitat Group
Upland Longleaf Pine Forests and Woodland	52%	longleaf pine (21) longleaf pine/hardwood (26)	98 2	Upland Longleaf
Wet Pine Forests, Woodlands, and Savannas	21%	slash pine (22) slash pine/hardwood (14)	93 7	Wet Pine Forests
River Floodplain Hardwood Forest	19%	bottomland hardwood/yellow pine (46) sweet gum/yellow poplar (58) sweet gum/nuttall oak/willow oak (62) laurel oak/willow oak (64) sweet bay/swamp tupelo/red maple (68) beech/magnolia (69) undrained flatwoods (98)	9 1 1 21 68 <1 <1	Mesic Deciduous
Dry and Dry-Mesic Oak-Pine Forest	4%	yellow pine (25) loblolly pine (31) sand pine (34) southern red oak/yellow pine (44) white oak/black oak/yellow pine (47)	51 25 1 19 4	Oak and Oak pine
Coastal Plain Upland Mesic Hardwood	2%	loblolly pine/hardwood (13) yellow poplar (50) post oak/black oak (51) white oak/red oak/hickory (53)	15 4 16 65	Mesic Deciduous
Dry and Xeric Oak	<1%	(57) Scrub oak	100	Oak and Oak Pine
Xeric Pine and Pine-Oak Forest and Woodland	<1%	(49) Bear oak/scrub oak/yellow pine	100	Pine and Pine Oak
Cypress Tupelo	<1%	bald cypress (24) bald cypress/water tupelo (67)	33 67	Cypress Tupelo Swamp

Management Area 3 – Oakmulgee Division

Community	% of Forested Acres	Forest Types	% of community	Major Habitat Group
Upland Longleaf Pine Forests and Woodland	40	longleaf pine (21) longleaf pine/hardwood (26)	97 3	Upland Longleaf
Dry and Dry-Mesic Oak-Pine Forest	34	shortleaf pine/oak (12) loblolly pine/hardwood (13) yellow pine (25) loblolly pine (31) shortleaf pine (32) sand pine (34) southern red oak/yellow pine (44) white oak/black oak/yellow pine (47) northern red oak/hickory/yellow pine (48)	3 18 <1 70 <1 <1 5 2 1	Oak and Oak Pine
Dry Mesic Oak Forest	10	post oak/bear oak (51) white oak/red oak/hickory (53)	<1 99	Oak and Oak Pine
River Floodplain Hardwood Forest	9	bottomland hardwood/yellow pine (46) sweet gum/yellow poplar (58) sweet gum/nuttall oak/willow oak (62) laurel oak/willow oak (64)	29 32 39 <1	Mesic Deciduous
Mixed Mesophytic	4	yellow poplar-white oak-northern red oak (56)	100	Mesic Deciduous
Cypress Tupelo	3	sweet bay/swamp tupelo/red maple (68) bald cypress/water tupelo (67)	98 2	Cypress Tupelo Swamp
Xeric Pine and Pine-Oak Forest and Woodland	<1	Virginia pine (33) Bear oak/scrub oak/yellow pine (49)	72 28	Pine and Pine Oak

Management Area 4 – Talladega Division

Community	% of Forested Acres	Forest Types	% of community	Major Habitat Group
Dry and Dry-Mesic Oak-Pine Forest	29%	shortleaf/oak (12) yellow pine (25) loblolly pine (31) shortleaf pine (32) southern red oak/yellow pine (44) white oak/black oak/yellow pine (47) northern red oak/yellow pine (48)	4 5 70 16 4 <1 <1	Oak and Oak Pine
Dry Mesic Oak Forest	29%	post oak/bear oak (51) chestnut oak (52) white oak/red oak/hickory (53) white oak (54), chestnut oak/scarlet oak (60).	<1 17 80 <1 2	Oak and Oak Pine
Mountain Longleaf Pine Forests and Woodland	20%	longleaf pine (21) longleaf pine/hardwood (26)	99 1	Mountain Longleaf
Xeric Pine and Pine-Oak Forest and Woodland	14%	loblolly pine/hardwood (13) Virginia pine/oak (16) Virginia pine (33) chestnut oak/scarlet oak/yellow pine (45) bear oak/southern scrub oaks/and yellow pine (49)	16 4 30 49 1	Pine and Pine Oak Forests
Mixed Mesophytic Forest	6%	yellow poplar (50) yellow poplar/white oak/northern red oak (56)	1 99	Mesic Deciduous
River Floodplain Hardwood Forest	2%	bottomland hardwood/yellow pine (46) sweet gum/yellow poplar (58) willow (74)	28 71 1	Mesic Deciduous

Management Area 5 – Tuskegee

Community	% of Forested Acres	Forest Types	% of community	Major Habitat Group
Dry and Dry-Mesic Oak-Pine Forest	36%	loblolly pine/hardwood (13) loblolly pine (31) shortleaf pine (32) southern red oak/yellow pine (44) bear oak/southern scrub oaks/yellow pine (49)	8 90 <1 1 1	Oak and Oak Pine
River Floodplain Hardwood Forest	34%	bottomland hardwood/yellow pine (46) sweet gum/yellow poplar (58) Swamp chestnut oak/cherrybark oak (61) sweet gum/nuttall oak/willow oak (62) sugarberry/American elm/green ash (63) sweet bay/swamp tupelo/red maple (68)	24 33 1 41 <1 1	Mesic Deciduous
Upland Longleaf Pine Forests and Woodland	20%	longleaf pine (21)	100	Upland Longleaf
Wet Pine Forest, Woodlands, and Savannas	9%	slash pine (22)	100	Wet Pine Forests
Coastal Plain Upland Mesic Hardwood	1%	white oak/red oak/hickory (53)	100	Mesic Deciduous

1.1 Mesic Deciduous Forest Habitats

1.1.1 Affected Environment

Mesic deciduous forest habitats are dominated by trees that drop their leaves in the winter. They occur in slightly more moist soils than surrounding features. The mesic deciduous forest community types covered in this section include: *Mixed Mesophytic, River Floodplain Hardwood*, and *Coastal Plain Upland Mesic Hardwood* forests. As the name implies, *River Floodplain Hardwood* Forest community types are associated with floodplain, or riparian areas. *Coastal Plain Upland Mesic* Forest community types and *Mixed Mesophytic* Forest community types are not necessarily related to riparian areas, and may be found in upland areas. All of these community types will vary in species composition across the five National Forests in Alabama due to their occurrence in different geographical areas of the state. Refer to Table B-1 for complete composition information by management unit. Variation in elevations, soils, and climatic factors all play a role in the resultant assemblage of plants present. However, it is the moisture regime, which limits the role of natural disturbance (fire) in mesic deciduous forest habitats.

The National Forests in Alabama span the transitional areas from the Southern Appalachians proper, to the coastal plain, and this transition is reflected in the distribution of mesic deciduous forests on each management unit. The Bankhead National Forest lies in the Southern Cumberland Plateau. On Bankhead National Forest, mesic deciduous forest habitats comprise 10% of the forested area, with 8% in *Mixed Mesophytic* Forest community types and

2% in ***River Floodplain Hardwood*** Forest community types. The Talladega Division occurs on the southern edge of the Southern Ridge and Valley, with portions of its southern extent in the Piedmont physiographic region. On Talladega Division, mesic deciduous forest habitats comprise 8% of the forested area, with 6% in ***Mixed Mesophytic*** Forest community types and 2% in ***River Floodplain Hardwood*** Forest community types. The Oakmulgee Division and Tuskegee National Forest lie at the edge of the Fall Line that demarcates the Upper Coastal Plain. On Oakmulgee Division, mesic deciduous forest habitats comprise 13% of the forested area, with 9% in ***River Floodplain Hardwood Forest*** community types and 4% in ***Mixed Mesophytic*** Forest community types. On Tuskegee National Forest, mesic deciduous forest habitats comprise 35% of the forested area, with 34% in ***River Floodplain*** Forest community types and 1% in ***Coastal Plain Upland Mesic Hardwood*** Forest community types. Conecuh National Forest is in the Lower Coastal Plain physiographic region. On Conecuh National Forest, mesic deciduous forest habitats comprise 21% of the forested area, with 19% in ***River Floodplain Hardwood*** Forest community types and 2% in ***Coastal Plain Upland Mesic Hardwood*** Forest community types. From north to south on the National Forests in Alabama, the area of mesic deciduous forest habitats not associated with riparian or floodplain features, decreases from a high of 8% on the Bankhead National Forest, to a low of 1% - 2% on Tuskegee and Conecuh National Forests. Conversely, from north to south on the National Forests in Alabama, the area of mesic deciduous forest habitats associated with riparian and floodplain features, increases from a low of 2% on Bankhead National Forest and Talladega Division, to a high of 34% on Tuskegee National Forest. Mesic deciduous forest habitats are restricted to riparian areas in the Upper and Lower Coastal Plain physiographic regions (Oakmulgee Division, Tuskegee National Forest, and Conecuh National Forest management units). Therefore, the majority of these habitat types are expected to be protected by assignment and management under the Riparian (11) prescription under all alternatives except Alternative F and Alternative D.

In the Southern Cumberland Plateau and the Southern Ridge and Valley physiographic regions (Bankhead National Forest and Talladega Division management units, respectively), ***Mixed Mesophytic Forest*** community types typically thrive on north or north- east facing slopes and toe slopes. They may also be in association with small streams, narrow drains, well-drained floodplains and sheltered coves. The soils are fertile and well-drained, and sunlight reaching the forest floor is moderate to low. According to Martin et al. (1993), ***Mixed Mesophytic Forest*** communities are among the most biologically diverse-canopied forests in the temperate regions of the world and can consist of over 30 canopy species. The hardwood canopy may include yellow poplar (*Liriodendron tulipifera*), white oak (*Quercus alba*), northern red oak (*Quercus rubra*), sweet birch (*Betula lenta*), white ash *(Fraxinus Americana*), sugar maple (*Acer saccharum*), sweet gum (*Liquidambar styraciflua*), hemlock (*Tsuga canadensis*), and beech (*Fagus grandifolia*). Most mesic deciduous forest habitats on Bankhead and on Talladega Division are still associated with riparian corridors. The value of these habitats has been recognized and protected by the assignment of large portions of these communities to several protective prescriptions, including the Riparian (11), Botanical Area (4.D), Wilderness (1.A), and Canyon Corridor (4.L) prescriptions. Alternatives that maximize the proportion of mesic deciduous habitats assigned to these prescriptions are preferred.

River Floodplain Hardwood community types are common in active flood plains on large river systems and sandbars. Following disturbance, this community may form farther from the riverbank. This community type may also occur within narrow box canyons, V- shaped ravines, on colluvial deposits, and on narrow, confined terraces. Flooding is usually infrequent; however, they may be temporarily flooded in the spring (NatureServe 2002). Species composition of the canopy includes sycamore (*Platanus occidentalis*), cottonwood (*Populus deltoids*), river birch (*Betula nigra*), ironwood (*Carpinus americana*), bitternut hickory (*Carya cordiformis*), tulip popular (*Liriodendron tulipifera*), swamp chestnut oak (*Quercus michauxii*), swamp laurel oak (*Quercus laurifolia*), sweet gum (*Liquidambar styraciflua*), willow oak (*Quercus phellos*), and nuttall oak (*Quercus nutallii*). ***River Floodplain Hardwood*** community types make up most of the mesic deciduous habitats on the Conecuh, Oakmulgee, and Tuskegee management units. This reflects the character of the Coastal Plain physiographic units, where most of these acres are forested by bottomland hardwood/yellow pine forest types.

Coastal Plain Upland Mesic forest community types are found on the coastal plain's northern-most, elevated terrain, occurring on the slopes between drier uplands and more mesic lowlands. On the National Forests in Alabama, it only occurs in significant amounts on Conecuh and Tuskegee, where it is predominately the white oak/red oak/hickory (53) forest type. Small spring fed creeks may also be associated with this community type. Soils are moist and sunlight reaching the floor is low to moderate. Canopy vegetation includes white oak (*Quercus alba*), red oak (*Quercus rubra*), pignut hickory (*Carya glabra*), beech (*Fagus grandifolia*) southern magnolia (*Magnolia grandifolia*) and a loblolly pine (*Pinus taeda*) component may be present.

Current acreage of mesic deciduous forest habitats, ***Mixed Mesophytic Forest*** communities, ***River Floodplain Hardwood Forest*** communities, ***and Coastal Plain Upland Hardwood Forest*** communities for the National Forest in Alabama are shown in the following table.

Table 3B-2: Current (2002) acreage of Mesic Deciduous Forest Habitats, National Forests in Alabama.

	Bankhead	Conecuh	Oakmulgee	Tal. Div.	Tuskegee	Total
MIXED MESOPHYTIC	7,729	0	5,440	12,168	0	**25,337**
	6.4%		3.5%	6.1%		**4.5%**
River Floodplain	749	14,419	14,629	3,144	3,539	**36,480**
	0.6%	17.9%	9.5%	1.6%	33.9%	**6.5%**
COASTAL PLAIN UPLAND HARDWOOD	0	1,887	0	0	106	**1,993**
		2.4%			1.0%	**0.4%**
Total Unit	**8,478**	**16,306**	**20,069**	**15,312**	**3,645**	**63,810**
	7.0%	**20.3%**	**13.0%**	**7.7%**	**34.9%**	**11.3%**

% is total of forest acres on each unit

The abundance of mesic deciduous forest habitats in the future will be primarily dependent on the management of existing hardwood stands to maintain hardwood dominance. However, there are opportunities to increase the availability of mesic deciduous forests by restoring them to appropriate sites now occupied by pine plantations. Mesic deciduous forests currently comprise approximately 11% of the land base in the National Forests in Alabama.

On the National Forests in Alabama, the majority of the mesic deciduous forest habitats are currently in older age classes. There are approximately 64,000 acres of mesic deciduous forest in the National Forests in Alabama. Over 90% of these forest communities are in mid- to late successional stages. The current age class distribution of mesic deciduous forests are shown in Table 3B-3.

Table 3B-3: Current (2002) age class distribution of Mesic Deciduous Forest Habitats, National Forests in Alabama.

	Bankhead	Conecuh	Oakmulgee	Tal. Div.	Tuskegee	Total
MIXED MESOPHYTIC	7,729	0	5,440	12,168	0	25,337
EARLY (0-10 YEARS)	250	0	87	248	0	585
SAPLING/POLE (11-30 YEARS)	1,757	0	391	820	0	2,968
MID (31-80 YEARS)	529	0	2,572	2,549	0	5,650
LATE (81+ YEARS)	5,193	0	2,390	8,551	0	16,134
RIVER FLOODPLAIN	749	14,419	14,629	3,144	3,539	36,480
EARLY (0-10 YEARS)	0	174	32	43	148	397
SAPLING/POLE (11-30 YEARS)	0	366	1,190	459	492	2,507
MID (31-60 YEARS)	151	5,790	872	930	721	8,464
LATE (61+ YEARS)	598	8,089	12,535	1,712	2,178	25,112
COASTAL PLAIN UPLAND HARDWOOD	0	1,887	0	0	106	1,993
EARLY (0-10 YEARS)	0	0	0	0	0	0
SAPLING/POLE (11-30 YEARS)	0	104	0	0	0	104
MID (31-80 YEARS)	0	1,686	0	0	106	1,792
LATE (81+ YEARS)	0	97	0	0	0	97

A number of bird species, including the cerulean warbler (*Dendroica cerulea*) favor mature, mesic deciduous forest habitats with diverse and well-developed canopy structures that include canopy gaps and associated midstory and understory structural diversity (Ramey, 1996, Buehler and Nicholson, 1998, Rodewald and Smith, 1998, and Nutt, 1998). North Alabama is the southern end of the breeding distribution of cerulean warblers (Hamel, 1992). On the National Forests in Alabama, cerulean warblers are only known to breed in Bankhead National Forest. Other species of potential viability concern associated with canopy gaps and structurally diverse understories in mesic deciduous forests are identified in Appendix F. This structural diversity may be characteristic of the decadent, patchy conditions found in old growth forests, to which these species have presumably adapted. While a growing portion of the landscape in the Southern Appalachians consists of large hardwoods, most sites have very simple canopy structures (Runkle, 1985). This lack of structure is likely the result of previous even-aged timber management, resulting in forest stands of approximately equal-aged trees with low mortality and few canopy gaps. Most of these mid- and late-successional forests have not yet begun to develop the canopy gaps characteristic of old growth forests. It may be many centuries before such structure develops through natural succession.

Intermediate treatments such as thinning can be used to improve forest structure in mesic deciduous forest habitats. Canopy gaps created by these treatments would stimulate the development of the desired midstory and understory structure. Single-tree selection or small group selection (generally <0.75 acre group maximum size), implemented at relatively low intensities, achieves very similar desired conditions.

The hooded warbler (*Wilsonia citrina*) is selected as a Management Indicator Species (MIS) for mid- to late-successional mesic deciduous forest habitats on Bankhead National Forest and

Talladega Division management units. The hooded warbler is more common and widely distributed than the cerulean warbler. Like the cerulean warbler, the hooded warbler is heavily associated with bottomlands and moist deciduous forests with dense understories, where it breeds and feeds (Hamel 1992, Crawford et al. 1981). Since management opportunities exist to increase the structural diversity of closed-canopied stands to favor species, such as the hooded warbler, that optimize their life history in forests with canopy gaps and patches of dense understory. This species is deemed appropriate for helping to indicate the efficacy of management intended to favor its habitat.

Mesic deciduous habitats are largely limited to riparian-associated communities in the Piedmont and Upper and Lower Coastal Plain physiographic units, therefore no additional MIS is chosen for Mesic Deciduous habitats on Oakmulgee Division, Tuskegee National Forest, or Conecuh National Forest management units. Instead, these units will rely on MIS chosen to indicate the effects of management in riparian habitats on all National Forests in Alabama management units.

The Acadian flycatcher (*Empidonax virescens*) is deemed the most appropriate species to indicate management-induced changes to mature riparian forests. It is highly associated with mature deciduous forests along streams and bottomland hardwoods, which it uses for feeding and reproduction (Hamel 1992). It is also effectively monitored using proven, consistent protocols. It is relatively common in these habitats, providing enough data for evaluation. This species is selected to help indicate the effects of management activities on mature riparian habitats. Most mesic deciduous habitats are related to riparian areas. Acadian flycatchers are widely distributed throughout Alabama, and this MIS can be utilized on all National Forests in Alabama management units.

The importance of distinguishing MIS for early seral riparian habitats is most apparent in Piedmont and Coastal Plain forests. The Swainson's warbler (*Limnothlypis swainsonii*) is most appropriate to represent early-successional riparian habitats. It is strongly associated with canebrakes, tangles, and thick shrubby understories of open bottomland hardwoods and mixed forests (Hamel 1992). In some situations, it may be uncommon, making trend analysis difficult. Its populations would primarily be evaluated based on presence or absence in targeted habitat types. This species is selected to help indicate the effects of management activities designed to favor wildlife communities that rely on early-successional riparian areas.

1.1.2 Direct and Indirect Effects

The amount of regeneration treatments will affect the future quantity and distribution of mid- and late-successional mesic deciduous forest habitats. The future age class distribution of mesic deciduous forest habitats would vary among alternatives due to the differences in management intensity and emphasis.

Table 3B-4: Mesic Deciduous Forest Habitat age class distributions: +10 years, National Forests in Alabama.

	Successional Stages:	Early	Sap/Pole	Mid	Late
A	Bankhead	3%	18%	10%	69%
	Conecuh	1%	3%	44%	52%
	Oakmulgee	----	8%	17%	75%
	Talladega Division	2%	8%	20%	69%
	Tuskegee	4%	13%	23%	60%
	NFs in Alabama	**2%**	**9%**	**24%**	**65%**
B	Bankhead	2%	18%	7%	72%
	Conecuh	1%	3%	44%	52%
	Oakmulgee	1%	8%	17%	75%
	Talladega Division	2%	8%	21%	69%
	Tuskegee	4%	13%	23%	60%
	NFs in Alabama	**1%**	**9%**	**24%**	**66%**
D	Bankhead	2%	18%	7%	73%
	Conecuh	1%	3%	44%	52%
	Oakmulgee	1%	8%	17%	75%
	Talladega Division	2%	8%	23%	67%
	Tuskegee	6%	13%	21%	60%
	NFs in Alabama	**1%**	**8%**	**24%**	**66%**
E	Bankhead	2%	18%	7%	72%
	Conecuh	1%	3%	44%	52%
	Oakmulgee	----	8%	17%	75%
	Talladega Division	2%	8%	23%	67%
	Tuskegee	4%	13%	23%	60%
	NFs in Alabama	**1%**	**8%**	**24%**	**65%**
F	Bankhead	2%	18%	7%	72%
	Conecuh	1%	3%	44%	52%
	Oakmulgee	1%	8%	17%	75%
	Talladega Division	2%	8%	23%	67%
	Tuskegee	6%	13%	21%	60%
	NFs in Alabama	**2%**	**8%**	**24%**	**66%**
G	Bankhead	2%	18%	8%	72%
	Conecuh	1%	3%	44%	52%
	Oakmulgee	----	8%	17%	75%
	Talladega Division	6%	8%	10%	65%
	Tuskegee	----	13%	23%	60%
	NFs in Alabama	**2%**	**8%**	**24%**	**65%**
I	Bankhead	3%	21%	8%	69%
	Conecuh	5%	3%	46%	46%
	Oakmulgee	1%	8%	17%	75%
	Talladega Division	2%	8%	23%	67%
	Tuskegee	8%	13%	23%	56%
	NFs in Alabama	**3%**	**9%**	**25%**	**64%**

In the short term, or 10 years after implementation of the revised plan, none of the alternatives results in significant changes to the age structure of mesic deciduous forest habitats. Ten years is not a long enough analysis period to result in significant age-class distribution changes due to aging of existing stands.

Table 3B-5: Mesic Deciduous Forest Habitat age class distributions: +50 years, National Forests in Alabama.

	Successional Stages:	Early	Sap/Pole	Mid	Late
A	Bankhead	1%	31%	21%	47%
	Conecuh	----	18%	5%	76%
	Oakmulgee	3%	1%	2%	94%
	Talladega Division	----	22%	7%	70%
	Tuskegee	----	----	4%	96%
	NFs in Alabama	**1%**	**15%**	**8%**	**76%**
B	Bankhead	----	----	20%	80%
	Conecuh	----	1%	9%	90%
	Oakmulgee	1%	1%	3%	95%
	Talladega Division	18%	19%	7%	56%
	Tuskegee	5%	16%	18%	62%
	NFs in Alabama	**5%**	**6%**	**9%**	**80%**
D	Bankhead	----	38%	20%	41%
	Conecuh	----	18%	16%	65%
	Oakmulgee	3%	9%	34%	54%
	Talladega Division	----	15%	48%	37%
	Tuskegee	6%	6%	34%	55%
	NFs in Alabama	**1%**	**17%**	**30%**	**51%**
E	Bankhead	----	8%	20%	63%
	Conecuh	3%	6%	12%	80%
	Oakmulgee	1%	6%	6%	87%
	Talladega Division	18%	21%	8%	53%
	Tuskegee	----	----	4%	96%
	NFs in Alabama	**6%**	**9%**	**10%**	**74%**
F	Bankhead	----	43%	20%	37%
	Conecuh	----	18%	18%	64%
	Oakmulgee	----	43%	3%	54%
	Talladega Division	----	36%	7%	56%
	Tuskegee	----	46%	8%	46%
	NFs in Alabama	**----**	**35%**	**11%**	**54%**
G	Bankhead	----	2%	21%	77%
	Conecuh	----	1%	13%	85%
	Oakmulgee	----	----	11%	89%
	Talladega Division	18%	14%	11%	56%
	Tuskegee	----	----	4%	96%
	NFs in Alabama	**4%**	**4%**	**13%**	**79%**
I	Bankhead	----	8%	24%	68%
	Conecuh	----	7%	12%	81%
	Oakmulgee	3%	5%	3%	91%
	Talladega Division	3%	18%	7%	71%
	Tuskegee	2%	7%	13%	78%
	NFs in Alabama	**2%**	**9%**	**10%**	**79%**

With the exception of mesic oak forests, the forest types included here may not be benefited by presence of intense and frequent fire and many associated species are fire intolerant. Forest-wide objectives and standards have been established to minimize the acreage of these forests prescribed burned and reduce the impacts of prescribed fire in these communities when included as part of landscape-level burn units. The tendency of these forest types to retain moisture naturally reduces fire effects in these stands, even when they are included in burn areas.

The ability to manage existing mid- and late-successional mesic deciduous forest habitats to create desired structural habitat conditions would vary among alternatives due to the differences in management intensity and emphasis. Canopy gap treatments that enhance structural diversity in mature mesic hardwoods would benefit species such as cerulean warbler and hooded warbler as well as numerous other species associated with these habitat conditions. The cerulean warbler responds to changes in canopy structure resulting from canopy gaps. In the short-term, alternatives that provide for more creation of structural diversity in close-canopied mesic deciduous forests are expected to support larger populations of this species than alternatives that provide less of this condition; however, breeding densities are expected to remain low under all alternatives due to the position of the forest within its range (Hamel 1992:275). In the long term, alternatives that provide the highest levels of late-successional mesic deciduous forests are most likely to support the largest populations of this species. Additional standards have been included under all alternatives to protect habitat occupied by cerulean warblers. These include measures that both protect the structure of occupied habitat from modification and protect birds from disturbance during breeding. Inventory and monitoring of this species would be used to document occurrences and population response to effects of management on canopy structure in nearby habitat.

Hooded warblers are more common than cerulean warblers, more widely distributed on the National Forests in Alabama, and respond similarly to the under story growth that results from canopy gap creation. Its highest population densities are expected in these situations. Average breeding densities reported by Hamel (1992:C-8) are 16.0 pairs per 100 acres. Populations are expected to be highest under alternatives that provide for more creation of canopy gaps and older decadent forests.

The relatively stable number of acres of mesic deciduous forest habitats produced 50 years after revised plan implementation across all Alternatives reflects the allocation of a significant proportion of those acres to low management emphasis prescriptions such as the Riparian Prescription and the Canyon Corridor Prescription. Mesic deciduous forest habitats will exist at stable levels on the National Forests in Alabama regardless of management alternative.

Table 3B-6: Projected acreage of Mesic Deciduous Forest Habitats by alternative, National Forests in Alabama.

	A	B	D	E	F	G	I
MIXED MESOPHYTIC							
CURRENT (2002)	25.3	25.3	25.3	25.3	25.3	25.3	25.3
+10 YEARS	27.0	27.1	27.4	26.8	27.4	27.0	25.3
+50 YEARS	27.0	27.1	27.4	26.8	27.4	27.0	25.3
RIVER FLOODPLAIN							
CURRENT (2002)	36.5	36.5	36.5	36.5	36.5	36.5	36.5
+10 YEARS	40.4	37.6	37.7	37.4	37.7	37.6	36.5
+50 YEARS	40.4	37.6	37.7	37.4	37.7	37.6	36.5
COASTAL PLAIN UPLAND HARDWOOD							
CURRENT (2002)	2.0	2.0	2.0	2.0	2.0	2.0	2.0
+10 YEARS	2.2	2.1	2.2	2.2	2.2	2.3	2.0
+50 YEARS	2.2	2.1	2.2	2.1	2.2	2.3	2.0
TOTAL MESIC DECIDUOUS FOREST							
CURRENT (2002)	63.8	63.8	63.8	63.8	63.8	63.8	63.8
+10 YEARS	69.6	66.8	67.3	66.4	67.3	66.9	63.8
+50 YEARS	69.6	66.8	67.3	66.3	67.3	66.9	63.8

* ACREAGE REPRESENTED IN THOUSANDS OF ACRES

In the case of Mesic Deciduous habitats, the quantitative comparison of the alternatives may yield no readily apparent "better" alternative. A qualitative comparison of the alternative's emphases may reveal a preferable course for Mesic Deciduous Forest habitats. Alternative A emphasizes the production of goods and services, and includes the provision of sustained yield timber management. Alternative B is biologically driven; and emphasizes restoring natural resources and natural processes, and creating and maintaining wildlife habitats. The emphasis of Alternative D would be to reach and maintain a balanced age class. Alternative E emphasizes the provision of recreational opportunities. Alternative F is the "No Action" alternative, which in this case means current management direction put forth in the existing amended plan would be followed. Alternative G would emphasize linking together, through land allocations, movement corridors and large undisturbed areas, T&E species, species reintroduction, and watershed restoration. Alternative I combines the emphases of Alternative E (recreation) and Alternative B (wildlife habitats). All of the Alternatives include the Riparian Corridor Prescription, except for Alternative F and Alternative D. These two alternatives include only the existing streamside management zone application outlined in the existing Forest Plan.

Table 3B-7: Expected population trends[1] of MIS for Mesic Deciduous Forest Habitats by alternative, National Forests in Alabama. Population trends are based on expected trends in habitat quantity and quality.

	A	B	D	E	F	G	I
HOODED WARBLER							
+10 YEARS	=	+	+	+	+	=	+
+50 YEARS	--	=	--	-	--	=	=
ACADIAN FLYCATCHER							
+10 YEARS	=	=	=	=	=	=	=
+50 YEARS	-	=	-	-	--	+	=
SWAINSON'S WARBLER							
+10 YEARS	-	=	+	-	+	--	++
+50 YEARS	+	-	+	+	--	--	+

1 Population trend expressed as change from current levels: "++" = relatively large increase, "+" = increase, "=" = little to no change, "-" = decrease, "—" relatively large decrease.

Management indicator species may provide additional discerning information for evaluating the relative effects of management alternatives. MIS population trends are expected to be directly proportional to trends in habitat quantity and quality. The hooded warbler is an MIS for mid- and late successional Mesic Deciduous habitats on Bankhead National Forest and Talladega Division management units. The expected population trends for MIS of Mesic Deciduous habitats after 10, and 50 years of revised forest plan implementation are shown in Table B-7. Alternatives B and I, followed by Alternative G, project the most beneficial population trends for hooded warblers. The Acadian flycatcher is an MIS for mid- and late-successional riparian habitats. All the community types making up Mesic Deciduous habitats are closely related to, and constitute a large portion of riparian habitats on the National Forests in Alabama. Alternative G, followed by Alternatives B and I, provide the most favorable projected population trends for Acadian flycatchers. Swainson's warbler is an MIS for early successional (0-10 years) riparian habitats. Because of their short duration, early-successional mesic deciduous forest habitats are the most limited habitat types. Swainson's warbler population trend projections are most favorable under Alternative I, followed by Alternative B.

1.1.3 Cumulative Effects

The cumulative effect on the quantity and distribution of mesic deciduous forest habitats are determined by considering trends in the status of these conditions through time and across private and public ownerships. Based on regional conditions reported in SAMAB (1996: 49) the National Forests in Alabama likely contain a relatively small proportion of known occurrences of this community type on a landscape scale. However, examples of the type on private lands are unlikely to receive the same level of protection, where it is expected that the cumulative effects of development, recreational use, timber harvest, and other activities on these private lands will result in a decrease of good examples of these community types across the landscape. Even though people increasingly use the National Forest for recreational or social needs, protection actions will have positive effects, thus making national forest examples increasingly valuable as bio-reserves and contributing to regional conservation.

1.2 Eastern Hemlock Forest Habitats

1.2.1 Affected Environment

Eastern hemlock forest habitats include forested types whose canopies are dominated or co-dominated by eastern hemlock (*Tsuga canadensis*). These include: Eastern White Pine (3), Hemlock/Hardwoods (8), and White Pine/Cove Hardwoods (9). These forest types are predominant components of the ***Conifer-Northern Hardwood*** community type described for the National Forests in Alabama in the regional old-growth guidance (USDA Forest Service 1997). This community type (and forest type and major habitat group) occurs only on the Bankhead National Forest management unit on the National Forests in Alabama. For the purposes of this analysis, forests with a significant component of eastern hemlock are classified as such, putting priority on the presence of hemlock as a key habitat component. Refer to Table 3B-1 for complete composition information for this community type on Bankhead National Forest.

Eastern hemlock forest habitats typically occur on acidic soils and often have a dense shrub layer composed of ericaceous species. They are usually associated with steep slopes and canyons directly adjacent to rivers and creeks. These habitats are typically low in herbaceous diversity, but may support rich bryophyte communities. Most of these acres are associated with riparian areas or canyon regions of Bankhead National Forest. Table 3B-8 displays the current acreage of hemlock forest habitats on the National Forests in Alabama.

The combination of a largely evergreen canopy and a dense midstory in naturally occurring hemlock forests provide for a variety of benefits, including shading and cooling of riparian systems, thermal cover for wildlife, and nesting and foraging habitat for several species of neotropical migrant birds which are dependent upon the layered canopy structure and understory thickets (Rhea and Watson 1994). There is some evidence that hemlock forests provide necessary habitat components for the long-term conservation of red crossbills (Dickson 2001). Eastern hemlock forests may also be important refugia for species typically adapted to higher elevations. Dickson (2000) states that red-breasted nuthatches, winter wrens, and golden-crowned kinglets are found in late successional hemlock forests down to elevations of 2,000 feet, and several species of rare bryophytes that are known to occur primarily within the spruce/fir zone are also found at lower elevations in humid gorges often under a canopy that includes eastern hemlock (Hicks 1992).

Table 3B-8: Current (2002) acreage of Hemlock Forest Habitats, National Forests in Alabama.

	Bankhead	Conecuh	Oakmulgee	Tal. Div.	Tuskegee	Total
CONIFER, NORTHERN HARDWOOD	730	0	0	0	0	730
	0.6%					0.1%

% is total of forest acres on each unit

Eastern hemlock occurs on less than 1% of the National Forests in Alabama land base, and only on the Bankhead management unit. The current amount and distribution of mature eastern hemlock forests is threatened by the recent emergence of the hemlock wooly adelgid in the southern Appalachians. First identified in the eastern United States near Richmond, VA in 1924, this exotic pest has recently spread into the southern Appalachians and threatens to spread throughout the range causing mortality within five years after initial infestation (SAMAB

1996). However, as of 2002, no hemlock wooly adelgid has been identified on the National Forests in Alabama.

Eastern white pine, described in the SAA as co-dominate with hemlock, exists mainly on the Bankhead National Forest as off-site plantations. These off-site white pine plantations will not be perpetuated. The stands were recently affected by a southern pine beetle epidemic. The sites will be restored to native communities.

On the Bankhead National Forest, eastern hemlock forest habitats are found primarily in association with north facing coves and slopes, canyons and riparian systems where moist soil conditions are prolonged by slope and aspect effects. Under a restored fire regime, this distribution will likely persist.

Table 3B-9: Current (2002) age class distribution of Hemlock Forest Habitats, National Forests in Alabama.

	Bankhead	Conecuh	Oakmulgee	Tal. Div.	Tuskegee	Total
CONIFER, NORTHERN HARDWOOD	730	0	0	0	0	730
EARLY (0-10 YEARS)	0	0	0	0	0	0
SAPLING/POLE (11-30 YEARS)	0	0	0	0	0	0
MID (31-80 YEARS)	203	0	0	0	0	203
LATE (81+ YEARS)	527	0	0	0	0	527

Native communities of this type are primarily located along streams and stream terraces. Management direction is to protect these forests; little active management is planned. These forest types only exist on the Bankhead National Forest in the National Forests in Alabama, where it makes up only 1% of the forest's area. On the Bankhead National Forest, these forest types are associated with canyons and ravines that are usually in the Canyon Corridor prescription. The prescription was created to emphasize protection of these areas from management activities. Therefore, no MIS is selected for this community.

1.2.2 Direct and Indirect Effects

Eastern hemlock forest habitats are naturally limited in distribution, occurring primarily in association with north facing coves and slopes and riparian systems. Under all alternatives forest-wide standards are included that defer existing hemlock forest habitats from regeneration cutting during this plan period. In general, the use of prescribed fire in these communities will be consistent with the vegetation management, which is low. Prescribed burning in hemlock forests will only occur as part of a larger prescribed burn and will only be allowed to back through the hemlock sites. Fire intensity will be reduced in these areas by the more mesic conditions. No fire lines will be constructed in these areas.

Table 3B-10: Eastern Hemlock Forest Habitat age class distributions: +10 years, National Forests in Alabama.

	Successional Stages:	Early	Sap/Pole	Mid	Late
A	Bankhead	----	----	22%	78%
	NF's in Alabama	----	----	22%	78%
B	Bankhead	----	----	22%	78%
	NF's in Alabama	----	----	22%	78%
D	Bankhead	----	----	22%	78%
	NF's in Alabama	----	----	22%	78%
E	Bankhead	----	----	22%	77%
	NF's in Alabama	----	----	22%	77%
F	Bankhead	----	----	22%	78%
	NF's in Alabama	----	----	22%	78%
G	Bankhead	----	----	22%	78%
	NF's in Alabama	----	----	22%	78%
I	Bankhead	----	----	22%	78%
	NF's in Alabama	----	----	22%	78%

These provisions are included under all alternatives in an effort to maintain mature hemlock forests in the face of threats to this type from the hemlock wooly adelgid. Resultant of these provisions, no changes to the distribution and abundance of eastern hemlock forest are anticipated as a direct or indirect effect of national forest management. However, long-term effects from the hemlock wooly adelgid may be large (see cumulative effects).

Table 3B-11: Eastern Hemlock Forest Habitat age class distributions: +50 years, National Forests in Alabama.

	Successional Stages:	Early	Sap/Pole	Mid	Late
A	Bankhead	----	----	----	100%
	NF's in Alabama	----	----	----	100%
B	Bankhead	----	----	----	100%
	NF's in Alabama	----	----	----	100%
D	Bankhead	----	----	----	100%
	NF's in Alabama	----	----	----	100%
E	Bankhead	----	----	----	100%
	NF's in Alabama	----	----	----	100%
F	Bankhead	----	----	----	100%
	NF's in Alabama	----	----	----	100%
G	Bankhead	----	----	----	100%
	NF's in Alabama	----	----	----	100%
I	Bankhead	----	----	----	100%
	NF's in Alabama	----	----	----	100%

Because hemlock forest habitats would not be subject to regeneration cutting this planning period, they would move into older age classes with Plan implementation, thus increasing the proportion of mature forests of this type under all alternatives. Activities within hemlock stands would be limited under all alternatives and would promote mature forests with the desired multi-layered canopy condition that is needed by many species of wildlife.

Table 3B-12: Projected acreage of Hemlock Forest Habitats by alternative, National Forests in Alabama.

	A	B	D	E	F	G	I
CONIFER, NORTHERN HARDWOOD							
CURRENT (2002)	.8	.8	.8	.8	.8	.8	.8
+10 YEARS	1.2	1.2	1.2	1.2	1.2	1.2	1.2
+50 YEARS	1.2	1.2	1.2	1.2	1.2	1.2	1.2

Acreage represented in thousands of acres

Hemlock forest habitats would be managed to optimize its natural distribution, abundance, and condition in all plan alternatives, potential effects through plan implementation to these vegetative communities should be positive. There are twenty-six species of plants and animals of viability concern associated with hemlock forest habitats. The positive direct and indirect effects to hemlock forest habitats should contribute to the viability of these associated species under all alternatives. Because provisions for maintenance of hemlock are similar across all alternatives, the magnitude of these positive effects would be similar for all alternatives.

1.2.3 Cumulative Effects

An increase in the acreage of hemlock forest habitats has been documented across both public and private ownerships in the Southern Appalachians proper, since the mid 1970's (SAMAB 1996). This is largely attributable to upland encroachment of hemlock into areas where it would not occur under a more rigorous fire regime. This trend has not been true in the National Forests in Alabama, where prescribed fire has remained a viable tool. The use of prescribed fire in the restoration of upland habitats will likely shrink some of these communities back to the drains in some cases, while not affecting others, creating a more natural distribution on the landscape over time. Despite Plan protection, the current amount and distribution of mature eastern hemlock forest habitats may be threatened by the recent emergence of the hemlock wooly adelgid in the Southern Appalachians.

The fact that this community type is naturally limited in distribution, coupled with the impending threats from the hemlock wooly adelgid which will impact the species regardless of land ownership, leaves the long-term maintenance of historical distribution and abundance of this community type in question. The fate of associated viability concern species will be dependent upon their ability to adapt to changing environmental conditions associated with the decline of hemlock from within these communities. Species that utilize hemlock forest habitats in addition to other vegetative community types will be more likely to persist than species that are obligates to hemlock forest habitats.

1.3 Oak and Oak-Pine Forest Habitats

1.3.1 Affected Environment

The oak and pine dominated communities covered under this section include *Dry Mesic Oak Forest*, *Dry and Xeric Oak*, and *Dry and Dry-Mesic Oak-Pine Forest* communities. This Major Habitat Group exhibits the widest variation in species composition and dominance across the physiographic regions in the National Forests in Alabama, and strict reference to Table 3B-1 is required to accurately interpret potential management effects. Oak and oak-pine habitats encompass some pine forest types, some oak forest types, and mixed forest types. They are found primarily in the transition zone between the Piedmont and more mountainous regions of Alabama. However, oak and oak-pine habitats occur throughout all of the National Forests in Alabama, in all major physiographic provinces.

Ninety-eight percent of the *Dry Mesic Oak Forest* community on the Bankhead National Forest is comprised of a single forest type, White Oak/Red Oak/ Hickory (53). It constitutes 26% of that management unit's acreage. That same forest type predominates the community composition on Oakmulgee Division, where it constitutes 10% of the management unit's acreage. Twenty-nine percent of the Talladega Division is covered by the Dry Mesic Oak Forest community. It, too, is dominated by the White Oak/ Red Oak/ Hickory (53) forest type, which constitutes 80% of the community on Talladega Division. American chestnut (*Castanea dentata*) occurred as a co-dominant species in upland sites in this habitat group over north Alabama until its demise in the early 1900's. The presence of specific oak and oak-pine forest types may vary as dictated by soils, moisture, topography, geography, and other factors.

The *Dry and Xeric Oak* community occurs only in the Coastal Plain of the Conecuh National Forest, on sandhills. There, it constitutes less than one percent of the acreage of that management unit, and it may contain a longleaf pine component. *Dry and Xeric Oak* communities on the Conecuh National Forest are characterized by scrubby oaks such as turkey, blackjack, bluejack, and sand post oak.

The *Dry and Dry-Mesic Oak-Pine Forest* community varies greatly between management units and physiographic regions. This community's nomenclature is also problematic. It causes confusion between the inclusive oak, pine, and mixed oak-pine habitats it seeks to describe, and mixed oak-pine forest types. Mixed oak-pine forest types have been defined in the Forest Service's Prescription Handbook, as "stands in which 51 to 69 percent of the crowns in the dominant and co-dominant positions are the relevant (oak or pine) species, with the specific type species (e.g. white oak or shortleaf pine) prevailing". In other words, the *Dry and Dry-Mesic Oak-Pine Forest* community may in some situations, be entirely comprised of pine, and pine-hardwood forest types, and management actions applied under these circumstances may appear to reduce the oak component, while restoring, or increasing native pine ecosystems, such as the Shortleaf Pine-Bluestem Ecosystem and the Longleaf Pine-Bluestem (or Wiregrass) Ecosystem. Again, strict reference to Table 3B-1 is necessary to correctly interpret the effects analysis for this habitat group.

On the Bankhead National Forest management unit, in the Southern Cumberland Plateau, the loblolly pine forest type comprises 80% of this community. Many of the acres in the loblolly pine forest type on the Bankhead National Forest, are potentially subject to ecosystem restoration in the Forest Plan Revision. Bankhead National Forest loblolly stands, most of which are previously established plantations, may be subject to restoration to oak/yellow pine, shortleaf/oak, shortleaf, or longleaf forest types, depending on their site characteristics. Restoration to shortleaf or longleaf forest types will shift acres from the Oak and Oak-Pine habitat group to the Pine and Pine-Oak habitat group (or the Upland Longleaf habitat group), while no real conversion from an oak forest type to a pine forest type has taken place. Special attention to the actual composition by forest type, shown in Table 3B-1, should be paid in order to accurately weigh the analysis. On the Conecuh National Forest management unit, in the Lower Coastal Plain, four percent of the area is in *Dry and Dry-Mesic Oak-Pine Forest* communities. Three pine forest types comprise 77% of this community here, and two oak/yellow pine forest types comprise the remainder of the ***Dry and Dry-Mesic Oak-Pine Forest*** community on the Conecuh National Forest. Yellow pine and loblolly forest types on the Conecuh National Forest are potentially subject to ecosystem restoration efforts to restore Upland Longleaf habitats. Again, under this management direction, while acres will move from the Oak and Oak-Pine habitat group to the Upland Longleaf habitat group, no actual conversion from oak forest types to pine forest types will have taken place. This same trend of loblolly pine forest type dominance of the *Dry and Dry-Mesic Oak-Pine Forest* community holds true for the Oakmulgee Division, Talladega Division, and Tuskegee National Forest management units as well. The same potential ecosystem restoration management direction applies to upland pine forest types on these management units as well. Ecosystem restoration efforts in these stands would result in a change in the dominant pine species present, and a resultant change in the habitat group to which the stand is assigned, but not a conversion from oak species to pine species dominance.

In some cases, upland oak-dominated forests are presently more common due to fire suppression and successional encroachment into pine and pine-oak forest stands. Periodic fires are important to the ecology and sustainability of oak-pine habitats as well as pine-oak and pine habitats. In fact, plant diversity in most *Dry and Dry-Mesic Oak-Pine Forest* communities is relatively low, particularly in the absence of fire when one or two layers of ericaceous species dominate the forest under-story. (White and Lloyd 1998)

Predominant pine species of oak and oak-pine habitats include shortleaf pine (*P. echinata*), Virginia pine (*P. virginiana*), and loblolly pine (*P. taeda*). As with oaks, pine species dominance is often dependent upon a variety of environmental and physical factors from elevation, exposure, and disturbance regimes. For example, Virginia pine is common along dry, rocky ridge tops of northern Alabama but reaches its southern range limit in the lower Piedmont.

Although the abundance of oak and oak-pine habitats in Alabama at the time of European settlement is not clear, a variety of natural and anthropogenic factors likely maintained these habitat groups at higher levels than present, before European settlement. The periodic occurrence of insect pathogens, ice storms, lightning fires, and the use of fire by Native Americans, in the presence of much fewer barriers than present, likely allowed these habitat groups to dominate Alabama landscapes. At present, fire suppression efforts over many decades have increased the abundance of fire-intolerant species such as red maple and sourwood, which have invaded these habitats.

In the southern United States, acres of oak-hickory and oak-pine forests have increased over the last 50 years. (USDA Forest Service 2001: 49). Oak and oak-pine habitats are common throughout the South, comprising over half of the timberland of the region as a whole (USDA Forest Service 2001: 91-92). Oak-hickory forests are the dominant forest type in the Southern Appalachian Ecoregion, and are codominant with loblolly-shortleaf pine forests in the Piedmont Ecoregion. Southern yellow pine forest types dominate the Coastal Plain Ecoregion, but oak and oak-pine forest types still comprise nearly 30 percent of the timberland in this Ecoregion.

The abundance of oak and oak-pine habitats in the future will be primarily dependent on the success and extent of Shortleaf Ecosystem and Longleaf Ecosystem Restoration efforts and on management of existing oak stands to maintain oak dominance. There are also opportunities to increase the availability of oak forests by restoring them to appropriate sites now occupied by pine plantations. The current acreage of oak and oak-pine habitats on the National Forests in Alabama is shown in the following table.

Table 3B-13: Current (2002) acreage of Oak and Oak-Pine Forest Habitats, National Forests in Alabama.

	Bankhead	Conecuh	Oakmulgee	Tal. Div.	Tuskegee	Total
DRY-MESIC OAK	29,403	0	15,743	56,812	0	**101,958**
	24.4%		10.2%	28.4%		**18.0%**
Dry & Dry-Mesic Oak-Pine	64,020	4,302	51,796	59,958	3,729	**183,805**
	53.1%	5.3%	33.6%	29.9%	35.7%	**32.4%**
DRY & XERIC OAK	0	131	0	0	0	**131**
		0.2%				**0.02%**
Total Unit	**93,423**	**4,433**	**67,539**	**116,770**	**3,729**	**285,894**
	77.5%	**5.5%**	**43.9%**	**58.3%**	**35.7%**	**50.5%**

% is total of forest acres on each unit

Across the southern United States, about 50% of the upland hardwood forests (predominantly oak-hickory) and 30% of the natural oak-pine forests are in mid- and late-successional stages (41+ year-of-age) (USDA Forest Service 2001: 69-70). However, only about 1% of the planted oak-pine forests are in mid- and late-successional stages. The current age class distribution of oak and oak-pine habitats on the National Forests in Alabama is shown in the following table.

Table 3B-14: Current (2002) age class distribution of Oak and Oak-Pine Forest Habitats, National Forests in Alabama.

	Bankhead	Conecuh	Oakmulgee	Tal. Div.	Tuskegee	Total
DRY MESIC-OAK	29,403	0	15,743	56,812	0	101,958
EARLY (0-10 YEARS)	1,484	0	82	1,103	0	**2,669**
SAPLING/POLE (11-30 YEARS)	3,991	0	1,628	2,266	0	**7,885**
MID (31-80 YEARS)	1,665	0	8,895	15,999	0	**26,559**
LATE (81+ YEARS)	22,263	0	5,138	37,444	0	**64,845**
DRY & DRY-MESIC OAK-PINE	**64,020**	**4,302**	**51,796**	**59,958**	**3,729**	**183,805**
EARLY (0-10 YEARS)	8,418	29	26	579	0	**9,052**
SAPLING/POLE (11-30 YEARS)	15,731	508	10,232	21,368	638	**48,477**
MID (31-60 YEARS)	14,930	1,616	11,739	15,585	1,517	**45,387**
LATE (61+ YEARS)	24,941	2,149	29,799	22,426	1,574	**80,889**
DRY & XERIC OAK	**0**	**131**	**0**	**0**	**0**	**131**
EARLY (0-10 YEARS)	0	0	0	0	0	**0**
SAPLING/POLE (11-30 YEARS)	0	131	0	0	0	**131**
MID (31-80 YEARS)	0	0	0	0	0	**0**
LATE (81+ YEARS)	0	0	0	0	0	**0**

The structural condition of these habitats is a key factor in the maintenance of these communities. Brose et al. (2001) describe an emerging hypothesis that periodic, low-intensity surface fires were crucial to the perpetuation of mixed oak forests for millennia. Research indicates that oak forests may not perpetuate themselves without some level of disturbance, especially on mesic sites (Loftis 1991). Open oak-pine forests in the southeastern United States are essentially non-existent today as a result of fire suppression efforts. Fire suppression has allowed many fire-intolerant species to encroach upon this forest type and increase in abundance.

Treatments such as shelterwood harvest combined with prescribed burning (Brose et al. 1999) or basal area reduction from below using herbicides (Loftis 1991) have been shown to create conditions that promote adequate oak regeneration. Oak dominance can be maintained by maintaining suitable tree densities and moderate fire return intervals. Treatments such as moderate thinning and prescribed burning also can be used to create the desired habitat conditions in closed canopy oak forests.

To represent the dry, upland oak habitats in this group, the scarlet tanager (*Piranga olivacea*) is selected as the MIS on Bankhead National Forest and Talladega Division management units. This species is most abundant in upland mature deciduous forest (Hamel 1992). Trends for this species will be evaluated along with trends in total acres, age-class distribution, and levels of restoration and maintenance activities in this habitat group to provide a more complete picture of effects of management on this community. On the remaining management units of the National Forests in Alabama (Oakmulgee Division, Tuskegee National Forest and Conecuh National Forest), hardwood forest types are largely confined to mesic sites by the effects of fire and natural disturbance patterns on the landscape. Oak and Oak-pine habitats on management units in the piedmont, and upper and lower coastal plain are dominated by pine and pine-hardwood forest types, as shown in Table 3B-1. No MIS is needed for upland oak communities in the upper and lower coastal plain management units.

Mid- and late-successional oak forests provide an important source of hard mast and dens. In Alabama, the most dependable acorn producers include water, willow, and laurel oaks (Alabama Wildlife Federation, 1998). Acorns are a critical fall and winter food for numerous wildlife species (Martin et al. 1951). The availability of acorns have been shown to strongly influence population dynamics of species such as squirrels (Nixon et al. 1975), white-tailed deer (Wentworth et al. 1992) and white-footed mice (Wolff 1996). Despite this relationship, these species populations are ineffective indicators of the quality or quantity of Oak and Oak-Pine habitats. Oak mast production varies greatly with weather conditions between years, and squirrel, deer and turkey populations vary greatly due the effects of hunting mortality and disease outbreaks, in addition to variation related to food availability. Although no mast dependent viability concern species occur on the National Forests in Alabama, the gopher tortoise and eastern indigo snake are associated with the dry and xeric oak habitat type located on the Conecuh National Forest. The recognized importance of oak mast production, despite the availability of a good indicator species, lead to the inclusion of a direct measure of acres of mature oak as a useful and direct indicator of trends in hard mast production capability. Acres of mature oak will be used to indicate effects to mast dependent species instead of an MIS.

1.3.2 Direct and Indirect Effects

The future abundance of oak and oak-pine habitats is primarily related to the maintenance of stand conditions that ensure oak or pine dominance, and the restoration of oak forest types, pine forest types, or mixed pine and oak forest types on appropriate sites currently occupied by off-site pine plantations or other encroaching hardwood species such as gum and maple. Conversion of current “Oak and Oak-Pine” habitats through longleaf and shortleaf pine restoration would appear to reduce the abundance and distribution of these habitats, however, due to the dominance of these communities by loblolly and yellow pine plantations, no conversion from oak habitats to pine habitats would be taking place.

Table 3B-15: Oak & Oak-Pine Forest Habitat age class distributions: +10 years, National Forests in Alabama.

	Successional Stages:	Early	Sap/Pole	Mid	Late
A	Bankhead	17%	21%	18%	44%
	Conecuh	1%	18%	45%	36%
	Oakmulgee	6%	18%	31%	45%
	Talladega Division	2%	20%	27%	51%
	Tuskegee	----	17%	41%	42%
	NF's in Alabama	**8%**	**20%**	**25%**	**46%**
B	Bankhead	11%	21%	18%	50%
	Conecuh	1%	18%	45%	35%
	Oakmulgee	3%	18%	31%	47%
	Talladega Division	3%	21%	28%	49%
	Tuskegee	1%	17%	41%	40%
	NF's in Alabama	**6%**	**20%**	**26%**	**48%**
D	Bankhead	22%	22%	18%	39%
	Conecuh	5%	19%	47%	29%
	Oakmulgee	22%	19%	34%	25%
	Talladega Division	2%	20%	27%	50%
	Tuskegee	27%	21%	51%	----
	NF's in Alabama	**13%**	**21%**	**26%**	**40%**
E	Bankhead	16%	22%	17%	45%
	Conecuh	1%	18%	45%	36%
	Oakmulgee	6%	18%	32%	43%
	Talladega Division	4%	21%	27%	49%
	Tuskegee	6%	18%	43%	33%
	NF's in Alabama	**8%**	**20%**	**26%**	**45%**
F	Bankhead	23%	22%	18%	37%
	Conecuh	3%	19%	46%	33%
	Oakmulgee	9%	19%	32%	40%
	Talladega Division	4%	21%	28%	47%
	Tuskegee	2%	58%	1%	39%
	NF's in Alabama	**12%**	**21%**	**25%**	**42%**
G	Bankhead	10%	21%	18%	52%
	Conecuh	1%	18%	45%	36%
	Oakmulgee	12%	19%	33%	37%
	Talladega Division	4%	20%	27%	48%
	Tuskegee	7%	18%	43%	32%
	NF's in Alabama	**8%**	**20%**	**26%**	**46%**
I	Bankhead	14%	22%	18%	46%
	Conecuh	1%	18%	45%	36%
	Oakmulgee	1%	18%	31%	51%
	Talladega Division	4%	21%	27%	49%
	Tuskegee	3%	18%	42%	38%

	Successional Stages:	Early	Sap/Pole	Mid	Late
	NF's in Alabama	6%	20%	26%	48%

In order to maintain and/or increase oak and oak-pine habitats on the National Forests in Alabama, management alternatives that result in moderate fire regimes, thinning of suppressed, diseased, and other stressed trees, and restoration cuts to favor forest types making up oak and oak-pine habitats on that management unit, are favorable. For these alternatives, oak and oak-pine habitats would continue to be abundant and well distributed across the National Forests in Alabama.

Table 3B-16: Oak & Oak-Pine Forest Habitat age class distributions: +50 years, National Forests in Alabama.

	Successional Stages:	Early	Sap/Pole	Mid	Late
A	Bankhead	----	----	----	100%
	Conecuh	10%	17%	37%	36%
	Oakmulgee	13%	23%	27%	38%
	Talladega Division	11%	6%	5%	78%
	Tuskegee	----	----	----	100%
	NF's in Alabama	11%	13%	21%	55%
B	Bankhead	8%	13%	23%	56%
	Conecuh	1%	----	42%	57%
	Oakmulgee	8%	17%	19%	56%
	Talladega Division	4%	9%	8%	79%
	Tuskegee	3%	----	----	61%
	NF's in Alabama	6%	12%	16%	66%
D	Bankhead	5%	13%	30%	49%
	Conecuh	3%	25%	52%	21%
	Oakmulgee	10%	27%	31%	32%
	Talladega Division	16%	21%	4%	59%
	Tuskegee	76%	12%	12%	----
	NF's in Alabama	12%	19%	19%	50%
E	Bankhead	10%	15%	32%	44%
	Conecuh	17%	----	36%	48%
	Oakmulgee	4%	18%	21%	58%
	Talladega Division	8%	9%	11%	72%
	Tuskegee	46%	----	----	53%
	NF's in Alabama	8%	14%	22%	58%
F	Bankhead	12%	14%	33%	41%
	Conecuh	----	10%	53%	37%
	Oakmulgee	12%	23%	45%	21%
	Talladega Division	9%	11%	5%	76%
	Tuskegee	45%	3%	3%	48%
	NF's in Alabama	11%	15%	23%	51%
G	Bankhead	5%	8%	21%	66%
	Conecuh	----	----	53%	47%
	Oakmulgee	11%	20%	25%	43%
	Talladega Division	7%	12%	8%	73%
	Tuskegee	46%	----	----	53%

	NF's in Alabama	7%	12%	17%	64%
I	Bankhead	13%	15%	24%	48%
	Conecuh	----	13%	9%	79%
	Oakmulgee	5%	7%	14%	74%
	Talladega Division	5%	12%	12%	70%
	Tuskegee	61%	----	----	39%
	NF's in Alabama	8%	12%	16%	64%

The future age class distribution of oak and oak-pine habitats will vary among alternatives due to the differences in management intensity and emphasis. Management alternatives that maintain or increase the acreage of mid and late successional oak, pine and mixed oak-pine forests would be most beneficial to species associated with this forest type. Acorn production is greatest in mid and late successional oak forests. As discussed above, the expected quantity of mid and late successional oak forests would vary among alternatives, as would the availability of oak mast.

Table 3B-17: Projected acreage of Oak and Oak-Pine Forest Habitats by alternative, National Forests in Alabama.

	A	B	D	E	F	G	I
DRY MESIC-OAK							
CURRENT (2002)	102.0	102.0	102.0	102.0	102.0	102.0	102.0
+10 YEARS	100.7	101.8	104.4	101.2	102.8	100.8	102.0
+50 YEARS	109.7	120.0	111.6	74.2	109.8	109.7	114.6
DRY & DRY-MESIC OAK-PINE							
CURRENT (2002)	183.8	183.8	183.8	183.8	183.8	183.8	183.8
+10 YEARS	177.8	178.3	171.1	172.2	173.5	173.9	177.0
+50 YEARS	134.3	126.6	124.3	125.8	131.6	127.0	117.1
DRY & XERIC OAK							
CURRENT (2002)	0.1	0.1	0.1	0.1	0.1	0.1	0.1
+10 YEARS	0.5	0.5	0.5	0.5	0.5	0.5	0.5
+50 YEARS	0.5	0.5	0.5	0.5	0.5	0.5	0.5
TOTAL OAK AND OAK-PINE FOREST							
CURRENT (2002)	285.9	285.9	285.9	285.9	285.9	285.9	285.9
+10 YEARS	279.0	280.6	276.0	273.9	276.8	275.2	279.5
+50 YEARS	244.5	247.1	236.4	200.5	241.9	237.2	232.2

* ACREAGE REPRESENTED IN THOUSANDS OF ACRES

In the case of Oak and Oak-Pine habitats, the preceding quantitative comparison of the alternatives would appear to project a reduction in oak and oak pine forest types under each of the alternatives. This would not be an accurate interpretation of Table 3B-17. Unfortunately, the major habitat type group name, "Oak and Oak-Pine", is easily confused with the nomenclature used in Forest Service CISC Forest Types. CISC Forest type nomenclature would interpret the habitat group name to mean, "oak forest types (meaning stands whose canopies are 70% dominated by oak tree species) and oak/pine forest types (meaning stands whose canopies are 51-69% dominated by oaks with the remainder of the trees being pine)." In actuality, the habitat group name "Oak and Oak-Pine" denotes oak forest types, pine forest types, and mixed pine and oak forest types that would ordinarily occupy uplands. The reduction in acres seen under all of the alternatives represents the restoration of off-site loblolly (31) and yellow pine (25) plantation to native shortleaf pine (32) forest types and native longleaf (21) forest types on suitable sites.

A qualitative comparison of the alternatives' emphases may reveal a preferable course for Oak and Oak-Pine Forest habitats. Alternative A emphasizes the production of goods and services, and includes the provision of sustained yield timber management. Alternative B is biologically driven and emphasizes restoring natural resources and natural processes, and creating and maintaining wildlife habitats. The emphasis of Alternative D would be to reach and maintain a balanced age class. Alternative E emphasizes the provision of recreational opportunities. Alternative F is the "No Action" alternative, which in this case means current management direction put forth in the existing amended plan would be followed. Alternative G would emphasize linking together, through land allocations, movement corridors and large undisturbed areas, T&E species, species reintroduction, and watershed restoration. Alternative I combines the emphases of Alternative E (recreation) and Alternative B (wildlife habitats). All of the Alternatives include the Riparian Corridor Prescription, except for Alternative F and Alternative D. These two alternatives include only the existing streamside management zone application outlined in the existing Forest Plan.

Table 3B-18: Expected population trends[1] of MIS for Oak and Oak-Pine Forest Habitats by alternative, National Forests in Alabama. Population trends are based on expected trends in habitat quantity and quality.

	A	B	D	E	F	G	I
SCARLET TANAGER							
+10 YEARS	-	=	--	-	--	=	-
+50 YEARS	+	+	-	+	+	+	+

1 Population trend expressed as change from current levels: "++" = relatively large increase, "+" = increase, "=" = little to no change, "-" = decrease, "—" relatively large decrease.

Management indicator species may provide additional information for evaluating the relative effects of management alternatives. MIS population trends are expected to be directly proportional to trends in habitat quantity and quality. The scarlet tanager is an MIS for mid- and late successional Oak and Oak-Pine habitats on Bankhead National Forest and Talladega Division management units. The expected population trends for MIS of Oak and Oak-Pine habitats after 10, and 50 years of revised forest plan implementation are shown in Table 3B-18. Examining 10- and 50-year trends in the dry, upland oak portion of Oak and Oak-Pine habitats on Bankhead and Talladega management units only, reveals Alternatives B and G to be the most beneficial population trends for scarlet tanagers.

1.3.3 Cumulative Effects

Oak and oak-pine habitats are common on the National Forests in Alabama as well as on adjacent forest industry-, non-industrial private-, and other public lands (Hartsell and Brown 2002). Management opportunities permitted in most alternatives would ensure continued oak and oak-pine habitat dominance on national forest lands. However, the majority of oak and oak-pine habitats are on non-industrial private lands. These lands are the least likely to receive active forest management, and are therefore subject to the loss of oak dominance and succession to shade tolerant hardwood species.

Insects and diseases such as gypsy moth and oak decline also are expected to have an overall negative effect on oak forests in the future (SAMAB 1996: 103-108, 114-117). The gypsy moth is expanding its range and may reach Alabama in the next couple of decades and many of the older oak forests already are experiencing oak decline. The greatest impact of oak decline will be immediately behind the advancing front of gypsy moth infestation due to repeated severe defoliations. As existing oak stands grow older, susceptibility to this disease also will increase. Although oaks will not be eliminated from affected areas, oak abundance and diversity will be reduced. On both national forest and private lands, the future of oak forests will largely depend on active management such as thinning and burning that encourage oak reproduction to offset the impacts of these insects and diseases. Further discussion of these threats is found under the Forest Health section.

1.4 Pine and Pine-Oak Forest Habitats

1.4.1 Affected Environment

Pine and Pine-Oak Forest habitats on the National Forests in Alabama are comprised of the *Xeric Pine and Pine-Oak Forest and Woodland* community, which includes certain pine and oak forest types, and mixed pine and oak forest types. On the Bankhead National Forest management unit, this community comprises 11% of the forest area and is composed of Virginia (33), Virginia pine/oak (16), shortleaf pine (32), loblolly pine/hardwood (13) and various oak/yellow pine (45, 49) mixed forest types. On the Conecuh National Forest management unit, this community comprises less than 1% of the forest area, and is completely dominated by the bear oak/scrub oak/yellow pine (49) forest type. On the Oakmulgee Division management unit, the *Xeric Pine and Pine-Oak Forest and Woodland* community contains both Virginia pine (33) and Bear Oak/Scrub Oak/Yellow Pine (49) forest types. However, shortleaf pine (32) is not included (rather, it is part of the Dry and Dry-Mesic Oak-Pine Forest on Oakmulgee, Talladega, and Tuskegee) in the *Xeric Pine and Pine-Oak Forest and Woodland* community. The community is less than 1% of the Oakmulgee Division management unit's area. On the Talladega Division management unit, 14 % of the unit's area is in *Xeric Pine and Pine-Oak Forest and Woodland* communities, which here include Virginia pine (33), Virginia pine/oak (16), loblolly pine/hardwood (13), chestnut oak/scarlet oak/yellow pine (45), and bear oak/scrub oak/yellow pine (49) forest types. The *Xeric Pine and Pine-Oak Forest and Woodland* community is not represented on the Tuskegee National Forest management unit. Pine and Pine-Oak habitats obviously also include other pine forest types, such as shortleaf and longleaf stands. However, due to differences in the effects of topography, slope, aspect, and soils, different forest types comprise the community type in various physiographic regions of the state. For the purposes of this analysis, the *Xeric Pine and Pine-Oak Forest and Woodland* community is defined as shown in Table 3B-1 by management unit.

These forests occur on a variety of landforms at a wide range of elevations. Historically, in all of Alabama's physiographic regions these communities occupied areas that were, and are, subject to natural disturbance through fire. They typically occurred on south-facing ridges and slopes, or in gentler terrain, on well-drained, sandy uplands.

Abundance

During the last 50 years across the southeastern United States, pine plantations have increased in importance, expanding from 1% of the total pine forest acres to 48% of those acres (USDA Forest Service 2002: 1). At the same time, the 20-year trend reported for the Southern Appalachian Assessment area (SAMAB 1996: 27) shows a downward trend of 16% for southern yellow pine forests. These two facts together suggest that natural yellow pine forests have declined significantly and represent an opportunity for large-scale restoration of this community type.

The current acreage of Pine and Pine-Oak Forest Habitats on the National Forests in Alabama is displayed in the following table.

Table 3B-19: Current (2002) acreage of Pine and Pine-Oak Forest Habitats, National Forests in Alabama.

	Bankhead	Conecuh	Oakmulgee	Tal. Div.	Tuskegee	Total
XERIC PINE & PINE-OAK	13,550	447	82	25,155	0	**39,234**
	11.2%	0.6%	0.1%	12.6%		**6.9%**

% is total of forest acres on each unit

The National Forests in Alabama have been experiencing a southern pine beetle epidemic since 1999 and currently more than 34,000 acres of southern yellow pine forests have been severely impacted. Many of the sites impacted were densely stocked stands of loblolly pine that had either regenerated naturally in areas that were protected from wildfire or had been planted as pure pine plantations between 1930 and 1980. Beginning in the 1930s, the Civilian Conservation Corp provided the labor needed to reestablish forests on abandoned farmland and previously cutover upland timberland. The primary species used to reestablish forest conditions was loblolly pine. Beginning in the 1960s, the Forest Service began new efforts to improve forest economic yields by replacing some upland hardwood forests with faster growing loblolly pine. At that time, loblolly pine offered the best chance of high survival and success in reforestation. These efforts, along with some natural establishment of loblolly pine, have resulted in Xeric Pine & Pine-Oak occupying 11.3% of Management Area 1 – Bankhead, 12.6% of Management Area 4 – Talladega Division, and 2.5% of the Total Forest Acres. While loblolly pine is a native tree species, the dominance of pure stands of loblolly pine is not typical of native, fire dependent woodlands that normally occur on the uplands. Historically, natural communities were maintained by low intensity fires originating on ridgetops and southern exposures (NatureServe 2002). With large-scale mortality in these communities due to pine beetle effects, the opportunity now exists to restore these sites.

Table 3B-20: Current (2002) age class distribution of Pine and Pine-Oak Forest Habitats, National Forests in Alabama.

	Bankhead	Conecuh	Oakmulgee	Tal. Div.	Tuskegee	Total
XERIC PINE & PINE-OAK	13,550	447	82	25,155	0	39,234
EARLY (0-10 YEARS)	649	0	0	26	0	675
SAPLING/POLE (11-30 YEARS)	465	16	0	592	0	1,073
MID (31-60 YEARS)	2,141	396	39	7,437	0	10,013
LATE (61+ YEARS)	10,295	35	43	17,100	0	27,473

Several species of viability concern are associated with late-successional southern yellow pine forests maintained in open conditions by frequent fire. Many of these are discussed in the Woodlands, Savannas, and Grasslands Section. While public lands support the majority of late-successional acres, the structure and composition of these forests has been altered due to years of fire suppression resulting in less than optimal habitat conditions. Fire intolerant species such as Virginia pine have proliferated while other pines (shortleaf and longleaf) have seen dramatic declines (NatureServe 2002, Martin et al 1993). In the absence of fire, hardwoods, shrubs, and vines have replaced the open, grassy, herbaceous layer that is characteristic of frequently burned areas, and hardwoods have encroached into the midstory, further affecting forest structure. This change in forest structure and resulting habitat condition has had a direct effect on species dependent upon these communities. Several bird and reptile species associated with southern pine forests are in decline (Hunter et al. 2001) as various habitat components are lost. The Red-cockaded woodpecker, a keystone species for southern yellow pine, is heavily dependent on mixed pine stands as well as nearly pure stands of pine.

In addition to declines in species dependent upon specific habitat attributes, entire pine communities are in decline. This may be due to several factors including fire suppression, land conversion, human population growth and other human-induced impacts.

Several management indicators have been identified for assessing effects to pine and pine-oak forest communities. These indicators include both key habitat variables and Management Indicator Species (MIS). Key habitat variables to be monitored annually should include the number of acres of pine forests burned, the number of acres of off-site pine plantations restored to native species, and the number of acres of pine forests whose structures were restored by thinning or midstory removal treatments. These activities together indicate the level of effort directed at maintaining or restoring pine and pine oak communities.

The red-cockaded woodpecker is selected as the MIS for mid- and late-successional pine and pine-oak forests on Talladega Division, Oakmulgee Division, and Conecuh National Forest management units. Bankhead and Tuskegee National Forest red-cockaded woodpecker populations were extirpated through a lack of adequate prescribed fire and subsequent loss of suitable habitat. In addition to being a T&E species, the red-cockaded woodpecker is a good indicator of the desired conditions for this community type. The red-cockaded woodpecker's association with open, park-like, fire-maintained stands makes this species the most appropriate indicator for mid- and late-successional pine and pine-oak forests, when present.

The brown-headed nuthatch (*Sitta pusilla*) is selected as an MIS for mid- and late-successional pine and pine-oak forests for the Bankhead and Tuskegee National Forest management units. As a cavity-nesting species heavily associated with pine forests, it is a good indicator of mid- and late successional stages of this community type. Its favorable association with the conditions created by effective prescribed burns (Hunter et al. 1992), also make this species an indicator of the effectiveness of management on mid- and late-successional pine and pine-oak forests

Woodland, savanna, and grassland condition in Pine and Pine-Oak habitats, Upland Longleaf habitats, Wet Pine habitats, and Mountain Longleaf habitats on the National Forests in Alabama will be the focus of restoration efforts involving reducing tree cover and restoring periodic fire. Approximately 30% of mature ***Xeric Pine and Pine-Oak Forest and Woodland***, ***Upland Longleaf Pine Forests and Woodland***, ***Wet Pine Forest, Woodland, Savanna***, and ***Mountain Longleaf Pine Forests and Woodland*** communities restored to a woodland or savanna condition would provide critical habitats for species adapted to upland fire-maintained communities. Over time, these activities are expected to create grass-dominated understories. Beyrich's threeawn (*Aristida beyrichiana, formerly Aristida stricta)*, little bluestem (*Schizachyrium scoparium*), and broomsedge bluestem (*Andropogon tenarius & A. virginicus*) are examples of native, warm-season grasses adapted to open habitats and conditions associated with frequent fire. Community-level monitoring will evaluate the development of an herbaceous understory. There are several sensitive species known to occur on the National Forests in Alabama that also require open, fire maintained habitats, including the federal Candidate species, Georgia aster (*Aster georgianus*), milkweeds (*Asclepias spp*), and pitcher plants (*Sarracenia spp*). Of these, only the milkweeds are widely distributed across the five management units of the National Forests in Alabama. Still, community-level monitoring has been determined to better monitor herbaceous layer development, rather than selection of plant MIS for this habitat. Georgia aster is too infrequent to be an effective MIS. Pitcher plants occur in coastal plain bogs, a rare community, which will be directly monitored. The milkweeds and native warm-season grasses can only be monitored in the terms of relative abundance as part of community composition, rather than quantifiable population goals. Historically, and in well-managed landscapes, these species can be found scattered widely throughout the herbaceous understory. There is no specific overstory associated with the herbaceous understory of forests in woodland condition. Instead, they may occur abundantly in open xeric hardwoods, mixed hardwood/pine and open pine communities as well as those listed above. Little bluestem can be found on every unit. Beyrich's threeawn is found on the Conecuh. The broomsedge species are divided between the northern and southern units, with overlap on the Oakmulgee, Shoal Creek & Talladega units.

1.4.2 Direct and Indirect Effects

The future distribution of pine and pine-oak forests on the National Forests in Alabama will vary among alternatives in relation to management objectives for the maintenance and restoration of these community types.

Table 3B-21: Pine and Pine-Oak Forest Habitat age class distributions: +10 years, National Forests in Alabama.

	Successional Stages:	Early	Sap/Pole	Mid	Late
A	Bankhead	32%	3%	15%	50%
	Conecuh	2%	13%	85%	----
	Oakmulgee	----	----	48%	52%
	Talladega Division	8%	3%	27%	62%
	NF's in Alabama	**18%**	**3%**	**23%**	**56%**
B	Bankhead	9%	3%	15%	73%
	Conecuh	----	4%	92%	4%
	Oakmulgee	36%	----	64%	----
	Talladega Division	7%	2%	29%	62%
	NF's in Alabama	**7%**	**3%**	**25%**	**65%**
D	Bankhead	39%	3%	14%	44%
	Conecuh	----	4%	92%	4%
	Oakmulgee	34%	----	63%	3%

	Successional Stages:	Early	Sap/Pole	Mid	Late
	Talladega Division	18%	2%	30%	50%
	NF's in Alabama	**26%**	**3%**	**24%**	**47%**
E	Bankhead	29%	3%	16%	51%
	Conecuh	----	4%	92%	4%
	Oakmulgee	36%	----	64%	----
	Talladega Division	6%	2%	30%	62%
	NF's in Alabama	**14%**	**3%**	**26%**	**57%**
F	Bankhead	44%	3%	13%	41%
	Conecuh	----	4%	92%	4%
	Oakmulgee	----	----	48%	52%
	Talladega Division	18%	2%	30%	50%
	NF's in Alabama	**28%**	**2%**	**23%**	**46%**
G	Bankhead	11%	3%	16%	70%
	Conecuh	----	4%	92%	4%
	Oakmulgee	----	----	48%	52%
	Talladega Division	8%	3%	27%	61%
	NF's in Alabama	**9%**	**3%**	**23%**	**64%**
I	Bankhead	21%	3%	13%	63%
	Conecuh	----	4%	92%	4%
	Oakmulgee	----	----	48%	52%
	Talladega Division	4%	2%	30%	64%
	NF's in Alabama	**10%**	**3%**	**24%**	**63%**

To compare the potential level of maintenance and restoration activities among alternatives, the current distribution of southern yellow pine forests was compared with the prescription allocations for each alternative. Prescriptions were rated as to the management opportunity they provide for varying levels of vegetation management and prescribed burning (none, low, medium, and high).

For the National Forests in Alabama, alternatives D and I provide the most opportunity for management, though all alternatives have at least 50% of the acres allocated to prescriptions that would allow at least moderate levels of management.

Table 3B-22: Pine and Pine-Oak Forest Habitat age class distributions: +50 years, National Forests in Alabama.

	Successional Stages:	Early	Sap/Pole	Mid	Late
A	Bankhead	13%	41%	37%	9%
	Conecuh	----	8%	----	91%
	Oakmulgee	----	56%	5%	39%
	Talladega Division	10%	----	36%	55%
	NF's in Alabama	**11%**	**22%**	**36%**	**31%**
B	Bankhead	7%	16%	39%	38%
	Conecuh	----	23%	7%	70%
	Oakmulgee	----	59%		41%
	Talladega Division	----	4%	26%	70%
	NF's in Alabama	**3%**	**9%**	**31%**	**57%**
	Bankhead	13%	25%	51%	12%

D	Bankhead	13%	25%	51%	12%
	Oakmulgee	7%	84%	8%	----
	Talladega Division	5%	----	49%	46%
	NF's in Alabama	**9%**	**13%**	**50%**	**29%**
E	Bankhead	11%	41%	33%	15%
	Conecuh	3%	24%	7%	66%
	Oakmulgee	----	47%	----	52%
	Talladega Division	5%	6%	21%	68%
	NF's in Alabama	**8%**	**24%**	**27%**	**41%**
F	Bankhead	1%	24%	66%	10%
	Conecuh	----	90%	10%	----
	Oakmulgee	----	100%	----	----
	Talladega Division	----	11%	35%	54%
	NF's in Alabama	**----**	**18%**	**51%**	**31%**
G	Bankhead	16%	29%	13%	42%
	Conecuh	----	52%	8%	40%
	Oakmulgee	----	100%	----	----
	Talladega Division	4%	9%	30%	57%
	NF's in Alabama	**10%**	**19%**	**22%**	**49%**
	Bankhead	10%	15%	56%	19%
	Conecuh	----	43%	----	56%
	Oakmulgee	19%	----	24%	57%
	Talladega Division	----	5%	4%	91%
	NF's in Alabama	**4%**	**10%**	**27%**	**58%**

Future age class distributions and forest structure will vary among alternatives due to differences in management intensity and emphasis. The ability to use fire as a management tool will play a critical part in restoring natural species assemblages and forest structure within the southern yellow pine communities. The Broomsedge Bluestem grasses are species which show direct increase due to canopy openings and prescribed burning, and can often be tied to healthy mixed pine and pine oak forests (Varner, 1998).

Opportunities exist to manipulate vegetation in southern yellow pine forests through prescribed fire and other vegetation management techniques under all alternatives. Projected activities should be sufficient to enhance existing habitat conditions within pine and pine-oak forests above their current levels. Longer rotation ages coupled with frequent prescribed fire will enhance habitat attributes such as grassy understories and standing snags needed by several declining bird species (Hunter et al. 2001). Analysis indicates that, under all alternatives, in 50 years this habitat element will be relatively abundant and well distributed across the forest.

Table 3B-23: Projected acreage of Pine and Pine-Oak Forest Habitats by alternative, National Forests in Alabama.

	A	B	D	E	F	G	I
XERIC PINE & PINE-OAK							
CURRENT (2002)	39.2	39.2	39.2	39.2	39.2	39.2	39.2
+10 YEARS	34.8	38.7	41.7	39.0	43.1	33.1	41.9
+50 YEARS	43.7	39.8	51.6	51.2	52.3	37.2	46.2

Acreage represented in thousands of acres

For Pine and Pine-Oak habitats, the preceding quantitative comparison of the alternatives yields no clearly better alternatives. A qualitative comparison of the alternative's emphases may reveal a preferable alternative favoring Pine and Pine-Oak habitats. Alternative A emphasizes the production of goods and services, and includes the provision of sustained yield timber management. Alternative B is biologically driven; and emphasizes restoring natural resources and natural processes, and creating and maintaining wildlife habitats. The emphasis of Alternative D would be to reach and maintain a balanced age class. Alternative E emphasizes the provision of recreational opportunities. Alternative F is the "No Action" alternative, which in this case means current management direction put forth in the existing amended plan would be followed. Alternative G would emphasize linking together, through land allocations, movement corridors and large undisturbed areas, T&E species, species reintroduction, and watershed restoration. Alternative I combines the emphases of Alternative E (recreation) and Alternative B (wildlife habitats). All of the Alternatives include the Riparian Corridor Prescription, except for Alternative F and Alternative D. These two alternatives include only the existing streamside management zone application outlined in the existing Forest Plan.

Table 3B-24: Expected population trends[1] of MIS for Pine and Pine-Oak Forest Habitats by alternative, National Forests in Alabama. Population trends are based on expected trends in habitat quantity and quality.

	A	B	D	E	F	G	I
RED-COCKADED WOODPECKER							
+10 YEARS	-	++	--	-	--	+	++
+50 YEARS	--	++	-	-	+	-	++
BROWN-HEADED NUTHATCH							
+10 YEARS	-	++	--	-	--	+	++
+50 YEARS	--	++	-	-	+	-	++

1 Population trend expressed as change from current levels: "++" = relatively large increase, "+" = increase, "=" = little to no change, "-" = decrease, "—" relatively large decrease.

Management indicator species may provide additional information for evaluating the relative effects of management alternatives. MIS population trends are expected to be directly proportional to trends in habitat quantity and quality. The red-cockaded woodpecker is an MIS for mid- and late successional Pine and Pine-Oak habitats on Talladega Division, Oakmulgee Division, and Conecuh National Forest management units. Minimum red-cockaded woodpecker habitat restoration will occur under all alternatives during the ten-year life of the plan, however, native ecosystem restoration including prescribed fire, thinning, and species restoration above and beyond the minimum requirements is necessary for species recovery in the long term. The expected population trends for MIS of Pine and Pine-Oak habitats after 10 and 50 years of revised forest plan implementation are shown in Table 3B-24. Alternatives B and I, followed by Alternative G, project the most beneficial population trends for red-cockaded woodpecker. The emphasis under Alternative G to maintain large undisturbed areas, ultimately does not allow adequate ecosystem restoration to native species (and the concomitant creation of 0-10 age class). Alternatives B and I also emphasize restoration of native habitats, as is needed for red-cockaded woodpecker recovery in the long term. Under Alternative I, recreation interests are tantamount to restoration objectives. This will slow native ecosystem restoration and increase costs for project mitigation. This is reflected in the smaller acreages restored to native species under Alternative I. This same effect results in more acres in mid-and late successional stages under Alternative I than in Alternative B, but fewer acres restored to native species.

The brown-headed nuthatch is an MIS for mid- and late successional Pine and Pine-Oak habitats for the Bankhead and Tuskegee National Forest management units, as they have already lost their RCW populations and suitable habitats.

1.4.3 Cumulative Effects

Pine and pine-oak forests are common on the National Forests in Alabama as well as on adjacent private and public lands. The distribution of age classes varies considerably based upon ownership patterns, with the majority of older pine forests occurring on public lands. Management opportunities under all alternatives will ensure continued persistence of these communities on national forest lands with a focus on maintenance and restoration of natural species assemblages. Public lands already provide a vital function in providing the bulk of mid- and late-successional southern yellow pine forests and as restoration proceeds within these communities on national forest lands, the importance of these habitats to species of regional viability concern will increase.

1.5 Wet Pine Forest Habitats

1.5.1 Affected Environment

Wet Pine Forest habitats occur only on Conecuh National Forest management unit on the National Forests in Alabama, where they currently constitute 21% of the forested landscape. As shown in Table B.1-1, the *Wet Pine* community is comprised of slash pine (22) and slash pine/hardwood (14) forest types. However, approximately 50% of the acres in slash pine forest types are off-site, or not native to the sites where they currently exist. Previous forest management (generally reforestation efforts that predated improved longleaf regeneration techniques) resulted in slash pine plantations on upland longleaf sites. While these acres are currently in slash pine forest types (22 and 14), they are not Wet Pine Forest habitats, owing to their upland location. Their restoration back to longleaf pine (21) forest types, and to the *Upland Longleaf Pine Forests and Woodlands* community, would not truly reduce the amount of Wet Pine Forest habitats available.

Native Wet Pine Forest habitats may include several rare imbedded communities, such as coastal plain bogs, bayheads and baygalls, Atlantic white cedar swamps, and coastal plain ponds. These and other embedded wetlands were once a frequent occurrence across the southeastern coastal plain landscape (Walker 2001, Platt 1988). Wet Pine Forest habitats, also referred to as pine flatwoods, wet pine savanna, wet woodland flatwoods, and piney-woods bog complex (Mount 1980), are a fire subclimax community. Flatwoods bogs, coastal plain seepage bogs, and fringing bogs and bayheads are typically grouped and classified collectively as coastal plain bogs. They occur in Wet Pine communities, which are transitional areas between the drier upland sites in longleaf pine savanna, and the seeps, springs and streams in lower elevations. The smaller embedded rare communities, including coastal plain bogs (usually identified by soil, vegetation type, and elevation) are often structurally distinguishable from wet flatwoods, which have a denser canopy of pines and a dense shrub layer.

Table 3B-25: Current (2002) acreage of Wet Pine Forest Habitats, National Forests in Alabama.

	Bankhead	Conecuh	Oakmulgee	Tal. Div.	Tuskegee	Total
WET PINE	0	17,565	0	0	946	**18,511**
		21.8%			9.1%	**3.3%**

% is total of forest acres on each unit

Wet Pine Forest habitats occur on low, flat terrain and are usually dominated by slash pine (Mount 1980). Wiregrass is a frequent ground cover, with pitcher plant bogs embedded sporadically throughout the area. In Wet Pine communities, the water table is at, or near the surface during the wet seasons of the year, although the ground may be quite dry during dry seasons of the year.

Wet Pine Forest habitats can be distinguished from surrounding forests and woodlands by a reduction in overstory density, the presence of seasonally wet or inundated soils, a transition into low, relatively flat, poorly drained terrain. Good examples of Wet Pine Forest habitats have a low incidence of exotic species, and a high likelihood of embedded wetland and rare communities. Surface rutting or compaction has not affected drainage and feral hog, cattle, and horse populations, if present, are managed to keep their effects to species composition and hydrology, minimal. Occurrences can range in size up to several hundred acres.

Embedded rare communities in Wet Pine habitats can be distinguished from surrounding forests and woodlands by a marked change in overstory composition or density, the presence of ponded water or saturated soils and a decrease in elevation. These same characteristics also often result in the area being assigned to the riparian prescription (9f), or at least, to be associated with the streamside management zone (SMZ.) Good examples of rare communities have a low incidence of exotics. Occurrences are typically small, averaging a few acres in size, and on rare occasions reaching up to twenty acres in size.

Table 3B-26: Current (2002) age class distribution of Wet Pine Forest Habitats, National Forests in Alabama.

	Bankhead	Conecuh	Oakmulgee	Tal. Div.	Tuskegee	Total
WET PINE	**0**	**17,565**	**0**	**0**	**946**	**18,511**
EARLY (0-10 YEARS)	0	848	0	0	0	**848**
SAPLING/POLE (11-30 YEARS)	0	6,837	0	0	251	**7,088**
MID (31-60 YEARS)	0	6,634	0	0	386	**7,020**
LATE (61+ YEARS)	0	3,246	0	0	309	**3,555**

Because of the inherent wetland characteristics of these embedded rare community sites, they may all be grouped together for the analysis of potential management effects. Many of the potential impacts analyzed deal with hydrology and hydrological changes that may occur due to management or a lack of management and restoration.

Wet Pine Forest habitats, and their embedded wetland and rare community types, are dependent upon fire to retain their structurally open aspect and high species diversity. Without fire, these communities are subject to invasive species encroachment, hardwood encroachment, or conversion to another community type through overstory basal area increase or shrub layer density increase. Often, in wet pine habitats, fire is the primary restoration and maintenance tool. Restoration and maintenance of these habitats requires active and frequent management, including dormant and growing-season prescribed fire, and reduction of shrub or overstory densities to restore hydrologic regime through evapotranspiration reduction. Wet pine habitats and their embedded wetland and rare communities are becoming less common on the landscape. Although fire should be a primary tool used in restoration and maintenance of these communities, this is sometimes limited by smoke management, fuel loading, proximity to private lands or state highways or other critical considerations. A full range of additional restoration methods should be considered, mitigated by restrictions to protect soils and hydrologic processes.

There are numerous rare species associated with these rare community types including several species of orchids, yellow-eyed grasses and various carnivorous plants. Yellow Pitcherplant, also called Trumpets (*Sarracenia flava)*, White-topped Pitcherplant (*Sarracenia leucophylla*) and Parrot Pitcherplant (*S. psitticina*) are rare species associated with quality bog conditions.

Woodland, savanna, and grassland condition in Wet Pine will be the focus of restoration efforts involving reducing tree cover and restoring periodic fire. Over time, these activities are expected to create grass-dominated understories. Beyrich's threeawn (*Aristida beyrichiana, formerly Aristida stricta)*, Little Bluestem (*Schizachyrium scoparium*) and Broomsedge bluestem (*Andropogon tenarius & A. virginicus*) are native, warm-season grasses adapted to open habitats and conditions associated with frequent fire. There are several sensitive species known to occur on the National Forests in Alabama that also require open, fire maintained habitats, including the federal Candidate species, Georgia aster (*Aster georgianus*), milkweeds (*Asclepias* spp), and pitcher plants (*Sarracenia* spp). Of these, only the milkweeds are widely distributed across the five management units of National Forests in Alabama. Still, community-level monitoring for the development of an herbaceous understory has been determined to best indicate restored habitats. Georgia aster is too infrequent to be an effective MIS. Pitcher plants occur in coastal plain bogs, a rare community, which will be directly monitored. The milkweeds and native warm-season grasses can only be monitored in the terms of relative abundance as part of community composition, rather than quantifiable population goals. Historically, and in well-managed landscapes, these species can be found scattered widely throughout the herbaceous understory. There is no specific overstory associated with the diverse woodland herbaceous layer. Instead, they may occur abundantly in open xeric hardwoods, mixed hardwood/pine and open pine communities as well as those listed above. Little bluestem can be found on every unit. Beyrich's threeawn is found on the Conecuh. The broomsedge species are divided between the northern and southern units, with overlap on the Oakmulgee, Shoal Creek & Talladega units.

1.3.2 Direct and Indirect Effects

Wet Pine Forest habitats will be managed under all alternatives for protection, maintenance, and where possible, restoration of native community assemblages and structure. Restoration and maintenance activities designed to achieve desired conditions within Wet Pine Forest habitats include prescribed burning (all seasons), harvest (to restore proper overstory species composition), thinning, and mid-story removal.

Table 3B-27: Wet Pine Forest Habitat age class distributions: +10 years, National Forests in Alabama.

	Successional Stages:	Early	Sap/Pole	Mid	Late
A	Conecuh	3%	40%	38%	19%
	Tuskegee	----	27%	37%	36%
	NF's in Alabama	2%	39%	38%	20%
B	Conecuh	6%	40%	40%	14%
	Tuskegee	----	52%	11%	36%
	NF's in Alabama	5%	41%	38%	16%
D	Conecuh	6%	41%	40%	13%
	Tuskegee	36%	26%	37%	1%
	NF's in Alabama	8%	40%	40%	13%
E	Conecuh	5%	41%	39%	15%
	Tuskegee	33%	27%	37%	4%
	NF's in Alabama	7%	40%	39%	14%
F	Conecuh	4%	40%	39%	18%
	Tuskegee	36%	27%	37%	1%
	NF's in Alabama	5%	39%	39%	17%
G	Conecuh	6%	41%	40%	13%
	Tuskegee	33%	26%	37%	4%
	NF's in Alabama	7%	40%	40%	13%
I	Conecuh	3%	40%	39%	19%
	Tuskegee	1%	27%	41%	32%
	NF's in Alabama	3%	39%	39%	19%

Since maintenance and restoration of these habitat types are highly management-dependent, alternatives which favor low management intensities are considered detrimental to wet pine forest habitats. Alternatives that emphasize or allow the development of high densities of trees, or minimal human intervention would be least beneficial to associated species in the flatwoods and open bogs/ponds. Atlantic white cedar, baygalls, and swamp communities will be protected by the Riparian Prescription under all alternatives except Alternative D, which has only SMZ guideline protections to riparian communities.

Table 3B-28: Wet Pine Forest Habitat age class distributions: +50 years, National Forests in Alabama.

	Successional Stages:	Early	Sap/Pole	Mid	Late
A	Conecuh	32%	----	9%	59%
	Tuskegee	----	----	----	100%
	NF's in Alabama	29%	----	9%	62%
B	Conecuh	21%	15%	2%	62%
	Tuskegee	12%	27%	16%	46%
	NF's in Alabama	20%	16%	3%	62%
D	Conecuh	31%	20%	1%	48%
	Tuskegee	20%	36%	36%	9%
	NF's in Alabama	31%	21%	3%	46%
E	Conecuh	25%	9%	3%	64%
	Tuskegee	20%	36%	33%	12%
	NF's in Alabama	25%	10%	5%	52%

	Successional Stages:	Early	Sap/Pole	Mid	Late
F	Conecuh	32%	15%	1%	52%
	Tuskegee	20%	36%	36%	9%
	NF's in Alabama	31%	16%	3%	50%
G	Conecuh	19%	2%	2%	79%
	Tuskegee	20%	36%	33%	12%
	NF's in Alabama	19%	4%	3%	74%
I	Conecuh	19%	1%	1%	79%
	Tuskegee	----	----	5%	95%
	NF's in Alabama	18%	1%	1%	80%

Restoration and maintenance are most likely to benefit habitat for species included within this habitat association. Alternative B, which emphasizes native community and ecosystem restoration would most benefit species in this habitat association, followed closely by Alternative I, which also emphasizes restoration, but may be restricted by the equal consideration of recreation interests. All alternatives would allow for the management of threatened, endangered, and sensitive species, as needed, protection and restoration of rare communities, and noxious/invasive weed control.

Table 3B-29: Projected acreage of Wet Pine Forest Habitats by alternative, National Forests in Alabama.

	A	B	D	E	F	G	I
WET PINE							
CURRENT (2002)	18.5	18.5	18.5	18.5	18.5	18.5	18.5
+10 YEARS	18.2	17.7	17.6	17.8	18.0	17.6	18.1
+50 YEARS	13.8	14.3	16.7	14.6	16.7	13.5	13.5

* ACREAGE REPRESENTED IN THOUSANDS OF ACRES

For Wet Pine habitats, the preceding quantitative comparison of the alternatives yields no clearly better alternatives. A qualitative comparison of the alternative's emphases may reveal a preferable alternative favoring Wet Pine habitats. Alternative A emphasizes the production of goods and services, and includes the provision of sustained yield timber management. Alternative B is biologically driven; and emphasizes restoring natural resources and natural processes, and creating and maintaining wildlife habitats. The emphasis of Alternative D would be to reach and maintain a balanced age class. Alternative E emphasizes the provision of recreational opportunities. Alternative F is the "No Action" alternative, which in this case means current management direction put forth in the existing amended plan would be followed. Alternative G would emphasize linking together, through land allocations, movement corridors and large undisturbed areas, T&E species, species reintroduction, and watershed restoration. Alternative I combines the emphases of Alternative E (recreation) and Alternative B (wildlife habitats). All of the Alternatives include the Riparian Corridor Prescription, except for Alternative F and Alternative D. These two alternatives include only the existing streamside management zone application outlined in the existing Forest Plan.

Native communities of this type are primarily located along streams and stream terraces. Management direction along streams is mainly for protection. However, portions of this forest type have been planted in off-site plantations or developed in off-site areas under fire-suppressed conditions. Wet pine habitats on off-site areas are subject to restoration treatments. Wet pine forest types only exist on the Tuskegee and Conecuh National Forests in the National Forests in Alabama, where they make up only 3.3% of the forest's area. No MIS is selected for this community because it is not distinct from riparian habitats in native conditions or from upland pine in off-site conditions.

1.5.3 Cumulative Effects

Wet Pine Forest habitats are an integral portion of the landscape and may be found embedded throughout the Upland Longleaf Pine Forest habitat group on Conecuh National Forest. In many cases, the lands administered by private conservation groups, and state and federal agencies serve as a refuge for native plant communities that have been largely eliminated from other private lands.

Planned levels of maintenance and restoration activities on National Forest lands will influence the future abundance of wet pine forest habitats. The ability to meet the activity levels requiring thinning, burning and/or restoration methods will vary among the alternatives due to the differences in management intensity and emphasis. Wet Pine Forest habitats will continue to reflect the trend set forth in the direct effects section, with the greatest benefits arising from the restoration and management activities under Alternative B and Alternative I.

1.6 Upland Longleaf Pine Forest Habitats

1.6.1 Affected Environment

The *Upland Longleaf Pine Forests and Woodland* community is comprised of the longleaf (21) pine forest type and the longleaf/hardwood (26) mixed pine-hardwood forest type. These forest types also make up the Upland Longleaf habitat group for purposes of analysis of potential management effects. This distinction of the Upland Longleaf habitat group from other pine forest types, and from other upland xeric forest types, for the purposes of the effects analysis is due to the importance of longleaf habitats to many rare and declining plant and animal species. Upland Longleaf habitats occur on all units of the National Forests in Alabama, except for the Talladega Division management unit, where the longleaf forest component is characterized as the *Mountain Longleaf Pine Forests and Woodland* community.

Upland Longleaf Pine Forests and Woodland communities used to encompass over 90 million acres of the Gulf and Atlantic Coastal Plain (MacRoberts, 1991, Platt, 1988). The longleaf pine is a fire-adapted species, and the community is a fire subclimax community. It is typically dominated by longleaf pine, but may include other pine and hardwood tree species that are adapted to fire. Because of the community's fire dependence, prescribed fire must now be a large part of the management direction for maintenance and restoration of Upland Longleaf habitats. The fire-return period in the coastal plain has been observed to fall within a range of 1-5 years. Prescribed burning on a 2-4 year rotation may suffice for restoration and maintenance purposes. Understory trees are often few and widely spaced, including the natural pine regeneration under mature stands. The ground cover varies, but includes a variety of wiregrass, bluestem and bracken fern. Herbaceous legumes tend to be common in relatively open areas. Without fire, Upland Longleaf habitats are subject to encroachment by tree species not adapted to frequent, and growing season fires, and conversion to other community types.

Upland longleaf habitats often occur proximate to Wet Pine Forest habitats containing transitional slash (*Pinus elliottii*) or pond pine (*Pinus serotina*) grading into wetter areas. The shrub stratum may be dense or sparse, and may consist of inkberry (*Ilex glabra)*, titi (*Cyrilla racemiflora*), and saw palmetto (*Serenoa repens*). The rich and diverse herbaceous layer consists of wiregrass (*Aristida beyrichiana*), feather bristle beaksedge (*Rynchospora oligantha*), toothache grass (*Ctenium aromaticum*), Gulf chaffhead (*Carphephorus pseudoliatris*), and several pitcherplants, including trumpet pitcherplant (*Sarracenia alata*). Upland longleaf habitats can also occur as pine savannas, which can be differentiated from surrounding upland habitats by a reduction in overstory density and an increase in the herbaceous component of the understory. Very slight topographic changes result in savannas and their sizes can range up to several hundred acres.

Table 3B-30: Current (2002) acreage of Upland Coastal Plain Pine Forest Habitats, National Forests in Alabama.

	Bankhead	Conecuh	Oakmulgee	Tal. Div.	Tuskegee	Total
UPLAND LONGLEAF PINE	2,196	41,478	61,965	0	2,129	**107,768**
	1.8%	46.5%	40.2%		20.4	**19.1%**

% is total of forest acres on each unit

Upland Longleaf pine habitats vary in structure from forest, to woodland, to savanna characteristics. Based on physiognomic class definitions from the International Community Classification System (NatureServe, 2001), woodlands are open stands of trees with crowns usually not touching (forming 25%-60% canopy cover), and savannas, either hardwood or pine, have only scattered tree cover occupying no more than 25% canopy cover. Forests are stands of trees whose crowns are touching, with greater than 60% canopy cover. Woodland and savanna communities have dense herbaceous understories dominated by grasses such as little bluestem, Indiangrass, and needlegrass, and forbs such as asters, goldenrods, and legumes. Over 25 species of plants and animals listed as endangered or threatened, and nearly 100 candidate species are known to occur in the fire dominated longleaf pine forests of the south. Upland longleaf habitats in woodland or savanna condition are critical to the viability of many of these species.

Table 3B-31: Current (2002) age class distribution of Upland Coastal Plain Pine Forest Habitats, National Forests in Alabama.

	Bankhead	Conecuh	Oakmulgee	Tal. Div.	Tuskegee	Total
UPLAND LONGLEAF PINE	2,196	41,478	61,965	0	2,129	**107,768**
EARLY (0-10 YEARS)	575	3,174	8,241	0	708	**12,698**
SAPLING/POLE (11-30 YEARS)	800	7,995	11,450	0	602	**20,847**
MID (31-60 YEARS)	327	10,191	7,188	0	278	**17,984**
LATE (61+ YEARS)	494	20,118	35,086	0	541	**56,239**

Restoration and maintenance of Upland Longleaf habitats requires active and frequent management, including frequent or growing-season prescribed fire, harvest to restore native longleaf, and overstory or midstory basal area reduction. Currently, these community types are becoming less common on the landscape, although the restoration potential is great. Although fire should be a primary tool used in restoration and maintenance of these communities, this is sometimes limited by smoke management, fuel loading, proximity to private lands or state highways or other critical considerations. All restoration methods should be considered with site-specific recommendations to mitigate potential negative effects.

The red-cockaded woodpecker is selected as an MIS for mid- and late-successional Pine and Pine-Oak habitats on Talladega Division, Oakmulgee Division, and Conecuh National Forest management units. Upland Longleaf habitats, Wet Pine habitats, and Mountain Longleaf habitats, as specific subsets of the more general Pine and Pine-Oak habitats, can also provide suitable habitat for RCW if properly managed. In addition to being a T&E species, the red-cockaded woodpecker is a good indicator of the desired conditions for this community type. The relative abundance, connectivity, diversity and health of the ***Upland Longleaf Pine Forests and Woodland*** community is of paramount concern, and is a factor in RCW recovery efforts. Bachman's Sparrow is a neotropical migrant that can be found in similar park-like, frequently-burned sites with herbaceous understories, in Upland Longleaf habitats. It nests in clumps of native grasses and herbaceous vegetation. The red-cockaded woodpecker's association with open, park-like, fire-maintained stands makes this species the most appropriate indicator for mid- and late-successional Upland Longleaf habitat restoration efforts, when present.

Woodland, savanna, and grassland condition in Pine and Pine-Oak habitats, Upland Longleaf habitats, and Mountain Longleaf habitats on the National Forests in Alabama will be the focus of restoration efforts involving reducing tree cover and restoring periodic fire. Over time, these activities are expected to create grass-dominated understories. Beyrich's threeawn (*Aristida beyrichiana, formerly Aristida stricta)*, Little Bluestem (*Schizachyrium scoparium*) and Broomsedge bluestem (*Andropogon tenarius & A. virginicus*) are native, warm-season grasses adapted to open habitats and conditions associated with frequent fire. There are several sensitive species known to occur on the National Forests in Alabama that also require open, fire maintained habitats, including the federal Candidate species, Georgia aster (*Aster georgianus*), milkweeds (*Asclepias spp*), and pitcher plants (*Sarracenia spp*). Of these, only the milkweeds are widely distributed across the five management units of the National Forests in Alabama. Still, community-level monitoring of herbaceous understory development has been determined to better indicate restored woodland communities. Georgia aster is too infrequent to be an effective MIS. Pitcher plants occur in coastal plain bogs, a rare community, which will be directly monitored. The milkweeds and native warm-season grasses can only be monitored in the terms of relative abundance as part of community composition, rather than quantifiable population goals. Historically, and in well-managed landscapes, these species can be found scattered widely throughout the herbaceous understory. There is no specific overstory associated with these species, since they may occur abundantly in open xeric hardwoods, mixed hardwood/pine and open pine communities as well as those listed above. Little bluestem can be found on every unit. Beyrich's threeawn is found on the Conecuh. The broomsedge species are divided between the northern and southern units, with overlap on the Oakmulgee and Talladega Division management units.

1.6.2 Direct and Indirect Effects

Restoration and maintenance activities that result in an open forest canopy such as prescribed burning (including dormant, frequent, and summer burning), thinning, mid-story removal, and replacement of off-site species with native ecosystems favors and directly affects the abundance and distribution of Upland Longleaf habitats. Maintenance and restoration vary in management intensity by alternative. Alternatives that emphasize high densities of trees or minimal human intervention would be least beneficial to associated species in Upland Longleaf habitats.

Table 3B-32: Upland Longleaf Pine Habitats age class distributions: +10 years, National Forests in Alabama.

	Successional Stages:	Early	Sap/Pole	Mid	Late
A	Bankhead	----	1%	83%	16%
	Conecuh	8%	19%	25%	48%
	Oakmulgee	16%	18%	11%	55%
	Tuskegee	33%	28%	13%	26%
	NFs in Alabama	12%	17%	21%	49%
B	Bankhead	38%	36%	15%	11%
	Conecuh	9%	19%	24%	47%
	Oakmulgee	16%	18%	11%	55%
	Tuskegee	35%	28%	13%	25%
	NFs in Alabama	14%	19%	16%	50%
D	Bankhead	40%	35%	14%	11%
	Conecuh	10%	19%	24%	47%
	Oakmulgee	22%	17%	10%	51%
	Tuskegee	51%	21%	10%	19%
	NFs in Alabama	18%	18%	16%	48%
E	Bankhead	29%	41%	17%	13%
	Conecuh	9%	19%	24%	47%
	Oakmulgee	18%	17%	11%	53%
	Tuskegee	39%	26%	12%	23%
	NFs in Alabama	15%	19%	16%	62%
F	Bankhead	29%	41%	17%	13%
	Conecuh	9%	19%	25%	48%
	Oakmulgee	18%	17%	11%	53%
	Tuskegee	36%	27%	13%	25%
	NFs in Alabama	15%	19%	16%	50%
G	Bankhead	30%	41%	17%	13%
	Conecuh	9%	19%	24%	47%
	Oakmulgee	19%	17%	11%	52%
	Tuskegee	40%	26%	12%	23%
	NFs in Alabama	16%	18%	16%	49%
I	Bankhead	39%	35%	14%	12%
	Conecuh	8%	19%	24%	48%
	Oakmulgee	14%	18%	12%	56%
	Tuskegee	36%	27%	12%	24%
	NFs in Alabama	13%	19%	17%	51%

Restoration and maintenance activities are most likely to benefit Upland Longleaf habitats, and the species of viability concern dependant on those habitats. All alternatives would allow for management of threatened, endangered, and sensitive species, as needed, protection and restoration of rare communities, and noxious/invasive weed control.

Table 3B-33: Upland Longleaf Forest Habitat age class distributions: +50 years, National Forests in Alabama.

	Successional Stages:	Early	Sap/Pole	Mid	Late
A	Bankhead	33%	28%	13%	26%
	Conecuh	2%	9%	8%	81%
	Oakmulgee	4%	11%	17%	69%
	Tuskegee	----	----	33%	66%
	NFs in Alabama	**3%**	**10%**	**14%**	**73%**
B	Bankhead	25%	52%	10%	12%
	Conecuh	3%	5%	10%	81%
	Oakmulgee	8%	16%	18%	59%
	Tuskegee	3%	10%	35%	52%
	NFs in Alabama	**7%**	**15%**	**15%**	**63%**
D	Bankhead	11%	----	69%	19%
	Conecuh	----	3%	11%	85%
	Oakmulgee	5%	12%	30%	53%
	Tuskegee	5%	27%	42%	25%
	NFs in Alabama	**4%**	**9%**	**26%**	**61%**
E	Bankhead	----	32%	50%	18%
	Conecuh	3%	7%	10%	80%
	Oakmulgee	9%	16%	21%	53%
	Tuskegee	4%	30%	40%	25%
	NFs in Alabama	**6%**	**14%**	**19%**	**60%**
F	Bankhead	39%	2%	18%	40%
	Conecuh	----	5%	9%	85%
	Oakmulgee	12%	13%	22%	53%
	Tuskegee	15%	1%	52%	32%
	NFs in Alabama	**8%**	**10%**	**18%**	**63%**
G	Bankhead	----	40%	43%	17%
	Conecuh	1%	7%	10%	81%
	Oakmulgee	4%	14%	27%	56%
	Tuskegee	4%	28%	42%	25%
	NFs in Alabama	**3%**	**13%**	**23%**	**61%**
I	Bankhead	----	47%	41%	12%
	Conecuh	4%	7%	11%	79%
	Oakmulgee	3%	11%	13%	72%
	Tuskegee	7%	35%	31%	27%
	NFs in Alabama	**3%**	**13%**	**15%**	**68%**

For Upland Longleaf Forests and Woodland habitats, the quantitative comparison of the alternatives yields no clearly better alternatives. A qualitative comparison of the alternative's emphases may reveal a preferable alternative favoring Upland Longleaf Forests and Woodland habitats. Alternative A emphasizes the production of goods and services, and includes the provision of sustained yield timber management. Alternative B is biologically driven; and emphasizes restoring natural resources and natural processes, and creating and maintaining wildlife habitats. The emphasis of Alternative D would be to reach and maintain a balanced age class. Alternative E emphasizes the provision of recreational opportunities. Alternative F is the "No Action" alternative, which in this case means current management direction put forth in the existing amended plan would be followed. Alternative G would emphasize linking together, through land allocations, movement corridors and large undisturbed areas, T&E species, species reintroduction, and watershed restoration. Alternative I combines the emphases of Alternative E (recreation) and Alternative B (wildlife habitats). All of the Alternatives include the Riparian Corridor Prescription, except for Alternative F and Alternative D. These two alternatives include only the existing streamside management zone application outlined in the existing Forest Plan.

Table 3B-33: Projected acreage of Upland Longleaf Forest Habitats by alternative, National Forests in Alabama.

	A	B	D	E	F	G	I
UPLAND LONGLEAF PINE							
CURRENT (2002)	107.8	107.8	107.8	107.8	107.8	107.8	107.8
+10 YEARS	116.8	111.6	117.1	113.0	112.7	114.3	108.5
+50 YEARS	125.9	137.2	139.7	135.5	130.9	140.4	139.0

* Acreage represented in thousands of acres

Management indicator species may provide additional information for evaluating the relative effects of management alternatives. MIS population trends are expected to be directly proportional to trends in habitat quantity and quality. The red-cockaded woodpecker is an MIS for mid- and late successional Upland Longleaf habitats on Talladega Division, Oakmulgee Division, and Conecuh National Forest management units. Minimum red-cockaded woodpecker habitat restoration will occur under all alternatives during the ten-year life of the plan, however, native ecosystem restoration including prescribed fire, thinning, and species restoration above and beyond the minimum requirements is necessary for species recovery in the long term.

Table 3B-34: Expected population trends[1] of MIS for Upland Longleaf Forest Habitats by alternative, National Forests in Alabama. Population trends are based on expected trends in habitat quantity and quality.

	A	B	D	E	F	G	I
RED-COCKADED WOODPECKER							
+10 YEARS	-	+	-	-	-	+	=
+50 YEARS	-	+	-	--	-	+	+
BROWN-HEADED NUTHATCH							
+10 YEARS	+	=	-	-	=	=	=
+50 YEARS	-	++	-	-	-	++	++

1 Population trend expressed as change from current levels: "++" = relatively large increase, "+" = increase, "=" = little to no change, "-" = decrease, "—" relatively large decrease.

Th expected population trends for MIS of Upland Longleaf habitats after 10, and 50 years of revised forest plan implementation are shown in Table 3B-34. Alternatives B and G, followed by Alternative I, project the most beneficial population trends for red-cockaded woodpecker. This MIS evaluation includes only Conecuh and Oakmulgee management units, due to classification of longleaf forest types on Talladega Division as Mountain Longleaf habitats. These will be covered in the following section. Alternatives B and I emphasize restoration of native habitats, as is needed for red-cockaded woodpecker recovery in the long term. Under Alternative I, recreation interests are tantamount to restoration objectives. This will slow native ecosystem restoration and increase costs for project mitigation.

The brown-headed nuthatch is an MIS for mid- and late successional Upland Longleaf habitats for the Bankhead and Tuskegee National Forest management units, as they have already lost their RCW populations. Brown-headed nuthatch population trend projections are made from Upland Longleaf forest habitat trends on those two units only. Table 3B-34 shows positive population trends under alternatives B, G, and I.

1.6.3 Cumulative Effects

Upland Longleaf habitats, with their embedded communities were historically found as the dominant vegetation association across the coastal plain. Today, lands administered by private sporting and conservation groups, and state and federal agencies serve as refuge for the last remaining *Upland Longleaf Pine Forests and Woodland* communities, with their attendant structure and rare species associations. The Upland Longleaf habitats that remain encompass less than 1 percent of their historical occurrence. This is especially true on private lands, largely due to land use conversion, development, industrial forestry practices, and other extensive anthropogenic disturbance.

Planned levels of maintenance and restoration activities on National Forest lands will influence the future abundance of Upland Longleaf habitats. Amounts of thinning, burning, and restoration harvests will vary among the alternatives due to the differences in management intensity and emphasis. Regeneration harvest intensity is reflected in the amounts of Upland Longleaf habitats in the 0-10 age-class.

Upland longleaf habitats will continue to reflect the trend set forth under the direct effects section, with the greatest benefits arising from the restoration and management activities under Alternatives B, I and G. If lesser management is conducted, as under Alternative A and D, these communities will most likely persist but not thrive, or become relict of Upland Longleaf trees without associated fire-adapted herbaceous layers.

1.7 Mountain Longleaf Pine Habitats

1.7.1 Affected Environment

The *Mountain Longleaf Pine Forests and Woodland* community is comprised of the longleaf (21) pine forest type and the longleaf/hardwood (26) mixed pine-hardwood forest type. These forest types also make up the Mountain Longleaf habitat group for purposes of analysis of potential management effects. This distinction of the Mountain Longleaf habitat group from other pine forest types, and from other upland xeric forest types, for the purposes of the effects analysis is due to the importance of longleaf habitats to many rare and declining plant and animal species. *Mountain Longleaf Pine Forests and Woodland* communities are a variant of the *Upland Longleaf Forests and Woodland* community present in other physiographic regions of Alabama. Mountain longleaf habitats in the Ridge and Valley region of Alabama and Georgia represent the most-interior extent of the fire-adapted longleaf pine.

Historically, Upland Longleaf Pine (including mountain longleaf) habitats have declined from approximately 92 million acres historically, to about 3.2 million acres today (MacRoberts, 1991, Platt, 1998, Maceina et al 2000). The decline of longleaf habitats has continued in recent times, with longleaf forest acreages declining at over 27 percent between 1985 and

1995, (Outcalt and Sheffield 1996). Over 25 species of plants and animals listed, as endangered or threatened, and nearly 100 candidate species are known to occur in the fire dominated longleaf pine forests of the south. Mountain longleaf, already a small subset of the vast longleaf forest of the south, is a critically endangered component of the once vast longleaf pine forests that stretched from Virginia to east Texas (Varner et al 2000). Mountain longleaf occurs in the Ridge & Valley physiographic region at the southern terminus of the Appalachian Mountains in Alabama and Georgia, on three federal ownerships. Historically, mountain longleaf was documented in pure and mixed stands at elevations up to 1900' (Sargeant 1890, Harper 1928, Smith 1913). Above that elevation, only individual trees were documented to occur as part of mixed stands dominated by other species (Mohr 1901). On Talladega Division management unit of the National forests in Alabama, Mountain Longleaf habitats occur primarily on the ridges and southern/western aspects of the region.

Mountain (or montane) Longleaf habitats were historically maintained in an open structure by fire, both natural ignitions (such as lightning) and anthropogenic fire (Komarek 1974, Robbins and Myers 1992). As such, the system is fire dependent to maintain the open stand structure, species composition and forest function. Current research indicates that a fire return of two years is necessary to gain the stand structure of a savanna, with two to four year returns for maintenance of the current species composition (Varner et al 2000). Fire suppression, species conversion, naval stores use, feral hog predation of seedlings, and land use conversion have greatly reduced Mountain Longleaf habitats.

Table 3B-35: Current (2002) acreage of Mountain Longleaf Pine Habitats, National Forests in Alabama.

	Bankhead	Conecuh	Oakmulgee	Tal. Div.	Tuskegee	Total
MOUNTAIN LONGLEAF PINE	0	0	0	43,024	0	**43,024**
				21.5%		**7.6%**

% is total of forest acres on each unit

This open woodland or savanna community may have an overstory dominated by longleaf (*Pinus palustris*) pine, in both pure longleaf patches and mixed pine-hardwood stands contingent on fire history, disturbance and past land utilization. Other pine species, likely to occur depending on fire frequency and season, are shortleaf pine (*Pinus echinata*), Virginia pine (*Pinus virginiana*) and loblolly pine (*Pinus taeda*). Pure longleaf patches are typically all aged stands, with small even aged patches, which seeded in and grew from gaps in the canopy. These gaps, or patches, are typically the result of windstorms, ice storms, intense fires, and insect induced mortality (generally 0.1 to 0.5 acre in size), yet with occasional tornado or hurricane caused opening (0.5 to 2 mile wide strips) which left canopy gaps open for recruitment (Reed 1905, Schwarz 1907, Chapman 1909, Wahlenberg 1946). Species composition within individual stands varies drastically depending on fire history, rate of return and season of burn. For instance, in studies conducted on Ft McClellan, fire suppressed mountain longleaf stands displayed the fewest number of total species, fewest grasses, asters, legumes and forbs present, however the highest number of woody species. Conversely, as fire frequency increased, the total number of species, grasses, asters, legumes and forbs increased, while the number of woody species decreased (Varner et al 2000). Since woody species occurrence, presence and abundance indicate community succession stage, woody encroachment increases as fire recurrence decreases. Woody species associated with infrequent fire return are sassafras (*Sassafras albidum*), oaks (*Quercus spp.*), red maple (*Acer rubrum*), and black gum (*Nyssa sylvatica*), which are typical of mixed hardwood forests. When combined with mountain longleaf, this results in the mixed stands noted earlier, which is derived from infrequent fire return, minimized fire intensity or seasonality of burn. Thus, frequent fire, more intense fires, and lightning season fires all result in fewer woody species, resulting in pure stands of longleaf. Either condition of species composition can occur, such as mixed pine-hardwood stands, or pure stands of longleaf, contingent on the recurrence and seasonality of fire in this fire dependent community.

Table 3B-36: Current (2002) age class distribution of Mountain Longleaf Pine Habitats, National Forests in Alabama.

	Bankhead	Conecuh	Oakmulgee	Tal. Div.	Tuskegee	Total
MOUNTAIN LONGLEAF PINE	0	0	0	43,024	0	**43,024**
EARLY (0-10 YEARS)	**0**	**0**	**0**	**6,965**	**0**	**6,965**
SAPLING/POLE (11-30 YEARS)	**0**	**0**	**0**	**3,549**	**0**	**3,549**
MID (31-60 YEARS)	**0**	**0**	**0**	**4,022**	**0**	**4,022**
LATE (61+ YEARS)	**0**	**0**	**0**	**28,488**	**0**	**28,488**

Perhaps the most important component in determining the structural condition in a mountain longleaf system, are the bluestem grasses. Bluestems (*Andropogon ternarius, A. virginicus* and *A. scoparius*) are abundant in frequently burned longleaf pine stands throughout their range. In many cases, the community type is named the longleaf-bluestem community, recognizing the critical importance of the understory grasses in the system. As fire frequency increases, the abundance and percent cover, in bluestems increases. Conversely, as fire frequency decreases, bluestems decline or disappear entirely as woody species encroach into the stand.

Species composition, within the mountain longleaf community, can be very rich in numbers of total species. At least 117 species have been determined to occur in mountain longleaf pine stands with restored fire regimes and structural condition. Forty species have been identified as commonly found in high quality longleaf pine stands. Species commonly found in fire recurrent mountain longleaf stands, yet absent or rare in fire-suppressed stands include: Andropogon spp. (*A. ternarius, A. scoparius and A. virginicus*), Asclepias spp. (*A. amplexicaulis and A. tuberosa*), Aster spp. (*A. dumosus, A. patens and A. undulatus), Carya pallida, Chrysopsis graminifolia, Clitoria mariana, Coreopsis major, Galactia volubilis*, Helianthus spp. (*H. microcephallus and H. mollis*), Hypericum spp. (*H. gentianoides, H. hypericoides and H punctatum*), *Hypoxis hirsute, Krigia biflora, Kuhnia eupatorioides*, Lespedeza spp. (*L. intermedia, L. procumbens and L. virginiana*), Panicum spp. (*P. commutatum and P. viratum*), *Pinus palustris, Pteridium aquilinum, Quercus marilandica, Rhus copalina, Rhyncosia tomentosa, Salvia urticifolia, Senna marilandica, Sisyrhyncium angustifolium, Smilax glauca*, Solidago spp. (*S. erecta and S. odora*), *Tephrosia virginiana* and *Vaccinium arboreum*.

Mountain Longleaf habitats vary in structure from forest, to woodland, to savanna characteristics. Based on physiognomic class definitions from the International Community Classification System (NatureServe, 2001), woodlands are open stands of trees with crowns usually not touching (forming 25%-60% canopy cover), and savannas, either hardwood or pine, have only scattered tree cover occupying no more than 25% canopy cover. Forests are stands with tree canopies touching and forming >60% cover. Sparse forests, woodlands and savannas can have dense herbaceous understories dominated by grasses such as bluestems, and forbs such as asters, goldenrods, and legumes.

Restoration and maintenance of these communities requires active and frequent management, including rapid rotational burning, dormant and growing-season prescribed fire or mowing, restoration of native tree species, and thinning or mid-story control. Mountain Longleaf habitats are becoming less common on the landscape, although the restoration potential is great. In addition, since the age of the standing mountain longleaf is critical for several species, the restoration effort will take time to allow trees to age sufficiently to support red-cockaded woodpeckers and other cavity dependent species. Although fire should be a primary tool used in restoration and maintenance of these communities, this is sometimes limited by smoke management, fuel loading, proximity to private lands or state highways or other critical considerations. Additional methods should be considered during restoration using a full range of available options and site-specific recommendations.

Opportunities for Mountain Longleaf habitat restoration often occur on xeric, subxeric, and intermediate sites along ridgetops and on south, and west-facing aspects. The best candidates for restoration have herbaceous plant indicators either within the stand or adjacent to it, to provide a source of native herbaceous seed following disturbance.

The red-cockaded woodpecker is selected as an MIS for mid- and late-successional Pine and Pine-Oak habitats on the Talladega Division, Oakmulgee Division, and Conecuh National Forest management units. Upland Longleaf habitats and Mountain Longleaf habitats, as specific subsets of the more general Pine and Pine-Oak habitats, can also provide suitable habitat for RCW if properly managed. In addition to being a T&E species, the red-cockaded woodpecker is a good indicator of the desired conditions for this community type. Currently, populations on the Talladega Division are very low (less than 10 active cavity tree clusters) and extremely vulnerable to extirpation. Since RCW need open stands composed of mature pines and fire-dependent, herbaceous understories for foraging, active management of foraging areas is critical. Additionally, the need for older age trees for cavity excavation necessitates the use of recruitment devices (such as cavity tree inserts, restrictors, etc) until the stands age sufficiently to allow red-heart rot inoculation and natural cavity development. The relative abundance, connectivity, diversity and health of the ***Upland Longleaf Pine Forests and Woodland*** community is of paramount concern, and is a factor in RCW recovery efforts. It nests in clumps of native grasses and herbaceous vegetation. The red-cockaded woodpecker's association with open, park-like, fire-maintained stands makes this species the most appropriate indicator for mid- and late-successional Upland Longleaf habitat restoration efforts, when present.

Woodland, savanna, and grassland condition in Pine and Pine-Oak habitats, Upland Longleaf habitats, Wet Pine habitats, and Mountain Longleaf habitats on the National Forests in Alabama will be the focus of restoration efforts involving reducing tree cover and restoring periodic fire. Over time, these activities are expected to create grass-dominated understories. Beyrich's threeawn (*Aristida beyrichiana,* formerly *Aristida stricta)*, little bluestem (*Schizachyrium scoparium,*) and broomsedge bluestem (*Andropogon tenarius & A. virginicus*) are native, warm-season grasses adapted to open habitats and conditions associated with frequent fire. There are several sensitive species known to occur on the National Forests in Alabama that also require open, fire maintained habitats, including the federal Candidate species, Georgia aster (*Aster georgianus*), milkweeds (*Asclepias* spp), and pitcher plants (*Sarracenia* spp). Of these, only the milkweeds are widely distributed across the five management units of the National Forests in Alabama. Still, community-level monitoring of herbaceous understory development has been determined to better indicate restored habitats.

Georgia aster is too infrequent to be an effective MIS. Pitcher plants occur in coastal plain bogs, a rare community, which will be directly monitored. The milkweeds and native warm-season grasses can only be monitored in the terms of relative abundance as part of community composition, rather than quantifiable population goals. Historically, and in well-managed landscapes, these species can be found scattered widely throughout the herbaceous understory. There is no specific overstory associated with herbaceous understories. Instead, they may occur abundantly in open xeric hardwoods, mixed hardwood/pine and open pine communities. Little bluestem can be found on every unit. Beyrich's threeawn is found on the Conecuh. The broomsedge species are divided between the northern and southern units, with overlap on the Oakmulgee and Talladega Division management units.

1.7.2 Direct and Indirect Effects

Restoration and maintenance activities which result in an open forest canopy such as prescribed burning (including frequent rotation, dormant, and summer burning), harvesting (thinning and restoration cuts), and other mechanical or chemical mid-story removal methods directly affect the abundance of this community type. Since maintenance and restoration of these habitat types are highly management-dependent, the following probable activities, and management intensity modules are considered in determining the ability of the Forest Plan to address these conditions. These include burning, thinning, restoration, and maintenance activities.

Table 3B-37: Mountain Longleaf Pine Habitat age class distributions: +10 years, National Forests in Alabama.

	Successional Stages:	Early	Sap/Pole	Mid	Late
A	Talladega Division	17%	8%	9%	65%
	NF's in Alabama	17%	8%	9%	65%
B	Talladega Division	20%	8%	9%	63%
	NF's in Alabama	20%	8%	9%	63%
D	Talladega Division	18%	8%	9%	64%
	NF's in Alabama	18%	8%	9%	64%
E	Talladega Division	21%	8%	9%	62%
	NF's in Alabama	21%	8%	9%	62%
F	Talladega Division	21%	8%	9%	63%
	NF's in Alabama	21%	8%	9%	63%
G	Talladega Division	20%	8%	9%	63%
	NF's in Alabama	20%	8%	9%	63%
I	Talladega Division	20%	8%	9%	63%
	NF's in Alabama	20%	8%	9%	63%

Maintenance and restoration activities will vary in management intensity, by alternative. Those alternatives, which emphasize high densities of trees or minimal human intervention, would be least beneficial to associated species in Mountain Longleaf habitats.

High management intensity levels with emphasis on restoration and maintenance of Mountain Longleaf habitats are most likely to benefit species included in this habitat association. Alternative B, which emphasizes native community and ecosystem restorations, would most benefit species in this habitat association. Since many of the historic Mountain Longleaf habitat acres are currently in loblolly or mixed pine-hardwood forest types, restoring the stand composition and structure through harvest actions, followed by maintenance with fire will most closely return it to historic conditions. While balancing the restoration of native communities with recreational uses, results in Alternative I, are similar to Alternative B. Additional costs would be associated with mitigation actions that would be necessary under Alternative I in order to avoid potential effects to recreation quality. Alternatives E (recreation alternative) and D (vigorously growing forest), and A (economic), would pursue some recovery goals for the system, just at a different pace, depending on alternative and emphasis. However, it should be noted that rotational ages and method of regeneration must meet Red-cockaded Woodpecker EIS management direction.

Table 3B-38: Mountain Longleaf Pine Habitat age class distributions: +50 years, National Forests in Alabama.

	Successional Stages:	Early	Sap/Pole	Mid	Late
A	Talladega Division	1%	25%	19%	54%
	NF's in Alabama	1%	25%	19%	54%
B	Talladega Division	9%	14%	24%	54%
	NF's in Alabama	9%	14%	24%	54%
D	Talladega Division	----	22%	22%	57%
	NF's in Alabama	----	22%	22%	57%
E	Talladega Division	12%	7%	26%	55%
	NF's in Alabama	12%	7%	26%	55%
F	Talladega Division	5%	11%	32%	54%
	NF's in Alabama	5%	11%	32%	54%
G	Talladega Division	8%	16%	24%	52%
	NF's in Alabama	8%	16%	24%	52%
I	Talladega Division	8%	12%	26%	54%
	NF's in Alabama	8%	12%	26%	54%

Alternative C (minimal human intervention) and G (movement corridors and large undisturbed areas) would not meet Mountain Longleaf habitat needs since they rely on minimum management activity levels, which would prove detrimental to this fire dependent system. All alternatives would allow for management of threatened, endangered, and sensitive species as needed, however recovery timelines would be greatly extended and potentially not met for species currently close to extirpation under the minimum management intensity level alternatives. Alternatives would potentially allow restoration of rare communities, and noxious/invasive weed control, however the flexibility for active management would be severely curtailed.

Short-term negative direct effects are possible to individuals due to the potential for incidental mortality, damage to seed or root banks, and potentially overlooked individuals occurring in project areas during management implementation. Activities may temporarily set back plant and animal reproduction or growth. All known populations of threatened, endangered, and sensitive species will be protected from management activities that are likely to adversely affect them.

Table 3B39: Projected acreage of Mountain Longleaf Pine Habitats by alternative, National Forests in Alabama.

	A	B	D	E	F	G	I
MOUNTAIN LONGLEAF PINE							
CURRENT (2002)	43.0	43.0	43.0	43.0	43.0	43.0	43.0
+10 YEARS	43.2	44.8	44.0	43.0	45.5	45.1	45.2
+50 YEARS	53.8	55.1	51.9	51.8	54.9	56.2	62.4

* Acreage represented in thousands of acres

For Mountain Longleaf Forests and Woodland habitats, the quantitative comparison of the alternatives may yield no clearly preferable alternatives. A qualitative comparison of the alternative's emphases may reveal a preferable alternative favoring Mountain Longleaf Forests and Woodland habitats. Alternative A emphasizes the production of goods and services, and includes the provision of sustained yield timber management. Alternative B is biologically driven; and emphasizes restoring natural resources and natural processes, and creating and maintaining wildlife habitats. The emphasis of Alternative D would be to reach and maintain a balanced age class. Alternative E emphasizes the provision of recreational opportunities. Alternative F is the "No Action" alternative, which in this case means current management direction put forth in the existing amended plan would be followed. Alternative G would emphasize linking together, through land allocations, movement corridors and large undisturbed areas, T&E species, species reintroduction, and watershed restoration. Alternative I combines the emphases of Alternative E (recreation) and Alternative B (wildlife habitats). All of the Alternatives include the Riparian Corridor Prescription, except for Alternative F and Alternative D. These two alternatives include only the existing streamside management zone application outlined in the existing Forest Plan.

Management indicator species may provide additional information for evaluating the relative effects of management alternatives. MIS population trends are expected to be directly proportional to trends in habitat quantity and quality. The red-cockaded woodpecker is an MIS for mid- and late successional Mountain Longleaf habitats on Talladega Division management units. Minimum red-cockaded woodpecker habitat restoration will occur under all alternatives during the ten-year life of the plan, however, native ecosystem restoration including prescribed fire, thinning, and species restoration above and beyond the minimum requirements is necessary for species recovery in the long term.

Table 3B-40: Expected population trends[1] of MIS for Mountain Longleaf Forest Habitats by alternative, National Forests in Alabama. Population trends are based on expected trends in habitat quantity and quality.

	A	B	D	E	F	G	I
RED-COCKADED WOODPECKER							
+10 YEARS	=	+	-	-	=	+	+
+50 YEARS	-	+	-	-	=	=	+

1 Population trend expressed as change from current levels: "++" = relatively large increase, "+" = increase, "=" = little to no change, "-" = decrease, "—" relatively large decrease.

The expected population trends for MIS of Mountain Longleaf habitats after 10, and 50 years of revised forest plan implementation are shown in Table B.1.7-5. Alternatives B and I, followed by Alternative G, project the most beneficial population trends for red-cockaded woodpecker. Alternatives B and I emphasize restoration of native habitats, as is needed for red-cockaded woodpecker recovery in the long term. Under Alternative I, recreation interests are tantamount to restoration objectives. This will slow native ecosystem restoration and increase costs for project mitigation.

1.7.3 Cumulative Effects

Mountain Longleaf habitats and their embedded communities used to be found as the dominant association in the ridges and south/western facing slopes of the Ridge & Valley province. In many cases, these critical lands have been drastically reduced due to fire suppression, land use history, and land management practices. Remaining Mountain Longleaf habitats encompass less than 1 percent of their historical occurrence, largely due to development and other extensive anthropogenic disturbance. Since Mountain Longleaf habitats are fire-maintained through active management, it is unlikely that large-scale restoration of the system will occur outside federally owned and managed lands. The National Forests in Alabama have a disproportionate responsibility to restore the Mountain Longleaf forest habitats to suitable sites on Talladega Division.

These critical habitats will continue to reflect the trend set forth in the direct effects section, with the greatest benefits arising from the restoration and management activities under Alternative I and B. Alternatives D, E, F, G, and A would likely result in the presence of mountain longleaf, yet will be unlikely to restore, over the long-term, adequate areas of suitable habitat for the imperiled species that rely on this habitat group.

1.8 Cedar Woodland Habitats

1.8.1 Affected environment

The cedar woodland forest and cedar glades typically occur on areas of limestone or dolomite rock. They are associated with shallow or rocky soils or outcrops. Cedar glades occur primarily in the Interior Low Plateau province of the eastern United States. Its center of distribution is in middle Tennessee and radiates out to adjacent states, which includes northwest Alabama. The cedar glade community can be sporadically found in other physiographic provinces. (Quarterman, 1986)

Table 3B-40: Current (2002) acreage of Cedar Woodland Habitats, National Forests in Alabama.

	Bankhead	Conecuh	Oakmulgee	Tal. Div.	Tuskegee	Total
CEDAR WOODLAND	956	0	0	0	0	956
	0.8%					0.2%

% is total of forest acres on each unit

Cedar woodlands and cedar glades are well-vegetated communities that are dominated by winter annuals and drought-tolerant prairie forbs and grasses. The cedar woodland forest is an early-successional woodland, characterized by an open and sparse canopy, dominated by red cedar (*Juniperus virginiana*), red bud (*Cercis canadensis*) and chinquapin oak (*Quercus muehlenbergii*). Trees in the woodland are spaced out and small in stature. Cedar glades are dominated by red cedar (*J. virginiana*) and numerous herbaceous species. Soil depth on the glades may vary from nothing on exposed rock to 5cm to 20 cm deep. Where soil depth is greater than 20cm, including potholes and cervices, thickets or woods may grow. Woodlands often surround the cedar glade. (Bartgis, 1993)

The climate is wet in the winter and early spring and dry in the summer. This, along with the thin soils and almost impervious substrate, creates different hydrologic seasons. Glades and woodlands are unique in that many plant endemics, prairie disjunct species, and habitat-restricted species thrive in this community. At least twenty-nine taxa have been identified as endemic to cedar glades, and twenty-two of these are restricted to the southeast. Northern Alabama, along with the Central Basin of Tennessee, contain many of these endemic species. Many species of special concern are associated with cedar woodlands and glades.

Cedar woodlands and cedar glades are found on less than 1% of the Bankhead National Forest. These forest types are characterized by relatively low levels of disturbance, and from a habitat perspective, their primary value is providing habitat for a variety of species dependent on mixed successional forest stages.

Table 3B-41: Current (2002) age class distribution of Cedar Woodland Habitats, National Forests in Alabama.

	Bankhead	Conecuh	Oakmulgee	Tal. Div.	Tuskegee	Total
CEDAR WOODLAND	956	0	0	0	0	956
EARLY (0-10 YEARS)	0	0	0	0	0	0
SAPLING/POLE (11-30 YEARS)	0	0	0	0	0	0
MID (31-60 YEARS)	102	0	0	0	0	102
LATE (61+ YEARS)	854	0	0	0	0	854

The primary management recommendation is protection from activities that could disrupt the glades or woodlands or other community structures and functions. Specifically, these include protection from disturbance during development of roads, and maintenance of desirable in-stream flows, maintaining an open woodland quality, buffer zones to keep equipment out and disallowing excessive fuel loading within the habitat. Because Cedar Woodland habitats constitute such a small portion of the National Forests in Alabama landbase, and management emphasis will be protection of these habitats, no management indicator species were chosen for these habitats.

1.8.2 Direct and Indirect Effects

Cedar glade communities support significant populations or assemblages of rare plant species. All high quality cedar glade communities will be managed under the 9F (rare community) prescription under all alternatives. Similarly, existing woodland conditions associated with glades also would be included under rare community provisions. Primary management needs are protection from undesirable disturbance. These communities are characterized by low intensity, low frequency disturbances, and are often most threatened by unrestrained recreational use, since many are desirable for ATV users and horse riders. Several standards for rare communities ensure their maintenance or restoration across the Forest. Alternative E, which emphasizes recreation, and alternative A, emphasizing goods and services, may present the greatest management challenge to protection of these communities and associated species. Additional rare communities standards are designed to reduce or eliminate adverse effects to rare communities caused by recreational use and the goods and services alternative.

Table 3B-42: Cedar Woodland Habitats age class distributions: +10 years, National Forests in Alabama.

	Successional Stages:	Early	Sap/Pole	Mid	Late
A	Bankhead	----	----	11%	90%
	NF's in Alabama	----	----	11%	90%
B	Bankhead	----	----	11%	90%
	NF's in Alabama	----	----	11%	90%
D	Bankhead	----	----	11%	90%
	NF's in Alabama	----	----	11%	90%
E	Bankhead	----	----	11%	90%
	NF's in Alabama	----	----	11%	90%
F	Bankhead	----	----	11%	90%
	NF's in Alabama	----	----	11%	90%
G	Bankhead	----	----	11%	90%
	NF's in Alabama	----	----	11%	90%
I	Bankhead	----	----	11%	90%
	NF's in Alabama	----	----	11%	90%

Natural maintenance of cedar woodlands and cedar glades can be attributed to drought stress with fire only playing a minor role in maintenance due to sparse vegetation. (Bartgis, 1993) Fires are usually light and patchy and not continuous due to the lack of fuels and the 9F prescription encourages emphasizing lower intensity fires with light fuels of cedar woodlands and cedar glades during prescribed burning.

Table 3B-43: Cedar Woodland Habitats age class distributions: +50 years, National Forests in Alabama.

	Successional Stages:	Early	Sap/Pole	Mid	Late
A	Bankhead	----	----	27%	74%
	NF's in Alabama	----	----	27%	74%
B	Bankhead	----	----	----	100%
	NF's in Alabama	----	----	----	100%
D	Bankhead	----	----	----	100%
	NF's in Alabama	----	----	----	100%
E	Bankhead	----	----	----	100%
	NF's in Alabama	----	----	----	100%
F	Bankhead	----	----	----	100%
	NF's in Alabama	----	----	----	100%
G	Bankhead	----	----	----	100%
	NF's in Alabama	----	----	----	100%
I	Bankhead	----	----	----	100%
	NF's in Alabama	----	----	----	100%

Since rare communities would be protected or restored across all alternatives, the effects of National Forest management on these communities and associated species would be positive under all alternatives. In an effort to restore some of the ecological role that these communities have historically played, the draft revised plan (Alternative I) will contain objectives for restoring complexes of cedar woodlands and cedar glades. However, under all alternatives this community will remain relatively rare on the forest because of its naturally limited distribution.

Table 3B-44: Projected acreage of Cedar Woodland Habitats by alternative, National Forests in Alabama.

	A	B	D	E	F	G	I
CEDAR WOODLAND							
CURRENT (2002)	1.0	1.0	1.0	1.0	1.0	1.0	1.0
+10 YEARS	1.0	1.0	1.0	1.0	1.0	1.0	1.0
+50 YEARS	1.0	1.0	1.0	1.0	1.0	1.0	1.0

* Acreage represented in thousands of acres

1.8.3 Cumulative Effects

The cumulative effect on the quantity and distribution of cedar woodland forests and cedar glades is determined by considering trends in the status of these communities through time and across private and public ownerships. Even though people increasingly use the National Forest for recreational or social needs, protection actions will have positive effects. However, based on regional conditions reported in SAMAB (1996: 49) the Bankhead National Forest contains a relatively small proportion of known occurrences of this community type; examples of the type on private lands are unlikely to receive the same level of protection. It is expected that the cumulative effects of development, recreational use, timber harvest, and other activities on private lands will result in a decrease of good examples of these community types across the landscape, making national forest examples increasingly valuable to regional conservation.

1.9 Cypress Tupelo Swamp Forest Habitats

1.9.1 Affected Environment

The Cypress-Tupelo Swamp forest is a forested wetland and is usually considered part of the riparian river bottom and floodplain forests. The community dynamics can be controlled by periodic flooding, eroding and depositing of soil ((Smith, 1979). This forest community also may be seen below the transitional from adjacent upland communities to the saturated soils in concentric rings around a sinkhole pond or lake. These areas as a whole, even in riparian areas, tend to be more ponded than flooded, so are based on re-charge from annual precipitation. Soils tend to be sandy to loamy where water is a result of surface water table rather than poor drainage soils (Goddard, 2002).

Cypress tupelo swamp forests may be found mainly on the Conecuh, Oakmulgee and Tuskegee units. The primary management recommendation is that of protection from activities that could disrupt wetland hydrology or other community structures and functions. Specifically, these include protection from disturbance during development of road crossings, and maintenance of desirable in-stream flows.

Table 3B-45: Current (2002) acreage of Cypress Tupelo Habitats, National Forests in Alabama.

	Bankhead	Conecuh	Oakmulgee	Tal. Div.	Tuskegee	Total
CYPRESS, TUPELO	0	123	4,221	0	0	**4,344**
		0.2%	2.7%			**.8%**

% is total of forest acres on each unit

Cypress-Tupelo swamps occupy saturated or inundated sites often with the cypress and tupelo co-dominant. Nearly pure blackgum or cypress swamps occur, but neither differs significantly in floristic composition from cypress-tupelo swamps (Clewell, 1985). On the Tuskegee, there are areas where tupelo, with no cypress, occur on flat floodplains consisting of silt soils in depressional areas (Goddard, 2002). It has been suggested that these cypress-bare communities may be a result of: 1) historic harvest of the cypress; and/or, 2) gradual silting in of depressional ponds over long periods of time, eventually replacing the water with silty loam soils with tupelo succeeding the cypress (TNC, 1994).

Annual precipitation from the upland recharge areas, frequency, duration, depth and timing of flooding, along with windstorms, individual tree mortality due to age, and sediment deposition are the major factors that naturally control the cypress-tupelo swamp forest (Grace, 1995). Fire is believed to play a minor role in the dynamics of this community, due to its topographic position and inundated nature. Fires can occur during drought or exceptionally dry periods, but tend to be low-intensity smoldering fires that creep through the leaf litter. Beaver activity has historically played an important role in creating open wetland habitats that are now rare on the landscape. These impoundments create inundated areas that support the regeneration and establishment of new stands of cypress tupelo swamps.

It is estimated that more than 50% of the nation's wetlands have been destroyed in the past 200 years (Ernst and Brown 1988). Under the pressures of technology and population growth, swamps are fast disappearing; it is estimated that 45 million acres of swamps and marshes in the U.S. have been lost, and 75 million more acres are under siege (Smith 1979). They are vulnerable to destruction on private land and, therefore, it is critical to maintain these communities where they occur on national forest land. Wetlands have been ditched and drained for pastures, mined for peat (Ewel 1990), and filled for shopping centers. Loss of some wetlands can also be attributed to sedimentation, pollution, and plant succession due to fire suppression (USFWS 1991). The remaining swamps are affected by urban, industrial and agricultural pollutions including the use of pesticides and herbicides in agriculture, and maintenance of rights-of-ways as they can affect vegetation miles away from the point of application ((Smith, 1979).

Table 3B-46: Current (2002) age class distribution of Cypress Tupelo Habitats, National Forests in Alabama.

	Bankhead	Conecuh	Oakmulgee	Tal. Div.	Tuskegee	Total
CYPRESS, TUPELO	0	123	4,221	0	0	**4,344**
EARLY (0-10 YEARS)	0	0	47	0	0	**47**
SAPLING/POLE (11-30 YEARS)	0	0	17	0	0	**17**
MID (31-60 YEARS)	0	47	965	0	0	**1,012**
LATE (61+ YEARS)	0	76	3,192	0	0	**3,268**

Cypress Tupelo habitats constitute only a very small portion of the National Forests in Alabama. Management direction in these habitats is for protection of wetland resources only. For these reasons no management indicator species were selected for Cypress Tupelo habitats.

1.9.2 Direct and Indirect Effects

Cypress Tupelo Swamp Forests are primarily managed under the Riparian Prescription in all alternatives. Standards under all alternatives provide for protection of hydrologic function of wetland rare communities. Beaver created wetlands would normally be treated as rare communities, but beaver populations and impoundments could be managed to avoid adverse impacts to public safety, facilities, private land resources, at-risk species, forested wetlands, and other rare communities.

Table 3B-47: Cypress Tupelo Habitats age class distributions: +10 years, National Forests in Alabama.

	Successional Stages:	Early	Sap/Pole	Mid	Late
A	Conecuh	----	----	64%	36%
	Oakmulgee	1%	----	26%	73%
	NFs in Alabama	1%	----	27%	72%
B	Conecuh	----	----	56%	44%
	Oakmulgee	1%	----	26%	73%
	NFs in Alabama	1%	----	26%	72%
D	Conecuh	----	----	55%	45%
	Oakmulgee	1%	----	26%	73%
	NFs in Alabama	1%	----	26%	72%
E	Conecuh	----	----	56%	44%
	Oakmulgee	1%	----	26%	73%
	NFs in Alabama	1%	----	26%	72%
F	Conecuh	----	----	55%	45%
	Oakmulgee	1%	----	26%	73%
	NFs in Alabama	1%	1%	25%	72%
G	Conecuh	----	----	55%	45%
	Oakmulgee	1%	----	26%	73%
	NFs in Alabama	1%	----	26%	72%
I	Conecuh	----	----	55%	45%
	Oakmulgee	1%	----	26%	73%
	NFS IN ALABAMA	2%	----	26%	72%

Because wetland rare communities would be protected and maintained in all alternatives, no adverse direct or indirect effects to these communities are expected. Restoration efforts and creation of new wetlands through beaver activity may result in increased occurrence of these communities. However, analysis indicates that, under all alternatives, the cypress tupelo swamp forests would remain uncommon on the units because of their naturally limited distribution.

Table 3B-48: Cypress Tupelo Habitats age class distributions: +50 years, National Forests in Alabama.

	Successional Stages:	Early	Sap/Pole	Mid	Late
A	Conecuh	----	----	----	100%
	Oakmulgee	----	----	1%	99%
	NFs in Alabama	----	----	1%	99%
B	Conecuh	----	----	----	100%
	Oakmulgee	----	----	1%	99%
	NFs in Alabama	----	----	1%	99%
D	Conecuh	----	----	----	100%
	Oakmulgee	----	1%	1%	98%
	NFs in Alabama	----	1%	1%	98%
E	Conecuh	----	----	----	100%
	Oakmulgee	----	----	1%	99%
	NFs in Alabama	----	----	1%	99%
F	Conecuh	----	----	----	100%
	Oakmulgee	1%	----	1%	98%
	NFs in Alabama	1%	----	1%	98%
G	Conecuh	----	----	----	100%
	Oakmulgee	----	----	1%	99%
	NFs in Alabama	----	----	1%	99%
I	Conecuh	----	----	----	100%
	Oakmulgee	----	----	1%	99%
	NFs in Alabama	----	----	1%	99%

Table 3B-49: Projected acreage of Cypress Tupelo Habitats by alternative, National Forests in Alabama.

	A	B	D	E	F	G	I
CYPRESS, TUPELO							
CURRENT (2002)	4.3	4.3	4.3	4.3	4.3	4.3	4.3
+10 YEARS	4.5	4.5	4.5	4.5	4.5	4.5	4.4
+50 YEARS	4.5	4.5	4.5	4.5	4.5	4.5	4.4

* Acreage represented in thousands of acres

1.9.3 Cumulative Effects

Because all alternatives place priority on protection and maintenance of these communities, cumulative effects on national forest lands are expected to be neutral to positive. However, a significant proportion of the Coastal Plain swamps and Southern Appalachian cypress tupelo swamps are located on private lands (SAMAB 1996: 190) where protection may be poorly regulated. For these reasons, protection of this forest community on national forest lands is important to maintaining viability of associated species within the region.

2.0 Rare Communities

2.1 Wetland Rare Communities

2.1.1 Affected Environment

It is estimated that more than 50% of the nation's wetlands have been destroyed in the past 200 years (Ernst and Brown 1988). They are vulnerable to destruction on private land and, therefore, it is critical to maintain these communities where they occur on national forest land. Wetlands have been ditched and drained for pastures, mined for peat (Ewel 1990), and filled for shopping centers. Loss of some wetlands can also be attributed to sedimentation, pollution, and plant succession due to fire suppression (USFWS 1991). Beaver activity has historically played an important role in creating open wetland habitats that are now rare on the landscape. Beaver wetlands are beneficial for many rare species such as monkey face orchid (Shea 1992), but may be detrimental to others such as bog turtle (Jensen, pers. comm). Beaver impoundments also may cause unacceptable impacts to facilities and other resources.

Rare wetland communities in the Southern Appalachians, Cumberland Plateau, Piedmont and Coastal Plain include bogs, fens, seeps, swamps, ponds, pond margins, wet prairies, bayheads & baygalls, river gravel-cobble bars, and river scour areas as defined in this section. It is estimated that 5% of the national forest lands in Alabama may contain at least fragments of these communities. High quality sites, containing endemics, diversity of plants and animals, as well as retaining most of the structural and biological components are estimated to occur on less than 1% of the land base.

Bogs, fens, seeps, and ponds may be found in all regions, and are characterized by 1) soils that are semi-permanently to permanently saturated as a result of groundwater seepage, perched water tables, rainfall, or beaver activity, but otherwise are generally nonalluvial, and 2) presence of wetland-associated species such as sphagnum, ferns, and sedges. Dominant vegetation may be herbs, shrubs, trees, or some complex of the three. Ponds in this group include limesink, karst, and depression ponds, which may hold areas of shallow open water for significant portions of the year. Also included are historic wetlands resulting from beaver activity. New or artificial impoundments are not included, unless they support significant populations or associations of species at risk. The primary management need is that of protection from activities that could disrupt wetland hydrology or other community structures and functions. Some sites may require periodic vegetation management to maintain desired herbaceous and/or shrubby composition. Wetland rare communities that can be found on the National Forests in Alabama include but may not be limited to: Appalachian swamp forest/bog complex, Appalachian bogs, fens, wet prairie, upland seasonal ponds, forested acid seeps, beaverponds and wetland complex, Atlantic white cedar swamp, alluvial ponds, coastal plain ponds and pond margins, coastal plain baygalls and bayheads, coastal plain seepage bogs, karst-sinkholes, small stream forests.

Riverine rare communities are characterized by 1) sites adjacent to or within stream channels that are exposed to periodic flooding and scour, and 2) presence of significant populations or associations of species at risk. These communities may be found in both Appalachian and Piedmont regions. Primary management needs are protection from disturbance during development of road crossings, and maintenance of desirable in-stream flows. These communities include River Gravel-Cobble Bars, and river scours.

The SAA Terrestrial Report summarizes the approximate number of occurrences of some of these wetland communities on National Forest lands in the Southern Appalachians (SAMAB 1996: 190). These tend to be relatively small in size and scattered throughout the landscape.

Wetland rare communities support a large number of species of viability concern.

2.1.2 Direct and Indirect Effects

Wetland rare communities would be managed under all alternatives under the 9F Rare Community Prescription for protection, maintenance, and where possible, restoration. These wetlands generally fall within riparian corridors, so provisions of the Riparian Prescription also would apply. Standards under all alternatives provide for protection of hydrologic function of wetland rare communities, and prohibit fish stocking to maintain suitability for amphibian breeding. Beaver created wetlands would normally be treated as rare communities, but beaver populations and impoundments could be managed to avoid adverse impacts to public safety, facilities, private land resources, at-risk species, and other rare communities.

Because wetland rare communities would be protected and maintained in all alternatives, no adverse direct or indirect effects to these communities are expected. Restoration efforts and creation of new wetlands through beaver activity may result in increased occurrence of these communities to the benefit of associated species. However, analysis indicates that, under all alternatives, wetland rare communities would remain uncommon on the forest because of their naturally limited distribution.

2.1.3 Cumulative Effects

Because all alternatives place priority on protection and maintenance of these communities, cumulative effects on national forest lands are expected to be positive. However, a significant proportion of Southern Appalachian wetland rare communities are located on private lands (SAMAB 1996: 190) where protection may be poorly regulated. For these reasons, protection of these habitats on national forest land is important to maintaining viability of associated species within the region.

2.2 Glades, Barrens, and Associated Woodlands

2.2.1 Affected Environment

Glades and barrens are characterized by thin soils and exposed parent material that result in localized complexes of bare soils and rock, herbaceous and/or shrubby vegetation, and thin, often stunted woods. During wet periods, they may include scattered shallow pools or areas of seepage. Glades, barrens, and associated woodlands differ from rock outcrop communities by exhibiting soils and vegetative cover over the majority of the site, and differ from the more widespread woodland communities in that they occur on geologic substrates that are rare for the region, including limestone, dolomite, amphibolite, greenstone, mafic rock, serpentine, sandstone, or shale. Associated communities include Calcareous Woodlands and Glades, Mafic Woodlands and Glades, Serpentine Woodlands and Glades, and Shale Barrens as defined in the Southern Appalachian Assessment (SAMAB 1996: Appendix C). At a minimum, this rare community complex includes rare associations including but not limited to Limestone or dolomite woodlands and glades, serpentine woodlands and glades, shale glades and barrens, mafic glades and barrens, grassy pine glades and prairies.

These communities may be found in the Appalachian, Cumberland Plateau and Piedmont regions on the Bankhead, Oakmulgee, Shoal Creek and Talladega units. Limestone or dolomite, and sandstone glades and barrens occur primarily in the Ridge and Valley physiographic provinces ranging from Northern Alabama to Kentucky. Good examples are few and very restricted in distribution, and occupy less than 0.5% of the national forest lands in Alabama. Shale and mafic woodlands are more widespread in distribution, and may be forested if fire has not played a role in their maintenance or restoration. Most occurrences for mafic associations are from the Piedmont, but may occur as high as 3800 feet in elevation.

The SAA (1996:49) concluded that only 25% of the known occurrences for species associated with mafic and other calcareous habitats, occurred on national forest lands. Occurrence data for these communities on National Forest land is limited. Numbers of species of concern associated with glades, barrens, and associated woodlands include approximately 17 species on the Piedmont and 110 species in the Southern Appalachian/Cumberland Plateau. The majority are vascular plants (88% and 91% in Piedmont and Southern Appalachian/Cumberland plateau, respectively) followed by insects and reptiles.

Currently, inventory information for these communities is incomplete. Though underlying soils may differ from the surrounding soils in exchangeable nutrient capacity or pH, they may be overlooked in mapping efforts since they often occur as small inclusions within larger stands. To achieve desired composition and structure within these communities, many will require active restoration, such as basal area reduction, woody understory and mid-story control, or prescribed fire. Prescribed fire will often be needed to maintain these communities once restored.

Complexes of woodlands, savannas, and grasslands were once a frequent occurrence across the southeastern landscape, maintained with frequent fire on xeric ridge-tops and south-facing slopes (DeSelm and Murdock, 1993; Davis et al., 2002). Woodlands are open stands of trees, generally forming 25 to 60 percent canopy closure (Grossman et al. 1998:21) and may be of pine, hardwood (typically oak), or mixed composition. Savannas are usually defined as having lower tree densities than woodlands; grasslands are mostly devoid of trees. All of these conditions typically occurred in mixed mosaics within a fire-maintained landscape. In all cases, a well-developed grassy or herbaceous understory is present.

Existing remnants of this habitat and several associated rare species are limited primarily to roadsides and powerline rights-of-way (Davis et al., 2002) due to reductions in fire frequency across most landscapes. Some good examples of this community also may be found in areas managed for featured species such as the red-cockaded woodpecker and northern bobwhite quail.

Many species of viability concern area associated with this community in all the ecoregions. Of these, the majority are vascular plants, followed by reptiles, birds, and insects. Because existing woodland, savanna, and grassland complexes are rare and not consistently tracked, the current acreage in such condition is not well documented

2.2.2 Direct and Indirect Effects

Glades, barrens, and associated woodlands are identified under all forest plan revision alternatives as rare communities to be protected, restored, and maintained under the rare community prescription. Many examples of this type are likely to be overgrown or in need of some level of restoration. Some negative short-term effects to individual plants and animals associated with these communities could occur as a result of active restoration activities, which may temporarily alter the timing of reproduction or growth. Restoration and maintenance activities may cause some short-term negative effects by causing disturbance, mortality, or temporarily setting back plant and animal reproduction or growth. However, species associated with this community are relatively adapted to such disturbances, which are necessary to create and maintain optimal habitat conditions. In balance, these actions would result in beneficial effects to associated species. Short-term negative effects to species associated with these communities are expected to be small and discountable compared to the long-term positive benefits of habitat restoration activities. The Rare Community Prescription provides priority to protection and maintenance of such sites under all alternatives, including regular prescribed burning to maintain desired species composition and vegetation structure. Therefore, these sites are expected to be sustained for the foreseeable future under all alternatives.

Although the glade and barren communities are naturally restricted in distribution by soil conditions, under the rare community prescription all occurrences would be managed for restoration and maintenance of their characteristics. This emphasis is expected to result within 50 years in an abundance and distribution of this community on the National Forests in Alabama similar to that which occurred historically. However, since the majority of the best glades and woodlands occur on either private lands or lands administered by other agencies, any occurrences may be crucial to the recovery and maintenance of these rare community types.

2.2.3 Cumulative Effects

Cumulative effects on the quantity and distribution of these rare communities are predicted by considering opportunities to inventory and restore these communities across alternatives and across private and public ownerships. Ability to protect and restore these communities on the National Forest is limited by knowledge regarding their occurrence and distribution on the landscape. If only 25% of the known sites for this community type occur on National Forest land where management would be optimal, the majority of glades, barrens, and associated woodlands on the landscape likely occur on private lands where they may be vulnerable to development, competition with successional vegetation, and extirpation. Restoration and management activities on the National Forests in Alabama would play a critical role in the conservation of this community within the landscapes containing national forest land. It is not expected that private landowners will restore or manage to maintain significant amounts of woodland, savanna, and grassland complexes; therefore, they would remain limited in abundance without national forest restoration efforts.

Given the emphasis on rare communities under all Forest Plan revision alternatives, our knowledge regarding their distribution on National Forest land is likely to increase. This outcome suggests that the National Forest will play a larger role than private land in the conservation of glades, barrens, and associated woodlands in the future. Cumulatively, effects of forest plan revision implementation are likely to be critical to the maintenance of this community and associated rare species. The importance of national forest management is expected to increase with time, as national forest inventories and restoration efforts improve and private land examples of the community are subject to increasing pressures or neglect.

2.3 Forested Rare Communities

2.3.1 Affected Environment

Forested rare communities include the low elevation basic mesic forests, forested canebrakes and sandhills, all of which occur scattered throughout the landscape on the National Forests in Alabama. It is estimated that these forested rare communities occur on less than 3% of the total acreage.

The low-elevation basic mesic forest communities are characterized by closed-canopy deciduous overstories and rich and diverse understories of calciphilic herbs, underlain by high-base geologic substrates. On moderate to high elevation sites, these communities are typically found in protected coves, and can be distinguished from more acidic mesic cove forests by the abundance of species such as white basswood (*Tilia americana*), yellow buckeye (*Aesculus flava*), black walnut (*Juglans nigra*), faded trillium (*Trillium discolor*), sweet white trillium (*Trillium simile*), black cohosh (*Cimicifuga racemosa*), blue cohosh (*Caulophyllum thalictroides*), whorled horsebalm (*Collinsonia verticillata*), mock orange (*Philadelphus inodorus*), sweet shrub (*Calycanthus floridus*), sweet cicely (*Ozmorhiza* spp.), doll's eyes (*Actaea racemosa*), maidenhair fern (*Adiantum pedatum*), and plantain-leaved sedge (*Carex plantaginea*). Good examples of moderate and high elevation basic mesic forests have a low incidence of white pine (*Pinus strobus*), eastern hemlock (*Tsuga canadensis*), rhododendron (*Rhododendron* spp.), and Christmas fern (*Polystichum acrostichoides*).

An oak-dominated variant of moderate to high elevation basic mesic forest occurs over limestone on upper to mid slopes of the Interior Plateau of Tennessee, the Cumberlands of Alabama, and the Ridge and Valley of Georgia. This basic mesic community is dominated or codominated by shumard oak (*Quercus shumardii*) or chinquapin oak (*Quercus muehlenbergii*), in combination with various species of oaks and hickories and either sugar maple (*Acer saccharum*), chalk maple (*Acer leucoderme*), or southern sugar maple (*Acer barbatum*). Typical calciphilic understory species also are present.

On lower elevation sites, these communities are more typically found on north slopes, where dominant and characteristic overstory species are American beech (*Fagus grandifolia*) and northern red oak (*Quercus rubra*), with tulip poplar (*Liriodendron tulipifera*), white oak (*Quercus alba*), shagbark hickory (*Carya ovata*), or white ash (Fraxinus *americana*), with southern sugar maple, chalk maple, painted buckeye (*Aesculus sylvatica*), and pawpaw (*Asimina triloba*) in the midstory and shrub layers, and understories that include faded trillium, nodding trillium(*Trillium rugelii*), black cohosh, doll's eyes, foam flower (*Tiarella cordifolia var. collina*), bloodroot (*Sanguinaria canadensis*), bellworts (*Uvularia sp.*) and trout lilies (*Erythronium spp.)*. Good examples of low elevation basic mesic forests have a low incidence of sweetgum (*Liquidambar styraciflua*), loblolly pine (*Pinus taeda*), and exotics such as Japanese honeysuckle (*Lonicera japonica*) or Chinese privet (*Lingustrum vulgare*).

Basic mesic forest communities are found in the Appalachian, Cumberland Plateau, Coastal Plain and Piedmont regions.

The Southern Appalachian Assessment (SAMAB 1996:49) combined mesic and xeric mafic communities, and concluded that only 25% of the known occurrences for species associated with mafic and other calcareous habitats, occurred on National Forest land. Several species of viability concern are associated with basic mesic forests, with the majority being vascular plants (EIS, Appendix F). Identification of these communities is typically based on site-specific inventories.

Although at the time of European settlement, canebrakes were common in the Southeast, they rapidly disappeared following settlement due to factors such as overgrazing, clearing of land for farming, altered burning regimes, and changes in floodplain hydrology (Brantley and Platt, 2001). Faunal surveys in canebrakes are quite limited and canebrake ecology has been largely ignored by contemporary workers (Platt and Brantley 1997). At least six species of butterfly may be canebrake obligates (Scott 1986, Opler and Malikul 1992), and 5 of the 6 are thought to be declining due to destruction of cane habitat (Opler and Malikul 1992). Canebrakes also provide habitat for nesting Swainson's warbler (*Limnothlypis swainsonii*), a bird that is threatened by destruction of this habitat (Hamel 1992, Brown and Dickson 1994). Large canebrakes are extremely rare today, and therefore it is critical to maintain these communities where they occur on Forest Service land.

Canebrakes are characterized by almost monotypic stands of giant or switch cane (*Arundinaria gigantea or A. tecta*), often with no or low densities of overstory tree canopy. They are typically found in bottomlands or stream terraces. This community is found in the Appalachian, Cumberland Plateau, Piedmont, and Coastal Plain regions. Primary management needs are restoration and maintenance through overstory reduction and periodic prescribed fire.

The xeric sandhill community occurs in the east gulf coastal plain, where it is restricted to extrememly deep sandy soils. It is distinctive for it's lack of wiregrass and the extreme edaphic conditions. This association may have sentinel trees of longleaf pine (10-30% canopy) but is dominated by bluejack oak, turkey oak, sand post oak and sand live oak. The structure is highly variable depending on interval, seasonality and intensity of fires, resulting in a range from shrubs to small trees sparsely arranged. Hawthorn and gopher apple are typically present, while little bluestem and several endemic herbs may comprise the herbaceous understory.

Xeric sandhills can be distinguished from surrounding forests and woodlands by an increase in elevation, extremely deep sandy soils, low overstory density, and the small shrubby growth from of oak species.

2.3.2 Direct and Indirect Effects

All high quality basic mesic forest communities will be managed under the 9F (rare community) prescription under all alternatives. Primary management needs are protection from undesirable disturbance. These communities are characterized by low intensity, low frequency disturbances, and are often most threatened by recreational use, since many are desirable for interpretive trails. Several standards for rare communities ensure their maintenance or restoration across the Forest. The 9F prescription encourages the exclusion of basic mesic forests from prescribed burning blocks where this can be accomplished without large increases in fireline construction, and discourages direct firing unless necessary to secure control lines. Only low intensity fires are allowed. Alternative E, which emphasizes recreation, may present the greatest management challenge to protection of these communities and associated species. Additional rare communities standards are designed to reduce or eliminate adverse effects to rare communities caused by recreational use.

Although cane is found commonly as an understory component in bottomlands and stream terraces, provisions of the Rare Community Prescription would apply only to larger patches (generally greater than 0.25 acres) exhibiting high densities that result in nearly monotypic conditions, or to areas selected for restoration of such conditions. In addition, the rare community prescription would be applied to these communities where there are less than five (5) known occurrences on the unit, they contain rare plant species or are in particularly good condition. All existing canebrake communities meeting this definition would be managed under all alternatives for protection and maintenance. Restoration objectives are defined for the Revised Forest Plan (Alternative I) and would vary by alternative. Canebrakes generally fall within riparian corridors, and therefore, would also be subject to Riparian Prescription provisions.

Direct effects would be those of management activities conducted to restore and maintain the canebrakes. These management options would include prescribed burning and/or herbicide treatment to control competing herbaceous and woody vegetation and restore culm vigor, and overstory and midstory removal to restore declining stands of cane.

By specifically directing restorative prescribed burns on a 2 to 8-year interval, impacts to the canebrake should be beneficial. Prescribed burning would be carried out following standards and guidelines for prescribed fire, including prohibition of fire-line construction in rare communities. Overstory and midstory removal, where needed for restoration, would be conducted under the standards and guidelines developed for rare communities, thus preventing direct adverse effects to the canebrakes during implementation of the vegetation removal. Restoration and maintenance actions would result in long-term beneficial effects to the species associated with canebrake communities through improvement of their habitat. Canebrake restoration efforts would occur only on sites currently supporting cane.

Trends in abundance and condition of canebrakes would be positive under all alternatives, except Alt F (No Action), due to new focus on maintenance and restoration of this community. However, because of relatively low levels of restoration expected under all alternatives coupled with current rarity, canebrake communities are expected to remain rare for the foreseeable future relative to their historical distribution. Higher levels of restoration are not anticipated under any alternatives except Alternative B because other resource considerations receive priority within the riparian areas where most restoration opportunities exist.

Restoration and maintenance activities that result in an open forest canopy such as prescribed burning (including dormant, frequent, and summer burning), thinning, mid-story removal, mowing, and possible direct herbicide application directly affects the abundance of the sandhill community type. Some short-term negative direct effects are possible due to the incidental mortality of birds or reptiles while nesting or breeding, to the seed or root bank of plants occurring in the stands at the time of project activities, and to those individuals overlooked in the project area at the time that activities are implemented. Activities may temporarily set back plant and animal reproduction or growth. All known populations of threatened, endangered, and sensitive species will be protected from management activities that are likely to adversely affect them.

Since rare communities would be protected or restored across all alternatives, the effects of National Forest management on these communities and associated species would tend to maintain or offer restoration opportunities under all alternatives. However, under all alternatives these communities will remain relatively rare on the forest because of their naturally limited distribution.

2.3.3 Cumulative Effects

The cumulative effect on the quantity and distribution of basic mesic forests is determined by considering trends in the status of these communities through time and across private and public ownerships. Even though people increasingly use the National Forest for recreational or social needs, protection actions will have positive effects.

Management direction for canebrake communities is similar across revision forests. Because priority is put on these communities, effects of national forest management on them and the associated species is expected to be beneficial under all alternatives, except Alternative F. However, this community under all alternatives and in all ecoregions will remain rare relative to its historical distribution, making these habitats on national forest land critical to associated species.

Planned levels of maintenance and restoration activities on National Forest lands will influence the future abundance of coastal plain upland communities. The ability to meet the activity levels requiring thinning, burning and/or restoration methods will vary among the alternatives due to the differences in management intensity and emphasis. It is expected that continued protection and restoration of these communities, as emphasized in the rare community prescription will continue to ensure the presence and full functionality of this ecosystem.

Because the National Forests in Alabama occupy less than 4% of the land base in Alabama, they likely contain a relatively small proportion of known occurrences of this community type; examples of the type on private lands are unlikely to receive the same level of protection. It is expected that the cumulative effects of development, recreational use, timber harvest, and other activities on private lands will result in a decrease of good examples of these community types across the landscape, making national forest examples increasingly valuable to regional conservation.

2.4 Rock Outcrops and Cliffs

2.4.1 Affected Environment

Rock outcrops and cliffs are defined here as rare communities and include the following types of communities:

The low-elevation forested boulderfield community is characterized by rock fields, found below 3,500 feet elevation, that support a variable density of trees, typically dominated by a mixed pine (*Pinus palustris, P. echinata* and *P. virginiana*) and Oak/Hickory overstory. The understory is often composed of currant and Rockcap fern. It also may contain a rich bryophyte community. A new type-location of low elevation boulderfield was recently discovered and described on the Talladega/Shoal Creek analysis area in 2002 (Major, 2002). It is distinguished from talus slopes by the presence of trees, and is found in the Appalachian region, on the Talladega and Shoal Creek units.

Cliff and bluff communities are characterized by steep, rocky, sparsely-vegetated slopes, usually above streams or rivers. Cliff communities may be dry or wet, and include communities associated with waterfalls, such as spray cliffs and rock houses. These communities are found in the Appalachian and Cumberland Plateau regions, including the Bankhead, Shoal Creek, and Talladega. These have also been found along the Cahaba directly north of the Oakmulgee. This community includes Calcareous Cliffs, Mafic Cliffs, Sandstone Cliffs, and Spray Cliffs

Rock outcrop communities are characterized by significant areas of exposed, usually smooth, exfoliating granite, sandstone or calcareous rocks, with scattered vegetation mats and abundant lichens. These communities are found in both the Appalachian, Cumberland Plateau and Piedmont regions, and include the Bankhead, Oakmulgee, Shoal Creek and Talladega. This community includes sandstone, granite and limestone outcrops.

2.4.2 Direct and Indirect Effects

As stated above, rock outcrop and cliff communities are considered rare communities and will be managed optimally for protection, restoration, and/or maintenance through the 9F (rare community) prescription. This direction is the same under all plan alternatives thus the effects of National Forest management on these communities and associated species is expected to be neutral. A subset of these communities that are associated with riparian areas (spray cliffs, waterfalls, etc.) is also afforded protection by the riparian prescription under all plan alternatives. However, this habitat type will remain rare and poorly distributed on National Forest lands under all alternatives due to its naturally limited distribution.

2.4.3 Cumulative Effects

Cumulatively, these communities are vulnerable to negative impacts on private lands, making National Forest sites critical to maintain. As mitigation and protection above these communities is maintained, the sites on National Forest lands should remain intact.

2.5 Other Rare Communities

2.5.1 Affected Environment

This section includes caves, mines, karst and sinkhole formations. These can be found on physiographic province and have been reported on all units on the National Forests in Alabama except for the Tuskegee.

The cave and mine community types are characterized by natural and human-made openings in the ground that extend beyond the zone of light, creating sites buffered in relation to the outside environment. Included are karst and sinkhole features and sinking streams that lead to subterranean environments. Surfaces of karstlands are directly linked to cave water systems and aquifers (Kastning and Kastning 1990).

The shape and location of entrances, along with the hydrology, configuration, size, elevation, and patterns of airflow influence the types of fauna found within caves and mines (SAMAB 1996: 180). Many bats are dependent on caves, both seasonally and year-round. Bats select roosts with temperatures appropriate to their metabolic processes (Tuttle and Stevenson 1977). An intermediate, unusable range of temperatures characterizes most caves, and bats use a very small number of caves with desirable conditions.

In the Southern Appalachians, most caves are found in carbonate valleys of the Ridge and Valley and the Cumberland Plateau (SAMAB 1996: 180). The Blue Ridge contains fissure caves and a smaller number of solution caves found in limestone or dolomite collapsed valleys and windows. Because of their rarity and vulnerability, their protection is a key conservation need within this region (SAMAB 1996: 37). Sinkholes and karstlands are scattered throughout the planning area, and large examples are rare. They are most common in the Northern and Central Ridge and Valley (Jefferson National Forest), as well as the Cumberland Plateau (Bankhead National Forest), with fewer occurrences known from the Blue Ridge (SAMAB, 1996: 189).

There are sinkholes and sinkhole ponds scattered throughout the Conecuh and a notable cave that harbors seasonal use by several hundred Southeastern myotis in Alabama. There is a large cave located to the northeast of the Oakmulgee district, which has also been documented to contain small numbers of southeastern myotis bats. A cave in Calhoun County, on private land, approximately 5 miles northwest of the Shoal Creek has been found to harbor gray bats. A cave in Talladega County has also been recently discovered in 2002, occurring in sandstone, and has been found to harbor a species of long-eared bats.

Abandoned mines have become key year-round resources for bats displaced from natural roosts, including caves and large hollow trees, by human disturbance (Tuttle and Taylor 1994). Abandoned mines may provide microclimates similar to those of caves. Mines are used for maternity sites, hibernation sites, migratory stopover sites, and temporary night roosts. Some bats rely heavily on use of mines range-wide, and many bat species are believed to hibernate exclusively in old mines or caves (Tuttle and Taylor 1994).

The karst formations are located on the Oakmulgee (with subsets of dolomite on the Oakmulgee and northeastern Shoal Creek) and the Bankhead. Over 125 caves have been documented on the Bankhead National Forest. At least one, possibly two mine portals are known from the Shoal Creek, while rock wells occur all across the National Forests in Alabama and have demonstrated heavy use of overwintering bats in other locations in the south.

2.5.2 Direct and Indirect Effects

Possible threats to national forest caves and mines are: 1) direct disturbance from human visitation or improperly installed gates/closure devices, 2) management activities that indirectly result in alteration of temperature, humidity, surface water recharge or water quality, and 3) temporary decline in air quality due to prescribed burning (SAMAB 1996:90).

Provisions of the Rare Community Prescription (9F) and Forest-wide direction apply to caves and mines that support cave-associated species and are the same across all alternatives. Direct disturbance from human visitation is regulated by a standard that requires use of proper closure devices for caves and mines supporting species at viability risk (Cherokee FW-23). Consistent inclusion of this standard under all alternatives is expected to reduce frequency and degree of human intrusion, providing beneficial effects to associated species.

Management actions that may result in indirect alteration of temperature, humidity, surface water recharge or water quality within caves or mines include vegetation clearing and management, construction of roads, trails and other recreation developments, and other use of heavy equipment. Standards under all alternatives provide for undisturbed buffers around significant caves and mines and associated features to maintain vegetative cover and moist microclimatic conditions. Prohibited activities include vegetation cutting, recreation site development, and construction of roads, skid trails and log landings. Buffers surrounding those caves and mines occupied by federally listed bats will be protected from these actions; these activities are prohibited within ¼ mile of the site Until caves, mines, and associated features have been surveyed for use by federally listed bats, these species are assumed to be present and habitat is maintained for them by applying standards for occupied sites. Implementation of the Riparian Prescription (Rx 12) will also contribute to high water quality and abundant aquatic macroinvertebrates in cave water systems and connected streams.

Identifying caves and mines as smoke sensitive targets and planning to avoid them when developing prescribed burn plans mitigates effects of prescribed burning. Buffers around caves and mines occupied by federally listed bats will not be prescribed burned. Until caves or mines have been surveyed for use by federally listed bats, these species are assumed to be present and habitat is maintained for them by applying standards for occupied sites.

For more discussion on protection of other habitat issues for federally listed bats, see Section 6.0.

All caves and mines suitable for supporting characteristic fauna would be managed optimally for protection under all alternatives. Because of the priority put on protection of this community and associated species, effects of national forest management are expected to be positive under all alternatives.

2.5.3 Cumulative Effects

Caves and other karst features are naturally rare elements. In addition, a significant proportion of Southern Appalachian caves (95%) are located on private lands (SAMAB 1996: 37, 49) where protection may be poorly regulated. For these reasons, effects of protection of these habitats on national forest land is important to maintaining viability of associated species within the region.

3.0 Terrestrial Habitats

3.1 Mix of Early and Late Successional Forests

3.1.1 Affected Environment

Successional stages of forests are the determining factor for presence, distribution, and abundance of a wide variety of wildlife. Some species depend on early-successional forests, some depend on late-successional forests, and others depend on a mix of both occurring within the landscape (Franklin 1988, Harris 1984, Hunter et al. 2001, Hunter 1988, Litvaitis 2001). These habitat conditions are also important as wintering and stopover habitats for migrating species (Kilgo 1999, Suthers 2000, Hunter et al. 2001). Therefore, it is important that varying amounts of both types of habitat be provided within National Forest landscapes.

This section deals only with successional forest conditions. Permanent openings such as barrens and glades, balds, wildlife openings, old fields, pastures, and rights-of-way are covered elsewhere in this document. Mid- and late-successional conditions are covered only generally in this section. More detailed treatment of desired conditions for these successional stages can be found under individual forest community sections, the Old Growth section, and the Forest Interior Bird section.

For analysis purposes, forest succession is divided into four stages: early-, sapling/pole, mid-, and late- (SAMAB 1996:11, 284). Early-successional forest is defined as regenerating forest of 0 to 10 years of age for all forest community types. It is characterized by dominance of woody growth of regenerating trees and shrubs, often with a significant grass/forb component, and relatively low density or absent overstory. This condition is distinguished from most permanent opening habitats by dominance of relatively dense woody vegetation, as opposed to dominance of grasses and forbs. Such conditions may be created by even-aged and two-aged regeneration cutting, and by natural disturbance events, such as windstorms, severe wildfire, and some insect or disease outbreaks. Ages defining the remaining successional stages vary slightly by forest community type. Sapling/pole forest is characterized by canopy closure of dense tree regeneration, with tree diameters typically smaller than 10 inches. Mid-successional forest begins to develop stratification of over-, mid-, and understory layers. Late successional forests have developed canopy height diversity or disturbance-maintained structure, and display old growth characteristics in many community types. This stage usually contains the largest trees and often has well-developed canopy layers and scattered openings caused by tree mortality; or if the community is a fire, or disturbance sub-climax type, it may develop a woodland or savanna structure. The National Forests in Alabama forest ages corresponding to successional stages for each forest community type differ from other SAA Forests slightly owing to the extreme southerly distribution of its forest ecosystems. Forest stands reach the mid-successional structural stage at earlier ages in the more-fertile soils of the Piedmont and Coastal Plain. The *Dry and Dry-Mesic Oak-Pine Forest* community is dominated by pine forest types (31 and 25) on all National Forest in Alabama management units and therefore reaches the late successional stage at 60+ years, as do the other pine-dominated and disturbance adapted communities.

Table 3B-50: Forest age (years) corresponding to successional stages for each community type.

	Successional Stage			
Forest Community Type	**Early**	**Sapling/Pole**	**Mid**	**Late**
Cedar Woodlands	**0-10**	**11-30**	**31-60**	**61+**
Conifer-Northern Hardwood Forest	**0-10**	**11-30**	**31-80**	**81+**
Mixed Mesophytic Forest	**0-10**	**11-30**	**31-80**	**81+**
River Floodplain Hardwood	**0-10**	**11-30**	**31-60**	**61+**

	Successional Stage			
Forest Community Type	**Early**	**Sapling/Pole**	**Mid**	**Late**
Forest				
Dry-Mesic Oak Forest	**0-10**	**11-30**	**31-80**	**81+**
Dry and Xeric Oak Forest; Woodland and Savanna	**0-10**	**11-30**	**31-80**	**81+**
Xeric Pine & Pine-oak Forest & Woodland	**0-10**	**11-30**	**31-60**	**61+**
Montane Longleaf Pine	**0-10**	**11-30**	**31-60**	**61+**
Upland Longleaf Forest, Woodland & Savanna	**0-10**	**11-30**	**31-60**	**61+**
Dry and Dry-mesic Oak-pine Forest	**0-10**	**11-30**	**31-60**	**61+**
Coastal Plain Upland Mesic Hardwood Forest	**0-10**	**11-30**	**31-80**	**81+**
Cypress-Tupelo Swamp Forest	**0-10**	**11-30**	**31-60**	**61+**
Southern Wet Pine Forest, Woodland & Savanna	**0-10**	**11-30**	**31-60**	**61+**

Of particular importance as habitat are forest conditions that exist at both extremes of the forest successional continuum – early-successional and late-successional forests. Appendix F identifies species of viability concern associated with early-successional forests, mixed successional forest landscapes, and late-successional forests of a variety of forest community types.

Early-successional forests are important because they are highly productive in terms of forage, diversity of food sources, insect production, nesting and escape cover, and soft mast. Early-successional forests have the shortest lifespan (10 years) of the forest successional stages, and are typically in short supply and declining on national forests in the Southern Appalachians (SAMAB 1996:28), and in the eastern United States (Thompson 2001). Early-successional forests are also not distributed regularly or randomly across the landscape (Lorimer 2001). These habitats are essential for some birds (bobwhite quail, prairie warbler, yellow-breasted chat, Swainson's warbler); key to deer, turkey, and bear in the South; and sought by hunters, berry pickers, crafters, and herb gatherers for the wealth of opportunities they provide (Gobster 2001). Many species commonly associated with late-successional forest conditions also use early-successional forests periodically, or depend upon it during some portion of their life cycle (Hunter et al. 2001).

Sapling/pole stages are generally of least value to wildlife because closed canopies limit understory development, and trees are not yet large and old enough to begin producing mast or other wildlife benefits. However, this successional stage does provide value as cover for some species. Mid-successional forests begin to look and function like late-successional forests, and provide habitat for many species that use late-successional forests. For most of these species however, mid-successional forests provide lower quality habitat than do late-successional forests.

Like early-successional forests, late-successional forests provide habitats and food supplies for a suite of habitat specialists as well as habitat generalists. These habitats are important providers of high canopy nesting, roosting, and foraging habitat, suitable tree diameters for cavity development and excavation, and relatively large volumes of seed and hard mast. Although it takes many decades for late-successional forest conditions to develop, these habitats are more common and contiguous across national forest lands than surrounding landscapes and are dominant features in the SAA area (SAMAB 1996:28).

At the time of the SAA, those National Forest lands had only 3% of forest habitats in the early-successional stage, while 89% was in the mid- and late-successional classes; 45% of this was late-successional forest (SAMAB 1996:168). Other public lands were similar to the National Forest. Conversely, private industrial lands had 22% in early-successional forest and only 4% in late-successional forest; private non-industrial had 8% in early-successional forest and 9% in late-successional forest (SAMAB 1996:168-169). The 20-year trends (SAMAB 1996:28) show early-successional forest on the national forests decreasing by 4%, with late-successional forest increasing by 34%. Trends for private forests are mixed, with increases in both early- and late-successional forest percentages. These results likely reflect the mixed objectives of private landowners, with some focusing on commodity production and others on amenity values. In general, on National Forest lands forest conditions are weighted heavily toward total acres of older forests, while private forests are providing a more balanced distribution of forest successional conditions from young to old (Trani-Griep 1999). Only the Talladega Division of the National Forests in Alabama was included in the Southern Appalachian Man and the Biosphere analysis.

The National Forests in Alabama currently have only 6% in the early successional stage, while 54% is in late-successional classes. In order to understand the landscape context of the National Forests in Alabama, an examination of forested lands in the state is required. Timberlands in Alabama have increased since 1990, to their current coverage of 71% of the land area in the state (Hartsell 2002). Other public lands in early successional stages were higher than the National Forests in Alabama (11%). All ownerships combined (includes public, non-industrial private, and forest industrial private), in the state of Alabama, support 28% of the lands in early successional forests, and 36% in mid- and late-successional forests.

Quality of forest successional habitats may also vary between private and national forest lands. Objectives on national forests to provide for wildlife habitat needs, recreational activities, scenic integrity objectives, and water quality often result in greater vegetation structure retained in early-successional forests than in similar habitats on private lands. On private lands, more intensive management may simplify structure and composition, reducing habitat quality. Similarly, effort to restore and maintain desired ecological conditions and processes in mid- and late-successional forests, also often enhances habitat quality over that found on private lands. For these reasons, conclusions regarding cumulative habitat availability from both private and national forest lands must be made with caution.

Hurricanes (Foster 1992), lightning frequency (Delcourt 1998), fire frequency (Whitney 1986), and pre-settlement cultural activities (Delcourt 1987) were probably the major sources of disturbance events that created early successional forests prior to European occupation. Less drastic perturbations such as mortality events from tornadoes, insect or disease outbreaks, or defoliation (passenger pigeon roosts) were typically less extensive and cyclic but nonetheless provided a source of early-successional forest conditions. Natural disturbances, however, are unpredictable, episodic, and heterogeneous (Lorimer 2001); influential at a landscape scale; and are neither uniform nor random in distribution. Anthropogenic disturbances occurred more frequently in floodplains along major rivers and in "hunting grounds."

Overall, landscape patterns more consistently contain a component of early-successional forests in places more "likely" to be susceptible to disturbances, i.e., south and west facing slopes, sandy or well drained soils, or in fire adapted plant communities. Fire suppression, intensive agriculture resulting in massive soil losses, land use changes, and urban sprawl have drastically altered the variables that would perpetuate a landscape with a significant component of early- successional forests. With many species associated with early successional forests in the southeast in decline (Hunter et al. 2001), it is imperative that management actions include some provision for perpetuating early-successional forest conditions. At the same time, many of these same factors, especially land use conversion, have reduced the distribution and abundance of quality late-successional forests across the larger landscape. Maintenance of these on public lands is equally imperative.

An examination of Table 3.1.1-2 reveals that the most common community types across the National Forests in Alabama are the *Dry and Dry-mesic Oak-pine Forest* Community (~30%), the *Upland Longleaf Forest, Woodland, and Savanna* Community (~19%), and the *Dry-mesic Oak Forest* Community (~18%). Overall, stands on the National Forests in Alabama are in late-successional conditions (>55%). The *Dry and Dry-mesic Oak-pine Forest* Community on all management units of the National Forests in Alabama are dominated by pine forest types (31 and 25).

Table 3B-51: Current percentages of forested acreage on National Forests in Alabama in each successional stage by forest community type, 2002. (Old growth acres are included as late-successional forest.)

	Successional Stage			
Forest Community Type	**Early**	**Sapling/Pole**	**Mid**	**Late**
Cedar Woodlands	0	0	.01	.16
Conifer-Northern Hardwood Forest	0	0	.04	.10
Mixed Mesophytic Forest	.10	.53	1.00	2.86
River Floodplain Hardwood Forest	.07	.44	1.50	4.45
Dry-Mesic Oak Forest	.47	1.40	4.70	11.49
Dry and Xeric Oak Forest; Woodland and Savanna	0	.02	0	0
Xeric Pine & Pine-oak Forest & Woodland	.12	.19	1.77	4.87
Montane Longleaf Pine Forest	1.23	.63	.71	5.04
Upland Longleaf Forest, Woodland & Savanna	2.25	3.69	3.19	9.96
Dry and Dry-mesic Oak-pine Forest	1.6	8.59	8.04	14.33
Coastal Plain Upland Mesic Hardwood Forest	0	.02	.32	.03

	Successional Stage			
Forest Community Type	**Early**	**Sapling/Pole**	**Mid**	**Late**
Hardwood-Tupelo Swamp Forest	**.03**	**.01**	**.18**	**.58**
Southern Wet Pine Forest, Woodland & Savanna	**.15**	**1.26**	**1.24**	**.63**
Summed Over Community Types	**6.02**	**16.78**	**22.70**	**54.5**

Indicators of conditions related to successional forest habitats are acreage or percent of forested acres on the national forest within 3 categories of forest successional stages: 1) early successional forest, 2) mid- and late successional forest combined, and 3) late-successional forest alone. These three indicators are selected because they are most relevant to describing important habitat conditions. Early-successional forests are a key condition required by many species, and their level indicates near-future presence of sapling/pole successional stages as well. Because most species associated with late-successional conditions will also be found to some extent in mature or mid-successional forests, the combined level of these successional stages provides an indication of the total base of habitat available for these species. However, because late-successional forest conditions will often provide better quality habitat for these species, a focus on levels of this stage alone is also meaningful.

The prairie warbler (*Dendroica discolor*) is selected as management indicator species to represent early-successional forests. Because the mid- and late-successional forest habitats support more divergent communities depending on their composition, management indicator species for these habitats are identified and analyzed under the individual major forest community sections of this document.

Prairie warblers are shrubland nesting birds found in suitable habitats throughout the Southern Appalachians, Piedmont and Coastal Plain (Hamel 1992). Prairie warblers require dense forest regeneration or open shrubby conditions in a forested setting. Near optimal habitat conditions are characterized by regeneration, thinned areas or patchy openings 10 acres or more in size where woody plants average 2 to 3 meters in height, 3 to 4 cm dbh, and occur in stem densities around 3000 stems/acre (NatureServe 2001). Populations respond favorably to conditions created 3 to 10 years following forest regeneration in larger forest patches (Lancia 2000). Providing a sustained flow of regenerating forests is necessary to support populations of prairie warbler. Populations of prairie warbler have been steadily declining in the Eastern United States (Trend -2.08, P value 0.0000; Sauer 2000).

3.1.2 Direct and Indirect Effects

SPECTRUM modeling provides a means for examining attainment of desired successional mixes at particular points in time within the constraints of other factors such as existing age-class distribution. Modeled mixes of successional stages at 10 and 50 years of plan implementation vary by alternative due to the differences in management intensity and emphasis (see tables below).

The National Forests in Alabama are unique, in that the 5 Management Units comprising the Forest are in four different physiographic areas, and none of the Management Units are contiguous. Therefore, SPECTRUM Analysis was done for each management unit independently. Condition projections are reported in the tables below for each Management Unit.

Table 3B-52 summarizes the current and projected occurrence of the early successional forest habitats. Because of the direct association of breeding prairie warblers with early-successional forests, prairie warbler populations are expected to vary by alternative in direct relation to the abundance of this successional stage. Forest-wide standards limit early successional forests to 17% maximum levels. Early successional forest conditions are limited to 8% of the pine and pine-hardwood component in Red-cockaded woodpecker habitat management areas (HMAs). HMAs are located on Talladega, Oakmulgee, and Conecuh Management Units.

Table 3B-52: Current and expected percent of forested acreage in early-successional forest conditions on the National Forests in Alabama, after 10 and 50 years of implementing forest plan alternatives. (Derived from SPECTRUM models.)

Management Unit (Current)	Bankhead (10)		Conecuh (6)		Oakmulgee (6)		Talladega (4)		Tuskegee (8)	
Alternative	Year 10	Year 50	Year 10	Year 50	Year 10	Year 50	Year 10	Year 50	Year 10	Year 50
Alternative A	12	7	5	6	9	7	5	6	8	0
Alternative B	7	6	6	5	8	7	6	5	9	4
Alternative D	16	6	7	6	17	6	7	8	17	10
Alternative E	11	6	6	7	10	6	6	7	15	6
Alternative F	17	6	6	6	11	10	8	5	13	14
Alternative G	7	4	6	4	13	6	7	6	15	6
Alternative I	10	7	6	5	6	4	7	5	11	8

SPECTRUM modeling resulted in 5 – 17% early successional forest creation at the 10-year projection. Percent of early successional forest are generally lower at the 50-year projection due to an assumed completion of restoration activities, which are concentrated in the near future. Alternatives D and F most consistently produce the highest levels of early successional forest habitats on most Management Units.

Table 3B-53: Current and expected percent of forested acreage in mid- and late-successional forest conditions on National Forests in Alabama, after 10 and 50 years of implementing forest plan alternatives. (Derived from SPECTRUM models.)

Management Unit (Current)	Bankhead (72)		Conecuh (75)		Oakmulgee (78)		Talladega (81)		Tuskegee (73)	
Alternative	Year 10	Year 50	Year 10	Year 50	Year 10	Year 50	Year 10	Year 50	Year 10	Year 50
Alternative A	75	77	76	85	75	80	78	79	74	100
Alternative B	79	83	74	89	77	80	79	85	70	86
Alternative D	70	83	74	83	67	79	80	76	55	71
Alternative E	77	79	75	86	74	80	81	86	67	76
Alternative F	69	81	75	85	73	70	78	84	54	66
Alternative G	81	88	74	93	71	80	81	83	67	77
Alternative I	67	72	75	89	79	88	81	85	70	73

The table above summarizes the current and projected occurrence of mid- and late-successional forest habitats. Changes of these percentages reflect growth and aging of stands that are presently sapling/pole successional forests. These stands will most likely receive intermediate prescribed burning and thinning treatments to hasten the attainment of late-successional forest characteristics of spatial and vertical diversity. Differences between alternatives are difficult to discern due to the moderating effects of the duration of these conditions. However, a rank-order analysis of the resultant percentages reveals Alternatives I, G, and B (respectively) to be most efficacious in providing highest projections of mid- and late-successional forest conditions on National Forest in Alabama management units, collectively.

Table 3B-54. Current and expected percent of forested acreage in late-successional forest conditions on National Forests in Alabama, after 10 and 50 years of implementing forest plan alternatives. (Derived from SPECTRUM models.)

Management Unit (Current)	Bankhead (55)		Conecuh (42)		Oakmulgee (57)		Talladega (58)		Tuskegee (44)	
Alternative	Year 10	Year 50	Year 10	Year 50	Year 10	Year 50	Year 10	Year 50	Year 10	Year 50
Alternative A	60	54	43	76	54	62	59	69	46	92
Alternative B	68	67	41	79	56	64	59	72	45	70
Alternative D	59	58	41	72	46	49	60	61	28	35
Alternative E	66	58	42	76	53	62	61	74	39	52
Alternative F	58	54	42	74	52	44	58	70	41	39
Alternative G	69	73	41	82	50	57	62	70	39	52
Alternative I	56	51	43	80	58	76	61	72	42	53

Table 3B-54 displays the current and projected percentages of late successional forest conditions on each management unit. The differences between alternatives are difficult to discern due to the protracted duration of each of these successional stages. However, a rank-order analysis of the resultant percentages reveals Alternatives I, B, and G (respectively) to be most efficacious in providing the highest projections of late-successional forest conditions on National Forest in Alabama management units, collectively. It should be noted that alternatives which maximize mid- and late-successional forest habitats, minimize early successional forest habitats.

A quantitative comparison of the alternatives may not appear to project a "best" alternative for maximizing early successional or mid- and late-successional forest habitats. A qualitative comparison of the alternative's emphases may reveal a preferable course. Alternative A emphasizes the production of goods and services, and includes the provision of sustained yield timber management. Alternative B is biologically driven; and emphasizes restoring natural resources and natural processes, and creating and maintaining wildlife habitats. The emphasis of Alternative D would be to reach and maintain a balanced age class. Alternative E emphasizes the provision of recreational opportunities. Alternative F is the "No Action" alternative, which in this case means current management direction put forth in the existing amended plan would be followed. Alternative G would emphasize linking together, through land allocations, movement corridors and large undisturbed areas, T&E species, species reintroduction, and watershed restoration. Alternative I combines the emphases of Alternative E (recreation) and Alternative B (wildlife habitats). All of the Alternatives include the Riparian Corridor Prescription, except for Alternative F and Alternative D. These two alternatives include only the existing streamside management zone application outlined in the existing Forest Plan.

Table 3B-55: Expected population trends[1] of MIS for Early Successional Forest Habitats by alternative, National Forests in Alabama. Population trends are based on expected trends in habitat quantity and quality.

	A	B	D	E	F	G	I
PRAIRIE WARBLER							
+10 YEARS	+	+	++	+	++	=	=
+50 YEARS	=	-	+	=	+	--	=

1 Population trend expressed as change from current levels: "++" = relatively large increase, "+" = increase, "=" = little to no change, "-" = decrease, "—" relatively large decrease.

Management indicator species may provide additional information for evaluating the relative effects of management alternatives, and may combine quantitative and qualitative alternative characteristics. MIS population trends are expected to be directly proportional to trends in habitat quantity and quality. The prairie warbler is an MIS for early successional forest habitats on the National Forests in Alabama. The expected population trends for MIS after 10 and 50 years of revised forest plan implementation are shown in Table 3B-55. Alternatives D and F produce the most beneficial population trends for prairie warblers, followed by alternatives A and E.

3.1.3 Cumulative Effects

Across the landscape in which the national forest exists, cumulative mixes of successional forests will be affected by actions on private lands, and results of insect and disease outbreaks and storms that serve to create relatively large patches of canopy tree mortality. Although outbreaks and storms are difficult to predict, levels of these influences and private land factors are not expected to vary across alternatives. These external factors would be considered in site-specific planning under all alternatives to moderate cumulative effects. Early-successional forests created by outbreaks or storms would be included in calculations of existing conditions, which would be used to determine whether management actions are needed to meet early-successional forest objectives. If objectives are met through these unplanned events, creation of additional early-successional forest by management action would not be planned. Presence of quality successional forest habitats on surrounding private lands, to the extent they can be known, would be considered during site-specific planning to determine where within the range of successional forest objectives is most desirable for national forest lands. However, in order to provide for the diversity of plant and animal communities on national forest land as required by the National Forest Management Act, effort would be made under all alternatives to achieve successional mixes on national forest lands that are within the objectives or desired conditions of each allocated prescription and its associated successional mix option. Although exact mixes would vary somewhat across alternatives as described in the preceding section, when viewed cumulatively across the landscape, it is expected that the national forest lands would provide the majority of late-successional forests and private land would provide a greater proportion of early-successional forests under all alternatives.

3.2 Permanent Openings and Rights-of Way

3.2.1 Affected Environment

Habitats considered here include permanent openings and utility rights-of way. Other early successional habitats such as woodlands, grasslands, and early successional forests are discussed elsewhere in this document.

Permanent Openings and Old Fields

Permanent grass/forb and seedling/sapling/shrub habitats are important elements of early successional habitat. Permanent openings typically are maintained for wildlife habitat on an annual or semi-annual basis with the use of cultivation, mowing, or other vegetation management treatments. These openings may contain native grasses and forbs or may be planted to non-native agricultural species such as clover, orchard grass, wheat, or small grains.

Permanent openings are used by a variety of wildlife, both game and non-game species. Parker et al. (1992) reported use of agricultural openings by 54 species of birds and 14 species of mammals in a study on the Chattahoochee National Forest. Bird species observed included wild turkey, several species of raptors and woodpeckers, and numerous songbirds including a number of neotropical migrants such as pine warbler, ovenbird, and black-throated green warbler. The greatest number of avian species and highest bird species diversity was found within the edge zone of the openings. Mammals observed included species such as white-tailed deer, striped skunk, woodchuck, bobcat, black bear, red bat, eastern cottontail, opossum, and several small mammals.

The benefits of permanent openings to white-tailed deer are well documented. Permanent openings, especially those containing grass-clover mixtures, are used most intensively in early spring, but are also an important source of nutritious forage in late winter when acorns are in short supply (Kammermeyer et al. 1993). Kammermeyer and Moser (1990) found a significant relationship between openings and deer harvest with only 0.13% of the land area in high quality openings. Forest openings also are a key habitat component for wild turkeys throughout the year (Thackston et al. 1991, Brenneman et al. 1991). Maintained openings provide nutritious green forage in the winter and early spring, and seeds during late summer and fall. Because of the abundance of insects and herbaceous plants produced in these openings, they are especially important as brood rearing habitat for young turkeys (Nenno and Lindzey 1979, Healy and Nenno 1983).

There also are numerous wildlife benefits from openings maintained in native species. Native warm season grasses provide nesting, brood-rearing, and roosting habitat for northern bobwhite and other grassland species of wildlife (Dimmick et al. 2001). Native species are well adapted to local environments and generally require less intensive maintenance following establishment.

There currently are approximately 2,296 acres of permanent openings on the National Forest in Alabama. This represents 0.3% of the total National Forest acres. Most openings were created by the expansion of log landings following timber harvest or by closing and seeding old roads to create linear openings. Of the 2,296 acres of existing openings on the National Forests in Alabama, approximately 903 acres are on State Wildlife Management Areas (WMA's) and are maintained by Alabama DWFF personnel. USFS personnel would maintain the remaining 1,393 acres of openings outside of the WMAs. Many permanent openings are planted in high quality grass-clover mixtures, which include combinations of white and red clovers along with wheat, rye, oats, orchard grass, and ryegrass. Some of the older openings are dominated by fescue and/or annual weed species.

Table 3B-56: Current acreage and percent of total forest acres of permanent openings and rights-of-way on the National Forests in Alabama 2002.

	Bankhead	Conecuh	Oakmulgee	Talladega	Tuskegee	Total
Total acres permanent openings [1]	750	508	164	749	211	2382
% of total Forest acres	0.4%	0.6%	0.1%	0.4%	1.9%	0.4%
Total Acres of ROW	159	103	409	200	10	881
% of total Forest acres	0.09%	0.12%	0.25%	0.09%	0.09%	0.13%

1 other early successional habitats such as woodlands, grasslands, and early successional forests are not included in this analysis.

Rights-of-Way

Utility rights-of-way (ROW) are typically managed for purposes other than to provide wildlife habitat. However, they can provide wildlife benefits if managed appropriately. Rights-of-way can be established and maintained in plantings that enhance their benefits to wildlife. Once established, ROW maintenance costs generally are reduced.

The current acreage in utility rights-of-way is shown in Table 3B-56. Rights-of-way acreage was estimated by multiplying the existing miles of ROW by an average width of 60 feet. The majority of these ROWs is in a mixture of herbaceous plants and shrubs and is maintained by periodic cutting.

3.2.2 Direct and Indirect Effects

Permanent Openings

The management prescriptions vary in how they treat the creation and maintenance of permanent openings. Each prescription has been assigned to one of three options.

Option 1 - Existing wildlife openings are not maintained, but are allowed to succeed to forest. In some cases, existing openings may be obliterated through tree planting and elimination of non-native species. New permanent wildlife openings are not created.

The effects to wildlife species under option 1 would not be beneficial to the majority of wildlife species, especially demand species. Allowing permanent openings to succeed into forest would further decrease the likely already insufficient amount of openings available to important wildlife species. Implementing option 1 would reduce the number of permanent opening acres managed on the NFAL from 2,296 to 0. Under option 1, there would be no difference between maintenance levels of openings located on WMAs or general forestland. Likely results of implementing option 1 would be a decrease in forage and foraging habitat and a likely decrease hunter success rates.

Option 2 - Existing wildlife openings may be present and maintained, but no expansion of openings or creation of new permanent openings of this type occurs. Native species are emphasized when establishing food plants for wildlife. Some openings provide permanent shrub/sapling habitats as a result of longer maintenance cycles.

The effects to opening dependant wildlife species under option 2 would be beneficial although current numbers of acres maintained in permanent openings is at the lowest desired level to meet the requirements of most species dependant on openings. Under option 2 the 2,296 acres of wildlife openings that currently exist would be maintained. There would be no difference between maintenance levels of openings located on WMAs or general forestland. Under this option, it would be expected that hunter success rates would not drastically change when compared to previous years.

Option 3 – Existing wildlife openings may be present and maintained. Expansion of existing openings and/or creation of new openings may occur. Non-invasive non-natives are sometimes used when establishing food plants for wildlife, but native species are used where feasible and cost effective. Some openings provide permanent shrub/sapling habitats as a result of longer maintenance cycles.

The effects to opening dependant wildlife species under option 3 would be most beneficial. Currently the number of acres (2,296) of permanent openings on the NFAL is at the lowest desired level. Maintaining existing openings and having the ability to create new openings would increase the amount of forage and foraging habitat for many wildlife species. There would be no difference in maintenance and establishment acres for permanent openings when comparing WMAs and general forestland. This option would be expected to contribute to an increase in hunter success rates for deer.

No specific objectives for the quantity of permanent openings are established in the revised Forest Plan. Through the prescription allocation process described above, the forest will be zoned into areas of varying intensity of opening maintenance and development. The desired amounts of openings for a specific portion of the forest will be determined through site-specific analysis.

Table 3B-57 displays the acres of existing permanent openings in each permanent opening option by alternative for the National Forests in Alabama. Table 3B-58 displays the proportion of each forest by permanent opening option. The tables provide information both for the portion of the forests in State WMAs and for the Forests as a whole.

Table 3B-57: Acres of Existing Permanent Openings in each Permanent Opening Option by Alternative for State WMAs (WMA) and All National Forest Lands (TOTAL) on the National Forests in Alabama.

Alternative	Permanent Opening Option					
	Option 1 No Maintenance of Existing Openings		Option 2 Existing Openings Maintained/ No new openings		Option 3 Existing Openings Maintained/ New openings allowed	
	WMA	TOTAL	WMA	TOTAL	WMA	TOTAL
Alternative A	5	8	28	103	967	2269
Alternative B	5	8	28	102	967	2269
Alternative D	5	8	7	73	989	2300
Alternative E	17	29	28	104	955	2246
Alternative F	5	8	39	101	957	2271

Alternative	Permanent Opening Option					
	Option 1 No Maintenance of Existing Openings		Option 2 Existing Openings Maintained/ No new openings		Option 3 Existing Openings Maintained/ New openings allowed	
	WMA	TOTAL	WMA	TOTAL	WMA	TOTAL
Alternative G	5	10	312	514	683	1858
Alternative I	5	14	19	87	974	2278

Table 3B-58: Proportion of the National Forests in Alabama in State WMA's (WMA) and for the Forest as a whole (TOTAL) in each Permanent Opening Option by Alternative.

Alternative	Permanent Opening Option					
	Option 1 No Maintenance of Existing Openings		Option 2 Existing Openings Maintained/ No new openings		Option 3 Existing Openings Maintained/ New openings allowed	
	WMA	TOTAL	WMA	TOTAL	WMA	TOTAL
Alternative A	12	8	6	20	81	73
Alternative B	12	7	6	20	81	73
Alternative D	12	6	6	19	82	75
Alternative E	14	8	6	21	79	71
Alternative F	12	7	9	7	78	85
Alternative G	12	8	28	30	59	62
Alternative I	13	9	7	28	79	63

Rights-of-Way

In general, existing utility rights-of-way will be treated similarly under all alternatives. Rights-of-way typically are managed by third parties who should be encouraged to manage these to the extent possible to enhance their value to early-successional species. In addition, forest-wide standards have been established that prohibit broadcast herbicide application for maintenance and require site-specific environmental analysis prior to maintenance operations.

3.2.3 Cumulative Effects

Permanent openings are a very important habitat element for a variety of wildlife species including both game and non-game species. However, they comprise a very small portion (0.4%) of the landscape of the National Forests in Alabama. The habitat conditions provided in these permanent openings are very different from that provided by lawns, ball fields and golf courses that are much more common on adjacent private land. Generally, the openings on private land are not maintained in the high quality grass-clover mixtures available in the permanent openings. Therefore, most of the openings on private land do not provide comparable benefits to wildlife. In addition, the Forest Service does not have control of the management of the openings on private land. Areas that currently provide habitat may be developed in the future and therefore cannot be relied on to provide long-term wildlife benefits. It therefore is important to maximize the benefits from this limited acreage on the forests by maintaining these openings in high quality habitat conditions. Other open-land habitats such as rights-of way are very abundant on private land. Because of the abundance of these habitats on private land, management of these habitats is not a major focus of National Forest management.

3.3 Old Growth

3.3.1 Affected environment

The Forest Service has identified old growth as an important issue both internally and with the public. In 1989, Dale Robertson, the Forest Service chief at the time, developed a generic definition of old-growth forests (USDA memo, 1989). Old–growth forests are ecosystems 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 which may include tree size, accumulation of large wood material, number of canopy layers, species composition, and ecosystem function.

The age at which old growth develops and the specific structural attributes that characterize old growth will vary widely according to forest type, climate, site conditions, and disturbance regime. Old growth in fire-dependent forest types may not differ greatly from young forests in the number of canopy layers of accumulation of downed woody material. However, old growth is typically distinguished from younger growth by several of the following attributes:

- *Large trees for the species and site.*
- *Wide variation in tree sizes and spacing.*
- *Accumulations of large-sized dead standing and fallen trees that are high relative to earlier stages.*
- *Decadence in the form of broken or deformed tops or boles and root decay.*
- *Multiple canopy layers.*
- *Canopy gaps and understory patchiness*.

In June 1997, the Region 8 Old-Growth Team published Guidance for Conserving and Restoring Old-Growth Forest Communities on National Forests in the Southern Region. Descriptions of 16 old-growth forest communities are found in this report. The following table shows the current possible old growth by community types for the National Forests in Alabama by Management Area. Total possible old growth includes stands over the minimum age in areas suitable for timber production and all acres in areas unsuitable for timber production.

Table 3B-59: Current Possible Old Growth

Community Type – Minimum Age	Suitable over minimum age (acres)	Unsuitable (acres)	Total (acres)
Management Area 1 – Bankhead National Forest			
Cedar Woodland -	-	1,498	1,498
Conifer Northern Hardwood – 140	0	1,223	1,223
Dry Mesic Oak – 130	37	25,375	25,412
Mixed Mesophytic – 140	0	9,070	9,070
Dry and Dry Mesic Oak Pine – 100	2,503	29,320	31,823

River Flood Plain – 100	134	3,948	4,082
Upland Longleaf - 110	0	206	206
Xeric Pine and pine oak - 100	918	7,070	7,988
Total	3,592	77,710	81,302

Management Area 2 - Conecuh National Forest			
Coastal Plain Upland Hardwood – 120	0	388	388
Cypress Tupelo – 120	0	78	78
Dry Xeric Oak – 90	0	76	76
Dry and Dry Mesic Oak Pine – 100	18	925	943
River Flood Plain – 100	6	13715	13721
Upland Longleaf and South Florida Slash Pine – 110	0	8612	8612
Wet Pine – 80	0	6300	6300
Xeric Pine – 100	0	40	40
Total	24	30,134	30,158

Management Area 3 – Talladega NF Oakmulgee Division			
Cypress Tupelo – 12	0	4421	4421
Dry Mesic Oak – 130	0	5862	5862
Mixed Mesophytic Hardwood - 140	0	1484	1484
Dry and Dry Mesic Oak Pine - 100	425	13568	13993
River Flood Plain – 100	24	10380	10404
Upland Longleaf - 110	100	13181	13281
Total	552	48,899	49,451

Management Area 4 – Talladega NF Talladega Division			
Dry Mesic Oak – 130	365	31815	32180
Mixed Mesophytic Hardwood - 140	27	5507	5534
Mountain Longleaf – 110	530	14765	15295
Dry and Dry Mesic Oak Pine - 100	1156	21271	22427
River Flood Plain – 100	255	1562	1817
Xeric Pine and pine oak – 100	1014	22310	23324
Total	3,351	97234	100,585

Management Area 5 - Tuskegee National Forest			
Coastal Plain Upland Hardwood – 120	0	25	25
Dry and Dry Mesic Oak Pine – 100	104	376	480
River Flood Plain – 100	105	1777	1882
Upland Longleaf and South Florida Slash Pine – 110	19	227	246
Wet pine – 80	0	98	98
Total	228	2503	2731

Approximately 7.7 thousand acres of suitable lands that meet the minimum age requirement and approximately 214.8 thousand acres of unsuitable land provide potential old growth. In addition to the acres listed in the table above, a portion of the acres designated for Red-cockaded woodpecker management will provide old growth characteristics. The pine and pine-hardwood stands within RCW habitat management areas in Management Areas 2, 3, and 4 are managed on a 120-year to 170-year rotation.

3.3.2 Direct and indirect effects

In each alternative, most of the land designated as unsuitable (inappropriate) for timber production will develop into stands predominantly over 100 years old. Some of those acres are in recreation areas and administrative sites which would not retain those characteristics. In the unsuitable acres, wilderness and remote backcountry areas provide for large areas that will develop into potential old growth. Canyon corridors, riparian, wild and scenic rivers, and steep areas provide for medium size areas and linkages. Alternatives F and D have significantly less unsuitable lands than the other alternatives, approximately 30% of the total acres. Alternative E and Alternative I have approximately 41% of the total acres in unsuitable lands, while the other alternatives have approximately 40% of the total acres in unsuitable lands.

Of the suitable areas, many will also develop into older stands. Alternative B and Alternative I provide for the most acres of stands greater than 100 years old, while Alternative D and Alternative F provide the fewest. Suitable acres greater than 100 years old will provide for medium and small areas of potential old growth. The following table displays the percentage of each community type that will be older than 100 in the fifth decade, by alternative.

Table 3B-60: Percent of Community Type Greater than 100 Years Old in Period 5*

	Percent of Community greater than 100 years old in period 5 by alternative						
Community Type	A	B	D	E	F	G	I
Cedar Woodland	63	89	89	89	89	89	89
Conifer Northern Hardwood	85	88	88	85	88	88	78
Coastal Plain Upland Hardwoods	10	11	8	3	8	11	35
Cypress Tupelo	72	72	71	72	71	72	72
Dry and Mesic Oak	63	59	56	33	67	56	54
Dry and Dry Mesic Oak-Pine	9	17	8	21	6	20	18
Mixed Mesophytic	57	63	36	56	45	62	69
Mountain Longleaf	40	40	42	41	40	39	42
River Floodplain	60	65	40	61	39	61	59
Upland Longleaf Pine	18	31	14	24	33	29	35
Wet Pine	18	31	14	24	33	29	35
Xeric Pine / Pine Oak	42	34	33	31	14	33	40

*The percentages in the table are of those acres that were separated by community type for spectrum analysis and include both suitable and some unsuitable acres. However, some unsuitable areas, such as wilderness, were not separated by community type and are not included in these numbers.

3.3.3 Cumulative effects

National Forest lands will be managed to provide old growth in accordance with the regional old growth guidance. Over time, the amount of old growth is expected to increase in all alternatives and the old growth will be distributed across the forest. The increase in old growth will provide habitat for those wildlife species that require older forest conditions but reduce habitat for those species requiring younger forest conditions. All alternatives provide for inventory and verification of old growth stands. Those alternatives with more active management will provide more opportunity to identify existing old growth; however, those alternatives with fewer activities may provide more opportunities for old growth to develop.

Old growth on national forest lands will not affect old growth on private lands, but may affect the forest health and insect and disease on private lands, as most forest health and insect and disease issue in Alabama forest are related to older forest conditions.

3.4 Snags, Dens, and Downed Wood

3.4.1 Affected Environment

Large woody debris in the form of standing or fallen snags, branches, large logs, stumps, and root wads is an important habitat component to both terrestrial and stream areas. It is important both structurally and as a source of energy. Large snags provide birds with nesting and feeding sites, singing perches, and as lookout posts for predators and prey (Howard and Allen 1988). Bats roost and produce maternity colonies under exfoliating bark. Amphibians, reptiles, small mammals, and invertebrates utilize woody debris as cover. Animals use snags, logs, and stumps as denning sites. Downed wood and logs are used for drumming by grouse to attract mates. Small mammals utilize logs as travel ways. Fungi and other decomposers of woody debris are key components of food webs. Rotting wood tends to absorb moisture during wet periods and release it in dry periods, thus helping to maintain a cooler microclimate (Ernst and Brown 1988, Knutson and Naef 1997).

Large woody debris in riparian areas is used as cover by amphibians, insects, and other invertebrates, and small mammals. For a further discussion of riparian characters and the National Forests in Alabama riparian conditions, see sections 3.4 Riparian Habitats and 4.0 Aquatic Habitats, and Chapter 3A, Section 2.0 on water resources. Turtles and snakes use logs in streams and overhanging branches for basking and sunning. Within aquatic ecosystems, woody debris is instrumental in maintaining habitat structure and diversity, as well as supporting nutrient cycling and food webs.

Den trees, defined as living trees with hollows or cavities inhabited by animals, also are a critical habitat component for many species. They are used for nesting, roosting and hibernating. Many species of potential viability concern are associated with snags, downed wood, or den trees.

Hunter (1990) states that little information is available on how much large woody material is sufficient to support associated species. He cites literature that reviews expert opinion on snags, with a recommendation of 2 - 4 snags per acre being a “reasonable target.” Generally, for most dependent wildlife, the more snags the better for associated species.

On the National Forests in Alabama, the Bankhead National Forest is known to have Indiana bat foraging and hibernacula use. This species is critically tied to snags because of their use as roosts. The need to avoid disturbance to this species is the driving factor in considering effects of management on snags for the Bankhead National Forest. A complete discussion of Indiana bat habitat considerations can be found in the T&E section.

Snags, downed wood, and den trees are typically most abundant in late-successional forests. Current abundance of late-successional forest by community type is shown under the sections on Old Growth and Mix of Early and Late Successional Forests. This information indicates late-successional forests are abundant on the forest. Snags and downed wood also may be extremely abundant in forests affected by mortality events such as storms and insect and disease outbreaks.

Acres of late-successional forest are an appropriate indicator of the effects of management on these habitat elements because of their relative abundance in this successional stage. The pileated woodpecker (*Dryocopus pileatus*) is the best management indicator species for snags, dens, and downed wood. It requires large cavity trees for nesting, and forages on dead trees and downed logs across a variety of community types (Hamel 1992:190). Pileated woodpecker populations are tracked by the annual Breeding Bird Surveys (BBS) and bird point counts conducted throughout the Southeast.

3.4.2 Direct and Indirect Effects

On the Bankhead National Forest, direction under all alternatives states that unless necessary for insect or disease control or to provide for public and employee safety, standing snags and den trees would not be cut or bulldozed during vegetation management treatments unrelated to timber salvage. For timber salvage treatments, all live den trees and a minimum of five snags per acre from the largest size classes would be retained. Distribution of retained snags may be clumped.

In even-aged regeneration areas where at least three snags per acre are not present or cannot be retained as residuals, at least three standing snags/acre would be created from the larger diameter classes within the original stand. In addition, a minimum of five of the largest living mature trees per acre would be retained to provide potential future snags during the early and mid-successional stages of stand development. Distribution of snags and live residuals may be scattered or clumped. Live den trees would not be used for snag creation, but could count toward live residuals.

Forest-wide direction for potential black bear den trees under all alternatives states that den trees would be left during all vegetation management treatments occurring in habitats suitable for bears. Potential den trees are greater than 20 inches DBH and hollow with a broken top.

With these provisions included under all alternatives, existing snags, downed wood, and den trees would be well maintained on national forest land. Fire may reduce snags and downed wood in fire-dependent communities, but can also cause some tree mortality creating new snags and downed wood. Reduced density of these habitat elements in fire-dependent communities is expected to be within the range of variability that typically occurred in these communities under historical fire regimes.

Recruitment of new snags, downed wood, and den trees is most dependent on providing abundant late-successional forests. The analysis of seral stage distributions indicates that late successional forests (the sum of mature and old forests on the National Forests in Alabama) currently comprise over half of the forested acres. Projections to 10 years and 50 years following revised plan implementation also indicate that late-successional forests will be common and well distributed across all of the National Forests in Alabama. See Table 3B-61 to compare current and projected percentages of forested acreages in late-successional forest conditions.

Table 3B-61: Current and expected percent of forested acreage in late-successional forest conditions on National Forests in Alabama, after 10 and 50 years of implementing forest plan alternatives. (Derived from SPECTRUM models.)

Management Unit (Current)	Bankhead (55)		Conecuh (42)		Oakmulgee (57)		Talladega (58)		Tuskegee (44)	
Alternative	Year 10	Year 50	Year 10	Year 50	Year 10	Year 50	Year 10	Year 50	Year 10	Year 50
Alternative A	60	54	43	76	54	62	59	69	46	92
Alternative B	68	67	41	79	56	64	59	72	45	70
Alternative D	59	58	41	72	46	49	60	61	28	35
Alternative E	66	58	42	76	53	62	61	74	39	52
Alternative F	58	54	42	74	52	44	58	70	41	39
Alternative G	69	73	41	82	50	57	62	70	39	52
Alternative I	56	51	43	80	58	76	61	72	42	53

With the above protections and management provisions and the continuous creation of more habitat through aging age-class distributions, most alternatives will result in an increasing abundance and improved distribution of these habitat elements over the next 50 years, with benefits to associated species. Increased mortality of trees due to forest health threats potentially would increase abundance of snags and downed wood regardless of management approaches (see cumulative effects discussion below). Although den trees are also expected to increase in abundance as forests age, restoring an abundance of very large diameter den trees will require longer than 50 years of forest growth in many forest community types.

Because of their dependence on large snags, pileated woodpecker populations are expected to follow trends in snag availability and the abundance of older forests. Population trends, therefore, should be positive under most alternatives. However, because pileated woodpeckers breed at relatively low densities (2.1 pairs per 100 acres on average, Hamel 1990:C-4), obtaining robust datasets on populations is difficult. Therefore, to examine national forest trends in abundance of this species, data will likely need to be pooled with that from other national forests within the ecoregion and evaluated by comparing national forest trends with overall regional and range-wide trends.

Management indicator species may provide additional information for evaluating the relative effects of management alternatives. MIS population trends are expected to be directly proportional to trends in habitat quantity and quality. The pileated woodpecker is an indicator of the effects of management activities on the availability of habitats with desired abundance of snags.

Table 3B-62: Expected population trends[1] of MIS for habitats with desired abundance of snags, National Forests in Alabama. Population trends are based on expected trends in habitat quantity and quality.

	A	B	D	E	F	G	I
PILEATED WOODPECKER							
+10 YEARS	-	=	--	-	--	=	=
+50 YEARS	+	++	+	+	+	++	++

1 Population trend expressed as change from current levels: "++" = relatively large increase, "+" = increase, "=" = little to no change, "-" = decrease, "—" relatively large decrease.

The expected population trends for MIS of habitats with desired abundance of snags after 10 and 50 years of revised forest plan implementation are shown in Table 3B-62. Alternatives B and I, followed by Alternative G, project the most beneficial population trends for pileated woodpecker. Alternatives B and I emphasize restoration of native habitats, while Alternative G emphasizes large habitat blocks. Under Alternative I, recreation interests are tantamount to restoration objectives. This will slow native ecosystem restoration and increase costs for project mitigation.

3.4.3 Cumulative Effects

Across landscapes containing the national forest, national forest lands are expected to provide a disproportionately large share of the best quality habitats for species associated with snags, downed wood, and den trees. This result is expected because of the similar distribution of older forests on private lands. This disparity is expected to increase over time as other land uses affect abundance of older forests on private lands. Forest health threats also are expected to substantially add to cumulative effects on these habitat elements by increasing tree mortality. The increasing number of threats and increasing severity of effects has created an abundance of snags and downed wood at many locations on the national forest. This trend is expected to continue into the foreseeable future as forests age and many threats expand their zone of influence (see section on Forest Health). While national forest management can reduce the severity of tree mortality in some locations, forest health threats are nevertheless expected to have a substantially positive effect on abundance and distribution of snags and downed wood under all alternatives. Den trees, which generally need longevity to become high quality habitat elements for wildlife, are likely to be negatively affected by forest health threats across alternatives.

3.5 Woodlands, Savannas, and Grasslands

3.5.1 Affected Environment

Complexes of woodlands, savannas, and grasslands were once a frequent occurrence across the southeastern landscape, maintained with frequent fire on xeric ridge-tops and south-facing slopes (DeSelm and Murdock, 1993; Davis et al., 2002). Woodlands are open stands of trees, generally forming 25 to 60 percent canopy closure (Grossman et al. 1998:21) and may be of pine, hardwood (typically oak), or mixed composition. Savannas are usually defined as having lower tree densities than woodlands; grasslands are mostly devoid of trees and only exist on the National Forests in Alabama as small, embedded fragments in woodland complexes. On the National Forests in Alabama these conditions are found in xeric upland portions of the Upland Longleaf Pine, Mountain Longleaf Pine, Xeric Pine and Pine-Oak, Southern Wet Pine, Dry and Dry Mesic Oak-Pine, and Dry and Xeric Oak Forest Community Types. All of these conditions typically occurred in mixed mosaics within a fire-maintained landscape. In all cases, a well-developed grassy or herbaceous understory is present (Walker 2001).

Table 3B-63: Current total acreage of xeric and open forest communities on National Forests in Alabama, 2002. (Reported in thousands of acres.)

Community Type	Bankhead	Conecuh	Oakmulgee	Talladega	Tuskegee
Dry and Xeric Oak Forest	0	0.1	0	0	0
Montane Longleaf Forest	0	0	0	43.0	0
Dry and Dry Mesic Oak-Pine Forest	64.0	4.3	51.8	60.0	3.7
Upland Longleaf Forest	2.2	41.5	62.0	0	2.1
Southern Wet Pine Forest	0	17.6	0	0	0.9
Xeric Pine and Pine-Oak Forest	13.6	0.4	0.08	25.2	0

Existing remnants of this habitat and several associated rare species in both the Southern Appalachians and Piedmont are limited primarily to roadsides and utility rights-of-way (Davis et al., 2002) due to reductions in fire frequency across most landscapes. Some good examples of this community also may be found in areas managed for featured species such as the red-cockaded woodpecker and northern bobwhite quail. In the Coastal Plain physiographic region, these communities were even more widely distributed and common. Longleaf Pine forests once covered considerable upland areas of Alabama's Ridge and Valley province (Harper 1913).

Frequent fires that limited species composition and determined the open, park-like structure maintained woodland communities. Many species of viability concern are associated with this community in the Southern Appalachians, Piedmont, and Coastal Plain. Of these, the majority are vascular plants, followed by reptiles, birds, and insects. Actions required to restore the woodland condition include: restoration of species adapted to xeric, fire-maintained conditions; thinning to adjust species composition and reduce overstory density, remove midstory canopies, and allow the proliferation of herbaceous ground cover; and restoration of appropriate burning regimes.

Because existing woodland complexes are rare and not consistently tracked, the current acreage in such condition is not well documented. To determine the potential for this community type on the National Forests in Alabama, acreage in the most xeric pine and oak forest types was calculated, in addition to the acres of Longleaf Pine community types (Table 3B.1.0-1). These types are most likely to occupy sites that historically supported woodlands, savannas, and grasslands. These forest types may occur in several of the community types listed over the diverse physiographic conditions in Alabama. Therefore, the acres of late-successional habitats restored 50 years after plan implementation in the Upland Longleaf Pine, Mountain Longleaf Pine, Xeric Pine and Pine-Oak, Southern Wet Pine, Dry and Dry Mesic Oak-

Pine, and Dry and Xeric Oak Forest Community Types are the best indicator to compare alternatives.

Table 3B-64: Current acreage of mature and old xeric and open forest communities on National Forests in Alabama, 2002. (Reported in thousands of acres.)

Community Type	Bankhead NF	Conecuh NF	Oakmulgee Div	Talladega Div	Tuskegee NF
Dry and Xeric Oak Forest	0	0	0	0	0
Montane Longleaf Forest	0	0	0	28.5	0
Dry and Dry Mesic Oak-Pine Forest	24.9	2.1	29.8	22.4	1.6
Upland Longleaf Forest	0.5	20.1	35.1	0	0.5
Southern Wet Pine Forest	0	3.2	0	0	0.3
Xeric Pine and Pine-Oak Forest	10.3	0.03	0.04	17.1	0

Management indicators used to assess management effects to this community are: 1) total acres of woodland, savanna, and grassland complexes restored and maintained in desired conditions; 2) annual acreage of xeric forest types thinned for the purpose of restoring desired tree densities, 3) annual acreage of prescribed burning in xeric forest types for the purpose of restoring or maintaining open conditions and diverse understories, and 4) populations of management indictor species chosen to represent desired conditions within this type. Management indicator species chosen for this type on the National Forests in Alabama are Beyrich's threeawn (*Aristida beyrichiana*), little bluestem (*Schizachyrium scoparium*), broomsedge bluestem (*Andropogon tenarius*), Virginia bluestem (*A. virginicus*), and milkweeds (*Asclepias* spp.). The presence of these species and their proportion of total ground cover indicate the condition of the woodland or savanna.

3.5.2. Direct and Indirect Effects

In an effort to restore the ecological role that woodland complexes historically played in Alabama landscapes, restoration objectives were developed for woodland complexes in the revised plan. Direction was developed by biologists for migratory bird habitats in the Southern Cumberland Plateau & Ridge and Valley, and for the East Gulf Coastal Plain Partners in Flight physiographic regions (Hill et al. 1998 and Woodrey et al. 1998). In both of these plans, the need to restore and retain mature, fire-maintained upland habitats was cited. Objectives for woodland and savanna restoration were developed from these plans. Grassland habitats will exist as small inclusions in restored woodland and savanna communities. Restoration of woodland and savanna conditions to 30% of the mature and old, xeric, upland, fire-maintained landscapes in the long term is the revised plan objective. Desired conditions are that at least 20% of the mature and old, xeric upland forest types and longleaf pine forest types be restored to woodland condition, and that at least 10% of the xeric upland forest types and longleaf pine forest types be restored to the savanna condition. Therefore, alternatives producing the greatest proportion of late-successional xeric upland communities will have the greatest restoration potential for woodland and savanna complexes.

Table 3B-65: Proportion of late successional xeric upland communities on the National Forests in Alabama, after 10 and 50 years of implementing forest plan alternatives. Reported in thousands of acres. (Derived from SPECTRUM models.)

	Bankhead		Conecuh		Oakmulgee		Talladega		Tuskegee	
	Year 10	Year 50	Year 10	Year 50	Year 10	Year 50	Year 10	Year 50	Year 10	Year 50
Alternative A	26.1	12.2	25.0	47.8	59.4	63.4	61.6	76.4	2.5	6.1
Alternative B	35.1	30.0	24.1	49.0	61.3	65.4	61.4	88.7	2.4	4.9
Alternative D	20.3	18.7	23.7	47.1	45.3	49.4	61.4	73.0	0.5	1.5
Alternative E	28.2	25.1	24.2	48.2	57.9	62.0	60.1	90.3	1.7	1.8
Alternative F	17.9	14.7	24.6	48.2	55.4	42.6	58.2	78.3	2.0	2.2
Alternative G	36.0	40.3	23.9	50.2	53.2	57.3	56.9	80.0	1.7	1.8
Alternative I	29.7	21.0	24.6	49.7	64.5	87.4	62.6	89.3	2.2	2.5

Focus of management is on developing understory rather than the overstory. Desired conditions include heterogeneous canopy coverage averaging 25 to 60 percent, and dense grass and herbaceous ground layers. Scattered patches may be devoid of canopy to provide for interspersed savanna and grassland conditions. Restoration activities may include thinning of trees (generally to less than 60 $ft.^2$ of basal area per acre), prescribed burning, and mechanical or chemical midstory removal. Prescribed fire on relatively short rotations (1 to 3 years) typically would be used to maintain desired conditions, and may involve both dormant and growing season fires.

Acres of woodland, savanna, and grassland complex restored and maintained would vary by alternative, resultant of differing management emphases. An examination of Table 3B-66 reveals that woodland and savanna complex restoration potential acres are maximized under Alternatives I and B. Although Alternative I produces the largest amount of potential restoration acres, Alternative B produces a comparable amount, without the added caveat of recreational emphasis being coequal. The additional recreational emphasis in Alternative I will sometimes limit restoration efforts such as silvicultural treatments and prescribed burning.

Table 3B-66: Woodland and savanna restoration potential acres after 50 years of implementing forest plan alternatives. Equals 30% of xeric upland forest types restored after 50 years. Reported in thousands of acres. (Derived from SPECTRUM models.)

	Bankhead	Conecuh	Oakmulgee	Talladega	Tuskegee	Total NFAL
	Year 50	Year 50	Year 50	Year 50	Year 50	Year 50
Alternative A	3.7	14.3	19.0	22.9	1.8	61.7
Alternative B	9.0	14.7	19.6	26.6	1.5	71.4
Alternative D	5.6	14.1	14.8	21.9	0.4	56.8
Alternative E	7.5	14.5	18.6	27.1	0.5	68.2
Alternative F	4.4	14.5	12.8	23.5	0.7	55.9
Alternative G	12.1	15.1	17.2	24.0	0.5	68.9
Alternative I	6.3	14.9	26.2	26.8	0.8	75.0

Because good examples of this community have become rare or missing on today's landscape, abundance of this community type in the future will be directly related to the amount of restoration and maintenance activities accomplished. Restoration and maintenance activities would provide habitat for species included within this habitat association, including the community MIS, red-cockaded woodpeckers, and bobwhite quail. Populations of these species are expected to vary across alternatives based on the amount of habitat restored and maintained.

Management indicator species may provide additional information for evaluating the relative effects of management alternatives. MIS population trends are expected to be directly proportional to trends in habitat quantity and quality. One or both of these indicators occur on all National Forests in Alabama management units.

Table 3B-67: Expected population trends[1] of MIS for Woodland and Savanna Habitats by alternative, National Forests in Alabama. Population trends are based on expected trends in habitat quantity and quality.

	A	B	D	E	F	G	I
RED-COCKADED WOODPECKER							
+10 YEARS	-	++	-	+	-	=	++
+50 YEARS	-	++	-	-	--	+	+
NORTHERN BOBWHITE QUAIL							
+10 YEARS	-	++	-	+	-	=	++
+50 YEARS	-	++	-	-	--	+	+

1 Population trend expressed as change from current levels: "++" = relatively large increase, "+" = increase, "=" = little to no change, "-" = decrease, "—" relatively large decrease.

The expected population trends for MIS of Woodland and savanna condition habitats after 10 and 50 years of revised Forest Plan implementation are shown in Table 3B-67. Alternatives B and I, followed by Alternative G, project the most beneficial population trends for this habitat's management indicator species. Alternatives B and I emphasize restoration of native habitats and include dormant and growing season burning, thinning, and restoration of native species and structure. Under Alternative I, recreation interests are tantamount to restoration objectives. This will slow native ecosystem restoration and increase costs for project mitigation.

Restoration and maintenance activities may cause some short-term negative effects to individual MIS and other associated species by causing disturbance, mortality, or temporarily setting back plant and animal reproduction or growth. However, species associated with this community are relatively adapted to such disturbances, which are necessary to create and maintain optimal habitat conditions. In balance, these actions would result in beneficial effects to associated species.

3.5.3 Cumulative Effects

Restoration and management activities on the National Forests in Alabama would play a critical role in the conservation of this community within the landscapes containing national forest land. Natural woodland, savanna, and grassland habitats are currently rare, occurring on private ownerships primarily along mowed roadside and powerline rights-of-ways (Davis et.al., 2002). It is not expected that private landowners will restore or manage to maintain significant amounts of woodland, savanna, and grassland complexes; therefore, they would remain limited in abundance without national forest restoration efforts.

While there is no desire, obligation, or intention to restore all of the late-successional xeric community type acres to a woodland condition, it is useful to put 50-year objectives into this context. The Forest-wide objectives for mature, fire-maintained xeric uplands are to restore woodland complexes to 30 % of potential xeric forest sites, over the long term.

4.0 Aquatic Habitats

The State of Alabama is a world leader in aquatic biodiversity. The Mobile River basin supports more aquatic species than any other river drainage in North America. Although the National Forests encompass less than 3% of the Alabama land base, over 40% of the State's freshwater aquatic species are represented therein. Five distinct physiographic provinces and three major river basins are represented across the State as well as within the five National Forest management units in Alabama. As compared to other National Forests, Alabama National Forests rank first in the nation for the diversity of mollusks, fish, and turtles, and second in the diversity of crayfish and amphibians. Consequently, at all scales of consideration, the National Forests in Alabama hold a unique opportunity for the conservation of aquatic species and ecosystems.

4.1 Affected Environment

Within the National Forests of Alabama, aquatic habitats are primarily associated with over 7,700 miles of streams and rivers and over 3,000 acres contained in 38 reservoirs, lakes, and ponds (Chapter 3, Section 2.0: Water). The unique geologic history, productive climate and diverse geography of Alabama contribute to the diversity of aquatic habitats and species represented on the five management units of the National Forests in Alabama. The Bankhead and Talladega National Forests are primarily within the Cumberland Plateau and Ridge and Valley physiographic sections of the Appalachian Highlands. The Oakmulgee Division, Tuskegee, and Conecuh National Forests are considered to be within the East Gulf Coastal Plain for purposes of Forest Plan analysis. Each management unit has a substantial subset of aquatic species endemic to that particular physiographic area, river basin, or watershed. Aquatic environments differ among the five management units, further contributing to overall aquatic biodiversity.

All watersheds in the National Forests in Alabama support high aquatic diversity and relatively large numbers of endemic species. The Oakmulgee Division of the Talladega National Forest ranks first for aquatic biodiversity (species richness); the Talladega Division of the Talladega National Forest ranks second. The Talladega Division ranks first in "endemic" aquatic species (i.e. species unique to the river basin or management unit). Exceptional watersheds for aquatic diversity and inclusion of high numbers of listed, sensitive, or rare species include the Cahaba, Lower Conecuh, Middle Choccolocco, Upper Choccolocco, and Five Runs (in descending order). The Cahaba, Middle Choccolocco, Upper Choccolocco, and Upper Sipsey watersheds support the greatest number of species endemic to only those watersheds or river basins.

<u>Bankhead National Forest</u>

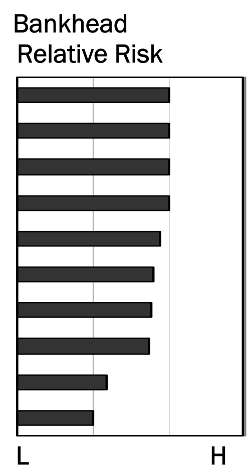
The Bankhead National Forest straddles two major river basins - the Tennessee to the north and the Mobile Delta-Alabama to the south. There are thirteen fifth level watersheds on the Bankhead National Forest, including three within the Tennessee River basin (Bear, Town, and

West Flint) and ten within the Black Warrior River and Alabama River basin (Big Nance, Clear, Crowdabout, Lewis Smith, Lower Brushy, Lower Rock, Lower Sipsey, Upper Brushy, Upper Rock, and Upper Sipsey). The Forest Service administers the majority of lands throughout the Upper Sipsey and Upper Brushy watersheds. However, the National Forest encompasses only portions of headwater streams within the Bear, Town, West Flint, and Upper Rock watersheds. Forest Service ownership is interspersed within the Clear, Lewis Smith, and Lower Brushy, and Lower Sipsey watersheds and inconsequential within Big Nance, Crowdabout, and Lower Rock watersheds. In total, the Forest Service manages approximately 34% of the watersheds associated with the Bankhead National Forest. Off-Forest influences include rural and sub-urban residential development as well as recreational facilities, agriculture, and mining.

General watershed conditions are described in Chapter 3, Section A, and summarized in Table 3B-68. Town Creek is the only watershed of greater than 2 % Forest Service ownership that does not have an "excellent" watershed condition rating. Town Creek's "average" rating is due to agricultural and urban influences downstream from the Bankhead National Forest.

Table 3B-68: Environmental conditions and projected aquatic species viability (based upon habitat suitability derived from watershed conditions) of the watersheds partially within the Bankhead National Forest under the no action alternative (Alternative F). Watershed conditions are classified as "excellent" (E), "average" (A), or "below average" (BA). Risk factors include sediment (S), point source pollution (P), temperature (T), or altered flow (F). Risk categories are 1a) no apparent impairment of risk factors and "low" viability risk, 1b) impairment of one to several risk factors and "moderate" viability risk with some opportunities for Forest Service influence, 1c) as in 1b, but with limited opportunities for Forest Service influence, 2) impairment of a high proportion of risk factors and "high" viability risk with some opportunities for Forest Service influence, and 3) as in 2, but with limited opportunities for Forest Service influence. See Appendix B for details on the assessment methods.

Watershed	% FS	Watershed Condition Rating	Risk Factors	#Species per Viability Risk Category					
				1a	1b FS	1c	2 FS	3	Total
Lower Brushy	36	E	SPTF	0	0	0	2	11	13
Clear	14	E	SPTF	0	0	0	0	9	9
Lewis Smith	10	E	SPF	0	0	0	0	4	4
Lower Flint	1	BA	SPTF	0	0	0	0	15	15
Town	2	A	STF	1	0	0	0	18	19
West Flint	16	E	STF	1	0	1	0	13	19
L. Sipsey Fork	32	E	SFT	0	4	0	8	6	18
Upper Bear	2	E	SPTF	0	0	6	0	16	22
Upper Brushy	82	E	SF	0	9	0	2	0	11
U. Sipsey Fork	87	E	SF	0	17	0	0	0	17



Within the Bankhead National Forest, the primary aquatic communities are lakes and reservoirs, beaver ponds, small rivers, streams, springs, and caves. Associated riparian communities include hemlock canyons, rock-houses, basic mesic forests, glades, seeps, rock outcrops, spray cliffs, cypress tupelo ponds, marsh, and wet prairie. Streams are typically confined within incised canyons or historically down-cut gullies of moderate to low gradients. Within headwater and tributary streams, warm summer water temperatures are moderated by numerous seeps, springs, and dense, almost continuous canopy closure. Large woody debris densities have not been formally analyzed, but appear to be close to levels expected for the current channel and forest conditions. However, given the history of these watersheds, channel morphology, substrates, and woody debris components are unlikely to approximate conditions prior to European settlement. The larger order streams have incomplete canopy closure due to both their greater width and discontinuous riparian coverage. Off-Forest land uses such as agriculture and residential development are the dominant influences within the larger streams of the lower watersheds. Water clarity is generally clear except during, and immediately after storm events and within the zone of periodic inundation by Lewis Smith Lake (a reservoir). Within the reservoir, water clarity is locally and seasonally variable, largely dependent on planktonic blooms associated with both non-point and point nutrient sources. Lewis Smith Lake is listed by the Alabama Department of Environmental Management as a mesotrophic water body.

Bankhead National Forest aquatic species diversity is high, but not as high as other areas in Alabama, ranking third and fourth among the five National Forest units in Alabama in the total number of mollusk and fish species. However, there are a number of endemic species (at least 7) of the Black Warrior River Basin that are found almost exclusively within the Bankhead National Forest; these species include Warrior darters, rush darters, blueface darters, Tuskaloosa darters, flattened musk turtles, Black Warrior waterdogs, and Kral's water plantain. The Bankhead National Forest leads other areas in the State, both in the number of federally listed and sensitive aquatic species (23), and the proportion of these species to the total number of aquatic species. At least 41 species may be at high risk for loss of viability due to impairment of habitat factors throughout the watersheds partially within the Bankhead National Forest (Section 3.B.7.2).

Based on watershed-wide conditions, eight out of ten watersheds partially on the Bankhead National Forest rate high in the number of potentially at-risk species. The primary habitat factors of potential concern include sediment and temperature, although point source pollution may also play a role. Habitat fragmentation associated with the inundation of Lewis Smith Lake and road crossings at over 130 bridges, culverts, and fords may be additional factors limiting fish and mussel populations (many mussels require fish hosts during early life). Species viability risks are high for Clear, Lewis Smith, Lower Brushy, Lower Flint, Lower Sipsey Fork, Town, Upper Bear, and West Flint watersheds. With the exception of Lower Sipsey Fork, Forest Service influence is limited due to the relatively low proportion of Forest Service lands and the overwhelming effects of downstream off-Forest factors. There may be opportunities for restoration in other watersheds with more moderate species viability concerns, including Upper Brushy Fork and Upper Sipsey Fork, since the headwaters of these watersheds are predominantly Forest Service lands. However, downstream off-Forest conditions and activities including habitat fragmentation, reservoir inundation, residential development, and agriculture will undoubtedly continue to have cumulative ongoing effects that may limit restoration effectiveness.

All of the Bankhead National Forest watersheds are situated within the Tennessee or Mobile River basins, and both basins are identified as World Wildlife Fund top priority freshwater ecoregions (Abell et al. 2000). Bankhead National Forest aquatic conservation priorities are considered of medium ranking for eight watersheds and low ranking for five watersheds, based upon the relative number of species of concern and apparent watershed conditions (McDougal et al. 2001). However, the viability assessment for this EIS indicates that 41 aquatic species may be at high risk due to habitat impairment within the watersheds partially on the Bankhead National Forest. Consequently, the Bankhead National Forest may warrant elevation to the second highest aquatic conservation priority among the five National Forest management units in Alabama. The Nature Conservancy has also recently identified six of these watersheds as priority areas for freshwater conservation actions (TNC 2002).

Conecuh National Forest

The Conecuh National Forest includes portions within three adjacent lower Gulf coast river basins. There are eight fifth level watersheds on the Conecuh National Forest, two within the Conecuh River basin (Upper Conecuh, Lower Conecuh), two within the Blackwater River basin (Blackwater, Sweetwater), and four within the Yellow River basin (Five Runs, Upper Yellow, Yellow Givens, and Yellow Watkins). The Forest Service does not determine land uses within the headwaters of most watersheds. Exceptions are the Blackwater and Five Runs watershed where Forest and private lands are interspersed throughout the watershed. Yellow and Conecuh River basin watersheds have little to no Forest Service lands along the mainstem. Within these watersheds, the Forest Service influence is minor in comparison to the influence of over 100 upstream miles of mainstem habitat that has been highly modified by channelization, reservoirs, agriculture, and urban development.

General watershed conditions are described in Chapter 3-Section 2 and Table 3B-69. The Conecuh has only one watershed with an “average” ranking for watershed health. All other watersheds are ranked as excellent.

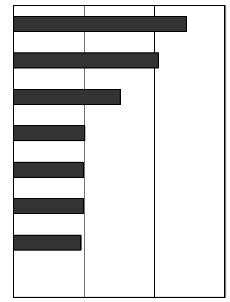
Aquatic communities include rivers, streams, swamps, bogs, springs, sinkholes, and ponds. Associated riparian habitats include baygall thickets, bayheads, marshes, and cypress tupelo. Streams and rivers are typically low gradient and unconfined, often meandering through wide floodplains of associated swamps and bottomland hardwoods. Stream and river water clarity is generally both stained and silty during all seasons of the year. Exceptions are isolated springs that run clear, and ponds, swamps, and bogs where surface water is stained but not turbid. Dominant substrates include sand, silt, and a soft clay-stone. Fine sediment is usually a large component of the substrates in all habitat types. Fine to medium organic particulates may build up within slack-water areas. Habitat diversity is relatively low. Stream reaches typically include long sections of sandy glides punctuated only by pocket pools associated with large woody debris or occasional soft clay-stone glides and riffles. Most native fish, turtles, and some mussel species appear to favor the habitat associated with large-woody debris. Reptiles and amphibians include species largely associated with backwater sloughs, swamps, and ponds. Large woody debris densities are higher on Forest than off-Forest (Herrington et al. 2001). However, given the current conditions of riparian forests both on and off-Forest, it would appear that woody debris recruitment levels may still be less than historical conditions. Given the history of these watersheds (heavy off-Forest agriculture and channelization, impoundment, woody debris removal, conversion to off-site pine, reduction of fire as an ecological driver), channel morphology, and woody debris components are unlikely to approximate conditions prior to European settlement.

Table 3B-69: Environmental conditions and projected aquatic species viability (based upon habitat suitability derived from watershed conditions) of the watersheds partially within the Conecuh National Forest under the no action alternative (Alternative F). Watershed conditions are classified as “excellent” (E), “average” (A), or “below average” (BA). Risk factors include sediment (S), point source pollution (P), temperature (T), or altered flow (F). Risk categories are 1a) no apparent impairment of risk factors and “low” viability risk, 1b) impairment of one to several risk factors and “moderate” viability risk with some opportunities for Forest Service influence, 1c) as in 1b, but with limited opportunities for Forest Service influence, 2) impairment of a high proportion of risk factors and “high” viability risk

with some opportunities for Forest Service influence, and 3) as in 2, but with limited opportunities for Forest Service influence. See Appendix B for details on the assessment methods.

Watershed	% FS	watershed cond. rating	Risk Factors	#Species per Viability Risk Category					
				1	1a FS	1b	2 FS	4	total
Upper Yellow	2	A	SP	0	0	12	0	19	31
L. Conecuh	4	E	SF	8	0	14	0	24	46
Five Runs	21	E	P	1	0	32	0	1	34
U. Conecuh	3	E	S	14	0	27	0	0	41
Yellow Watkins	14	E	S	11	0	21	0	0	32
Yellow Givens	12	E	S	12	0	22	0	0	34
Sweetwater	12	E	S	9	0	15	0	0	24
Blackwater	49	E		31	0	0	0	0	31

Conecuh
Relative Risk



On the Conecuh National Forest, overall aquatic species diversity is high, ranking third and fifth among the five National Forests in Alabama for the total number of fish and mollusk species. Although there are no species endemic specifically to the National Forest, there are many species (>11) endemic to Gulf coast watersheds that are well represented on the Forest. Such species include Escambia map turtle, Choctawhatchee darter, Florida sand darter, Choctaw bean (mussel), southern sandshell (mussel), purple pigtoe (mussel), rusty gravedigger crayfish, Peter's cheumatopsyche (caddisfly), and several dragonfly species. Anadromous species such as Gulf sturgeon and Alabama shad may also seasonally inhabit the rivers and large tributary streams of the Conecuh National Forest. Large portions of the Yellow and Conecuh Rivers are proposed as critical habitat for the threatened Gulf sturgeon. At least 11 federally listed or sensitive aquatic species inhabit the watersheds of the Conecuh National Forest. Although this is an "average" number, when compared to other Forests within Alabama, it is proportionately a lower number of proposed, endangered, threatened, or sensitive (PETS) species, given the total richness of species. At least 29 species may be at high risk for loss of viability due to impairment of habitat factors throughout the watersheds partially within the Conecuh National Forest.

Based on watershed-wide conditions, one of the watersheds partially on the Conecuh National Forest (Upper Yellow) rates as a high viability risk for aquatic species. However, six out of eight watersheds rate moderate on the number of potentially at risk species. Opportunities for watershed and aquatic habitat restoration may be limited, given the much larger upstream river basin problems (agriculture, silviculture, reservoirs, and residential development). Specific habitat factors of potential concern include sediment and temperature although point source pollution may also play a role. Habitat fragmentation associated with road crossings at over 200 bridges, culverts, and fords may be an additional factor limiting fish and mussel populations (many mussels require fish hosts during early life).

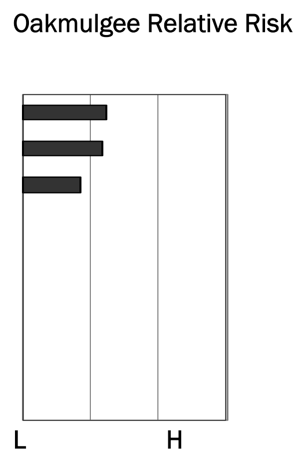
All of the Conecuh National Forest watersheds are within the Gulf Coast freshwater ecoregion, considered as a World Wildlife Fund third priority (Abell et al. 2000). Conecuh National Forest aquatic conservation priorities are considered of high ranking for four Yellow River watersheds and medium ranking for the other four watersheds, based upon the relative number of species of concern and apparent watershed conditions (McDougal et al. 2001). In addition, the viability assessment for this EIS indicates that 29 aquatic species may be at high risk due to habitat impairment within the watersheds partially on the Conecuh National Forest. Consequently, the Conecuh National Forest may warrant consideration as the third highest aquatic conservation priority among the five National Forest management units in Alabama.

<u>Oakmulgee Division of the Talladega National Forest</u>

The Oakmulgee Division is situated at the juncture of the upper coastal plain and the Cumberland Plateau physiographic regions. The proximity to this "fall-line" contributes to a juxtaposition of various ecological communities and a high diversity of aquatic species. The Oakmulgee Division of the Talladega National Forest straddles two major drainages – the Cahaba within the Alabama River basin and the Black Warrior River within the Tombigbee River basin. There are nine fifth level watersheds, including four within the Black Warrior drainage of the Tombigbee River basin (Big Brush, Fivemile, Elliotts, and Sandy), four within the Cahaba River Basin (Affonee, Cahaba, Gully, Little Oakmulgee), and one that drains directly into the upper Alabama River (Lower Mulberry). This unit of the National Forest encompasses varying portions of headwater streams within most of these watersheds. Forest Service ownership is interspersed within the upper Little Oakmulgee watershed and inconsequential within the Phipps, Sixmile, and Valley watersheds. Off-Forest influences primarily include rural residential development, agriculture, and silvicultural practices. General watershed conditions are described in Chapter 2-Section A. All watersheds on the Oakmulgee Division rank as in "excellent" watershed health.

Table 3B-70: Environmental conditions and aquatic species viability (based upon habitat suitability derived from watershed conditions) of the watersheds partially within the Oakmulgee National Forest under the no action alternative (Alternative F). Watershed conditions are classified as "excellent" (E), "average" (A), or "below average" (BA). Risk factors include sediment (S), point source pollution (P), temperature (T), or altered flow (F). Risk categories are 1a) no apparent impairment of risk factors and "low" viability risk, 1b) impairment of one to several risk factors and "moderate" viability risk with some opportunities for Forest Service influence, 1c) as in 1b, but with limited opportunities for Forest Service influence, 2) impairment of a high proportion of risk factors and "high" viability risk with some opportunities for Forest Service influence, and 3) as in 2, but with limited opportunities for Forest Service influence. See EIS, Appendix B for details on the assessment methods.

Watershed	% FS	Watershed Condition Rating	Risk Factors	#Species in each Viability Risk Category					
				1a	1b FS	1c	2 FS	3	Total
Big Brush	2	E	SF	3	0	7	0	1	11
Cahaba	11	E	S	11	0	38	0	0	4
L. Mulberry	8	E	S	3	0	4	0	0	7
Affonee	24	E		35	0	0	0	0	35
Gully	24	E		34	0	0	0	0	34
Little Oakmulgee	25	E		18	0	0	0	0	18
Big Sandy	30	E		21	0	0	0	0	21
Elliotts	40	E		11	0	0	0	0	11
Five Mile	27	E		10	0	0	0	0	10



Aquatic habitats include springs, beaver ponds, swamps, ponds, bogs, seeps, sloughs, and backwaters. Associated riparian habitats include bogs, seeps, baygalls, sandbars, riverine gravel bars, cypress tupelo, glades, basic mesic forest, mesic hardwood slopes, ravines, and canebrakes. There is one large impounded recreational lake and several small natural ponds. Streams and rivers are typically of moderate gradient and channel confinement. Water flow is sluggish to stagnant during base flow. Temperatures are warm, and largely influenced by climatic conditions. On-Forest tributaries have nearly complete canopy closure but the greater influence comes from off-Forest agricultural and municipal lands. Although large woody debris densities have not been formally analyzed, they appear to be close to levels expected for the current channel and forest conditions. However, given the history of these watersheds (extensive cutting and off-Forest urban and industrial development), channel morphology, substrates, and woody debris components are unlikely to approximate conditions prior to European settlement. Water clarity is generally clear but stained except during and after storm events when water may be turbid with suspended silt. The main stem of the Cahaba River is known for its unique character of bedrock, slab rock, and gravel shoals. Within tributaries, substrates include sand, silt, gravel, and occasional silt-stone bedrock. Fine sediment is usually a large component of the substrates in all habitat types. Fine to medium organic particulates may build up within slackwater areas. Habitat diversity is moderate ranging from sandy glides to gravel riffles. Mussel species appear to favor the habitat associated with either sand shelves or gravel riffles. Reptiles, amphibians, and fish include species largely associated with backwater sloughs, swamps, and ponds.

Aquatic species diversity is extremely high, ranking first and second among the National Forests in Alabama for the total number of fish and mollusk species. The Cahaba River has been shown to support more fish species than any comparably sized river in North America (Master et al. 1998). Although there are no species endemic only to the National Forest, there are numerous species endemic to the Cahaba river basin (>13). Such species include Alabama darters, Cahaba shiners, skygazer shiners, goldline darters, Alabama creekmussels, Upland combshell (mussel), four species of snails, and several caddisfly species. Eleven aquatic species are listed or sensitive within watersheds of the Oakmulgee Division of Talladega National Forest. Although this is an “average” number of at risk species, when compared to other Forests within Alabama, it is proportionately a lower number of species at risk given the total number of aquatic species. At least one species may be at high risk for loss of viability due to impairment of habitat factors throughout the watersheds partially within the Oakmulgee Division of the Talladega National Forest.

Based on watershed-wide conditions, none of the eight watersheds partially on the Oakmulgee Division of the Talladega National Forest rate high in the number of potentially at risk species. Watershed conditions are considered “excellent” and habitat factors of concern for species viability have not been identified. Habitat fragmentation associated with road crossings at over 130 bridges, culverts, and fords may be a factor limiting the distribution of fish and mussel populations (many mussels require fish hosts during early life). Species viability risk is moderate for both the Cahaba and Lower Mulberry watersheds but the opportunities for Forest Service influence are limited due to the relatively low proportion of Forest Service lands and the overwhelming effects of upstream and downstream off-Forest factors such as residential development, silviculture, and agriculture.

All of the Oakmulgee watersheds are within the Mobile river basin, a World Wildlife Fund top priority freshwater ecoregion (Abell et al. 2000). The Cahaba River has been identified by The Nature Conservancy as a river basin critical for the conservation of freshwater diversity (Master et al. 1998). Oakmulgee aquatic conservation priorities are considered of high ranking for five watersheds based upon the relative number of species of concern and apparent watershed conditions (McDougal et al. 2001). However, the viability assessment for this EIS indicates that only one aquatic species may be at high risk due to habitat impairment within the watersheds partially on the Bankhead National Forest. Consequently, the Oakmulgee National Forest may warrant demotion to the fourth-highest aquatic conservation priority among the five National Forest management units in Alabama. The Nature Conservancy has also recently identified two out of nine of these watersheds (Little Oakmulgee and Cahaba watersheds) as priority areas for freshwater conservation actions (TNC 2002).

Talladega Division of the Talladega National Forest

The Talladega Division includes portions of the Ridge and Valley and Piedmont physiographic regions. It also straddles two major Alabama River Basin drainages – the Coosa to the west and the Tallapoosa to the east. There are fifteen fifth level watersheds on the Talladega Division of the Talladega National Forest. Ten drain into the Coosa River basin (Cheaha, Middle Choccolocco, Upper Choccolocco, Hurricane, Talladega, Tallaseehatchee on Talladega, Tallaseehatchee on Shoal Creek, Upper Terrapin, and Weogufka, and Upper Hatchet), and five drain into the Tallapoosa River basin (Cahulga, Cane, Chulafinnee, Ketchepedrakee, Muscadine). The Forest Service administers the majority of land throughout the Upper Choccolocco watershed. However, the National Forest encompasses only small proportions of headwater streams within most of the other watersheds. Forest Service ownership is highly interspersed within the Upper Terrapin, Middle Choccolocco, Chulafinnee, Talladega, Tallaseehatchee, and Upper Hatchet watersheds. Off-Forest influences primarily include rural, sub-urban, and urban development, as well as silvicultural practices and agriculture.

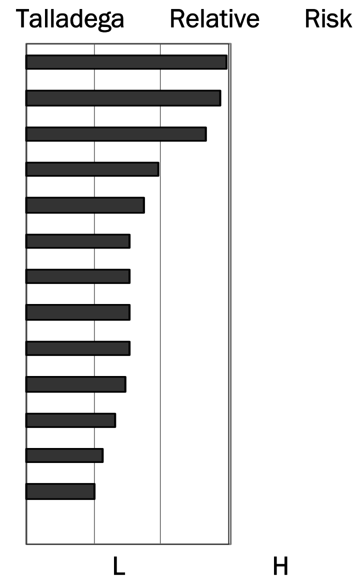
General watershed conditions are described in Chapter 3, Section A. Based upon the watershed health index, there are three watersheds ranked as below average. Of these three watersheds, only the southernmost Tallaseehatchee watershed and the Middle Choccolocco watershed have over 10% Forest Service land ownership. Both of these watersheds are degraded due to downstream and off-Forest activities and the opportunities for Forest Service contributions to improvements are limited. The Talladega watershed is ranked as average. All other watersheds are considered as in “excellent” condition.

Aquatic communities include rivers, streams, springs, seeps, beaver ponds, ephemeral pools, marshes, and eight artificial impoundments. Associated riparian communities include fens, spraycliffs, cedar glades, basic mesic forest, mesic deciduous forest, and canebrakes. Streams are typically of moderate to high gradients and moderate channel confinement. Headwater temperatures are cool to warm with moderation from springs, seeps, and a fairly continuous riparian canopy. Large woody debris densities have not been formally analyzed, but appear to be close to levels expected for the current channel and forest conditions. Given the more moderate history of these watersheds (cutting, and some off-site pine conversion) channel morphology, substrates, and woody debris components may approximate conditions prior to European settlement.

Water clarity is clear except during and immediately after storm events. Dominant substrates include bedrock and cobble. Fine sediment is usually a small component of higher energy riffles and runs. Substrates are the primary structural component creating heterogeneous habitat. Stream reaches typically alternate between cobble riffles, runs, or glides and bedrock shoals, chutes, or cascades. Clearly defined pools are not a common feature. Most native fish and mussel species appear to favor pocket water within or immediately below riffles and runs. Reptiles and amphibians are largely riparian associated species.

Table 3B-71: Environmental conditions and aquatic species viability (based upon habitat suitability derived from watershed conditions) of the watersheds partially within the Talladega National Forest under the no action alternative (Alternative F). Watershed conditions are classified as "excellent" (E), "average" (A), or "below average" (BA). Risk factors include sediment (S), point source pollution (P), temperature (T), or altered flow (F). Risk categories are 1a) no apparent impairment of risk factors and "low" viability risk, 1b) impairment of one to several risk factors and "moderate" viability risk with some opportunities for Forest Service influence, 1c) as in 1b, but with limited opportunities for Forest Service influence, 2) impairment of a high proportion of risk factors and "high" viability risk with some opportunities for Forest Service influence, and 3) as in 2, but with limited opportunities for Forest Service influence. See EIS, Appendix B for details on the assessment methods.

Watershed	%FS	Watershed Condition Rating	Risk Factors	#Species in each Viability Risk Category					
				1a	1b FS	1c	2 FS	3	Total
M.Choccolocco	23	BA	SPTF	0	0	2	0	42	44
Upper Hatchet	11	E	SP	0	0	3	0	24	27
Hurricane	6	E	SPF	0	0	1	0	10	11
Tallaseehatchee	22	BA	PTF	0	0	15	0	6	21
Upper Terrapin	26	E	PF	0	0	24	0	4	28
Talladega	22	A	P	0	0	31	0	0	31
Cahulga	36	E	P	0	0	13	0	0	13
Chulafinnee	21	E	P	0	0	12	0	0	12
Ketchepedrakee	32	E	P	0	0	11	0	0	11
Cheaha	36	E	TF	3	0	21	0	2	26
U. Choccolocco	71	E	F	5	0	35	0	0	40
Weogufka	1	E	S	3	0	9	0	0	12
Muscadine	2	E	S	4	0	8	0	0	12
Cane	19	E		16	0	0	0	0	16



Overall aquatic species diversity is high, ranking first in mollusk species numbers. However, fish species are less diverse, ranking fifth among the five National Forests in Alabama. At least 18 aquatic species are endemic to Talladega Division watersheds. The Holiday darter is endemic to the Shoal Creek District of the Talladega National Forest. Other species endemic to the Coosa and Tallapoosa River basins include lipstick darters, coldwater darters, lined chubs, Tallapoosa muscadine bridled darters, bronze darters, Cheaha beloneurian stoneflies, several caddisflies, southern acornshells (mussel), Georgia pigtoes (mussel), three crayfish species, Tulotoma snails, and several other snail species. At least 11 aquatic PETS species are known to inhabit the watersheds of the Talladega National Forest. Although this is an "average" number of species, when compared to other Forests within Alabama, it is proportionately a higher number of PETS species given the total number of aquatic species. At least 52 species may be at high risk for loss of viability due to impairment of habitat factors throughout the watersheds partially within the Talladega National Forest.

Based on watershed-wide conditions, three out of 14 watersheds partially on the Talladega National Forest (Weogufka, Upper Hatchet, Middle Choccolocco, and Hurricane) rate high in the number of potentially high-risk species. The primary habitat factors of potential concern include point source pollution, followed by sediment and temperature. Habitat fragmentation associated with road crossings at over 280 bridges, culverts, and fords may be an additional factor limiting the distribution of fish and mussel populations (many mussels require fish hosts during early life). Opportunities for Forest Service mitigation are limited due to the relatively low proportion of Forest Service lands and the overwhelming effects of downstream off-Forest factors. There may be opportunities for restoration in other watersheds with more moderate species viability concerns including Upper Terrapin, Upper Choccolocco, Talladega, and Tallaseehatchee Creeks since the headwaters of these watersheds are predominantly Forest Service lands. However, downstream off-Forest conditions and activities including habitat fragmentation, reservoir inundation, residential development, and agriculture will undoubtedly continue to have cumulative ongoing effects that may limit restoration effectiveness.

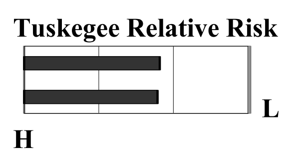
All of the Talladega National Forest watersheds are within the Mobile River basin, a World Wildlife Fund top priority freshwater ecoregion (Abell et al. 2000). Talladega National Forest aquatic conservation priorities are considered of high ranking for six watersheds and medium ranking of four watersheds based upon the relative number of species of concern and apparent watershed conditions (McDougal et al. 2001). In addition, the viability assessment for this EIS indicates that 52 aquatic species may be at high risk due to habitat impairment within the watersheds partially on the Talladega National Forest. Consequently, the Talladega National Forest may warrant consideration as the highest aquatic conservation priority among the five National Forest management units in Alabama. The Nature Conservancy has also recently identified all but one (Talladega) of these 12 watersheds as priority areas for freshwater conservation actions (TNC 2002).

Tuskegee National Forest

The Tuskegee National Forest is within the upper Gulf coastal plain physiographic province. The two watersheds of the Tuskegee National Forest drain into the Tallapoosa River, a major tributary to the Alabama River Basin. The Forest Service only administers lands within a small portion of the headwaters of the Chewacla watershed. Tuskegee National Forest encompasses a more substantial portion of the Uphapee watershed, located within the lower half of the Choctafaula Creek tributary. Off-Forest influences primarily include rural, sub-urban, and urban development as well as agriculture. General watershed conditions are described in the EIS, Chapter 3, Section A and EIS, Appendix B. Both watersheds are ranked as average.

Table 3B-72: Environmental conditions and aquatic species viability (based upon habitat suitability derived from watershed conditions) of the watersheds partially within the Tuskegee National Forest under the no action alternative (Alternative F). Watershed conditions are classified as “excellent” (E), “average” (A), or “below average” (BA). Risk factors include sediment (S), point source pollution (P), temperature (T), or altered flow (F). Risk categories are 1a) no apparent impairment of risk factors and “low” viability risk, 1b) impairment of one to several risk factors and “moderate” viability risk with some opportunities for Forest Service influence, 1c) as in 1b, but with limited opportunities for Forest Service influence, 2) impairment of a high proportion of risk factors and “high” viability risk with some opportunities for Forest Service influence, and 3) as in 2, but with limited opportunities for Forest Service influence. See EIS, Appendix B for details on the assessment methods.

Watershed	% FS	Watershed Condition Rating	Risk Factors	#Species in each Viability Risk Category					
				1a	1b FS	1c	2 FS	3	Total
Uphapee	10	A	SP	0	1	18	0	5	24
Chewacla	1	A	SPF	0	0	19	0	4	23



Aquatic communities include streams, springs, seeps, sloughs, backwaters, beaver ponds, and several artificial impoundments. Associated riparian habitats include cypress tupelo, basic mesic forest, and canebrakes. Streams are typically of low gradient and moderate confinement and sinuosity. Water flow is sluggish to stagnant during base flow. Temperatures are warm, and largely influenced by climatic conditions. On-Forest tributaries have nearly complete canopy closure but the greater influence comes from off-Forest agricultural and municipal lands. Water clarity is generally clear but stained except during and after storm events when water may be extremely turbid with suspended silt. Dominant substrates include sand, silt, gravel, and occasional silt-stone bedrock. Fine sediment is usually a large component of the substrates in all habitat types. Fine to medium organic particulates may build up within slack water areas. Habitat diversity is moderate ranging from sandy glides to gravel riffles. Mussel species appear to favor the habitat associated with either sand shelves or gravel riffles. Reptiles, amphibians, and fish include species largely associated with backwater sloughs, swamps, and ponds. It is not clear how wood debris recruitment has been influenced by historical and recent management. Given the history of these watersheds (topsoil depletion due to extensive cutting, clearing, and tilling, and off-Forest agriculture and urbanization), channel morphology, substrates, and woody debris components are unlikely to approximate conditions prior to European settlement.

Overall aquatic species diversity is high, ranking second and fourth among the five National Forests in Alabama for the total number of fish and mollusk species. No species are known to be endemic only to the Tuskegee National Forest. However, approximately 5 species are endemic to the Tallapoosa River basin. At least 12 aquatic species are either federally listed or identified as sensitive. Although this is an “average” number of PETS species when compared to other Forests within Alabama, it is proportionately a lower number of species at risk given the total number of species. In addition, given the small size of the Forest, the density of PETS species is extremely high and much higher than other National Forest units within Alabama. At least seven species may be at high risk for loss of viability due to impairment of habitat factors throughout the watersheds partially within the Tuskegee National Forest.

Based on watershed-wide conditions, both watersheds partially within the Tuskegee National Forest rate moderate for the number of potentially at risk species. The primary habitat factors of potential concern include sedimentation followed by point source pollution. Habitat fragmentation associated with road crossings at over 140 bridges, culverts, and fords may be an additional factor limiting the distribution of fish and mussel populations (many mussels require fish hosts during early life). The species viability risk is moderate for both watersheds, but the opportunities for Forest Service mitigation are limited.

All of the Tuskegee watersheds are within the Mobile river basin, a World Wildlife Fund top priority freshwater eco-region (Abell et al. 2000). Tuskegee National Forest aquatic conservation priorities are considered of high ranking for the two watersheds based upon the relative number of species of concern and apparent watershed conditions (McDougal et al. 2001). However, the viability assessment for this EIS indicates that seven aquatic species may be at high risk due to habitat impairment within the watersheds partially on the Tuskegee National Forest. Consequently, the Tuskegee National Forest may warrant consideration as the fifth aquatic conservation priority among the five National Forest management units in Alabama. The Nature Conservancy has recently identified both of these watersheds as priority areas for freshwater conservation actions (TNC 2002).

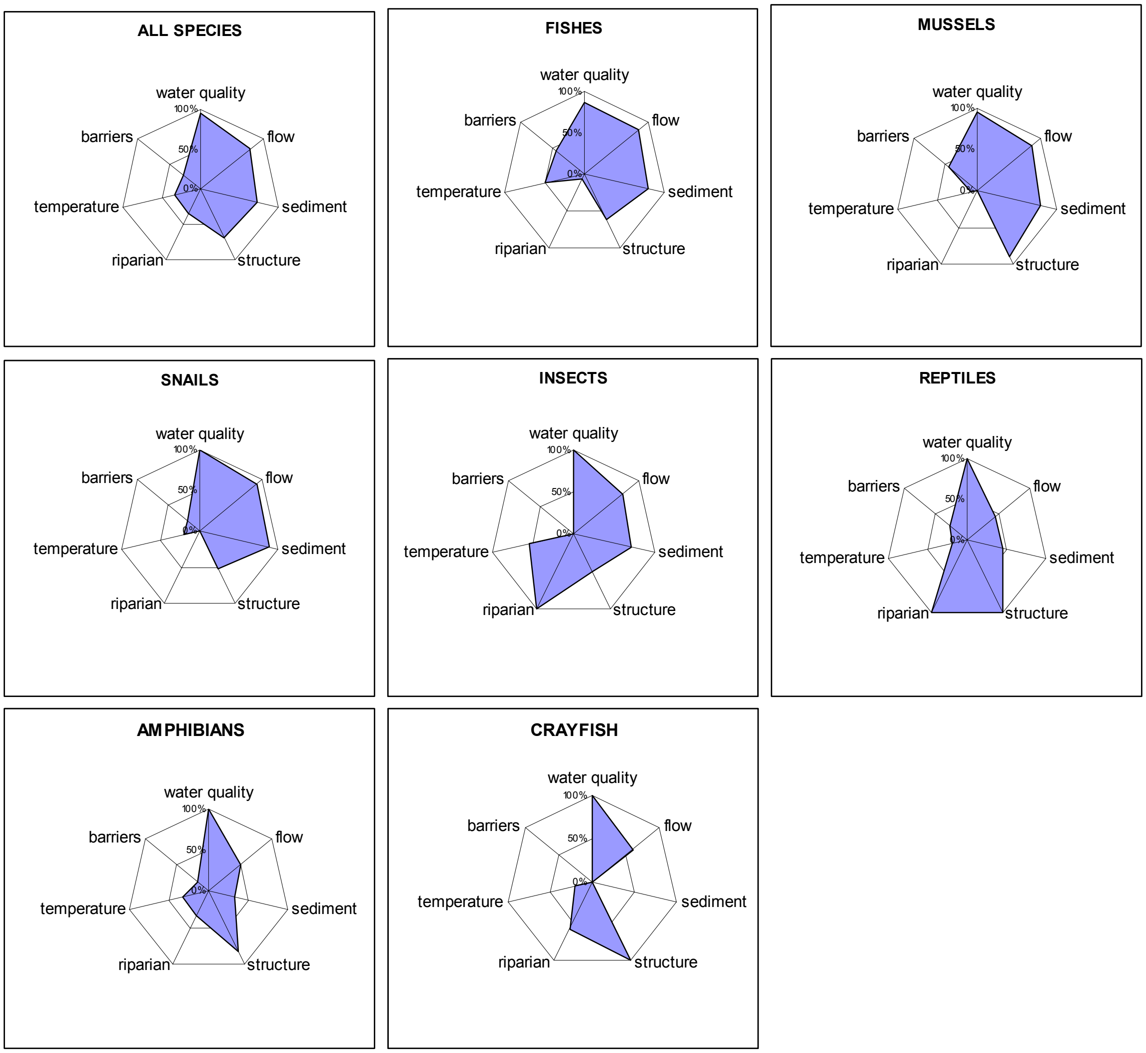
Overview of Aquatic Habitat and Species within the National Forests in Alabama

Aquatic organisms are uniquely adapted to their environment, and in many cases highly specialized in their habitat needs. Over 80% of Alabama's aquatic PETS and rare species are habitat specialists with high sensitivity to alteration in their habitat. These species and many other aquatic species are sensitive to alterations in such habitat parameters as structure, water quality, substrate, vegetation, flow, and the quality and quantity of interaction with the riparian zone (Figure 3B-1).

Water quality is a primary habitat factor. This composite includes consideration of dissolved oxygen, pH/alkalinity, chemical point source pollution, and eutrophication or nutrient status. Many PETS and rare aquatic species are specialized in their preference for a narrow range of pH, alkalinity, or other aspects of water chemistry. Most are sensitive to various forms of pollution including chemical contamination. Water quality is identified as a key habitat feature of potential concern in 18 watersheds associated with the National Forests in Alabama. Nine of these watersheds are within the Talladega National Forest, perhaps reflecting both the adaptation of many Appalachian species to the higher water quality of the region and the situation of several areas of severe off-Forest contamination.

Most species have requirements for certain amounts of water flow, including current, depth, and periodicity. It is a basic requirement of all aquatic species that may be taken for granted. Flow was indicated as a potential concern in 19 watersheds, ten of these on the Bankhead National Forest.

Figure 3B-1: Relative importance of habitat factors to PETS and rare aquatic species and taxa of the National Forests in Alabama. The points of the polygons represent the proportion of the species within each taxonomic group with specialized requirements for each of the habitat components and thus the relative importance of these sensitivity factors to each taxon (ranging from maximal at the circumference to minimal at the center for each factor). This data is derived from the available information in the literature and consequently may under-represent the requirements of lesser known species and taxa (e.g. many of the insects).



Sediment includes consideration of turbidity, bedload silts, and gross sedimentation. Sediment is identified as a key habitat feature of potential concern in 26 watersheds associated with the National Forests in Alabama. Ten of these watersheds are within the Bankhead National Forest. Sediment, and particularly the abundance of fine silts, is an important factor for over 50% of the species. A high proportion of mussels, snails, fish, and insects are specialized in their requirements for clear water and relatively silt-free coarse substrates.

As seen, habitat structure is an important specialization of most taxa and aquatic species. This composite includes macro-channel morphology, channel niche habitats, woody debris, aquatic vegetation, and substrate. Over half of the Alabama PETS and rare aquatic species are specialized in their needs for certain types of substrates, in-stream vegetation, and channel configurations. Many species specialize in pool, riffle, or shoal habitats. Shoals are one of the most species rich habitats with large numbers of snails, mussels, and fish as specialized inhabitants. Darters and other stream fishes often require large cobble, boulders, or bedrock as cover or spawning sites. Stream banks can also provide important structure necessary for cover or reproduction. Reptiles and amphibians have particular aquatic vegetative needs, often including leafpacks, large woody debris, or submergent or emergent vegetation. Woody debris is an important component of most aquatic habitats (streams, rivers, lakes, and swamps) and a habitat need for approximately one fifth of the PETS and rare aquatic species. Logs, stumps, and brush maintain additional in stream habitat complexity through their interaction with hydrologic processes (Lassettre and Harris 2001). Most stream pools are associated with logs and stumps. Wood and brush also provides cover for the more reclusive aquatic species. Prey species use cover to hide from predators, and predators use cover from which to launch their pursuit of prey. At a smaller scale, fine organic particulates are the substrates that support the basis of entire food chains.

The importance of the riparian and aquatic habitat interface may be higher than represented, and includes shade, cover, bank habitat, and terrestrial connective corridors between wetlands. Reptiles, amphibians, and many insects have obvious connections to riparian habitat since many species forage or reproduce within the streamside zone. Ultimately, all aquatic species are tied to the riparian zone through nutrient cycling.

Riparian habitat can also influence water temperatures (Gregory et al. 1991). Fewer aquatic species are known to be temperature specialized. Thermally specialized species include those that inhabit microclimates of springs or caves, and short-lived species tied to a particular season. Insects rank high in the number of thermally specialized species due to their spring habitat association and seasonality. Headwater streams typically harbor cool-water specialist species, as these areas are largely groundwater fed and well shaded by continuous canopy cover. Perhaps for this reason, temperature was indicated as a potential concern in ten watersheds, and the headwaters of the Bankhead National Forest included seven of these watersheds.

“Barriers” considers sensitivity to impediments of movements due to physical obstructions. Natural and artificial channel alterations can serve as barriers and limit upstream and downstream movements. Waterfalls and beaver dams may be natural impediments to upstream and downstream movements along stream corridors. Artificial barriers may include road crossings, culverts, dams, and impoundments. Inundation in and of itself may impede movements of species that cannot tolerate still water or low oxygen along the substrate. Deep open water devoid of cover from predation can also be a problem. Semi-aquatic species may be limited by discontinuous riparian cover or certain types of vegetation. Roads may also hamper terrestrial movements of semi-aquatic species. Barriers have not been analyzed for their role in the watersheds of the National Forests. However, it is expected that further analysis will be completed as per revised Forest Plan direction and that it will show that habitat fragmentation due to barriers has been highest within the Talladega National Forest.

In summary, all seven of these environmental factors are important to a large component of aquatic species. Almost all aquatic species have one or more habitat specializations. Consequently, the effects of National Forest activities are of greatest concern when there is potential for alteration of the habitat conditions of greatest importance to the largest number of aquatic species. Such habitat conditions include water quality, flow, sediment, and habitat structure. In the past, management indicator species have been selected with the intention of using them as surrogates for monitoring habitat quality. The management indicator species concept has not been always been effective, however, due to the cyclic and patchy distribution of aquatic species. It has also been difficult to find species that are sensitive to management activities and found in widespread and sufficient abundance for repeatable sampling. For these reasons, a different approach will be undertaken whereby aquatic community composition and habitat quality will be monitored in addition to tracking individual at risk species. Studies have confirmed that there is an inter-relationship between habitat conditions and aquatic community diversity. Community-based indices such as the EPA's macroinvertebrate rapid bio-assessment protocol and localized biotic integrity measures will be utilized in conjunction with monitoring of population trends of PETS and representative rare species.

Conversely, from a biodiversity perspective, the effects of National Forest activities are also of concern where there is potential for alteration of habitat conditions that are essential to some, but not necessarily all species. Such specialized habitat conditions include shoal bedrock outcroppings (structure), aquatic weed-beds (vegetation), leaf-packs (riparian), large woody debris (riparian), and springs (water quality and temperature). The abundance and distribution of specialist species can be used as indicators of aquatic habitat quality and diversity. Continued monitoring of PETS species should be sufficient, since most PETS species are habitat specialists. Monitoring of community-based indices of diversity would also provide measures of aquatic habitat distribution and quality.

4.2 Direct and indirect effects

Water Quality

Water quality is the primary risk factor in the viability of aquatic species (Figure 3.B.4.6). Historically, human activities ranging from industry and mining to forestry and agriculture have contributed to alterations in water qualities (Abell et al. 2000). Recent trends in water quality have included increasing atmospheric deposition of chemicals that can acidify surface waters and mobilize other natural or human-caused contaminants (SAMAB 1996). Direct effects of water quality degradation could include reduced reproduction or mortality due to the release of toxins, reduction in oxygen availability, or a change in water chemistry or nutrients. Indirect effects may include increased predation, susceptibility to disease (Gilbertson et al. 2003), competition with invasive species, or reduction in the availability and quality of food.

Currently, Forest Service managed activities that could release toxic substances include vehicular leaks, chemical spills, mining, and the use of herbicides and pesticides. The Forest Service has limited control over trends in atmospheric deposition and acidification of surface waters. Vehicles constantly leak low levels of oil and other potentially toxic fluids. Run-off from roads, parking lots, and other heavily used surfaces has the potential to contribute chemicals that could adversely affect aquatic organisms. These indirect effects are difficult to quantify and are largely outside of the control of the Forest Service. The greater potential for measurable but less predictable effects is through toxic spills in to aquatic habitats. Spills can come from vehicular or equipment breakdown or alternatively from accidental release of transported chemicals. Except on major highways, where the Forest does not have jurisdiction, there are few examples of bulk transport of hazardous chemicals on National Forest roads. Some transport of hazardous chemicals including diesel fuel, oil, and pesticides occurs, but is limited to: 1) private individuals using roads that lead to private residences; 2) campers and other recreating publics; and 3) Forest Service contractors. Opportunities to address concerns related to hazardous materials are largely limited to Forest Service and contract workers. Current standards (alternative F) include precautions for the safe handling of toxic materials by Forest Service employees. Motorized vehicles and mechanized equipment are restricted to designated stream crossings and are not permitted in the streamside management zone (SMZ) when the water table is within 12 inches of the ground surface. These standards would also apply to the new action alternatives. In addition, clauses in Forest Service contracts specify safe handling measures for hazardous materials. All alternatives will thus have potential for containment release but standards will minimize the probability and magnitude of effects on aquatic habitats. Alternatives A and D may have a slightly elevated risk for contaminant spills or leaks due to increased equipment use and vehicular access.

Herbicide and pesticide use has been largely limited to situations where run-off or drift into aquatic habitats is unlikely. The exceptions include those situations where prohibition against using herbicides or pesticides may have unacceptable environmental consequences such as expansion of invasive species. Current Forest Service practices (alternative F) are limited by standards on herbicide and pesticide use. Aerial or ground applied treatments of pesticides are not allowed in the SMZ. Cut-surface treatments of pesticides are allowed. Under all of the other alternatives, the new standards of the riparian strategy would provide additional protection such as limiting use of soil-active herbicides within ephemeral stream zones, clearly marking SMZ buffers, and locating pesticide-handling sites to areas outside of the SMZ. The action alternatives therefore might be expected to show a slightly lower risk of surface water contamination. However, herbicide and pesticide use may increase over current levels under alternatives B, E, G, and I. Therefore, risks are not as reduced as in alternatives A and D.

Nutrient enrichment is another category of potential water quality degradation. In addition to providing recreational facilities and maintaining ponded water, lake management activities include liming and fertilization. Lakes and reservoirs are of variable productivity depending on climatic outfall, downstream nutrient transport, and liming and fertilization programs. Liming is often an integral step in lake or reservoir management given the acidic nature of many of the area's watersheds. At higher acidity levels (lower pH) additional nutrients are less available for uptake into to the food chain. To date there has not been a comprehensive assessment of the affects of liming and fertilization on downstream riverine aquatic fauna. Based on the literature, it is likely that liming could negatively affect mollusks through alteration of pH and alkalinity (Nedeau et al. 2000). Fertilization also has the potential to be detrimental to downstream native riverine communities through eutrophication, reduction of oxygen, alteration of nutrient cycles and primary production, and encouragement of invasive species (Nedeau et al. 2000; Carpenter et al. 1998). Under current management (alternative F), liming and fertilization activities would be expected to continue to decline due to State regulations against nutrient discharge, and the current SMZ standard that limits fertilization to circumstances for water quality or PETS habitat improvements. If cases are shown to fit these stipulations, additional administrative studies, monitoring, and mitigation measures would likely be necessary where there could be downstream affects on listed species. Under the action alternatives, the SMZ standards, State regulations, and ESA considerations would also apply. All of the action alternatives are therefore expected to result in reduction in nutrification due to Forest Service fertilization programs. Alternative E may have less of a reduction in effects due to increased emphasis on recreational fisheries.

Hard rock mining and other mineral extraction activities also have the potential for altering water chemistry or releasing contaminants. Much of the Bankhead National Forest has historically been affected by coal mining. However, the Forest Service has not retained lands with active hard rock mineral operations. Oil and gas exploration on the Conecuh National Forest continues, and may expand in the future. Under the action alternatives additional standards are provided for protection of riparian and ephemeral stream zones. All new mineral or oil and gas leases will contain a no-surface occupancy or controlled surface use stipulation. The action alternatives are therefore slightly more restrictive than the current management situation. Alternatives A, E, and G would have additional reduction in risks due to the expected reduction in oil and gas leasing.

In summary, under all Forest Plan alternatives, special precautions would be taken to avoid adverse changes in water quality. Potential water quality effects would be reduced or minimized to a slightly greater extent by alternatives A, D, E, and G. All Forest Plan alternatives could continue some localized effects on water quality but such effects would be largely mitigated by Forest Service programs and consequently are not expected to be of sufficient magnitude to reduce population viability or species security.

Water Flow

Water flow and water levels is the second most important aquatic habitat element according to the specialization of species. Of course, availability of water is a necessity for all aquatic species. Within the State of Alabama, historical and ongoing activities including channelization, impoundments, diversions, and water withdrawals continue to affect the distribution and quantity of water in aquatic habitats. Although the State would appear to have bountiful water supplies, water is not unlimited. Riverine habitat and species have been impacted to the greatest extent. Many of the large river mussel species are federally listed or extinct due to alterations in water flow. The National Forests in Alabama have limited involvement in large rivers. Moreover, current or proposed Forest Service management activities are not likely of sufficient magnitude to measurably affect flow.

Besides contributing sediment, roads also affect the timing and volume of stream discharges by intercepting and concentrating surface and subsurface flows, expanding or decreasing the channel networks, and by reducing infiltration. Other factors relating to altered water flow include vegetation removal, watershed withdrawals, and impoundments. Historically, landscape-scale vegetative removal through timber cutting and agricultural clearing has had the greatest impact on watershed infiltration and run-off. However, currently, Forest Service silvicultural practices are greatly reduced in frequency and intensity. At the watershed scale, increasing impervious surfaces of roadways and urban and suburban development has become the largest issue. Current Forest Service practices (alternative F) are limited by standards on silviculture and ground disturbing activities. Streamside vegetative removal is limited to single tree selection under circumstances of benefit to the resource. All of the action alternatives include similar measures. Based upon the apparent differences in management activities among the alternatives, there may be an increase in watershed effects for alternative A and D (more roads and developed recreation areas).

Impoundments may increase watershed infiltration and evaporation resulting in reduced downstream water flow. Existing dams and reservoirs were created over the last 50 years primarily for sediment or flood control, municipal water storage, and recreational activities. Many of these reservoirs are either downstream or controlled by an off-Forest dam outside of the jurisdiction of the National Forests. The Forest Service has lands adjoining only one reservoir (Lewis Smith on the Bankhead National Forest) managed under a Federal Energy Regulatory Commission hydropower license (currently up for renewal in 2004). During the 1950s and 1960s, the Forest Service created or acquired property with smaller impoundments primarily designed to provide fishing opportunities. Due to the cost and environmental consequences, the Forest Service is unlikely to create additional impoundments. Moreover, such activities would require project specific NEPA analysis and consultation under the ESA. The National Forests are phasing out of their very limited use of groundwater wells. The Forest Service, therefore, has only minimal and secondary involvement in reservoir projects that could adversely affect water flow or availability. Reservoir and water withdrawal activities are not expected to differ among the alternatives.

Sediment

Management activities that mobilize fine sediments pose the third largest potential affect to aquatic species. Sediment is an important factor in the suitability of aquatic habitat, but it may be less important than other factors within the Mobile River Basin largely because these systems are naturally prone to high sediment loading rates. The majority of aquatic species are largely tolerant of fine sediments, especially within the ecosystems of the coastal province (i.e. Oakmulgee Division, Conecuh and Tuskegee National Forests). The more northerly headwater watersheds of the Talladega and Bankhead National Forests support the vast majority of sediment sensitive species. Sediment mobilizing management activities are thus of greater concern for the Bankhead and Talladega National Forests.

Currently, the Forest Service engages in only a few activities that potentially could result in extensive sediment run-off. Forestry practices have changed in favor of the lower impact approaches of smaller scale seed and shelterwood cuts. Riparian and streamside zones are not included in commercial timber sales. Responses to pest infestations have also been recently modified to avoid direct impacts to riparian corridors. Run-off from roadways continues to be potential a source of sediments however current management standards provide additional measures (such as 50 to 210 foot buffers) to minimize the transport of sediment from roadways to waterways. Current management standards (alternative F) minimize soil disturbance within riparian habitat. Healthy well-vegetated riparian corridors provide a filtering capacity so that sediment may be trapped, deposited, and stored and less sediment reaches the stream or other water body. Under all of the action alternatives, the new standards of the riparian strategy would provide additional protection such as preference for cut and leave methods of insect control, stabilization of disturbed soils, minimized roads and trails within riparian zones, and use of hand lines near streams for prescribed burns. The direct and indirect effects of sediment transport, alteration of channel substrates, siltation, and turbidity, are thus expected to slightly decline under the action alternatives. Effects may further decline under alternative I due to decreased overall watershed disturbance from upland silvicultural activities. Therefore, all Forest Plan alternatives could affect aquatic habitat through continued run-off of sediment but effects would be reduced under the action alternatives and would not be expected to be of sufficient magnitude to place aquatic species at risk of loss of viability or extinction.

Habitat Structure

Habitat structure is a significant environmental factor for a wide variety of aquatic species. Channel morphology, stream banks, and woody debris are the primary aspects of structure that can be manipulated by human activities

Within the State of Alabama, historical activities such as the inundation by dams or channelization by dredging, mining, or bank stabilization have likely contributed to the greatest number of species extinctions (Buhlmann and Gibbons 1997, Williams et al. 1993). Habitat alterations have ongoing adverse impacts on aquatic organisms through complete loss of suitable habitat, reduction in habitat quality, and blockage of travel and re-colonization corridors (Moyle and Leidy 1992). However, due to their location, extent, and intensity, current Forest Service activities are highly unlikely to result in large-scale modifications to aquatic habitat. Lake and reservoir management and road and trail crossings are the only Forest Service activities that presently occur within, and have potential to directly modify lake, pond, and stream habitat.

Currently, lake, pond, and reservoir management activities include occasional removal of accumulated sediments and repairs to earthen dams. Although the current Forest Plan does not prohibit construction of additional impoundments, the expense and likelihood for concerns over effects on listed aquatic species effectively limits such actions.

Over a period of several decades, reservoirs may need dredging of accumulated inorganic and organic sediments. Sediment accumulation appears to be at relatively high levels in many reservoirs due to accelerated sediment influx from upstream watersheds and the accumulation of detritus derived from naturally or artificially high productivity within the reservoir. Under current Forest Plan direction, approximately one to two dredging projects occur every five years. Repairs to failing earthen dam structures occur once every ten years. Dam repair maintains available deepwater habitat. There would be direct and positive benefits to species that require open deepwater habitat (primarily game fish) Species that prefer shallow, weedy still water or species that are susceptible to predation from game fish would decline. Such activities are expensive, time intensive, and thus infrequent. Project level NEPA analysis would also be required. Conversely, removal of beavers or their dams sometimes is necessary in order to protect roads or structures. Beaver ponds typically favor aquatic species that prefer shallow weedy quiet water (less than 5% of the PET and sensitive aquatic species and mostly coastal plain species) Beaver dams may also serve as temporary barriers along aquatic corridors and may lead to further downstream channel modifications if they blow out during floods.

Under current Forest Plan direction (the no action alternative F), lake management activities would continue at present frequency and intensity (1-2 projects per 5-10 years). Beaver dam removal would also occur on only an occasional basis. Funding, NEPA and ESA considerations are the primary controls on project implementation. Under all of the action alternatives, current direction continues. Alternative E emphasizes recreation and may encourage additional funding for lake and reservoir habitat enhancements with some added benefits to habitat quality. New impoundments are allowed on a case-by-case basis following site-specific analysis.

Roads and trails have historically been designed to follow ridges or valleys (McDougal et al. 2001). In some cases, roadbeds impinge upon the natural sinuosity of stream channels resulting in an indirect ongoing effect of shortening, straightening and reducing habitat complexity. Current road and trail networks also include a relatively high density of stream crossings in at least five watersheds. At crossing sites, there may be direct modification of the channel configuration resulting in a shallower and wider cross section at low water fords or a narrow and sometimes artificial drop of either bridges or culverts. Water may also be impounded upstream from the road crossing, creating an artificial pool, pond, or wetland. Habitat modifications can happen due to the original design or later modification of the road or trail bed. Alternatively, in the case of "un-improved" low water fords, habitat modification may occur over an extended period of vehicle, horse, or foot traffic.

Under all Forest Plan alternatives, special precautions would be taken to avoid and minimize channel modifications and associated direct mortality to aquatic organisms. Current riparian and streamside management standards (alternative F) include precautions for limiting temporary roads, skid trails, and fire plow lines to only designated crossings. Temporary roads would cross streams only on temporary bridges or low water fords. Under most circumstances, road and trail crossings are configured to minimize the footprint within the riparian zone. Under all of the action alternatives, these SMZ standards would also apply and the new standards of the riparian strategy would provide additional protective measures such as stating that trails would be constructed and maintained with minimal resource damage. When culverts are removed, stream banks and channels must be restored to a natural size and shape. When existing OHV trails within the riparian corridor are causing unacceptable resource impacts, appropriate mitigation measures (including OHV trail closure) would be implemented. All new stream crossings would be constructed so that they do not adversely affect the passage of aquatic organisms or significantly alter the natural flow regime.

In conclusion, all Forest Plan alternatives could affect aquatic habitat through small-scale localized and generally temporary modifications but such effects are not expected to be of sufficient magnitude to result in a decline in overall aquatic habitat quality or place aquatic species at additional risk of loss of viability or extinction. The action alternatives include additional protective measures and are thus likely to further reduce the potential effects of roads and trails on habitat structure. Although alternatives A and D could result in increased road building, protective standards should be adequate to avoid or mitigate additional effects on channel structure, and therefore the net effect would be beneficial to aquatic species, but less than for the other action alternatives.

Riparian Interface

Healthy riparian corridors are critical to all of the other habitat quality factors. Intact headwater riparian corridors maintain water quality, influence flow, buffer sediment inputs, provide large and small woody debris, and moderate water temperatures. Aquatic habitats are integrally linked to their surrounding and adjoining riparian habitat. Riparian vegetation also provides the raw material that drives nutrient cycling. Leaves and twigs ultimately become the basis for the food chain that connects all aquatic organisms.

Historically, riparian vegetation has been greatly altered through timber cutting, tree plantation development, and agricultural clearing. Riparian areas are no longer considered suitable for timber production. Current Forest Service practices that continue to have the potential to affect riparian, and by extension, aquatic habitats, include vegetative restoration (removal of off-site tree species), invasive species control, pest management, and creation of early successional habitat for other riparian dependent resources or upland wildlife. The Forest Service may also engage in direct habitat enhancements through addition of large woody debris or brush structures to either stream channels or lakes. Except in the case of highly artificial reservoir environments, it is preferable to manage for healthy riparian habitat that will automatically provide for continuous recruitment of wood and other benefits to aquatic systems.

Current riparian management would continue under the no action alternative F with ongoing improvements in overall riparian habitat diversity and quality. Under the current Forest Plan and the streamside management zone standards (alternative F) streamside vegetative removal is limited to single tree selection under circumstances of benefit to the resource. Action alternatives include similar measures. Existing wildlife openings identified as causing environmental degradation through concentrated runoff, soil erosion, sediment transport to the channel or water body will be mitigated or closed and restored. New wildlife openings within the riparian corridor are only permitted where needed to provide habitat for riparian dependant species. The action alternatives also include an objective of creating 4-10% early successional habitat within the riparian zone. Creation of early successional riparian habitat could reduce future availability of large woody debris. Ongoing effects would include a limited, but never the less adverse, localized short term impact on stream temperature and woody debris sources in areas where mid to late successional forests are set-back to early successional stages. All of the Plan alternatives therefore include similar levels of riparian activities and protective measures, with a slight advantage to alternatives B, G, and I.

In summary, under all alternatives, riparian corridors would be established along all perennial and intermittent streams and streamside management zones would provide protection for the channeled ephemeral channels. Riparian corridors would be managed to retain, restore, and/or enhance the inherent ecological processes and functions of riparian areas and their embedded aquatic ecosystems. Management activities within these corridors would be governed by the riparian prescription standards. Ephemeral channels, which are outside of the riparian corridors, and general watershed conditions would be protected by both the Forest-wide standards and the streamside management zone standards. When future projects are implemented with full consideration of all of these standards, direct or indirect adverse effects to aquatic organisms and their aquatic habitats would be highly unlikely.

Temperature

Most southern native aquatic species are adapted to warm water temperatures. However, approximately 5 % of the PETS and rare species inhabit the fairly constant and moderate temperatures of springs, sinkholes, and caves. Such species could be adversely impacted by management activities that shift water temperatures in either direction. Species of the higher elevation mountain and headwater streams may also be affected by alterations in thermal regime. Approximately 15 % of the aquatic PETS and rare species fall within the overall category of thermally sensitive species primarily associated with headwaters streams of the main division of the Talladega National Forest.

Historically, water temperatures have been affected primarily by impoundments and loss of riparian canopy cover. Impoundment of water can result in increased heat gain and stratification of warm over cooler water. Depending on the configuration of the outflow, downstream flow releases may be warmer or cooler than the inflowing streams. As discussed, for effects on water flow, the Forest Service has limited control over the management of existing reservoirs. Due to the cost and environmental consequences, the Forest Service is unlikely to create additional impoundments. Moreover, such activities would require project specific NEPA analysis and ESA consultation.

Water withdrawal is emerging as a more serious threat, not only to water flow and levels, but also to temperatures. As surface water flow and volume decreases there is less buffering capacity from climatic fluctuations in air temperature. Likewise, increasing off-Forest groundwater withdrawal is affecting levels of groundwater and aquifers, which in turn results in less moderation from the fairly constant temperature contributions of springs and seeps. Current Forest Service activities are unlikely to result in widespread or long-term alterations in groundwater related thermal regime.

Water temperatures are more likely to be affected by management activities that remove streamside trees. The shading afforded by streamside trees has a measurable benefit to instream temperatures. Solar shading keeps temperatures cool, especially during the summer period of maximum leaf-out. Historical silvicultural practices of extensive cutting along streambanks likely had measurable impacts on thermally sensitive aquatic species. Current Forest Service silvicultural activities are unlikely to affect water temperatures. Under the current Forest Plan and the streamside zone management standards (alternative F) streamside vegetative removal is limited to single tree selection under circumstances of benefit to the resource. Action alternatives include similar measures. Existing wildlife openings identified as causing environmental degradation through concentrated runoff, soil erosion, sediment transport to the channel or water body will be mitigated or closed and restored. New wildlife openings within the riparian corridor are only permitted where needed to provide habitat for riparian dependant species. The action alternatives also include an objective of creating 4-10% early successional habitat within the riparian zone. If creation of early successional habitat opens up the forest canopy along the streamside zone, thermal gain could increase instream water temperatures. All of the Plan alternatives therefore include similar levels of riparian activities and protective measures, with a slight advantage to alternatives B, G, and I. All Forest Plan alternatives could affect aquatic habitat through small-scale thermal alterations but are not expected to be of sufficient magnitude to place species at risk of loss of viability or extinction.

Barriers

In addition to the direct and localized effects of habitat modification, road crossings may be barriers to passage of aquatic organisms. In the southeast, most river and stream species are adapted to low gradients and moderate currents. Low water fords, bridge aprons, and culvert pipes may include artificial cascades or waterfalls that are beyond the jumping and swimming capabilities of many aquatic species. These drops may block movements primarily during low flows. The shallow laminate flows of aprons or the concentrated flow of culverts can impede aquatic organism movements at either low or high flows.

Road crossings and other artificial barriers may restrict fish access to prime habitat. Highly migratory species such as sturgeon, lampreys, and eels, may decline in overall population numbers due to their inability to move between freshwater and marine reproductive and rearing habitat. Smaller stream fishes may not migrate across large distances; however, many species rely on seasonal upstream movements to access more suitable spawning habitat and to replenish populations that have declined due to natural or human caused disturbance.

Since mussels rely on fish hosts during their early life history, mussels may also be limited in their distribution due to artificial barriers. Young mussels attach themselves to fish. In this way, mussel populations can re-populate upstream areas that could otherwise become devoid of mussels over years of downstream drift or periodic floods and drought. Amphibians and reptiles may also be affected by road crossings. Aquatic obligate species such as waterdogs may be blocked from upstream movements. Semi-aquatic species such as turtles and frogs may be forced to travel overland and across roadways where they are susceptible to predation and road kill. Even slow moving snails and salamanders can be affected since they may be attracted to the cobble cover and hardened substrates present at some low water fords. Their concentration at crossings can result in elevated road mortality and deplete local populations.

A comprehensive fish passage assessment has not been completed for the National Forests in Alabama. However, based on the typical configuration, number, and distribution of road crossings, it is likely that fish movements have been restricted by as much as a third of their normal range, particularly within the upper portions of many watersheds. Road crossing density is highest on the Tuskegee National Forest, followed by individual watersheds of the Conecuh, Bankhead, and Talladega National Forests.

Summary of Direct and Indirect Effects

Under current management direction (the no action alternative), roads and pest control activities would continue to have the greatest potential for effects on aquatic species and their habitats. Application of the streamside management zone standards and best management practices would largely mitigate adverse impacts. Action alternatives A, D, and E are projected to have similar or potentially slightly increased effects. Alternatives B, G, and I are expected to have slightly reduced effects due to increased beneficial programs, reduced land disturbance, and additional protective measures under the riparian management prescription. These differences in alternatives are summarized in Table 3B-73.

Due to the distribution of aquatic resources in relation to National Forest activities, there could be differing magnitudes of effects on the various types of aquatic habitats. Management activities such as roads and forest restoration would primarily affect streams, springs, and wetlands, whereas lakes and reservoirs are less likely to be affected by upland and riparian activities. National Forest involvement and influence is limited in large rivers. Current habitat conditions and trends would continue and consequently, riverine habitat and species would likely remain on the present trajectory.

Lake and reservoir management activities will continue at current levels under the no action alternative (F). Management activities may include recreational facility improvements, reservoir maintenance, fish stocking, liming, fertilization, and placement of habitat enhancement structures. Among the alternatives, there may be some minor differences in the extent of these activities and consequently their effects on habitat and species.

Under current management direction and all action alternatives, emphasis would remain on demand species within reservoirs and native aquatic communities and PETS species within streams and rivers. Current trends of riparian and aquatic habitat restoration would continue, resulting in stable or improved conditions for stream habitat and species. Such improvements may be slightly accelerated by the more aggressive riparian restoration activities of alternatives B, G, and I.

Table 3.B-73: Projected effects on aquatic habitat quality associated with varying levels of management activities under the Forest Plan alternatives: ++ = relatively large benefits, + = some benefits, o = neutral effects or no change; - = some negative effects or a downward trend;-- is a relatively large negative effect.

Aquatic Habitat factors influences	Alternatives						
	A	B	D	E	F	G	I
Water Quality	++++-	+++++—	++–	+++++—–	o	+++++—	+++++—
silviculture	+	+++	-	++	o	++	+++
prescribed fire	o	-	o	- -	o	- -	- -
herbicides	o	- -	o	- -	o	- -	- -
roads & trails	-	o	-	o	o	o	o
fertilization	+	+	+	+-	o	+	+
minerals	++	+	+	++	o	++	+
Flow	+-	+++++	- -	++-	o	++++	+++++
silviculture	+	+++	-	++	o	++	+++
Roads	-	++	-	-	o	++	++
impoundments	o	o	o	o	o	o	o
water use	o	o	o	o	o	o	o
Sediment (section 3.A.2)	+++	+	-	++++	o	++	+++++
Structure	+++-	++++	++++-	+++++	o	+++++	++++
improvements	o	o	o	+	o	o	o
roads & trails	++-	++	++-	++	o	++	++
woody debris	+	++	++	++	o	+++	++
Riparian interface	++-	++++-	++-	++-	o	+++++-	++++-
restoration	+	++	+	+	o	+++	++
pest control	o	+	o	o	o	+	+
early succ. rip.	+-	+-	+-	+-	o	+-	+-
Temperature	+-	+-	+-	+-	o	+-	+-
impoundments	o	o	o	o	o	o	o
water use	o	o	o	o	o	o	o
riparian canopy	+-	+-	+-	+-	o	+-	+-
Barriers	+	++	+	+	o	++	++
dams	o	o	o	o	o	o	o
roads & trails	+	++	+	+	o	++	++
Summary effects rank	5th	3rd	o	4th	=	2nd	1st

Table 3B-74: Effects of alternatives on sub-categories of aquatic habitats: ++ = relatively large benefits, + = some benefits, o = neutral effects or no change; - = some negative effects or a downward trend;-- is a relatively large negative effect.

Categories of aquatic habitat	Alternatives						
	A	B	D	E	F	G	I
Streams	+	++	+	+	o	+++	++
Rivers	o	o	o	o	o	O	o
Reservoirs	o	o	o	+	o	O	o
Natural lakes or ponds	+	++	+	+	o	++	++
Summary Effects Ranking	4	2	4	3	5	1	2

Ongoing effects expected under all action alternatives would include the following trends: 1) overall improvements in riparian habitat diversity and quality, which in turn improve aquatic habitat quality, especially for such factors as maintenance of water temperatures and availability of woody debris; 2) the potential for limited localized short-term impacts on stream temperature and woody debris sources in areas where mid- to late-successional forests are set-back to earlier successional stages (up to 4-6% of lineal distances as a Forest Plan objective under all alternatives); 3) a reduction in the likelihood of Forest Service associated chemical spills; 4) declining sediment inputs as roads are repaired or retired; 5) decreased habitat fragmentation as road crossings are improved for upstream passage; and 6) a continued declining but small amount of direct mortality on individual aquatic organisms, primarily associated with road crossings or illegal activities beyond the control of the Forest Service. There may be subtle differences among the action alternatives due to varying levels of management activities across the landscape. Consequently, alternative I would be expected to have relatively more beneficial effects on aquatic habitats, followed by alternatives G, B, E, A, and D, in descending order. The difference in the magnitude of effects is not large, however, due to the application of the streamside and riparian management standards under all of the action alternatives. Likewise, the difference between the no action and action alternatives is not large because the current Plan has also included substantial protective measures and standards.

4.3 Cumulative Effects

Historically, the primary factors contributing to aquatic habitat degradation have been sediment runoff, point discharge pollutants, reduction in riparian health, and alteration of flow and channel morphology (Abell et al. 2000). In addition, habitat fragmentation has become one of the most severe threats to aquatic species and biodiversity. Historical influences are expected to continue throughout Alabama riverbasins. Many National Forest streams will continue to receive elevated sediment, nutrients, and chemical contaminants from downstream run-off or atmospheric deposition due to past and present off-Forest activities. Historical and present day off- Forest silvicultural practices will continue to limit transport of large woody debris to downstream National Forest stream segments. Episodic disease will periodically disturb riparian forests and contribute to loss of riparian benefits to aquatic ecosystems. The historical loss of the American chestnut continues to substantially influence stream ecosystem integrity (Smock and MacGregor 1988). Clearing of off-Forest riparian vegetation will reduce the buffering effect on downstream National Forest water temperatures. The effects of National Forest activities must therefore be considered in the context of overall trends and ongoing watershed conditions, especially in those watersheds with extensive upstream non-federal lands. Such cumulative effects would be most pronounced in the larger stream and river systems of the Conecuh, Tuskegee, and Oakmulgee Division of the Talladega National Forests. Cumulative off-Forest effects are generally less for the Bankhead National Forest watersheds.

Direct and indirect adverse effects to aquatic communities are minimized by the riparian and Forest-wide watershed standards; however, they are not entirely eliminated and even low levels of adverse effects can be additive with off-Forest and watershed wide effects to such an extent that they go beyond a threshold for the viability of some aquatic species. According to the viability assessment, there are 21 out of a total of 43 watersheds (49%) with one or more species rated as a high viability risk (EIS section 3.B.7). However, the Forest Service is estimated to have minimal influence over the vast majority (~90%) of these possible viability outcomes due to the limited extent of Forest Service lands and the overwhelming cumulative effects from off-Forest conditions and activities. Based upon the results of sediment modeling (Clingenpeel 2003), the magnitude of change in sediment production is not expected to result in differing levels of risk to aquatic species viability (section 3.A.2, water). Presumably, since sediment may be reflective of general watershed conditions, it also indicates the magnitude of relative impairment among the other factors (water quality, temperature, and flow). Given the small levels of distinction expected for direct and indirect effects among alternatives, it is also unlikely that effects on the other essential components of aquatic habitat will translate into quantifiable differences in cumulative effects substantial enough to affect species viability at the watershed, population, or regional levels.

5.0 Threatened and Endangered Species (Includes Candidates)

5.1 FEDERALLY LISTED TERRESTRIAL AND SEMI-TERRESTRIAL ANIMALS

Red-cockaded woodpecker *(Picoides borealis)*

Affected Environment

The red-cockaded woodpecker (*Picoides borealis*) is a federally listed endangered species endemic to open, mature and old–growth pine ecosystems in the southeastern United States. Currently, there are an estimated 12,500 red-cockaded woodpeckers living in roughly 5,000 family groups across twelve states. This is less than three percent of estimated abundance at the time of European settlement (USFWS, 2003). The red-cockaded woodpecker was listed as endangered in 1970 (35 Federal Register 16047) and received federal protection under the Endangered Species Act of 1973. The precipitous decline in population size that led to the species' listing was caused by an almost complete loss of habitat. Fire-maintained old-growth pine savannas and woodlands that once dominated the southeast, no longer exist except in a few, isolated, small patches. Longleaf pine (*Pinus palustris*) ecosystems, of primary importance to red-cockaded woodpeckers, are now among the most endangered ecosystems on earth. Shortleaf (*P. echinata*), loblolly (*P. taeda*), and slash pine (*P. elliottii*) ecosystems, important to red-cockaded woodpeckers outside the range of longleaf, also have suffered severe declines (USFWS, 2003).

In 1986, red-cockaded woodpecker populations were on Bankhead NF, Conecuh NF, Oakmulgee Division (of Talladega NF), Talladega Division (of Talladega NF), and Tuskegee NF (Costa and Escano, 1989). By 1992 the Tuskegee population had been extirpated (Escano 1995). Today, red-cockaded woodpecker populations remain on Conecuh NF, Oakmulgee Division, and Talladega Division. Populations on Bankhead NF were extirpated since 1992. The Bankhead and Tuskegee populations were already very small in 1986. Unlike earlier declines that led to the species' listing, these later extirpations were not the result of timber harvesting. Two trends account for these later population extirpations: first, a loss of the two-layered, (open pine canopy and herbaceous groundcover) forest structure; followed by a loss of the pine-dominated forest composition, required by red-cockaded woodpeckers. Hardwood midstory within active clusters has been associated with cluster abandonment (Loeb et al. 1992). These extirpations were the result of unimpeded succession, through a lack of adequate burning and thinning in pine and pine-hardwood stands. Fire suppression has severe and numerous impacts on southern pine ecosystems, including changes in tree species composition and forest structure (USFWS, 2003).

Table 3B-75 identifies remaining red-cockaded woodpecker populations on National Forests in Alabama, and their current size. Long-term population goals were determined in cooperation with the U.S. Fish and Wildlife Service as part of the Revised Recovery Plan in defining species recovery standards. Short-term population goals, established as part of this Forest Plan revision, are defined as population increase objectives over the next ten years. These objectives reflect the minimum population growth rate directed in the Revised Recovery Plan. Greater population growth rates during the planning period are desirable and encouraged, where aggressive habitat restoration progress is possible.

Southern pine forests today are very different from pre-colonial forest communities, not only in extent but also in species composition, age, and structure (Ware et al. 1993, Noel et al 1998). Original pine forests were old, open, and contained a two-layered structure of canopy trees and diverse, pyrophytic grass and forb groundcovers. These forests were dominated by longleaf in the coastal plain, longleaf/shortleaf/loblolly in the Piedmont and interior highlands, and slash in south Florida. Much of today's pine forests are young, dense, and dominated by loblolly pine, with a substantial hardwood component resultant of fire exclusion or the exclusive use of dormant season burning. Today's pine forests have dense, shade-tolerant mid-stories and little or no groundcover (Ware et al. 1993).

Table 3B-75: Red-cockaded Woodpecker Habitat Management Area Population Objectives

RCW HMA	2002 Active Clusters	Long-Term Population Goal	Short Term Population Goal	Recovery Designation
Shoal Creek	8	125	18	Essential Support
Talladega	0	110	10	Essential Support
Oakmulgee	120	394	185	Secondary Core
Conecuh	19	309	28	Secondary Core

Current threats to red-cockaded woodpecker recovery on National Forest lands are: the loss of roosting and nesting substrate through past over-harvest or die-off of mature pines; the loss of foraging habitat and proper stand structure through encroachment of woody vegetation into preferred herbaceous ground-covers in the absence of dormant- and, especially, growing-season fires; and the loss of suitable habitat through unimpeded succession of pine and pine-hardwood stands toward hardwood-dominated conditions. Red-cockaded woodpeckers' naturally low fecundity and the potential effects of isolation, habitat fragmentation, and cavity competition exacerbate these habitat limitations (USFWS 2003). Management actions to alleviate these threats include: the production and retention of pine trees 100+ to 120+ years old, depending on tree species; the installation of artificial roosting and nesting cavities; the protection of artificial and natural cavities from competitors; the restoration and maintenance of low (50-80 sq. ft per acre) basal areas of trees in upland pine and pine hardwood forest stands; the restoration of native pine species to altered, off-site plantations and other appropriate upland sites; and control of hardwood midstory encroachment through the use of mechanical, chemical, and prescribed burning methods.

Both dormant season and growing season burns can be utilized to maintain red-cockaded woodpecker habitats; however, growing season burns are more efficacious in killing encroaching hardwoods, restoring habitat structure, and favoring the development of native, pyrophytic grasses and forbs. Population management techniques to be utilized include: capture, banding and monitoring of individual birds; translocation of birds from donor populations; and intra-population translocations. Population management techniques will follow Revised Recovery Plan requirements for permits, training, and compliance.

Project-level decisions implementing red-cockaded woodpecker improvement actions will include: restoration of off-site pine stands with native pine species; regeneration of limited mature pine stands with retention of potential roost trees; thinning of mid-successional and mature pine and pine-hardwood stands; prescribed burning to remove encroaching woody vegetation and restore herbaceous ground-covers; and chemical and mechanical treatment of midstory hardwoods where fire is not a viable management tool.

Table 3B-76: Red-cockaded Woodpecker Habitat Management Area Objectives

RCW HMA	Total HMA Size	Sub-HMA Size	Minimum Number of *Recovery Standard* Foraging Acres Restored
Shoal Creek	67,397	25,000	3000 (25 cluster sites)
Talladega	56,850	19,000	1800 (15 cluster sites)
Oakmulgee	98,584	NA	24600 (205 cluster sites)
Conecuh	56,223	NA	4200 (35 cluster sites)

Table 3B-76 shows the minimum number of acres that must be restored to the level defined in the Revised Recovery Plan as the Recovery Standard foraging acres. The Recovery Standard for foraging states: For medium to high productivity sites (defined in that Plan as site index 60 or higher) provide each group of woodpeckers 120 acres of good quality habitat which has some large old pines, low densities of small and medium pines, sparse ($\leq$ 7 ft tall) or no hardwood midstory, and groundcovers consisting of $\geq$ 40% native bunchgrasses and pyrophytic forbs within 0.5-miles of the cluster. This habitat condition can only be achieved through the use of all of the habitat management actions previously described. For sites with low productivity (site index < 60) provide 200 – 300 acres of good quality foraging habitat.

Potential Effects – Red-cockaded woodpecker

Direct effects to red-cockaded woodpeckers include mortality of individual red-cockaded woodpeckers related to capture, handling, translocation, or prescribed fire. Prescribed fire, even when employed within prescription and Revised Recovery Plan guidelines, may result in the loss of individuals if nest trees are burned during nesting season. However, for the period of 1998-2002 all RCW properties managing their habitats with prescribed fire, burned 6195 active clusters with no losses of nests (Costa 2003). The Revised Recovery Plan increases the protection standard (area raked around each roost tree) above those used during the compilation of the data cited above. Therefore, the potential for mortality red0cockaded woodpeckers during nesting season due to prescribed fire is deemed insignificant and discountable, with standard mitigations given in the Recovery Plan. Losses of individual cavity trees to fire can be compensated by installation of artificial cavities. Avoidance of prescribed burning during the nesting season is not recommended, since nesting season coincides with timing favorable for other important ecological fire effects.

Indirect effects to red-cockaded woodpeckers occur at the landscape level and at the population level. There will be beneficial effects of the habitat management actions to red-cockaded woodpecker habitats and populations. Harmful habitat isolation and fragmentation effects will be reduced as suitable habitat areas are enlarged and joined across the Habitat Management Areas. Population expansion will be fostered by: restoration of off-site pine stands with native pine species; regeneration of limited mature pine stands with retention of potential roost trees; thinning of mid-successional and mature pine and pine-hardwood stands; prescribed burning to remove encroaching woody vegetation and restore herbaceous ground-covers; chemical and mechanical treatment of encroaching midstory where fire is not a viable management tool; installation of artificial roosting and nesting cavities; protection of artificial and natural cavities from competitors through the installation of excluder devices; capture, banding and monitoring of individual birds to facilitate monitoring of the population; and translocation of birds as necessary to optimize annual reproduction.

Cumulative effects to red-cockaded woodpecker populations over the long-term are expected to be population growth at rates prescribed in the Revised Recovery Plan, Recovery Plan population objective attainment, and ultimately, recovery of the species. Management of red-cockaded woodpecker populations on National Forests in Alabama will be according to the RCW EIS Record of Decision and the Revised Recovery Plan as required by the Endangered Species Act, and will not vary by alternative. Habitat Management Areas for red-cockaded woodpeckers have been established on the Talladega, Conecuh, and Oconee National Forests through direction in the Revised Recovery Plan for red-cockaded woodpeckers. Management direction has been incorporated into forest plans through the allocation of acres to the Red-cockaded Woodpecker Habitat Management Area Prescription (RX-8.D.) and/or the Red-cockaded Woodpecker sub-Habitat Management Area Prescription (RX-8.D.1) and through forest-wide protections of endangered species. Additional benefits to the red-cockaded woodpecker will be derived from areas in the following Prescription Allocations: Rare Communities Prescriptions (Coastal Plain Sandhills, Coastal Plain Bogs, Woodlands, savannas and grasslands), Restoration of Longleaf and Shortleaf Ecosystem Prescriptions, and Dispersed Recreation with Vegetation Management Prescriptions (where the target recreational activity requires vegetation management producing open, park-like forest stands (e.g. quail hunting)).

Beneficial management actions required to implement the Revised Recovery Plan include: the harvesting of timber, including thinning and regeneration; the use of mechanical, chemical, and prescribed burning midstory and hardwood encroachment control methods; the installation of artificial roosting and nesting cavities; the protection of artificial and natural cavities from competitors through the installation of excluder devices; the capture, banding and monitoring of individual birds; the translocation of birds from donor populations to recipient populations;

and intra-population translocations, as necessary to optimize annual reproduction. Mitigation actions required under the Revised Recovery Plan for habitat management include: protection of active and inactive cavity trees within burn units; utilization of two-aged regeneration method rather than clear-cutting; rotation ages not less than 120 years for longleaf and shortleaf, and 100 years for loblolly and slash pines; limitation of regeneration area size; and limitation of operable season to avoid nesting and brood-rearing periods in active clusters.

Implementation of the Revised Land and Resource Management Plan for the National Forests in Alabama is not likely to adversely affect the red-cockaded woodpecker, as residual potential risks to individuals after full implementation of protective measures are insignificant and discountable. Additional site-specific analysis would be done on all projects with the potential for affecting this species.

Bald eagle *(Heliaeetus leucocephalus)*

Affected Environment

The bald eagle ranges over most of the North American continent, from as far north as Alaska and Canada, down to Mexico. Experts believe that in 1782 when the bald eagle was adopted as our national bird, their numbers may have ranged from 25,000 to 75,000 nesting pairs in the lower 48 states. Since that time the species has suffered from habitat destruction and degradation, illegal shooting, and most notably from contamination of its food source by the pesticide DDT. In the early 1960's, only 417 nesting pairs were found in the lower 48 states. In 1999, more than 5,748 nesting pairs of bald eagles were recorded for the same area, resulting primarily from the banning of DDT in the United States in 1972 aided by additional protection afforded under the Endangered Species Act (USDI, Fish & Wildlife Service, 1999).

Bald eagles have few natural enemies but usually prefer an environment of quiet isolation from areas of human activity (i.e. boat traffic, pedestrians, or buildings), especially for nesting. Their breeding areas are generally close to (within 4 km) coastal areas, bays, rivers, lakes, or other bodies of water that reflect general availability of primary food sources including fish, waterfowl, rodents, reptiles, amphibians, seabirds, and carrion (Andrew and Mosher 1982, Campbell et al. 1990). Although nesting territory size is variable, it typically may encompass about 2.59 square kilometers. Most nest sites are found in the midst of large wooded areas adjacent to marshes, on farmland, or in logged-over areas where scattered seed trees remain (Andrew and Mosher, 1982). The same nest may be used year after year, or the birds may alternate between two nest sites in successive years. Bald eagles mate for life and are believed to live 30 years or more in the wild. Breeding bald eagles in Virginia appear to be permanent residents, whereas the young disperse extensively northward and southward. Although bald eagles may range over great distances, they usually return to nest within 100 miles of where they were raised (USDI, Fish & Wildlife Service, 1995).

Winter home ranges for eagles can be very large, especially for non-breeding birds. They generally winter throughout the breeding range but are more frequent along the coast. These birds commonly roost communally. The Bald Eagle was a locally common, breeding and wintering resident in Alabama on the Gulf Coast and the Tennessee Valley before 1960 (Imhof, 1976). Today the species is a rare to uncommon breeding and wintering resident. There have been confirmed sightings on the CNF, usually around large bodies of water such as lakes or ponds, at Open Pond, private land north of Wing, AL, and at Brooks Hines Lake. As recently as 1999, a pair of eagles established a nest at Brooks Hines Lake and successfully fledged at least one chick. During 2001, eagles nested on the opposite side of Brooks Hines Lake but no success was observed.

The primary threats to the bald eagle include loss of nesting, foraging, and roosting habitat especially along shorelines, disturbance by humans, biocide contamination, decreasing food supply, and illegal shooting (Byrd and Johnstone, 1991, Buehler et al, 1991). Bald eagles also have died from lead poisoning because of feeding on waterfowl that had inadvertently ingested lead shot. In 1991, the U.S. Fish and Wildlife Service completed a program to phase out lead shot for waterfowl hunting.

Potential Effects – Bald eagle

Direct effects to bald eagles, in the form of fatalities to individual birds, are not likely to occur through normal, legal, management actions and activities occuring on National Forests in Alabama.

Indirect effects to bald eagles and their habitat could occur. Negative indirect effects include disturbance that would result in breeding or nesting failure, and alteration of occupied habitats. Timber harvesting or road building activities have the potential to impact the bald eagle or its habitat, should it occur near streams, lakes, or other wetlands. Human disturbance from roads, trails, and campgrounds can also adversely affect the use of an area for nesting or roosting by eagles. Beneficial indirect effects could result through the protective emphases in Canyon Corridor, Rare Community, Riparian, and Wild and Scenic River prescriptions allocated to suitable potential habitats.

Cumulative effects to bald eagle populations are expected to be negligible under all alternatives. The Revised Forest Plan and all alternatives include a standard establishing 1500-foot protection zones around bald eagle nests and communal roost sites. Vegetation management that would affect forest canopy within these zones is prohibited, and other activities that may disturb eagles are prohibited within these zones during periods of use. The Riparian Prescription, with its emphasis on low levels of disturbance and maintenance of mature forest, provides direction for management of shorelines where bald eagles may forage. No additional specific provisions related to foraging habitat are included due to the variety of circumstances that may be involved. These issues would be addressed during site-specific analysis.

Because this management direction addresses critical needs for habitat and protection of roosts and nests from human disturbance, the Revised Forest Plan and alternatives are not likely to adversely affect the bald eagle, and should provide conditions beneficial to this species. Additional site-specific analysis would be done on all projects with the potential for affecting this species.

Wood stork *(Mycteria americana)*

Affected Environment

The United States breeding population of wood storks is listed as an endangered species. This species may have formerly bred in all the coastal Southeastern United States from Texas to South Carolina. Currently, they breed throughout Florida, Georgia, and coastal South Carolina Post-breeding storks from Florida, Georgia, and South Carolina occasionally disperse as far north as North Carolina and as far west as Mississippi and Alabama. Storks sighted in Arkansas, Louisiana, Texas, and points farther west may have dispersed from colonies in Mexico. The amount of overlap and/or population interchange is unknown (U. S. Fish and Wildlife Service 1996).

The estimated total population of nesting storks throughout the southeastern United States declined from 15,000 to 20,000 pairs during the 1930's to a low of between 4,500 and 5,700 pairs for most years between 1977 and 1980. Since 1983, the U.S. population has ranged between 5,500 and 6,500 pairs. Factors contributing to the decline include loss of feeding habitat, water level manipulations affecting drainage, predation and/or lack of nest tree regeneration, and human disturbance (U. S. Fish and Wildlife Service 1996).

Wood storks use a variety of freshwater and estuarine wetlands for nesting, feeding, and roosting. Freshwater colony sites must remain inundated throughout the nesting cycle to protect against predation and abandonment. Foraging sites occur in shallow, open water where prey concentrations are high enough to ensure successful feeding. Good feeding conditions usually occur where the water column is uncluttered by dense patches of aquatic vegetation. Typical foraging sites throughout the species range include freshwater marshes and stock ponds, shallow, seasonally flooded roadside or agricultural ditches, narrow tidal creeks or shallow tidal pools, managed impoundments and depressions in cypress heads and swamp sloughs. Almost any shallow wetland depression where fish become concentrated, either through local reproduction or the consequences of area drying may be used as feeding habitat (U. S. Fish and Wildlife Service 1996).

The wood stork is fairly common but irregular in the coastal plain of Alabama in the summer and fall, and farther north it is rare to uncommon, occuring mostly in the Tennessee Valley (Imhof 1976). Wood storks are not known to be resident during breeding or wintering seasons on National Forests in Alabama. Occasional transients are known to occur on the Conecuh, and may exploit seasonal wetlands on Oakmulgee and Tuskegee as post-breeding storks disperse in late summer and fall.

Potential Effects – Wood stork

No direct effects to woodstorks are expected under any of the alternatives. No breeding colonies of woodstorks are known to occur on National Forests in Alabama.

Indirect effects include alteration of habitat being utilized by woodstorks on National Forests in Alabama. Woodstorks are only known to utilize shallow wetlands on National Forest management units in the lower coastal plain during the late summer and early fall. This period is called the post-breeding dispersal period. Openings in forested wetlands, beaver swamps, and other open, shallowly flooded wetlands used by wood storks as foraging sites are all protected by the riparian prescription (11), and are not often the target of management actions. The riparian corridor standards insure that these sites would be managed to retain, restore, and/or enhance the inherent ecological processes and function of the associated aquatic, riparian, and upland components within the corridor. The appropriate Wetland Rare Community (9F) standards also would be applied to natural wetland sites which may be used for foraging as well as other wetland sites that may be used in the future. The wetland rare communities would be managed under all alternatives for protection, maintenance, and where possible, restoration. Additional potentially suitable habitats are protected in the Wilderness (1), and Wild and Scenic River (2) prescriptions. The riparian corridor and rare community standards discussed above would ensure that vegetative and hydrologic conditions of existing and potential wood stork foraging areas will be protected under all alternatives. These potential indirect effects to woodstork habitat, though beneficial, are insignificant, due to the relatively low level of use of heavily forested lands such as National Forests in Alabama, by woodstorks. No indirect effects to woodstorks are expected under any of the alternatives.

No nesting colonies are present on any National Forests in Alabama management unit. However, as loss of foraging habitat is considered one of the causes for the decline of this species, protection of foraging habitat can contribute to the recovery of this species. The riparian corridor and wetland rare community standards and foraging area standards described above are the same under all alternatives and across all Forests. Therefore, there will be no adverse cumulative effects to these wetland communities or to the wood stork and other associated species.

Through the implementation of riparian corridor and wetland rare community standards, and foraging areas standard discussed above, implementation of any Plan alternative will have no effect to wood stork. Additional site-specific analysis would be done on all projects with the potential for affecting this species.

Gray bat *(Myotis grisescens)*

Affected Environment

The gray bat occupies a limited geographic range in limestone karst areas of the southeastern U.S. (USDI FWS 1982). The bat is more narrowly restricted to cave habitats than any other mammal occurring in the U.S., and occupies caves year-round. Most individuals migrate seasonally between maternity and hibernating caves. About 95% of the known population inhabits nine winter caves, none of which is located on or near NFAL.

Limiting factors for the gray bat may include warm caves in the northern portion of its range, and cold caves in the southern portion. A key cause of decline appears to be human disturbance and loss of cave habitat quality. The recovery plan (USDI FWS 1982) recommends actions focused on cave acquisition and gating.

Deforestation of areas around occupied cave entrances and in between caves and large water sources (feeding corridors) may have a detrimental effect. Forest cover provides protection from predators, especially for young bats. Retention of forested corridors around cave entrances, along river and perennial stream edges, and along reservoir shorelines within 25 km of known gray bat maternity caves is important (USDI FWS 1982, Best et al 1995).

Although the gray bat is currently listed as endangered, some bat researchers have endorsed a proposed status change to threatened due to population increases and successful protection of many inhabited caves (Currie and Harvey 2002). Gray bats are now estimated to number over 2.6 million individuals.

Both major hibernacula and Priority 1 maternity caves are known from Alabama and Tennessee. However, those caves are over 50 miles from the nearest Forest Service management unit, that being the northern extent of the Talladega Division of Talladega National Forest. An individual Gray bat was reportedly mist-netted over Choccolocco Creek in 1995 near the Talladega Division. A new cave was recently found on Talladega Division, but contained no Gray bats during the initial and a subsequent survey. There is potential for gray bat use of Talladega Division. Gray bats are known from two caves on Bankhead National Forest. No known maternity sites exist on or within the proclamation boundary of either management unit.

Potential Effects – Gray bat

Direct effects to individual gray bats are not likely through normal, legal activities. Possible indirect effects under all alternatives are alteration of cave habitats through management or human recreation activities; removal of forest cover around caves or along riparian foraging corridors; and loss of water quality limiting production of aquatic insects.

Indirect effects to gray bat caves would be the same under all alternatives. For each alternative, standards would protect all hibernacula and maternity colony sites that are discovered or purchased. Forest wide standards require installation of gates or other protective structures at entrances of all caves and mines occupied by significant populations of all bats. Human intrusion would be controlled within .25 miles of these sites. These sites would be protected by maintenance of a .25 mile vegetated buffer. Standards also require development of prescribed burning plans that identify caves and mines as smoke-sensitive targets. Until caves and mines have been surveyed for use by bats, it is assumed that federally-listed bats are present and habitat is maintained for them.

Indirect effects on foraging habitat are expected to be the similar under all alternatives since riparian corridors will be well protected by SMZ guidelines and/or the Riparian Prescription. The National Forests in Alabama have allocated 112,387 acres of riparian corridor along all perennial streams (1,648 miles) and all intermittent streams (1,491 miles). These acres will be managed under Prescription 11 (Riparian Corridors) for all alternatives. The objective of this prescription is to retain, restore or enhance ecological processes and functions of these systems. The minimum forested corridor width provided for perennial streams, lakes and ponds is 100 feet on either side of the waterway. In addition, National Forests in Alabama will retain its pre-existing Streamside Management Zone guidelines that provide protection for an additional 11,306 miles (64,494 acres) of ephemeral drainages. These standards will not only provide forest cover for foraging and protection from predation, but will also ensure high water quality to support the aquatic insect prey base. Further site-specific consultation with U.S. Fish and Wildlife Service would be required for projects within 20 miles of known maternity sites, if those projects may affect canopy cover along perennial streams or forested lake shorelines.

The Revised Forest Plan and its alternatives is not likely to adversely affect this species because this management direction addresses the critical needs for habitat and protection of the gray bat and should improve or maintain foraging, roosting and maternity/hibernacula habitat conditions for this species. Additional site-specific analysis would be done on all projects with the potential for affecting the species.

Indiana bat *(Myotis sodalis)*

Affected Environment

The distribution of Indiana bats is generally associated with limestone caves in the eastern U.S. (Menzel et al. 2001). Within this range, the bats occupy two distinct types of habitat. During summer months, maternity colonies of more than 100 adult females roost under sloughing bark of dead and partially-dead trees of many species, often in forested settings (Callahan et al. 1997). Reproductive females require multiple alternate roost trees to fulfill summer habitat needs. Adults forage on winged insects within three miles of the occupied maternity roost. Swarming of both males and females and subsequent mating activity occurs at cave entrances prior to hibernation (MacGregor et al. 1999). During this autumn period, bats roost under sloughing bark and in cracks of dead, partially-dead and live trees.

Wintering colonies require very specific climatic regimes within cold, humid caves or mines primarily west of the Appalachian Mountains (Barbour and Davis 1969; Menzel et al. 2001). Few sites provide these conditions, and approximately 85% of the entire known population inhabits only nine caves or mine shafts (Menzel et al. 2001; USDI FWS 1999).

Although most hibernacula have been protected, the Indiana bat range-wide population has declined by about 60% since the 1960's (USDI FWS 1999). Causes of decline are not known; declines have continued despite efforts to protect all known major hibernacula. Researchers are focusing studies on land use practices in summer habitat, heavy metals, pesticides and genetic variability in attempt to find causes for the declines.

Hibernacula are known to Bankhead National Forest. Recommended habitat management includes protecting known significant hibernacula from human impacts, retaining forested condition around the entrances to significant hibernacula, and evaluating opportunities to protect Indiana bats through land acquisition (Menzel et al. 2001).

It is difficult to quantify summer roosting habitat for Indiana bat at a range-wide, regional or local level due to the variability of known roost sites and lack of knowledge about landscape scale habitat characteristics of maternity roosts. Within the planning area, maternity roost sites are known from Virginia and Tennessee. Forest management practices that affect occupied roost trees may have local impacts on Indiana bat populations. However, the bats live in highly altered landscapes, depend on an ephemeral resource--dead and dying trees--and may be very adaptable. Anecdotal evidence suggests that these bats may respond positively to some degree of habitat disturbance (USDI FWS 1999).

Two winter hibernacula are known from the Bankhead National Forest. Current research efforts are seeking to establish the use of Bankhead National Forest by Indiana bats outside of the hibernation period. Research partially funded by Forest Service has documented the use of tree roosts on Bankhead National Forests in fall, prior to the winter hibernation period. No maternity roosts or summer tree roosts have been identified on Bankhead National Forest. However, there is some likelihood that portions of Bankhead National Forest near, and north of the winter hibernacula, may support summer maternity colonies.

General standards that would help ensure adequate roost habitat include retention of snags whenever possible; prescribed burning to restore and maintain uncluttered, open midstory foraging conditions (using only cool season backing fires in karst areas); and ensuring a continuous supply of oaks, hickories, and ash as well as other trees with exfoliating bark (Menzel et al. 2001).

Potential Effects – Indiana bat

Properly implemented prescribed burns have the potential to provide beneficial effects including improvement of foraging habitat conditions and creation of additional roosts. The flame lengths of prescribed burns are not likely to have a direct effect on roost trees. Indiana bats would be absent from the general forest area during all dormant season fires.

Potential roost trees could be directly affected by vegetation management, firewood and salvage sales, routine maintenance/permitting of small clearings including easements, rights-of-way, and reasonable access to privately owned lands, and road construction. Implementation of Alternative D could result in the highest levels of vegetation disturbance and possible impact to currently occupied and potentially occupied roost trees. For any alternative that allows active vegetation management during the period young are nonvolant, there is a small potential for “take” of a maternity roost tree. However, standards described below would further minimize the chance of take for all alternatives.

Growing season burns (conducted June 1 through August 1) have the potential to have direct effects on roost trees and particularly nonvolant young, and there is potential for “take”. To avoid injury to young bats, site-specific (project level) surveys for Indiana bat would be required in potential maternity roost habitat under all alternatives to determine that the bats are not likely present before implementing the burn. If Indiana bats were detected, project-level consultation with U.S. Fish and Wildlife Service would occur.

Indirect effects would be similar under alternatives A, B, E, G, and I, because Streamside Management Zones, and Riparian and Rare Community (Caves and Mines) prescription standards would provide consistent protective measures. Alternatives D and F do not afford Riparian Prescription protections, however all alternatives include the use of Stramside Management Zone Protections as amended to the existing Forest Plan. Until caves and mines have been surveyed for use by bats, it is assumed that federally listed bats are present and habitat is maintained for them. Human intrusion would be controlled within 0.25 miles of these sites by closing public access routes and by prohibiting recreational activities (camping, fire-building) within this zone. Forest wide standards require installation of gates or other protective structures at entrances of all caves and mines occupied by significant populations of all bats, including Indiana bats.

Under all alternatives, known Indiana bat roosts would be protected from cutting and modification until they were no longer suitable, unless treatments were needed for public or employee safety. This action would require project-level consultation with U.S. Fish and Wildlife Service. Snags with exfoliating bark would be protected unless projects involved salvage harvests, insect and disease control, or facility construction. Larger shagbark hickories would not be cut for fuel wood, and snags would not be cut for fuel wood between May 1 and August 15, when maternity roosts may be present. All types of vegetation treatments (salvage, even-aged and uneven-aged regeneration) would require varying levels of snag retention and specific retention of leave trees. Routine (non-catastrophic) salvage treatments occurring between May 15 and August 15 would require site-specific (project level) surveys for Indiana bat to determine that the bats are not likely present before implementing the treatment. This would require project-level consultation with U.S. Fish and Wildlife Service. Treatment of catastrophic salvage events would require a separate NEPA analysis and appropriate level of consultation with U.S. Fish and Wildlife Service.

For all alternatives of the Revised Forest Land and Resource Management Plan, the determination of effect is not likely to adversely affect Indiana bat. Management direction addresses the critical needs for habitat and protection of the Indiana bat and should improve or maintain foraging, roosting and hibernacula habitat conditions for this species. The levels of vegetation management allowed within cave protection zones are not likely to diminish summer roosting or foraging habitat in a significant way. Summer roosting use on Bankhead National Forest has not been established by ongoing research efforts. However, the possibility for “take” cannot be completely eliminated with any level of management. Forestwide standards should reduce the potential for “take” to levels that are insignificant and discountable. Additional site-specific analysis would be done on all projects with the potential for affecting this species.

Mitchell’s satyr *(Neonympha mitchellii)*

Affected Environment

Neonympha mitchellii French has been referred to as one of the most restricted (Parshall and Kral, 1989) and critically endangered butterflies in eastern North America (Shuey, 1997; Roble et al., 2001). Prior to the discovery of an additional population in 1983, the species’ known global range included occurrences from Michigan, Indiana, northeastern Ohio, northern New Jersey, and perhaps Maryland. Over 30 historical populations were collectively known from these states, but by 1990, the species was considered extirpated from all but Michigan and Indiana (USFWS, 1998). The results of a morphological comparison of individuals found by Parshall and Kral in 1983 in North Carolina, led to the separation of *N. mitchellii* into a complex of two subspecies: the nominate form, *N. m. mitchellii* (Mitchell's satyr), representing the Michigan-Indiana populations and the North Carolina population as *N. m. francisci* (St. Francis satyr). On 11 July 1998, an additional population of *N. mitchellii* was discovered in Floyd County, Virginia. Preliminary morphological examinations of *N. mitchellii* from Virginia suggest that these populations may be assigned to the subspecies *francisci* (Roble et al., 2001).

On 24 June 2000, a single male Mitchell's satyr was photographed in the Oakmulgee Ranger District of the Talladega National Forest, Bibb County, Alabama. On 5 June 2001, the first colony or deme for Alabama was located and documented by a series of photographs. However, the taxonomic identity of Alabama's population(s) has not been determined. If the satyr in Alabama is determined to be either subspecies *mitchellii* or *francisci*, the same legal status and protection afforded to each taxon will also be applied to the colonies in Alabama. Conversely, if the satyr is determined to represent a taxon new to science, then a description of this butterfly will have to be undertaken and a new federal listing process initiated, if deemed appropriate.

Both *N. m. mitchellii* and *N. m. francisci* are highly specialized and selective in their habitats. Both species are federally listed: *N. m. mitchellii* was listed as Endangered on 20 May 1992 and *N. m. francisci* was listed as Endangered on 26 January 1995. The nominate subspecies inhabits calcareous fens that support a herbaceous community dominated by sedges with scattered shrubs (Shuey, 1997). *N. m. francisci* satyr is found primarily in wet meadows dominated by an assortment of sedges and wetland graminoids; often relicts of beaver activity (USFWS, 1996). Based on observations on the Oakmulgee Ranger District of the Talladega National Forest, the apparent habitat preference for the satyr in Alabama, is the interface of lowland shrub-sedge marshes and forested swamps that have been influenced or created by beaver activity. Due to such high habitat specificity, both subspecies have experienced alarming declines and extirpations from former localities throughout their respective ranges. The primary cause of these declines is centered upon wetland alteration, degradation, and destruction through the draining and conversion of these habitats to other forms of land use such as agriculture, road construction, and development (Shuey, 1997). Secondary factors adversely affecting this species complex can be attributed to the removal and elimination of the elements that help to create suitable wetland habitat for the satyr such as widespread beaver eradication and control programs and the disruption of the natural fire regime. This secondary factor in habitat loss seems particularly relevant to Alabama populations. A third factor implicated as the cause for some localized extinctions (e.g., as reported for the New Jersey populations) is over-collection (TNC, ALNHP 2002).

Potential Effects – Mitchell’s satyr

The main factors in local extirpation of Mitchell’s satyr, wetland alteration, degradation, and destruction through draining and conversion of land use; occurred on surrounding private lands across the landscape in the past. These factors are beyond the control of the Forest Service. Secondary factors adversely affecting this species complex can be attributed to the removal and elimination of the disturbance elements that historically created suitable wetland habitat for the satyr. Beaver impoundments that later succeeded into wet herbaceous ecosystems, and herbaceous wetlands occurring in woodland and savanna complexes maintained by fire, were likely the historic native habitat of satyrs. Widespread beaver eradication and disruption of the natural fire regime allowed natural succession to further reduce suitable habitat. A Forest Supervisor’s Closure Order on the collection of butterflies, especially for Mitchell’s Satyrs was enacted on the Oakmulgee Division. Enforcement of this Order aims to protect satyrs from local extirpation due to collection.

Habitat succession factors are particularly relevant to Alabama populations and may be controlled by purposeful forest management. The Forest Plan Revision includes a rare community prescription that would protect many wetland types potentially utilized by satyrs. The Oakmulgee Division is targeted to restore woodlands and savanna complexes, increasing the area and types of wetlands available as potential satyr habitat. Alternatives A, B, E, G, and I include the Riparian Prescription which conserves riparian values in a corridor along streams. These areas include open water, and perennial and intermittent streams. National Forests in Alabama instituted Streamside Management Zones in 1995, which would be continued under all of the alternatives, to protect ephemeral, intermittent and perennial drainages. The wetlands protected under these management directions would adequately protect known and potential satyr habitats.

Implementation of the Revised Land and Resource Management Plan for the National Forests in Alabama is not likely to adversely affect Mitchell's satyr. Genetic taxonomic identity of Alabama's Mitchell's satyr occurences has not yet been confirmed. None-the-less, management direction addresses the critical needs for habitat and protection of Mitchell's satyr and should improve or maintain suitable habitats for this species. The possibility for "take" cannot be completely eliminated with any level of management. Forestwide standards for riparian and streamside management zone protections should reduce the potential for "take" to levels that are insignificant and discountable. Additional site-specific analysis would be done on all projects with the potential for affecting this species.

Eastern indigo snake *(Drymarchon corais couperi)*

Affected Environment

Drymarchon corais couperi (Holbrook) was federally listed as Threatened in January of 1978 (USFWS 1982). This long, heavy-bodied snake is shiny blue-black overall, with chin, head, and sides of neck suffused with cream, orange, or red. Individuals range widely (50-100 ha) in warmer months between sandhills and riparian and swamp habitats. During cooler months, they remain within a smaller range (10 ha) and utilize the deep holes of rotting tree roots, or gopher tortoise burrows in sandhills communities. The species historic range included southern Alabama, however, its current range indicates that they are likely very rare or extirpated in Alabama (NatureServe 2001).

In a survey conducted by Bob Mount (1980) in fulfillment of a contract with Forest Service, Mount concluded, " Intensive efforts to locate this snake, or substantive evidence of its presence, in Conecuh National Forest were unsuccessful. It has not been located anywhere in Alabama since 1954, although it does occur at a few localities in the Florida panhandle. I am reasonably certain that there are no remnants of the native population of this species in Conecuh National Forest, although the possibility should not be discounted." Reintroduction efforts followed on Solon Dixon Forestry Center. This population was considered successful in a 1990 USFWS report to Congress (NatureServe, 2001), however, the last documented occurrence of an individual of this population was in 1991 (Johnson, personal communication), and no Indigo snakes have been documented on Conecuh National Forest during recent and ongoing herpetofaunal surveys (Guyer, pers. comm., and Bailey, pers comm.). Experimental reintroductions of that era were usually exempt from Endangered Species Act protections.

Potential Effects – Eastern indigo snake

As a top carnivore, the indigo snake likely existed in low population densities. The main factors in local extirpations of indigo snakes remains conversion of habitats, fragmentation of habitats by roads, agricultural uses, and other inhospitable habitats, followed by a loss of long-term population viability (NatureServe, 2001). Decline of the species is attributed to loss of mature longleaf pine habitat due to conversion to slash and sand pine plantations, urbanization, and agricultural uses, commercial collection of the species for the pet trade, and former widespread gassing of gopher tortoise burrows to collect rattlesnakes.

In Georgia, indigo snakes occur in sandhill regions dominated by mature longleaf pines, turkey oaks, and wiregrass, such as those available on Conecuh National Forest. Large areas of contiguous suitable habitat (2400-10,000 acres) have been identified as necessary for the restoration of viable populations of indigo snakes (NatureServe 2001). Under all alternatives of the Revised Forest and Land Resource Management Plan, adequate suitable habitats in sandhill and riparian ecosystems will be maintained and restored, to potentially support viable populations of indigo snakes. Recovery actions to reintroduce the species into suitable habitat areas could be considered under the Revised Forest Plan.

Implementation of any alternative of the Revised Forest and Land Management Plan will have no effect on Eastern indigo snakes. Management direction addresses the critical needs for habitat improvement, conservation, and protection of eastern indigo snakes and should improve or maintain suitable habitat quality and quantity for this species. This species has not been known to naturally occur in the area since 1954. Forestwide standards for riparian and rare community (sandhill) protections should protect potential habitat. Additional site-specific analysis would be done on all projects with the potential for affecting this species.

Flatwoods salamander *(Ambystoma cingulatum)*

Affected Environment

The flatwoods salamander was federally listed as Threatened, on April 1, 1999. Sekerek et al. (1996) states that the flatwoods salamander occurs in pine-flatwoods-wiregrass habitat. This species reproduces in shallow ponds and lives under large woody debris or in small animal burrows near these ponds as an adult. The flatwoods salamander has been reported only once on Conecuh National Forest by Bob Mount (1980), who caught two larvae in an ephemeral pond. Mount described the ephemeral pond as a small, ephemeral flatwoods pond, exposed to sunlight about three feet in maximum depth and containing no fish. Mount also reported that optimal habitat for the species occurred routinely. He hypothesized in his report that a potential reason for the scarcity of this species on the Conecuh, despite that amount of suitable habitat available, may be that the Conecuh National Forest is on the northwestern periphery of the species' known range, and it is possible that minimum temperatures in November and December are limiting (Mount 1980). The effects of habitat fragmentation by private, converted, or otherwise unsuitable lands are amplified on the periphery of a species' range.

The closest collection of flatwoods salamanders near the Conecuh National Forest was made less than 10 miles east of the Conecuh National Forest (Bailey and Jensen, 1992.) Bailey and Jenson have made (and continue to make) numerous attempts to locate the salamander on Conecuh National Forest in subsequent years. Although their attempts to locate Flatwoods Salamander on Conecuh National Forest have been unsuccessful, their efforts continue.

Additionally, Bailey and Jensen (1992) also identified habitat likely to support the flatwoods salamander on Conecuh National Forest.

Potential Effects – Flatwoods salamander

Forest management is compatible with flatwoods salamander habitat maintenance when activities mimic natural conditions in pine flatwoods. Fire is an essential tool in maintaining flatwoods salamander habitat, particularly fire in the lightning- or growing season when salamanders are not breeding or dispersing (Johnson and Wehrle, 2002.) Standards protecting soil and water resources will serve to protect salamander populations, by protecting seasonally wet sites from actions that alter hydrologic regimes. Community protections for seeps, coastal plain flatwoods, riparian corridors, and upland coastal plain ponds insure habitat protections for flatwoods salamanders. Recovery actions to reintroduce the species into suitable habitat areas could be considered under any alternative of the Revised Forest Plan.

For all alternatives of the Revised Forest and Land Resource Management Plan, the determination of effect is not likely to adversely affect flatwoods salamanders. Management direction addresses the critical needs for habitat maintenance, restoration, and protection of flatwoods salamanders and should improve or maintain the quality and quantity of suitable habitat for this species. This species has not been found on Conecuh National Forest since 1980, despite numerous attempts to find the species in the suitable habitat that occurs on Conecuh National Forest. However, the possibility for the species' presence, and therefore "take" cannot be completely eliminated with any level of management. Forestwide standards for rare communities and wetlands, riparian and streamside management zone protections should reduce the potential for "take" to levels that are insignificant and discountable. Forestwide objectives for native community structure, function, and composition restoration should improve the amount and quality of suitable habitat available for flatwoods salamanders. Additional site-specific analysis would be done on all projects with the potential for affecting this species.

5.2 Threatened and Endangered Aquatic Species (Includes Candidate Species)

The National Forests in Alabama serve as important habitat reserves for listed aquatic species and biodiversity in general. Geographically, the National Forests encompass less than 3% of the State's land mass but support over 60% of the listed freshwater species.

There are 25 aquatic federally listed endangered or threatened species associated with the National Forests in Alabama, representing half of all listed species. Listed aquatic species include 14 endangered and 11 threatened species. Mollusks compose nearly 75% of the aquatic listed species with 12 mussels and 6 snails. Additionally, there are six listed fishes and one turtle. According to the species viability assessment, over 50% of the listed aquatic species (14) are rated as being at a high level of risk for loss of population viability. Among those with the highest viability risks include the dark pigtoe, Cumberlandian combshell, orange-nacre mucket, pygmy sculpin, and flattened musk turtle. It is estimated that the National Forests have potential to influence habitat conditions and thus species viability for a little less than half (6) of the high risk listed species (dark pigtoe, orange-nacre mucket, flattened musk turtle, Alabama lampshell, Coosa moccasinshell, and upland combshell). The other eight high-risk species are beyond the influence of the Forest Service due to either the limited distribution of habitat and species on the National Forests or the overwhelming effects of off-Forest watershed conditions. Substantial population imperilment risks (viability outcome categories 4 or 5) are noted for 10 endangered or threatened species, where critically low overall species abundance and recent deleterious population trends are indicated. In those cases where the analysis of watershed-wide habitat conditions yields a lower risk to species viability than might be indicated by overall population data, species imperilment is likely due to broader off-Forest and statewide conditions. Given that all Forest Plan alternatives provide similar levels of protection and incentives for listed species habitat restoration, it is likely that all of the alternatives would result in similar viability outcomes. There would be continued improvements and a stable or upward trend for those species where the Forest Service has influence, and a stable or downward trend for the other species. The potential effects of the various Forest Plan alternatives are discussed for each listed species within the following sections of this document. The Biological Assessment (USFS 2003a) provides a more thorough discussion of the effects of the preferred alternative on federally listed species.

Candidate species are identified by USFWS as high priority species for future evaluation for federal listing. There are five candidate species recently or historically located on or near the National Forests (Black Warrior waterdog, Alabama shad, Alabama pearlshell, Alabama clubshell, and Georgia pigtoe). The Alabama clubshell and Georgia pigtoe have not been recorded on or near the National Forests for over ten years and may be considered as extirpated. They continue to be included in this assessment, primarily as a precautionary measure in case they are re-discovered or repatriated to their former habitat in the future. According to the species viability assessment, all three of the candidate mussels rate at a high viability risk, whereas the Black Warrior waterdog and Alabama shad rate at a moderate viability risk. Since the Black Warrior waterdog is also eligible for the population imperilment risk adjustment, it may be considered among those with high overall risk concerns. Additional discussion of alternative effects is provided in the following sections for individual candidate species.

Sensitive species are identified by the USFS as species of concern due to low and declining abundance. Candidate species are tracked as “sensitive” species by the USFS. Including candidate species, there are 68 aquatic species on the 2002 Regional Forester’s sensitive species list of Alabama, representing 38% of all species on this list (USFWS 2002). According to the species viability assessment, almost 20% (12) of the aquatic sensitive species are rated as being at a high level of risk for loss of population viability. Species with the highest viability risks include the rush darter, longhead darter, Southern kidneyshell, and *Hydroptila cheaha* (a caddisfly). These high-risk species are extremely rare and primarily occur off-Forest; consequently, Forest Service activities would have minimal influence on species security. It is estimated that the National Forests have potential to influence habitat conditions and thus species viability for only a third (4) of the high-risk sensitive species (Sipsey Warrior darter, Tuskaloosa darter, Alabama rainbow, and Alabama spike). The other eight high-risk species are beyond the influence of the Forest Service due either to the limited distribution of habitat and species on the National Forests, or the overwhelming effects of off-Forest watershed conditions. Substantial population imperilment risks (viability outcome categories 4 and 5) were included for 23 sensitive species (two of these candidates for listing) where critically low overall species abundance and recent deleterious population trends are additionally indicated. However, potential Forest Service mitigation influence is limited to only one of these. In those cases where the analysis of watershed-wide habitat conditions yields a lower risk to species viability than might be indicated by overall population data, species imperilment is likely due to broader off-Forest and statewide conditions. Given that all Forest Plan alternatives provide equivalent levels of protection and incentives for listed and sensitive species habitat restoration, it is likely that all of the alternatives would result in similar viability outcomes. There would be continued improvements and a stable or upward trend for those species where the Forest Service has influence, and a stable or downward trend for the other species. Within the following section, the potential effects of Forest Plan alternatives are briefly discussed for only those sensitive species with high risk rankings and potential for Forest Service influence. The Biological Evaluation (USFS 2003b) provides a more thorough discussion of the effects of the preferred alternative on these high-risk species as well as the other moderate to low risk sensitive species.

In summary, PET and sensitive species viability risks are not expected to differ among the Forest Plan revised action alternatives given the similarity of protective measures and PET and sensitive species direction. All of the action alternatives would benefit PET and sensitive species beyond the no-action alternative due to the inclusion of strengthened riparian, streamside management zone, and ephemeral channel standards. Some of these benefits may cumulatively be sufficient to result in improved population and species viability as summarized in the following tables. At the more localized level of the habitat and individual, the extent of the benefits would vary due to the particular circumstances of the watershed and the species. For a few species and in some watersheds there is a possibility of small short-term localized negative effects on individuals. In all cases, such negative effects would be minimized or mitigated by revised Forest Plan direction and would not interfere with species viability or population stability. Such detailed effects are summarized and discussed for each PET and high-risk sensitive species in the following sections.

Table 3B-77: Summary of the effects of Forest Plan revision alternatives on listed species. Localized effects include direct or indirect effects on habitat and individuals. Species viability reflects the cumulative effects at the watershed and population scales. (+ is positive effects resulting in an upward trend; o is neutral effects and no change; - is negative effects and a downward trend)

Listed Species	Statu	Alternative Effects on Species Viability at the Watershed Scale							Alternative Effects on Localized Habitat or Individuals						
		A	B	D	E	F	G	I	A	B	D	E	F	G	I
Flattened musk turtle	T	+	+	o	+	o	+	+	+	++	+	-++	o	++	+++
Gulf sturgeon	T	o	O	o	o	o	o	o	+	++	+	-++	o	++	+++
Pygmy sculpin	T	o	O	o	o	o	o	o	+	++	+	-++	o	++	+++
Blue shiner	T	+	+	o	+	o	+	+	+	++	+	-++	o	++	+++
Cahaba shiner	E	o	O	o	o	o	o	o	+	++	+	-++	o	++	+++
Goldline darter	T	o	O	o	o	o	o	o	+	++	+	-++	o	++	+++
Alabama sturgeon	E	o	O	o	o	o	o	o	o	o	o	o	o	o	o
Cumberlandian combshell	E	o	O	o	o	o	o	o	o	o	o	o	o	o	o
Upland combshell	E	+	+	o	+	o	+	+	+	++	+	-++	o	++	+++
Southern acornshell	E	o	O	o	o	o	o	o	+	++	+	-++	o	++	+++

Listed Species	Statu	Alternative Effects on Species Viability at the Watershed Scale							Alternative Effects on Localized Habitat or Individuals						
		A	B	D	E	F	G	I	A	B	D	E	F	G	I
Fine-lined pocketbook	T	+	+	o	+	o	+	+	+	++	+	-++	o	++	+++
Orange-nacre mucket	T	+	+	o	+	o	+	+	+	++	+	-++	o	++	+++
Alabama moccasinshell	T	+	+	o	+	o	+	+	+	++	+	-++	o	++	+++
Coosa moccasinshell	E	+	+	o	+	o	+	+	+	++	+	-++	o	++	+++
Southern clubshell	E	o	O	o	o	o	o	o	+	++	+	-++	o	++	+++
Dark pigtoe	E	+	+	o	+	o	+	+	+	++	+	-++	o	++	+++
Southern pigtoe	E	o	O	o	o	o	o	o	+	++	+	-++	o	++	+++
Ovate clubshell	E	+	+	o	+	o	+	+	+	++	+	-++	o	++	+++
Triangular kidneyshell	E	+	+	o	+	o	+	+	+	++	+	-++	o	++	+++
Lacy elimia	E	o	O	o	o	o	o	o	+	++	+	-++	o	++	+++
Round rocksnail	T	o	O	o	o	o	o	o	o	o	o	o	o	o	o
Painted rocksnail	T	o	O	o	o	o	o	o	+	++	+	-++	o	++	+++
Flat pebblesnail	E	o	O	o	o	o	o	o	o	o	o	o	o	o	o
Cylindrical Lioplax	E	o	O	o	o	o	o	o	o	o	o	o	o	o	o
Tulotoma	E	o	O	o	o	o	o	o	+	++	+	-++	o	++	+++

Table 3B-78. Summary of the effects of Forest Plan revision alternatives on candidate species. Localized effects include direct or indirect effects on habitat and individuals. Species viability reflects the cumulative effects at the watershed and population scales. (+ is positive effects resulting in an upward trend; o is neutral effects and no change; - is negative effects and a downward trend)

Candidate Species	Status	Alternative Effects on Species Viability at the Watershed Scale							Alternative Effects on localized habitat or individuals						
		A	B	D	E	F	G	I	A	B	D	E	F	G	I
Black Warrior waterdog	SC	+	+	o	+	o	+	+	+	++	+	-++	o	++	+++
Alabama shad	SC	o	o	o	O	o	o	o	+	++	+	-++	o	++	+++
Alabama pearlshell	SC	o	o	o	O	o	o	o	+	++	+	-++	o	++	+++
Georgia pigtoe	SC	o	o	o	O	o	o	o	+	++	+	-++	o	++	+++
Alabama clubshell	SC	o	o	o	O	o	o	o	+	++	+	-++	o	++	+++

Table 3B-79. Summary of the effects of Forest Plan revision alternatives on sensitive species. Localized effects include direct or indirect effects on habitat and individuals. Species viability reflects the cumulative effects at the watershed and population scales. (+ is positive effects resulting in an upward trend; o is neutral effects and no change; - is negative effects and a downward trend)

Sensitive Species	Status	Alternative Effects on Species Viability at the Watershed Scale							Alternative Effects on Localized Habitat or Individuals						
		A	B	D	E	F	G	I	A	B	D	E	F	G	I
Escambia map turtle	S	o	o	o	O	o	o	o	+	++	+	-++	o	++	++

Sensitive Species	Status	Alternative Effects on Species Viability at the Watershed Scale							Alternative Effects on Localized Habitat or Individuals						
		A	B	D	E	F	G	I	A	B	D	E	F	G	I
Alabama hickorynut	S	o	o	o	O	o	o	o	+	++	+	-++	o	++	++
Alabama heelsplitter	S	o	o	o	O	o	o	o	+	++	+	-++	o	++	++
Rayed creekshell	S	o	o	o	O	o	o	o	+	++	+	-++	o	++	++
Tennessee	S	o	o	o	O	o	o	o	+	++	+	-++	o	++	++
Alabama	S	o	o	o	O	o	o	o	+	++	+	-++	o	++	++
Southern	S	o	o	o	O	o	o	o	+	++	+	-++	o	++	++
Choctaw bean	S	o	o	o	O	o	o	o	+	++	+	-++	o	++	++
Ridged mapleleaf	S	o	o	o	O	o	o	o	+	++	+	-++	o	++	++
Purple pigtoe	S	o	o	o	O	o	o	o	+	++	+	-++	o	++	++
Southern sandshell	S	o	o	o	O	o	o	o	+	++	+	-++	o	++	++
Alabama spike	S	+	+	o	+	o	+	+	+	++	+	-++	o	++	++
Alabama rainbow	S	+	+	o	+	o	+	+	+	++	+	-++	o	++	++
Coosa combshell	S	o	o	o	O	o	o	o	+	++	+	-++	o	++	++
Southern kidneyshell	S	o	o	o	O	o	o	o	+	++	+	-++	o	++	++
Cheum. bibbensis	S	o	o	o	O	o	o	o	+	++	+	-++	o	++	++
Hydroptila	S	o	o	o	O	o	o	o	+	++	+	-++	o	++	++
Morse's Long-horn	S	o	o	o	O	o	o	o	+	++	+	-++	o	++	++
Say's spiketail	S	o	o	o	O	o	o	o	+	++	+	-++	o	++	++
Cocoa clubtail	S	o	o	o	O	o	o	o	+	++	+	-++	o	++	++
Laura's clubtail	S	o	o	o	O	o	o	o	+	++	+	-++	o	++	++
Townes' clubtail	S	o	o	o	O	o	o	o	+	++	+	-++	o	++	++
Hydroptila patriciae	S	o	o	o	O	o	o	o	+	++	+	-++	o	++	++
Alleghany snaketail	S	o	o	o	O	o	o	o	+	++	+	-++	o	++	++
Belle's sanddragon	S	o	o	o	O	o	o	o	+	++	+	-++	o	++	++
Treetop emerald	S	o	o	o	O	o	o	o	+	++	+	-++	o	++	++
Helma's net-spinning	S	o	o	o	O	o	o	o	+	++	+	-++	o	++	++
Robust baskettail	S	o	o	o	O	o	o	o	+	++	+	-++	o	++	++
Hydropsyche hageni	S	o	o	o	O	o	o	o	+	++	+	-++	o	++	++
Smokey showdragon	S	o	o	o	O	o	o	o	+	++	+	-++	o	++	++
Twin-striped clubtail	S	o	o	o	O	o	o	o	+	++	+	-++	o	++	++
Hodges' clubtail	S	o	o	o	O	o	o	o	+	++	+	-++	o	++	++
Hydroptila setigera	S	o	o	o	O	o	o	o	+	++	+	-++	o	++	++
Carlson's	S	o	o	o	O	o	o	o	+	++	+	-++	o	++	++
Hydroptila	S	o	o	o	O	o	o	o	+	++	+	-++	o	++	++
Appalachian	S	o	o	o	O	o	o	o	+	++	+	-++	o	++	++
Hydroptila cheaha	S	o	o	o	O	o	o	o	+	++	+	-++	o	++	++
Frecklebelly madtom	S	o	o	o	O	o	o	o	+	++	+	-++	o	++	++
Alabama darter	S	o	o	o	O	o	o	o	+	++	+	-++	o	++	++
Backwater darter	S	o	o	o	O	o	o	o	+	++	+	-++	o	++	++
Skygazer shiner	S	o	o	o	O	o	o	o	+	++	+	-++	o	++	++
Southern logperch	S	o	o	o	O	o	o	o	+	++	+	-++	o	++	++
Goldstripe darter	S	o	o	o	O	o	o	o	+	++	+	-++	o	++	++
Crystal darter	S	o	o	o	O	o	o	o	+	++	+	-++	o	++	++
Freckled darter	S	o	o	o	O	o	o	o	+	++	+	-++	o	++	++
Holiday darter	S	o	o	o	O	o	o	o	+	++	+	-++	o	++	++
Choctawhatchee	S	o	o	o	O	o	o	o	+	++	+	-++	o	++	++
Coldwater darter	S	o	o	o	O	o	o	o	+	++	+	-++	o	++	++
Bronze darter	S	o	o	o	O	o	o	o	+	++	+	-++	o	++	++

Sensitive Species	Status	Alternative Effects on Species Viability at the Watershed Scale							Alternative Effects on Localized Habitat or Individuals						
		A	B	D	E	F	G	I	A	B	D	E	F	G	I
Lined chub	S	o	o	o	O	o	o	o	+	++	+	-++	o	++	++
Coal darter	S	o	o	o	O	o	o	o	+	++	+	-++	o	++	++
Florida sand darter	S	o	o	o	O	o	o	o	+	++	+	-++	o	++	++
Tuskaloosa darter	S	+	+	o	+	o	+	+	+	++	+	-++	o	++	++
Sipsey Warrior darter	S	+	+	o	+	o	+	+	+	++	+	-++	o	++	++
Rush darter	S	o	o	o	O	o	o	o	+	++	+	-++	o	++	++
Longhead darter	S	o	o	o	O	o	o	o	+	++	+	-++	o	++	++
Rusty gravedigger	S	o	o	o	O	o	o	o	+	++	+	-++	o	++	++
Procambarus	S	o	o	o	O	o	o	o	+	++	+	-++	o	++	++
Cambarus englishi	S	o	o	o	O	o	o	o	+	++	+	-++	o	++	++

The beneficial effects of revised Forest Plan direction are outlined within the Aquatic Habitat section. They include numerous standards that would largely protect against sediment release during soil disturbance, flow alterations due to soil compaction, chemical run-off from roads and facilities, pesticide inputs, channel modifications at road crossings, nutrient inputs from fertilization or fires, and changes in streamside vegetation due to silvicultural methods. Under all action alternatives, there could be an increase in early successional riparian vegetation in order to meet revised Forest Plan objectives (minimum of 1-2% of riparian in early successional). Species that favor early successional riparian habitat (some insects) would benefit. However, the majority of PET and sensitive species require habitat qualities that are best maintained in conjunction with mid to late successional streamside vegetation. Consequently, there is potential for increasing early successional riparian to result in localized reduction of canopy cover, elevation of water temperatures, alteration of nutrient cycling, and decrease in woody debris. Since the riparian objectives come with the caveat of Forest Biologist and Hydrologist approval for the specific locations and extent of vegetative manipulations, presumably adverse effects on PET and sensitive species would be avoided and there would be no difference among the alternatives. Under all alternatives, there could potentially be short-term and localized elevations in sediment run-off due to such Forest health related activities as tree removal or burning. Application of revised Forest Plan standards would minimize the extent and magnitude of effects and full consideration of watershed restoration and species conservation priorities within project planning would further reduce the likelihood of multiple concurrent actions causing significant cumulative effects. Application of minimizing standards would therefore decrease overall effects of soil disturbing activities under all alternatives; however such measures may not be sufficient to off-set the increased soil disturbing potential of alternative D. Consequently, the short-term watershed effects of most alternatives relative to the no action alternative would decline (I to the greatest extent, followed by E, A, G, and B), but the watershed effects of alternative D could increase. In the long-term, restoration approaches to forest health may improve overall watershed conditions and therefore further reduce the potential for sediment run-off and risks of catastrophic die-offs due to disease. If so, long-term effects on water quality, channel stability, and streamside vegetation would be expected to improve for those alternatives making the greatest gains in restoration of upland and riparian forests (Alternatives B, I, and G). Direct mortality of listed species at road and trail crossings has largely been dealt with under the current Plan, and would continue to be minimized under all action alternatives with the application of additional management standards. Implementation of the protective standards would be monitored and adjusted as needed. Project level surveys and monitoring would be conducted according to the Southeast Regional supplement of the Forest Service Manual (FSM 2672).

All of the action alternatives would also provide opportunities for proactive habitat restoration and PET and sensitive aquatic species protection through consolidation of Forest ownership, contributions to recovery and conservation, participation in population and habitat enhancements and restoration, and commitment to ongoing surveys and monitoring. Forest-wide standards and prescribed levels of activities would continue progress towards watershed, riparian corridor, and aquatic habitat restoration. Watershed restoration would lead to long-term reductions in erosion and sediment run-off into aquatic habitats. Restoration of riparian corridors would generally lead to reduced siltation, improved habitat stability and complexity, decreasing water temperatures, and greater availability of large woody debris. Increasing emphasis on habitat restoration and removal of barriers to aquatic species' movements would be afforded through implementation of revised Forest Plan goals and objectives. Formulation and implementation of aquatic conservation strategies would assist in focusing inventory, research, restoration, and monitoring efforts. Revised Plan direction aims to foster participation in cooperative watershed assessments, planning, and restoration. Moreover, there are goals and objectives encouraging Forest Service participation in natural resource education. Therefore, the revised plan implementation of all alternatives should be of some level of benefit to the habitat and population viability of PET and sensitive aquatic species.

Effects specific to the each PET, candidate, and high-risk sensitive species are discussed within the following sections. Species accounts are grouped by federal status (listed, candidate, or sensitive) and taxon (amphibians, reptiles, fishes, mussels, and snails), and arranged alphabetically by species scientific names within each group. The methodology and summary data used in the species viability risk assessment is provided in Appendix B. Effects both specific to individual species and common among species are summarized in the tables above.

Flattened musk turtle (*Sternotherus depressus*)

Environmental Baseline

Flattened musk turtles are listed as threatened under the Endangered Species Act (USFWS 1987). They are endemic and historically inhabited many of the streams in the upper third of the Black Warrior River basin. Currently, they have been extirpated from over 30% of their historical range. Only about 15% of the remaining habitat appears to support healthy reproducing populations. The species is considered to be in decline range-wide (USFWS 2000b). Extant populations, potential habitats, and viability assessment results are displayed in Appendix B, discussed in greater detail within the Biological Assessment (USFS 2003a), and summarized in the Aquatic Species Viability Section. There are no other occurrences of this species on National Forest system lands.

Flattened musk turtles are found primarily in lower order headwater streams. Optimal habitat appears to be free flowing large streams or small rivers having vegetated shallows alternating with deeper pools (USFWS 1990a). They appear to require detectable currents and an abundance of crevices and submerged cobble and boulders or bedrock for cover (USFWS 1990a). Other factors contributing to habitat quality include a low silt load and substrate deposits, low nutrient content and bacterial counts, moderate temperatures, and minimal chemical pollution (Mount 1981). Siltation may affect turtles by eliminating or reducing their mollusk food supplies, altering the rocky habitats where they seek food and cover, reducing the quality and availability of nesting sand bars, and accumulating toxic chemicals and pathogens that are detrimental to their health. Moderate temperatures may also be important in both summer and winter (Mount 1981). The flattened musk turtle is a highly aquatic species that rarely basks, only leaves the water to lay eggs, and does not stray far from the immediate stream channel and lower terraces of the riparian corridor (Holmes & Marion 2002). Higher densities have been observed in areas with extensive lower terrace sand deposits (Ernst et al. 1983), possibly in correlation with the availability of suitable nesting habitat. Disease related mortality has been identified as a potential concern (Dodd 1988). Female turtles rely on a diet of mussels and snails to provide the essential nutrients for reproduction (Marion et al. 1991). Consequently, availability of mollusk prey is necessary for this species and the habitat requirements for mussels are also applicable to flattened musk turtles. Since they are dependant on molluscan prey, barriers to mussel host fish may also be a factor.

Historically, siltation, chemical pollution, and hydrological changes associated with mining, navigation, and flood control projects have had adverse effects on flattened musk turtles and their habitat (Dodd et al. 1988). Habitat fragmentation has also been cited as a contributor to the species decline (Dodd 1990). Turtle populations continue to be vulnerable to decline given their low fecundity and dependence on molluscan prey. Mussel prey species are sensitive to sedimentation, pollution, barriers to host fish passage, and other forms of habitat alteration (see also effects discussion for T&E mussel species). Such historical watershed-wide conditions have led to the current status of this species being considered as at a high risk of continued decline in 4 out of 5 potentially species-inhabited Forest Service watersheds. An additional population imperilment risk was noted for the flattened musk turtle, thereby including it in viability outcome categories 4 and 5. Based on the watershed assessment completed in conjunction with the Forest Plan EIS (Appendix B), all of the analyzed factors (sediment, point-source pollution, temperature, and flow) contribute to the risks to the viability of this species. These risk factors appear to be impaired in 4 out of 5 watersheds (all except upper Sipsey Fork). Overall watershed condition (Clingenpeel 2003) is rated as “excellent” in all watersheds where this species potentially occurs (Clear, Lewis Smith, lower Brushy, upper and lower Sipsey Forks). Clear Creek has limited opportunities for restoration due to the small proportion of Forest Service system lands and the legacy of strip mining. Lower Brushy Creek offers the best opportunity for ongoing protection of a viable population; however, Forest Service influence is less than the influence in Lower Sipsey Fork, also an important population.

Potential Effects

For the flattened musk turtle populations on or near the Bankhead National Forest, potential influences would include any activities that could increase sedimentation, siltation, or turbidity, contribute pollutants, adjust water chemistry or nutrient cycling, raise water temperatures, change flow, modify habitat, alter streamside vegetation, or block fish passage. Such effects would be minimized given the protection measures that would be applied under all of the action alternatives for the revised Forest Plan (see section 3.B.4.0 for a full discussion on effects common to all species and watersheds). However, as discussed at the beginning of this section, the increased potential for watershed effects in alternative D, would be common to all species; otherwise, the alternatives are similar with a slight reduction in the anticipated watershed effects under alternatives G and B and a larger decrease in potential watershed effects for alternatives I, E, and A. Direct mechanical damage is unlikely since roadway and trail crossings are generally limited to bridges within the habitat areas of this species. Under all of the alternatives one on-Forest and one off-Forest reservoir may continue to affect mussel prey populations through altered flow, chemistry, and nutrient cycling, and as barriers to host fish passage. If alternative E results in increased emphasis on lake and reservoir enhancements for recreational fisheries, there may be a slight increase in potential adverse effects due to accelerated lake fertilization programs (see also section 8.4.0).

Protection, monitoring, and augmentation would be the primary recovery objectives for this species. Actions would be taken in order to identify additional suitable habitat and re-patriate fish hosts and mussels to areas on National Forest lands.

Given the positive opportunities for pro-active conservation of the species and the protection afforded by the Forest-wide and riparian standards under all of the alternatives, the selection of any of the Forest Plan alternatives for the National Forests in Alabama, is not likely to adversely affect the flattened musk turtle.

Gulf Sturgeon (*Acipenser oxyrinchus desotoi*)

Environmental Baseline

Gulf sturgeon are listed as threatened under the Endangered Species Act (USFWS 1991a). Critical habitat has been designated, including portions of the mainstem Yellow and Conecuh Rivers within the Conecuh National Forest (USFWS 2003b). Among the five National Forest management units in Alabama, Gulf sturgeon and their critical habitat are only known to occur within or adjacent to the Conecuh National Forest. Alabama populations are considered rare and unstable. Extant populations, potential habitats, and viability assessment results are displayed in Appendix B, discussed in greater detail within the Biological Assessment (USFS 2003a), and summarized in the Aquatic Species Viability Section.

Gulf sturgeon are anadromous and highly mobile, migrating hundreds of miles between their primary Gulf coast feeding areas and their spawning and rearing areas within mainstem rivers and lower tributaries. Spawning typically occurs in March and April over hardened bottoms with a strong current (NS 2003). Preferred adult and juvenile habitat appears to be deep channels with sand interspersed with bedrock, cobble, or boulder bottoms. The primary constituent elements of critical habitat have been identified as: abundant food items, suitable riverine spawning substrates, suitable resting holes, necessary water flow, water quality, sediment quality, and unobstructed migratory pathways (USFWS 2003b).

Over-exploitation, habitat modification, and water quality degradation are the primary factors believed to have led to the decline of the sturgeon. Dams and other channel modifications have also impeded upstream passage into many historic habitat areas. Such historical conditions have led to the current status of this species being considered as at a high risk of continued decline in 2 out of 6 potentially species-inhabited Forest Service watersheds. An additional population imperilment risk was noted for Gulf sturgeon, thereby including it in viability outcome category 5 (Table 3.B.7.2.1). Based on the watershed assessment completed in conjunction with the Forest Plan EIS, excessive sediment, point-source pollution, and flow alterations may contribute the greatest risk to the viability of this species. These risk factors appear to be impaired in 5 out of 6 watersheds (all except Blackwater). Overall watershed condition (Clingenpeel 2003) is rated as "average" in the upper Yellow watershed and "excellent" in all of the other watersheds where this species potentially occurs (lower Conecuh, Blackwater, North, Five Runs, and lower Yellow). The opportunities for Forest Service influence, either positive or negative, are limited, however, due to the overwhelming contributions of extensive upstream perturbations and the possibility of downstream and off-Forest barriers to movements.

Potential Effects

Forest Service management activities that could influence Gulf sturgeon include any actions that could increase sedimentation, contribute pollutants, alter flow, modify main channel habitat, or block fish passage. Such effects would be minimized given the protection measures that would be applied under all of the action alternatives for the revised Forest Plan (see section 3.B.4.0 for a full discussion on effects common to all species and watersheds). However, as discussed at the beginning of this section, the increased potential for watershed effects in alternative D, would be common to all species; otherwise, the alternatives are similar with a slight reduction in the anticipated watershed effects under alternatives G and B and a larger decrease in potential watershed effects for alternatives I, E, and A. No reservoirs under Forest Service management could affect flows or fish passage. Since sturgeon primarily utilize the mainstem and large river reaches, and most road crossings are County controlled bridges, it is unlikely that Forest Service roads act as barriers. Direct mechanical damage is unlikely since roadway and trail crossings are generally limited to bridges within the habitat areas of this species.

Protection, monitoring, and coordinated research would be the primary recovery objectives for this species under all of the alternatives. Given the positive opportunities for pro-active conservation of the species and the protection afforded by the Forest-wide and riparian standards under all of the alternatives, the selection of any of the Forest Plan alternatives for the National Forests in Alabama, is not likely to adversely affect the Gulf sturgeon or adversely modify critical habitat.

Pygmy sculpin (*Cottus pygmaeus*)

Environmental Baseline

The pygmy sculpin is listed as threatened under the Endangered Species Act (USFWS 1989). This sculpin is endemic to the Coosa River basin and currently only occupies habitat within one isolated spring and a spring-run (Coldwater Spring) near, but not downstream from the Shoal Creek District of the Talladega National Forest. This population is considered stable at around 7,000 to 9,000 individuals, but it remains at risk due to its restriction to, and dependence on, one spring as well as its extreme sensitivity to alterations in habitat, temperature, and water chemistry (USFWS 2003). According to the viability assessment conducted in conjunction with the Forest Plan revision, pygmy sculpin ranks among the top 13 highest risk species. If in the future, it is located on or downstream from the Talladega National Forest, all factors of potential sensitivity (sediment, point-source pollution, temperature, and flow) would need to be considered in application of protective measures. The middle Choccolocco watershed is rated as "below average" and is impaired for all of the sensitivity factors important to this species.

However, most of these factors are impaired due to off-Forest conditions beyond the control of the Forest Service.

Potential Effects

Given the currently known distribution of pygmy sculpin and their suitable habitat, there would be no effects from implementation of any of the alternatives for the revised Land Resource Management Plan.

Blue shiner (*Cyprinella caerulea*)

Environmental Baseline

Blue shiners are listed as threatened under the Endangered Species Act (USFWS 1992a). The species historically was endemic to the Cahaba and Coosa River systems and their tributaries in Alabama, Tennessee, and Georgia. Blue shiners were last collected in the Cahaba River in 1971 and are now considered extirpated from that system (Pierson and Krotzer 1987). Currently, there are approximately six definable populations occurring in headwater streams of the Coosa River system in Georgia, Tennessee, and tributary streams in northeastern Alabama (USFWS 1995a). Three of these populations are in Alabama, and of these, two are partially located on, or downstream, from the Talladega National Forest. Extant populations, potential habitats, and viability assessment results are displayed in Appendix B, discussed in greater detail within the Biological Assessment (USFS 2003a), and summarized in the Aquatic Species Viability Section.

This species inhabits cool, clear, low to moderate velocity currents and moderate depths over sand gravel substrates of riffles and runs in mid-order medium to large streams and adjoining tributaries (Pierson and Krotzer 1987, Dobson 1994). They are often found in association with submerged woody debris, brush, and water willow (*Justicia americana*) (USFWS 1995a). It is assumed that blue shiners depend upon small rock crevices for egg laying, as do other members of its genera (Mayden 1989); therefore they are susceptible to excessive sedimentation during their breeding period. Reproduction is also dependant on a mating strategy involving active courtship displays (Mayden 1989). Furthermore, the blue shiner is a visual feeder, feeding on floating terrestrial insects and submerged immature aquatic insects (Etnier and Starnes 1993), and can therefore be greatly impacted by turbid waters (Burkhead and Jenkins 1991). Members of this genus are also sensitive to low dissolved oxygen levels, which may be caused by low flows and nutrient enrichment. Excessive sediment (Stiles 1990) and low dissolved oxygen levels (< 3mg/l) have been documented and implicated as reasons for the apparent extirpation of this species from the Cahaba River (USFWS 1995a). Chemical contaminants are also present within both the Cahaba and Choccolocco River systems. Chemical pollutants have been shown to disrupt neurological, endocrine, developmental, and reproductive functions in a wide variety of species, including fish (Terrell and Perfetti 1989).

The decline of blue shiner populations may be attributed to sedimentation, channel modifications, point-source pollution, and eutrophication associated with reservoirs, urbanization, sewage pollution, and strip mining. Such historical and recent conditions have led to the current status of this species being considered as at a high risk of continued decline in 3 out of 7 potentially species-inhabited Forest Service watersheds (see section 3.B.4.0 and

Appendix B for further interpretation of these rankings). An additional population imperilment risk was noted for the blue shiner, thereby including it in viability outcome categories 4 and 5. Based on the watershed assessment completed in conjunction with the Forest Plan EIS (Appendix B), all of the analyzed factors (sediment, point-source pollution, temperature, and flow) contribute to the risks to the viability of this species. These risk factors appear to be impaired in 4 out of 7 watersheds (all except upper Choccolocco, Affonee, and Gully). General watershed condition (Clingenpeel 2003) is rated as "below average" in middle Choccolocco and Tallaseehatchee, and "excellent" in all of the other watersheds where this species potentially occurs (Cheaha, upper Hatchet, Affonee, and Gully). The opportunities for Forest Service influence, either positive or negative, are limited, however, due to the small proportion of each watershed under Forest Service management and the interspersion of private lands.

Potential Effects

For populations on or downstream from the National Forests in Alabama, potential influences include any activities that could increase sedimentation, siltation, or turbidity, contribute pollutants, adjust water chemistry or nutrient cycling, raise water temperatures, change flow, modify habitat, alter streamside vegetation, or block fish passage. Such effects would be minimized given the protection measures that would be applied under all of the action alternatives for the revised Forest Plan (see section 3.B.4.0 for a full discussion on effects common to all species and watersheds). However, as discussed at the beginning of this section, the increased potential for watershed effects in alternative D, would be common to all species; otherwise, the alternatives are similar with a slight reduction in the anticipated watershed effects under alternatives G and B and a larger decrease in potential watershed effects for alternatives I, E, and A. No reservoirs under Forest Service management could affect flows or fish passage; however, there are off-Forest reservoirs that may continue to influence this species. Since blue shiners primarily utilize the mainstem and large river reaches, and most road crossings are County controlled bridges, it is unlikely that Forest Service roads are acting as barriers. Direct mechanical damage is also unlikely since roadway and trail crossings are generally limited to bridges within the habitat areas of this species.

Protection, monitoring, and coordinated research would be the primary recovery objectives for this species under all of the alternatives. Given the positive opportunities for pro-active conservation of the species and the protection afforded by the Forest-wide and riparian standards under all of the alternatives, the selection of any of the Forest Plan alternatives for the National Forests in Alabama, is not likely to adversely affect blue shiners.

Cahaba shiner (*Notropis cahabae*)

Environmental Baseline

Cahaba shiners are listed as endangered under the Endangered Species Act (USFWS 1990b). Cahaba shiners historically occurred only in the Cahaba River and lower reaches of its tributaries. Their current range has been reduced by over a third to approximately 60 river miles with the largest remaining concentration extending 15 miles below the fall line (Mayden and Kuhajda 1989). Extant populations are considered to be in decline (USFWS 1992b). Four sites are known within several miles upstream and downstream from the Oakmulgee Division of the Talladega National Forest; however, these sites may be peripheral to the preferred habitat above the fall-line (Shepard et al. 1995). It is probable, but not confirmed, that Cahaba shiners inhabit the ¼ mile section of the Cahaba River adjoining the Oakmulgee Division of the Talladega National Forest. All of these populations are within the Oakmulgee Division of the Talladega National Forest in Alabama; and there are no other occurrences of this species on National Forest system lands. Extant populations, potential habitats, and viability assessment results are displayed in Appendix B, discussed in greater detail within the Biological Assessment (USFS 2003a), and summarized in the Aquatic Species Viability Section.

This species is normally confined to the main channel of the Cahaba River, however it may seasonally move into the lower reaches of tributaries during periods of rapidly rising water levels. The primary habitat appears to be the interface between quiet shallow waters and swift riffle areas associated with large shoals (Howell et al. 1982). Within these areas, it is found in the greatest abundance in slow currents over patches of sand or gravel substrates immediately downstream from boulders. Cahaba shiners depend upon small rocky crevices in which to lay eggs; therefore, they are susceptible to excessive sedimentation. Furthermore, the Cahaba shiner is a visual feeder, feeding on floating terrestrial insects and submerged immature aquatic insects (USFWS 1992), and can therefore be greatly impacted by turbid waters (Burkhead and Jenkins 1991). Members of this genus are also sensitive to low dissolved oxygen levels, which may be caused by low flows and nutrient enrichment. Excessive sediment has been documented in the Cahaba River and identified as a concern for this species (Stiles 1990). Low dissolved oxygen levels (<3mg/l) have also been reported in the Cahaba River (USFWS 1992b). Chemical containments are also present within both the Cahaba River. Chemical pollutants have been shown to disrupt neurological, endocrine, developmental, and reproductive functions in a wide variety of species, including fish (Terrell and Perfetti 1989).

The decline of Cahaba shiner populations may be attributed to sedimentation, channel modifications, point-source pollution, and eutrophication associated with reservoirs, urbanization, sewage pollution, and strip mining. Such historical and recent conditions have led to the current status of this species being considered as at a moderate risk of continued decline in 1 out of 2 potentially species-inhabited Forest Service watersheds. An additional population imperilment risk was noted for the Cahaba shiner, thereby including it in viability outcome category 5. Based on the watershed assessment completed in conjunction with the Forest Plan EIS (Appendix B), excessive sediment has been identified as a possible high risk to the viability of this species in the Cahaba River. Overall watershed condition (Clingenpeel 2003) has been rated as “excellent” in all of the watersheds in which this species may occur. The opportunities for Forest Service influence, either positive or negative, are limited, however, given the small portion of habitat under Forest Service management (< ½ acre) and due to the overwhelming effects of upper basin development, industry, agriculture, and other land uses.

Potential Effects

For Cahaba shiner populations on or near the National Forests in Alabama, potential influences include any activities that could increase sedimentation, siltation, or turbidity, contribute pollutants, adjust water chemistry or nutrient cycling, raise water temperatures, change flow, modify habitat, alter streamside vegetation, or block fish passage. Since the species is not expected to be directly on Forest Service tributary habitat, the primary concerns are with overall downstream watershed affects. Under all Forest Plan alternatives, Forest-wide and riparian standards would largely protect the Cahaba shiner and its habitat from sediment that could otherwise be released during management activities. However, as discussed at the beginning of this section, the increased potential for watershed effects in alternative D, would be common to all species; otherwise, the alternatives are similar with a slight reduction in the anticipated watershed effects under alternatives G and B and a larger decrease in potential watershed effects for alternatives I, E, and A.

On the National Forests of Alabama, recovery objectives would include periodic surveys to determine the extent of the range of the species. Currently this may only be the case on less than 1 mile of mainstem Cahaba River habitat. Direct mechanical damage is unlikely since roadway and trail crossings are generally limited to bridges within the habitat areas of this species.

Given the positive opportunities for pro-active conservation of the species and the protection afforded by the Forest-wide and riparian standards under all of the alternatives, the selection of any of the Forest Plan alternatives for the National Forests in Alabama is not likely to adversely affect the Cahaba shiner.

Goldline darter (*Percina aurolineata*)

Environmental Baseline

Goldline darters are listed as threatened under the Endangered Species Act (USFWS 1992a). Their historical range is assumed to have extended throughout all of the major tributaries of the Alabama River Basin in Alabama, Georgia, and Tennessee. Currently, goldline darters are thought to inhabit approximately half of their historical Cahaba River basin habitat including portions of the Oakmulgee Division of the Talladega National Forest. Extant populations, potential habitats, and viability assessment results are displayed in Appendix B, discussed in greater detail within the Biological Assessment (USFS 2003a), and summarized in the Aquatic Species Viability Section. Goldline darters may also inhabit the Cherokee National Forest in Tennessee.

The goldline darter prefers moderate to swift currents and deeper waters of large tributary streams and rivers above the fall line (Lee et al. 1980). It is usually encountered within white-water rapids over predominantly gravel substrates interspersed among cobble, rubble, bedrock or small boulders, as well as among patches of water willow (*Justicia*) or river-weed (*Podostemum*) (Page and Burr 1991).

The decline of goldline darter populations may be attributed to sedimentation, channel modifications, point-source pollution, and eutrophication associated with urbanization, sewage pollution, and strip mining (Stiles 1990, USFWS 1992a). Such historical and recent conditions have led to the current status of this species being considered as at a moderate risk of continued decline in 1 out of 3 potentially species-inhabited Forest Service watersheds. An additional population imperilment risk was noted for the Goldline darter, thereby including it in viability outcome category 5. Based on the watershed assessment completed in conjunction with the Forest Plan EIS (Appendix B), excessive sediment has been identified as a possible high risk to the viability of this species in Cahaba River. Overall watershed condition (Clingenpeel 2003) has been rated as "excellent" for all of the watersheds where this species may occur. The opportunities for Forest Service influence, either positive or negative, are limited, however, given the small portion of habitat under Forest Service management (< ½ acre) and due to the overwhelming of upper basin development, industry, agriculture, and other land uses.

Potential Effects

For the goldline darter populations on or near the National Forests in Alabama, potential influences include any activities that could increase sedimentation, siltation, or turbidity, contribute pollutants, adjust water chemistry or nutrient cycling, raise water temperatures, change flow, modify habitat, alter streamside vegetation, or block fish passage. Since the species is not expected to be directly on Forest Service tributary habitat, the primary concerns are with overall downstream watershed affects. Under all Forest Plan alternatives, Forest-wide and riparian standards would largely protect the goldline darter and its habitat from sediment that could otherwise be released during management activities. However, as discussed at the beginning of this section, the increased potential for watershed effects in alternative D, would be common to all species; otherwise, the alternatives are similar with a slight reduction in the anticipated watershed effects under alternatives G and B and a larger decrease in potential watershed effects for alternatives I, E, and A. Direct mechanical damage is unlikely since roadway and trail crossings are generally limited to bridges within the habitat areas of this species.

Periodic surveys and monitoring would be the primary recovery objectives for this species. Given the positive opportunities for pro-active conservation of the species and the protection afforded by the Forest-wide and riparian standards under all of the alternatives, the selection of any of the Forest Plan alternatives for the National Forests in Alabama is not likely to adversely affect the goldline darter.

Alabama sturgeon (*Scaphirhynchus suttkusi*)

Environmental Baseline

The Alabama sturgeon is listed as endangered under the Endangered Species Act (USFWS 2000a). This species is endemic to the Mobile Bay drainage and historically ranged over 750 miles within the Tombigbee River system in Alabama and Mississippi and the mainstem Alabama River and lower portions of the Cahaba, Coosa, and Tallapoosa Rivers in Alabama. Its current habitat has been reduced by over 90% to less than 150 miles within the lower Alabama River. Although the Oakmulgee Division of the Talladega National Forest touches upon historical habitat within the mainstem of the Cahaba River, this species has not been confirmed within this area since the 1980's. Extant populations, potential habitats, and viability assessment results are displayed in Appendix B, discussed in greater detail within the Biological Assessment (USFS 2003a), and summarized in the Aquatic Species Viability Section. There are no other occurrences of this species on National Forest system lands.

This species is anadromous, moving between estuarine feeding areas and mid to lower river basin spawning and rearing habitat. Alabama sturgeon appear to prefer unmodified main channel habitat of larger rivers (USFWS 2000a). Closely related species are associated with strong currents over sand gravel substrates. Sturgeon are opportunistic bottom feeders on fish, mollusks, and aquatic insects. Spawning habitats are thought to be within main channel areas of tributaries where there are strong currents over hardened substrates.

The construction of dams and impoundment of prime channel habitats are thought to be the principal reasons for the reduction in the range and population size of the Alabama sturgeon. Over fishing, channelization, water flow alteration, and water quality degradation undoubtedly also played roles in their decline. Such historical and recent conditions have led to the current status of this species being considered as at a moderate risk of continued decline in the one potentially species-inhabited Forest Service watershed (Cahaba). An additional population imperilment risk was noted for the Alabama sturgeon, thereby including it in viability outcome category 5. Based on the watershed assessment completed in conjunction with the Forest Plan EIS (Appendix B), excessive sediment has been identified as a possible high risk to the viability of this species. The overall watershed condition (Clingenpeel 2003) has been rated as "excellent" in the Cahaba River. The opportunities for Forest Service influence, either positive or negative, are limited, however, given the small portion (< ½ acre) of habitat under Forest Service management within the mainstem Cahaba River and due to the overwhelming of upper basin development, industry, agriculture, and other land uses.

Potential Effects
Due to its limited distribution in the mainstem of the Cahaba River, and its possible extirpation throughout the area, this species is unlikely to be influenced by Forest Service activities in the near future. If the species is re-discovered or recovery plans include active re-patriation within or adjacent to National Forest lands, additional cooperative and coordinated research and protective actions would be undertaken.

Given the currently known distribution of Alabama sturgeon and their mainstem suitable habitat, there would be no effect from any of the alternatives of the revised Land Resource Management Plan.

Cumberlandian combshell (*Epioblasma brevidens)*

Affected Environment

Cumberlandian combshells are listed as endangered under the Endangered Species Act (USFWS 1997). The species historically occurred throughout the mainstem of the Tennessee River basin in Alabama, Georgia, Tennessee, Kentucky, and Virginia. This species has largely bee extirpated from its former range, with only seven remaining tributary population scattered across Kentucky, Tennessee, Virginia, and Alabama. The largest extant population is that of the Clinch River in Virginia. Bear Creek, tributary to the Tennessee River, and downstream from the Bankhead National Forest, is the last known population in Alabama; this population is small (USFWS 1997). Extant populations, potential habitats, and viability assessment results are displayed in Appendix B, discussed in greater detail within the Biological Assessment (USFS 2003a), and summarized in the Aquatic Species Viability Section. Cumberlandian combshells are also known to inhabit portions of the upper Clinch River in Virginia and the Powell River in Tennessee, both within the Jefferson National Forest.

This species was historically found in normally clear water, on stable coarse sand-gravel-cobble substrates in shoals of medium tributary streams and large rivers with medium to fast current velocities (Dennis 1984, Gordon 1991). Viable populations appear to only inhabit shallow water although relic non-reproducing populations may remain in areas of inundation (Gordon & Layzer 1989). Cumberlandian combshells are absent from the smaller tributary streams (Parmalee and Bogan 1998). Cumberlandian combshells utilize a variety of fish hosts to carry and nurture their young including, but not limited to banded sculpin (*Cottus carolinae*), mottled sculpin (*Cottus bairdi*), logperch (*Percina caprodes*), redline darter (*E. rufilineatum*), and Tennessee snubnose darter (*E. simoterum*) (Yeager and Saylor 1995; Parmalee and Bogan 1998). As for most freshwater mussels, this species is long-lived and not reproductively mature until attaining 8 or more years of age (Neves and Moyer 1988).

The decline of Cumberlandian combshell populations may be attributed to alteration in pH, sedimentation, and release of heavy metals associated with strip mines. Eutrophication and sedimentation associated with agriculture and development have also played a role. Currently, there is only one watershed downstream from the National Forests in Alabama that could include this species. This species is considered at high risk in the Bear Creek watershed primarily due to off-Forest influences. Based on the watershed assessment completed in conjunction with the Forest Plan EIS (Appendix B), excessive sediment has been identified as the primary risk to the viability of this species. The overall watershed condition has been characterized as “excellent” for the Bear Creek watershed. Downstream off-Forest land uses continue to adversely impact Cumberlandian combshells through impeded fish passage, excessive sedimentation, channel alterations, and the release of toxic chemicals.

Potential Effects

This species is not likely to be found on the Bankhead National Forest since its primary habitat is the larger river reaches within the lower portion of the watershed. For the populations downstream from the National Forest, potential influences include any activities that could increase sedimentation, siltation, or turbidity, contribute pollutants, adjust water chemistry or nutrient cycling, raise water temperatures, change flow, modify habitat, alter streamside vegetation, or block fish passage. Under all Forest Plan alternatives, Forest-wide and riparian standards would largely protect the species and its habitat from sediment released during management activities. However, as discussed at the beginning of this section, the increased potential for watershed effects in alternative D, would be common to all species; otherwise, the alternatives are similar with a slight reduction in the anticipated watershed effects under alternatives G and B and a larger decrease in potential watershed effects for alternatives I, E, and A.

Watershed and water quality protection would be the primary recovery objectives for this species. Periodic monitoring of watershed conditions will be conducted in conjunction with other resource priorities and project-level monitoring.

Given the positive opportunities for pro-active conservation of the species and the watershed and water quality protection afforded by the Forest-wide and riparian standards under all of the alternatives, the selection of any of the Forest Plan alternatives for the National Forests in Alabama, is not likely to adversely affect the Cumberlandian combshell.

Upland combshell (*Epioblasma metastriata*)

Affected Environment

Upland combshells are listed as endangered under the Endangered Species Act (USFWS 1993b). Upland combshells historically occurred in the Black Warrior, Cahaba, and Coosa Rivers, and some of their tributaries in Alabama, Georgia, and Tennessee. When listed, the mussel was believed to be restricted to only the Conasauga River in the upper Coosa River Basin in Georgia. Recent surveys of historic habitat have been unable to locate any extant populations. The species may be extinct, however, biologists continue to retain hope that additional surveys may locate these mussels (USFWS 2003c). Critical habitat has been proposed for 8 watersheds in Alabama, Georgia, and Tennessee (USFWS 2003c). Portions of the proposed critical habitat are located on Terrapin Creek within the Shoal Creek District of the Talladega National Forest. Proposed critical habitat is also located within Hatchet Creek, downstream from the Talladega National Forest. Extant populations, potential habitats, and viability assessment results are displayed in Appendix B, discussed in greater detail within the Biological Assessment (USFS 2003a), and summarized in the Aquatic Species Viability Section. Historical and potential habitat also occurs on the Cherokee National Forest in Georgia.

Upland combshells typically inhabit swift currents over stable sand gravel substrates in riffles and shoals of small to medium sized rivers (Parmalee and Bogan 1998; USFWS 2003c). Host fish have not been identified. As for most freshwater mussels, this species is likely long-lived, and not reproductively mature until attaining 8 or more years of age (Neves and Moyer 1988). The primary constituent elements identified as of importance for proposed critical habitat include: stable channels, appropriate flows, necessary water quality, clean substrates, available fish hosts, and lack of competitive non-native species (USFWS 2003).

The historical decline of upland combshells may be attributed to habitat modification, sedimentation, eutrophication, and other forms of water quality degradation. Impediment of host fish passage may also be a factor. Such historical conditions have led to the current status of this species being considered as at a high risk of continued decline in 2 out of 5 potentially species-inhabited Forest Service watersheds. An additional population imperilment risk was noted for the upland combshell, thereby including it in viability outcome categories 4 and 5. Based on the watershed assessment completed in conjunction with the Forest Plan EIS (Appendix B), excessive sediment, point-source pollution, and altered flow have been identified as the primary risks to the viability of this species. These risk factors appear to be impaired in 4 out of 5 watersheds (all except upper Choccolocco). Overall watershed condition (Clingenpeel 2003) is rated as “excellent” in all watersheds where this species potentially occurs (Cahaba, upper Choccolocco, upper Terrapin, upper Hatchet, and upper Sipsey Fork). Within Hatchet Creek, the opportunities for Forest Service influence, either positive or negative, are limited given the relatively small (but not insignificant) portion of habitat under Forest Service management (11%). The Forest Service may have a greater role in watershed restoration within the Upper Chocolocco, and Terrapin watersheds. However, since this is a lower watershed riverine species, other factors such as off-Forest habitat fragmentation and pollution may over-ride Forest Service watershed improvements. Restoration is unlikely in the Cahaba and Upper Sipsey Fork watersheds, unless efforts are undertaken to repatriate the species into its former range. Downsteam and upstream off-Forest land uses continue to adversely impact upland combshells through impeded fish passage, excessive sedimentation, channel alterations, and the release of toxic chemicals.

Potential Effects

For the upland combshell historical habitat on or near the National Forests in Alabama, potential influences include any activities that could increase sedimentation, siltation, or turbidity, contribute pollutants, adjust water chemistry or nutrient cycling, raise water temperatures, change flow, modify habitat, alter streamside vegetation, or block fish passage. Such effects would be minimized given the protection measures that would be applied under all of the action alternatives for the revised Forest Plan (see section 3.B.4.0 for a full discussion on effects common to all species and watersheds). However, as discussed at the beginning of this section, the increased potential for watershed effects in alternative D would be common to all species; otherwise, the alternatives are similar with a slight reduction in the anticipated watershed effects under alternatives G and B and a larger decrease in potential watershed effects for alternatives I, E, and A. Several on-Forest (but not Forest Service controlled) reservoirs may continue to affect mussel populations through altered flow, chemistry, and nutrient cycling, and as barriers to fish passage. Direct effects are not expected since this species may be extirpated from its historical habitat on the National Forests.

Protection, monitoring, and augmentation would be the overall recovery objectives. Actions would be taken in order to identify additional suitable habitat and re-patriate fish hosts and mussels to areas on National Forest lands.

Given the positive opportunities for pro-active conservation of the species and the protection afforded by the Forest-wide and riparian standards under all of the alternatives, the selection of any of the Forest Plan alternatives for the National Forests in Alabama is not likely to adversely affect upland combshells and is not likely to adversely modify proposed critical habitat.

Southern acornshell (*Epioblasma othcaloogensis*)

Affected Environment

Southern acornshells are listed as endangered under the Endangered Species Act (USFWS 1993b). Southern acornshells historically were endemic the upper Coosa River system in Alabama and Georgia and the Cahaba River above the fall line in Alabama. The most recent records are from the early 1970's in the Coosa River tributaries and the 1930's in the Cahaba (USFWS 2003c). Therefore, this species may be considered historical and possibly extirpated. Due to its originally wide distribution and the lack of comprehensive surveys, biologists retain hope that the species is not extinct and may be re-discovered. Critical habitat has been proposed for seven watersheds in Alabama, Georgia, and Tennessee (USFWS 2003c). Portions of the proposed critical habitat are located on Terrapin Creek within the Shoal Creek District of the Talladega National Forest. Proposed critical habitat is also located within Hatchet Creek, downstream from the Talladega National Forest and within the Cahaba River, upstream from the Oakmulgee Division of the Talladega National Forest. Extant populations, potential habitats, and viability assessment results are displayed in Appendix B, discussed in greater detail within the Biological Assessment (USFS 2003a), and summarized in the Aquatic Species Viability Section. Historical or potential habitat also occurs within the Cherokee National Forest in Tennessee and Georgia.

Southern acornshells typically inhabit fine gravel substrates in riffles and runs of rivers and large tributary streams above the fall line (Parmalee and Bogan 1998). The Southern acornshell is not known to survive impoundment and appears to require swift currents, coarse low silt substrates, and highly oxygenated water (Pierson 1992). Life history and host fish are unknown for this species. The primary constituent elements identified as of importance for proposed critical habitat include: stable channels, appropriate flows, necessary water quality, clean substrates, available fish hosts, and lack of competitive non-native species (USFWS 2003c).

The decline and extirpation of Southern acornshell populations may be attributed to habitat modification, sedimentation, eutrophication, and other forms of water quality degradation. Impediments to host fish passage may also be a factor. Such historical conditions have led to the current status of this species being considered as at a high risk of continued decline in 3 out of 6 potentially species-inhabited Forest Service watersheds. Based on the watershed assessment completed in conjunction with the Forest Plan EIS (Appendix B), excessive sediment, point-source pollution, and flow have been identified as the primary risks to the viability of this species. These risk factors appear to be impaired in 2 of the 3 watersheds (Cahaba, upper Terrapin). Overall watershed condition (Clingenpeel 2003) is rated as "excellent" in all watersheds where this species potentially occurs (Cahaba, upper Choccolocco, upper Terrapin). Within the Cahaba River, the opportunities for Forest Service influence, either positive or negative, are limited given the small portion of habitat under Forest Service management (< ½ acre) and due to the overwhelming of upper basin development, industry, agriculture, and other land uses. The Forest Service may have a greater role in restoration within the Upper Chocolocco and Terrapin watersheds. However, these two suspected extant populations of Southern acornshell mussels may inhabit only a portion of the suitable habitat within the National Forests in Alabama. Recent drought conditions and existing barriers to fish passage may currently limit populations within the upper portions of these two watersheds. In addition, due to the off-Forest reservoirs, there is a high level of habitat fragmentation and the additional barriers of numerous road stream crossings could hamper host fish passage and further the risks of decline or extirpation due to catastrophic events.

Potential Effects

For Southern acornshell populations of on or near the National Forests in Alabama, potential influences include any activities that could increase sedimentation, siltation, or turbidity, contribute pollutants, adjust water chemistry or nutrient cycling, raise water temperatures, change flow, modify habitat, alter streamside vegetation, or block fish passage. Such effects would be minimized given the protection measures that would be applied under all of the action alternatives for the revised Forest Plan (see section 3.B.4.0 for a full discussion on effects common to all species and watersheds). However, as discussed at the beginning of this section, the increased potential for watershed effects in alternative D, would be common to all species; otherwise, the alternatives are similar with a slight reduction in the anticipated watershed effects under alternatives G and B and a larger decrease in potential watershed effects for alternatives I, E, and A. Several on-Forest (but not Forest Service controlled) reservoirs may continue to affect mussel populations through altered flow, chemistry, and nutrient cycling, and as barriers to fish passage. Direct effects are not expected since this species may be extirpated from its historical habitat on the National Forests.

Protection, monitoring, and augmentation would be the primary recovery objectives for this species. Actions would be taken in order to identify additional suitable habitat and re-patriate fish hosts and mussels to areas on National Forest lands.

Given the positive opportunities for pro-active conservation of the species and the protection afforded by the Forest-wide and riparian standards under all of the alternatives, the selection of any of the alternatives for the National Forests of Alabama is not likely to adversely affect Southern acornshells and is not likely to adversely modify proposed critical habitat.

Fine-lined pocketbook (*Lampsilis altilis*)

Affected Environment

Fine-lined pocketbooks are listed as threatened under the Endangered Species Act (USFWS 1993b). Fine-lined pocketbooks historically occurred in the Alabama, Tombigbee, Black Warrior, Cahaba, Tallapoosa, Coosa River systems, and their tributaries. Currently, this species is limited to small streams above the fall line within the Cahaba, Coosa, and Tallapoosa River Basins (USFWS 2003c). Critical habitat has been proposed for 12 watersheds including portions of the Uphapee and Chewacla Creeks on the Tuskegee National Forest, Cane Creek, and the Tallapoosa River downstream of the Shoal Creek District of the Talladega National Forest, Hatchet Creek downstream of the Talladega District, Shoal Creek tributary to the Upper Choccolocco largely within the Shoal Creek District of the Talladega, and Cheaha Creek tributary to the middle Choccolocco largely within the Talladega District (USFWS 2003c). Extant populations, potential habitats, and viability assessment results are displayed in Appendix B, discussed in greater detail within the Biological Assessment (USFS 2003a), and summarized in the Aquatic Species Viability Section. An additional population is known to inhabit the Conasauga River of Tennessee and Georgia, on and downstream from the Cherokee National Forest.

Fine-lined pocketbooks are typically found in a sand-mud mixture with gravel in moderate current and depths (Parmalee and Bogan 1998). It is a fairly ubiquitous species, inhabiting both rivers and headwater streams. Largemouth (*Micropterus salmoides*), redeye (*Micropterus coosae*), and spotted bass (*M. punctulatus*), as well as green sunfish have been identified as suitable fish hosts for the glochidia (Haag et al. 1999). As for most freshwater mussels, this species is likely long-lived, and not reproductively mature until attaining 8 or more years of age (Neves and Moyer 1988). The primary constituent elements identified as of importance for proposed critical habitat include: stable channels, appropriate flows, necessary water quality, clean substrates, available fish hosts, and lack of competitive non-native species (USFWS 2003).

The decline and extirpation of most populations of fine-lined pocketbook mussels may be attributed to habitat modification, sedimentation, eutrophication, and other forms of water quality degradation. Impediment of host fish passage may also be a factor. Such historical conditions have led to the current status of this species being considered as at a high risk of continued decline in 2 out of 15 potentially species-inhabited Forest Service watersheds. An additional population imperilment risk was noted for the Fine-lined pocketbook, thereby including it in viability outcome categories 4 and 5. Based on the watershed assessment completed in conjunction with the Forest Plan EIS (Appendix B), excessive sediment, point-source pollution, and flow alterations may contribute the greatest risk to the viability of this species. Within the Chewacla, Middle Choccolocco, and Talladega watersheds, the opportunities for Forest Service influence, either positive or negative, are limited given the small portion of habitat under Forest Service management and due to combinations of upstream and downstream industry, agriculture, and other land uses. Restoration is unlikely in the Upper Sipsey Fork watershed, unless efforts are undertaken to repatriate the species into the extirpated areas.

The 15 possible extant populations of fine-lined pocketbook mussels probably inhabit less than half of the suitable habitat for this species within the National Forests in Alabama. Recent drought conditions and existing barriers to fish passage may further limit populations within the upper portions of these watersheds. These risk factors appear to be impaired in 10 of the 15 watersheds (all except upper Brushy, upper Sipsey, Cane, upper Choccolocco, and Cheaha). Overall watershed condition (Clingenpeel 2003) is rated as “below average in the middle Choccolocco and Tallaseehatchee watersheds, “average” in the Talladega, Uphapee, and Chewacla watersheds, and “excellent” in all of the other watersheds where this species potentially occurs (upper and lower Sipsey, upper Brushy, Cane, Muscadine, upper Choccolocco, upper Terrapin, Cheaha, and upper Hatchet). Two populations in the Upper Terrapin and Upper Hatchet watersheds may be at risk for decline primarily due to off-Forest factors, however, there may be opportunities for positively increasing the security of the species through restoration (reconfiguring road stream crossings for fish passage) and protective measures (such as land acquisition), on portions of the Talladega National Forest. Downstream off-Forest land uses continue to adversely impact fine-lined pocketbooks and their habitat through elevated levels of sediment run-off, channel alterations, and the release of toxic chemicals.

Potential Effects

For populations of fine-lined pocketbook mussels on or near the National Forests in Alabama, potential influences include any activities that could increase sedimentation, siltation, or turbidity, contribute pollutants, adjust water chemistry or nutrient cycling, raise water temperatures, change flow, modify habitat, alter streamside vegetation, or block fish passage. Such effects would be minimized given the protection measures that would be applied under all of the action alternatives for the revised Forest Plan (see section 3.B.4.0 for a full discussion on effects common to all species and watersheds). However, as discussed at the beginning of this section, the increased potential for watershed effects in alternative D, would be common to all species; otherwise, the alternatives are similar with a slight reduction in the anticipated watershed effects under alternatives G and B and a larger decrease in potential watershed effects for alternatives I, E, and A. Under all of the alternatives two on-Forest and several off-Forest reservoirs may continue to affect mussel prey populations through altered flow, chemistry, and nutrient cycling, and as barriers to host fish passage. Effects are expected to be similar across all of the action alternatives. Direct effects of mechanical damage would decline under all of the action alternatives due to the inclusion of strengthened standards that would minimize heavy equipment use and low water fords at road and trail crossings. .

Protection, monitoring, and augmentation would be the primary recovery objectives for this species. Actions would be taken in order to identify additional suitable habitat and restore fish hosts and mussels to areas on National Forest lands.

Given the positive opportunities for pro-active conservation of the species and the protection afforded by the Forest-wide and riparian standards under all of the alternatives, the selection of any of the Forest Plan alternatives for the National Forests in Alabama, is not likely to adversely affect the fine-lined pocketbook and not likely to adversely modify proposed critical habitat.

Orange-nacre mucket (*Lampsilis perovalis)*

Affected Environment

Orange-nacre muckets are listed as threatened under the Endangered Species Act (USFWS 1993b). The species historically occurred in the mainstem and tributaries of the Alabama, Tombigbee, Black Warrior, and Cahaba, River systems in Alabama, Mississippi, and Georgia. Currently, the mussel may be extirpated from the mainstem Tombigbee, Black Warrior, and Alabama Rivers; however, it may still be found within several river basins including the Black Warrior and Cahaba Rivers (USFWS 2003c). Critical habitat has been proposed for 15 watersheds in Alabama and Mississippi (USFWS 2003c). Portions of the proposed critical habitat are located in the Sipsey Fork largely on the Bankhead National Forest and within the Cahaba River upstream from the Oakmulgee Division of the Talladega National Forest. Extant populations, potential habitats, and viability assessment results are displayed in Appendix B, discussed in greater detail within the Biological Assessment (USFS 2003a), and summarized in the Aquatic Species Viability Section. There are no other occurrences of this species on National Forest system lands.

Orange-nacre muckets inhabits headwater streams and small rivers among stable sand, gravel, or cobble substrates in moderate to swift currents. Relatively clean substrates (low silt), high oxygen, and low turbidity are required (USFWS 2003c). Redeye bass (*Micropterus coosae*), spotted bass (*Micropterus punctulatus*), and largemouth bass (*Micropterus salmoides*) have been identified as suitable fish hosts for the glochidia (Haag and Warren 1997). As for most freshwater mussels, this species is likely long-lived, and not reproductively mature until attaining 8 or more years of age (Neves and Moyer 1988). The primary constituent elements identified as of importance for proposed critical habitat include: stable channels, appropriate flows, necessary water quality, clean substrates, available fish hosts, and lack of competitive non-native species (USFWS 2003c).

The decline and extirpation of most populations of orange-nacre mucket mussels may be attributed to habitat modification, sedimentation, eutrophication, and other forms of water quality degradation. Impediment of host fish passage may also be a factor. The 7 known or suspected extant populations of orange-nacre muckets probably inhabit only a portion of the suitable habitat within the National Forests in Alabama. Recent drought conditions and existing barriers to fish passage may limit the extent of populations within the upper portions of most watersheds. Such historical conditions have led to the current status of this species being considered as at a high risk of continued decline in 6 out of 7 potentially species-inhabited Forest Service watersheds. An additional population imperilment risk was noted for the orange-nacre mucket, thereby including it in viability outcome categories 4 and 5. Based on the watershed assessment completed in conjunction with the Forest Plan EIS (Appendix B), excessive sediment, point-source pollution, and flow alterations may contribute the greatest risk to the viability of this species. These risk factors appear to be impaired in all of the watersheds (Clear, lower Brushy Fork, lower and upper Sipsey Forks, Big Brush, Cahaba, and Uphapee). Overall watershed condition (Clingenpeel 2003) is rated as "average" in the Uphapee watershed and "excellent" in all of the other watersheds where this species potentially occurs. The opportunities for Forest Service influence, either positive or negative, are limited, however, due to the small proportion of each watershed under Forest Service management and the interspersion of private lands and overwhelming habitat fragmentation due to the Lewis Smith Reservoir on the Sipsey tributaries and uncertain species status within the other river basins. Clear Creek has limited opportunities for restoration due to the small proportion of Forest Service system lands and the ongoing impacts of upper basin strip mining. Upstream and downstream off-Forest land uses would continue to adversely impact these mussels through excessive sedimentation, channel alterations, and the release of toxic chemicals.

Potential Effects

For the orange-nacre mucket populations on or near the National Forests in Alabama, potential influences include any activities that could increase sedimentation, siltation, or turbidity, contribute pollutants, adjust water chemistry or nutrient cycling, raise water temperatures, change flow, modify habitat, alter streamside vegetation, or block fish passage. Such effects would be minimized given the protection measures that would be applied under all of the action alternatives for the revised Forest Plan (see section 3.B.4.0 for a full discussion on effects common to all species and watersheds). However, as discussed at the beginning of this section, the increased potential for watershed effects in alternative D, would be common to all species; otherwise, the alternatives are similar with a slight reduction in the anticipated watershed effects under alternatives G and B and a larger decrease in potential watershed effects for alternatives I, E, and A. Under all of the alternatives two on-Forest and several off-Forest reservoirs may continue to affect mussel prey populations through altered flow, chemistry, and nutrient cycling, and as barriers to host fish passage. Effects are expected to be similar across all of the action alternatives. Direct effects of mechanical damage would decline under all of the action alternatives due to the inclusion of strengthened standards that would minimize heavy equipment use and low water fords at road and trail crossings. .

Protection, monitoring, and augmentation would be the primary recovery objectives for this species. Actions would be taken in order to identify additional suitable habitat and re-patriate fish hosts and mussels to areas on National Forest lands.

Given the positive opportunities for pro-active conservation of the species and the protection afforded by the Forest-wide and riparian standards under all of the alternatives, the selection of any of the alternatives for the Cherokee National Forest, National Forests of Alabama, and Chattahoochee National Forest is not likely to adversely affect the orange-nacre mucket and is not likely to adversely modify proposed critical habitat.

Alabama lampmussel (*Lampsilis virescens)*

Affected Environment

Alabama lampmussel are thought to be extinct in Tennessee and only extant within one Tennessee River Basin watershed in northeastern Alabama. This was a large river and lower tributary species that probably was historical downstream from the Bankhead National Forest.

Potential Effects

Alabama lampmussel are not likely to be found on or downstream from the National Forests in Alabama, and consequently, there would be no effects under any of the action alternatives.

Alabama moccasinshell (*Medionidus acutissimus*)

Affected Environment

Alabama moccasinshells are listed as threatened under the Endangered Species Act (USFWS 1993b). Alabama moccasinshells historically occurred in the Alabama, Tombigbee, Black Warrior, Cahaba, Coosa River systems, and their tributaries in Alabama, Mississippi, and Georgia. The species appears to have declined or disappeared from mainstem-rivers of all basins but continues to survive in many tributary streams (USFWS 2003c). Critical habitat has been proposed for 16 watersheds including portions within the Sipsey Fork largely on the Bankhead National Forest and within the Cahaba River upstream from the Oakmulgee Division of the Talladega National Forest (USFWS 2003c). Extant populations, potential habitats, and viability assessment results are displayed in Appendix B, discussed in greater detail within the Biological Assessment (USFS 2003a), and summarized in the Aquatic Species Viability Section. There are no other occurrences of this species on National Forest system lands.

Alabama moccasinshells typically inhabit moderate current over sand, gravel, and cobble in shallow water shoals of small streams (Parmalee and Bogan 1998). This species also inhabits sandy shelves of stream edge margins (NS 2001). This species attracts host fish by flickering its white patches along the otherwise black mantle margins (Haag & Warren 2001). The blackspotted topminnow (*Fundulus olivaceus*), Tuscaloosa darter (*Etheostoma douglasi*), redfin darter (*E. whipplei*), blackbanded darter (*Percina nigrofaciata*), naked sand darter (*Ammocrypta beani*), Southern sand darter (*A. meridiana*), Johnny darter (*E. nigrum*), speckled darter (*E. stigmaeum*), saddleback darter (*Percina vigil*), and logperch (*P. caprodes*) have been identified as suitable fish hosts for the glochidia (Haag and Warren 1997, 2001). As for most freshwater mussels, this species is likely long-lived, and not reproductively mature until attaining eight or more years of age (Neves and Moyer 1988). The primary constituent elements identified as of importance for proposed critical habitat include: stable channels, appropriate flows, necessary water quality, clean substrates, available fish hosts, and lack of competitive non-native species (USFWS 2003c).

The four possible extant populations of Alabama moccasinshell probably inhabit less than half of the suitable habitat for this species within the National Forests in Alabama. Recent drought conditions and existing barriers to fish passage may limit populations within the upper portions of many these watersheds. The decline and extirpation of Alabama moccasinshell populations may be attributed to habitat modification, sedimentation, eutrophication, and other forms of water quality degradation. Impediment of host fish passage may also be a factor. Such historical conditions have led to the current status of this species being considered as at a moderate risk of continued decline in 3 out of 4 potentially species-inhabited Forest Service watersheds. An additional population imperilment risk was noted for the Alabama moccasinshell, thereby including it in viability outcome categories 4 and 5. Based on the watershed assessment completed in conjunction with the Forest Plan EIS (Appendix B), excessive sediment and flow alterations may contribute the greatest risk to the viability of this species. These risk factors appear to be impaired to some extent in all of the watersheds. Overall watershed condition (Clingenpeel 2003) is rated as "excellent" in all watersheds where this species potentially occurs (lower and upper Brushy forks, lower and upper Sipsey Forks). The opportunities for Forest Service influence, either positive or negative, are limited, however, primarily due to the overwhelming effects of Lewis Smith Reservoir and development within the lower portion of the watersheds. Clear Creek has limited opportunities for restoration due to the small proportion of Forest Service system lands and the ongoing impacts of upper basin strip mining. Other areas are of limited potential for restoration due to unknown population status. Regardless of Forest Service actions, off-Forest land uses continue to adversely impact these mussels through elevated levels of sediment run-off, channel alterations, and the release of toxic chemicals.

Potential Effects

For the Alabama moccasinshell populations on or near the National Forests in Alabama, potential influences include any activities that could increase sedimentation, siltation, or turbidity, contribute pollutants, adjust water chemistry or nutrient cycling, raise water temperatures, change flow, modify habitat, alter streamside vegetation, or block fish passage. Such effects would be minimized given the protection measures that would be applied under all of the action alternatives for the revised Forest Plan (see section 3.B.4.0 for a full discussion on effects common to all species and watersheds). However, as discussed at the beginning of this section, the increased potential for watershed effects in alternative D, would be common to all species; otherwise, the alternatives are similar with a slight reduction in the anticipated watershed effects under alternatives G and B and a larger decrease in potential watershed effects for alternatives I, E, and A. Under all of the alternatives one on-Forest and several off-Forest reservoirs may continue to affect mussel prey populations through altered flow, chemistry, and nutrient cycling, and as barriers to host fish passage. Effects are expected to be similar across all of the action alternatives. Direct effects of mechanical damage would decline under all of the action alternatives due to the inclusion of strengthened standards that would minimize heavy equipment use and low water fords at road and trail crossings. .

Protection, monitoring, and augmentation would be the primary recovery objectives for this species. Actions would be taken in order to identify additional suitable habitat and re-patriate fish hosts and mussels to areas on National Forest lands.

Given the positive opportunities for pro-active conservation of the species and the protection afforded by the Forest-wide and riparian standards under all of the alternatives, the selection of any of the Forest Plan alternatives for the National Forests in Alabama is not likely to adversely affect the Alabama moccasinshell and not likely to adversely modify proposed critical habitat.

Coosa moccasinshell (*Medionidus parvulus*)

Affected Environment

Coosa moccasinshells are listed as endangered under the Endangered Species Act (USFWS 1993b). Coosa moccasinshells historically occurred in the Cahaba, Sipsey Fork of the Black Warrior, Coosa River systems, and their tributaries in Alabama, Georgia, and Tennessee. Currently, the species may be extirpated from the Cahaba and Black Warrior River basins. Since listing, the species has only been documented in the Conasauga River of the upper Coosa River Basin (USFWS 2003c). Critical habitat has been proposed on nine watersheds of Alabama, Georgia, and Tennessee including portions of Terrapin and Shoal Creeks on the Shoal Creek District of the Talladega National Forest, Cheaha Creek on the Talladega District, and Hatchet Creek downstream from the Talladega District (USFWS 2003c). Extant populations, potential habitats, and viability assessment results are displayed in Appendix B, discussed in greater detail within the Biological Assessment (USFS 2003a), and summarized in the Aquatic Species Viability Section. Additional populations may also occur on the Cherokee National Forest in Georgia and Tennessee. This species is considered to be locally common in the Conasauga River within Tennessee, but present only in small and localized populations elsewhere (USFWS 2003c).

Coosa moccasinshells typically inhabit sand-gravel-cobble substrates in and around bedrock in moderate current shoals or runs of various sized streams and small rivers (Parmalee and Bogan 1998). They appear to require clear (low turbidity) and highly oxygenated water. They are known to utilize blackbanded darters (*Percina nigrofasciata*) as glochidial hosts (USFWS 2003c). As for most freshwater mussels, this species is likely long-lived, and not reproductively mature until attaining 8 or more years of age (Neves and Moyer 1988). The primary constituent elements identified as of importance for proposed critical habitat include: stable channels, appropriate flows, necessary water quality, clean substrates, available fish hosts, and lack of competitive non-native species (USFWS 2003c).

The six known or suspected extant populations of Coosa moccasinshell mussels probably inhabit only a small fraction of the suitable habitat remaining for this species within the National Forests in Alabama. Recent drought conditions and existing barriers to fish passage, such as the presence of numerous reservoirs, may limit populations within the upper portions of these watersheds. The decline and extirpation of Coosa moccasinshell populations may be attributed to habitat modification, sedimentation, eutrophication, and other forms of water quality degradation. Impediment of host fish passage may also be a factor. Such historical conditions have led to the current status of this species being considered as at a high risk of continued decline in 3 out of 6 potentially species-inhabited Forest Service watersheds. An additional population imperilment risk was noted for the Coosa moccasinshell, thereby including it in viability outcome categories 4 and 5. Based on the watershed assessment completed in conjunction with the Forest Plan EIS (Appendix B), excessive sediment, point-source pollution, and altered flow may contribute the greatest risk to the viability of this species. These risk factors appear to be impaired in all of the watersheds except for the upper Choccolocco. Overall watershed condition (Clingenpeel 2003) is rated as "below average" in the middle Choccolocco watershed and "excellent" in all of the other watersheds where this species potentially occurs (lower and upper Sipsey Forks, upper Terrapin, upper Choccolocco, and upper Hatchet). Restoration is unlikely in the Upper Sipsey Fork watershed, unless efforts are undertaken to repatriate the species into its former range. The opportunities for Forest Service influence, either positive or negative, are limited, however, due to the small proportion of each watershed under Forest Service management and the interspersion of private lands, and reservoirs and development within the lower portion of the watersheds.

Potential Effects

For populations of Coosa moccasinshells on or near the National Forests in Alabama, potential influences include any activities that could increase sedimentation, siltation, or turbidity, contribute pollutants, adjust water chemistry or nutrient cycling, raise water temperatures, change flow, modify habitat, alter streamside vegetation, or block fish passage. Such effects would be minimized given the protection measures that would be applied under all of the action alternatives for the revised Forest Plan (see section 3.B.4.0 for a full discussion on effects common to all species and watersheds). However, as discussed at the beginning of this section, the increased potential for watershed effects in alternative D, would be common to all species; otherwise, the alternatives are similar with a slight reduction in the anticipated watershed effects under alternatives G and B and a larger decrease in potential watershed effects for alternatives I, E, and A. Several on-Forest (but not Forest Service controlled) reservoirs may continue to affect mussel populations through altered flow, chemistry, and nutrient cycling, and as barriers to fish passage. Direct effects of mechanical damage would decline under all of the action alternatives due to the inclusion of strengthened standards that would minimize heavy equipment use and low water fords at road and trail crossings.

Protection, monitoring, and augmentation would be the primary recovery objectives for this species. Actions would be taken in order to identify additional suitable habitat and re-patriate fish hosts and mussels to areas on National Forest lands.

Given the positive opportunities for pro-active conservation of the species and the protection afforded by the Forest-wide and riparian standards under all of the alternatives, the selection of any of the Forest Plan alternatives for the National Forests in Alabama is not likely to adversely affect the Coosa moccasinshell and is not likely to adversely modify proposed critical habitat.

Southern clubshell (*Pleurobema decisum*)

Affected Environment

Southern clubshells are listed as endangered under the Endangered Species Act (USFWS 1993b). The species was historically known to occur in every major sub-basin of the Mobile River Basin with the exception of the Tensaw River, but including the Alabama, Tombigbee, Black Warrior, Cahaba, Tallapoosa, and Coosa Rivers in Mississippi, Alabama, and Georgia. At one time, Southern clubshells were reported to be extremely common in the Cahaba River (van der Schalie 1938). The species may be extirpated from the Cahaba River, and appears to be gone from the main channels of the Tombigbee and the Black Warrior Rivers (USFWS 2003c). Critical habitat has been proposed for 19 watersheds in Alabama, Mississippi, Georgia, and Tennessee (USFWS 2003c). Portions of proposed critical habitat are within Uphapee and Chewacla Creeks on the Tuskegee National Forest, Terrapin Creek on the Shoal Creek District of the Talladega National Forest, Hatchet Creek downstream of the Talladega District, and the Cahaba River upstream from the Oakmulgee Division of the Talladega National Forest. Extant populations, potential habitats, and viability assessment results are displayed in Appendix B, discussed in greater detail within the Biological Assessment (USFS 2003a), and summarized in the Aquatic Species Viability Section. Additional habitat and occurrences are on the Cherokee National Forest in Tennessee and Georgia.

The Southern clubshell is found in slow to moderate currents over coarse gravel-cobble habitat adjacent to riffle-runs of large streams and small rivers (Pierson 1991). Occasionally, this species is also encountered in firm sand gravel shelves along stream margins (Pierson 1991, NS 2003). Southern clubshells do not appear to survive in beaver ponds or other slack water habitats with silty substrates (Pierson 1991). Large woody debris may be an important habitat component as it provides sheltered areas with stable substrates in otherwise rapidly shifting channel bottoms (Pierson 1991). Large woody debris may be of greatest significance within lower tributary and riverine reaches where stable bedrock controls are a less common feature. Woody debris is also correlated with the abundance and diversity of native fishes, typically host species for mussels (Herrington et al. 2001). The blacktail shiner (*Cyprinella venusta*), Alabama shiner (*C. callistia*), and tricolor shiner (*C. trichroistira*) have been identified as a suitable fish hosts (Haag and Warren 2001, USFWS 2003). As for most freshwater mussels, this species is likely long-lived, and not reproductively mature until attaining eight or more years of age (Neves and Moyer 1988). The primary constituent elements identified as of importance for proposed critical habitat include: stable channels, appropriate flows, necessary water quality, clean substrates, available fish hosts, and lack of competitive non-native species (USFWS 2003).

The decline of Southern clubshells is attributed to a combination of impacts including channel modification, impoundment, gravel mining, agricultural runoff, and urban or industrial discharges (Pierson 1991). Such historical conditions have led to the current status of this species being considered at high risk of continued decline in 2 out of 8 potentially species-inhabited Forest Service watersheds. An additional population imperilment risk was noted for the Southern clubshell, thereby including it in viability outcome category 5. Based on the watershed assessment completed in conjunction with the Forest Plan EIS (Appendix B), excessive sediment, point-source pollution, and flow alterations may contribute the greatest risk to the viability of this species. These risk factors appear to be impaired in 6 of the 8 watersheds (all but upper Choccolocco and Talladega). Overall watershed condition (Clingenpeel 2003) is rated as “below average” in the middle Choccolocco watershed, “average” in the Talladega, Uphapee, and Chewacla watersheds, and “excellent” in the Cahaba, upper Choccolocco, upper Terrapin, and upper Hatchet watersheds. The opportunities for Forest Service influence, either positive or negative, are limited, however, due to the small proportion of each watershed under Forest Service management and the interspersion of private lands and the overwhelming influence of both upstream and downstream areas. The Terrapin population is at risk due to reservoirs fragmenting habitat and restricting the ability of this species to re-colonize the upper watershed. The Uphapee and Chewacla populations appear to be stable (Pierson 1991), but remain at risk due to upstream and surrounding land uses that influence base flows. Within the Uphapee and Chewacla drainages, pesticide and herbicide runoff may also be a factor as demonstrated by fish kills attributed to that cause (Pierson 1991). The lower Talladega Creek population has been reportedly affected by organic enrichment as evidenced by excessive algal growth, turbidity, and water odor (Pierson 1991). Georgia populations within the Upper Coosa River Basin, although only occurring along a short reach of the river, continue to be fairly robust, while mussel populations in Chewacla Creek appear to be small and localized. Southern clubshell mussels probably inhabit less than half of the suitable habitat for this species within the National Forests in Alabama. Recent drought conditions and existing barriers to fish passage may further limit populations within the upper portions of most these watersheds.

Potential Effects

For the populations of Southern clubshell mussels on or downstream of the National Forests in Alabama, potential influences include any activities that could increase sedimentation, siltation, or turbidity, contribute pollutants, adjust water chemistry or nutrient cycling, raise water temperatures, change flow, modify habitat, alter streamside vegetation, or block fish passage. Such effects would be minimized given the protection measures that would be applied under all of the action alternatives for the revised Forest Plan (see section 3.B.4.0 for a full discussion on effects common to all species and watersheds). However, as discussed at the beginning of this section, the increased potential for watershed effects in alternative D, would be common to all species; otherwise, the alternatives are similar with a slight reduction in the anticipated watershed effects under alternatives G and B and a larger decrease in potential watershed effects for alternatives I, E, and A. Under all of the alternatives one on-Forest and several off-Forest reservoirs may continue to affect mussel prey populations through altered flow, chemistry, and nutrient cycling, and as barriers to host fish passage. Direct effects of mechanical damage would decline under all of the action alternatives due to the inclusion of strengthened standards that would minimize heavy equipment use and low water fords at road and trail crossings.

All extant populations of the southern clubshell probably occur off-Forest. However, surveys need to be conducted in suitable habitat of the on-Forest watersheds. As stated in the Forest Plan goals and objectives pro-active actions would be taken in order to identify additional suitable habitat and re-patriate fish hosts and mussels to these areas.

Given the positive opportunities for proactive conservation of the species and the protection afforded by the Forest-wide and riparian standards, the selection of any of the Forest Plan alternatives for the National Forests in Alabama is not likely to adversely affect the Southern clubshell and is not likely to adversely modify proposed critical habitat.

Dark pigtoe (*Pleuorbema furvum*)

Affected Environment

Dark pigtoes are listed as endangered under the Endangered Species Act (USFWS 1993b). The species historically was restricted to the Black Warrior River basin above the fall line (USFWS 2003c). Since listing, it has been confirmed in the Sipsey Fork and its tributaries and from the North River and a tributary (USFWS 2003c). Critical habitat has been proposed for three watersheds in Alabama (USFWS 2003c). Portions of proposed critical habitat are within the Sipsey Fork largely on the Bankhead National Forest. Extant populations, potential habitats, and viability assessment results are displayed in Appendix B, discussed in greater detail within the Biological Assessment (USFS 2003a), and summarized in the Aquatic Species Viability Section. There are no other occurrences of this species on National Forest system lands. Populations are localized and with low numbers of individuals in all known occupied streams (USFWS 2003c).

Dark pigtoes are found in shallow and swift current portions of sand, gravel, and cobble shoals and rapids in small rivers and large streams. It may be found in mostly sandy substrates, but it usually is encountered in a mixture of sand gravel (NS 2003). Fish hosts have been identified as the largescale stoneroller (*Campostoma oligolepis*), Alabama shiner (*Cyprinella callistia*), blacktail shiner (*Cyprinella venusta*), creek chub (*Semotilus atromaculatus*), and blackspotted topminnow (*Fundulus olivaceus*) (Haag and Warren 1997). As for most freshwater mussels, this species is likely long-lived, and not reproductively mature until attaining eight or more years of age (Neves and Moyer 1988). The primary constituent elements identified as of importance for proposed critical habitat include: stable channels, appropriate flows, necessary water quality, clean substrates, available fish hosts, and lack of competitive non-native species (USFWS 2003c).

The five known or suspected extant populations of dark pigtoe mussels probably inhabit less than half of the suitable habitat for this species within the National Forests in Alabama. Recent drought conditions and existing barriers to fish passage may further limit populations within the upper portions of these watersheds. The decline of dark pigtoe populations may be attributed to channel modification, habitat fragmentation, and point-source pollution associated with reservoirs and strip mining. Such historical conditions have led to the current status of this species being considered as at a high risk of continued decline in 2 out of 5 potentially species-inhabited Forest Service watersheds. An additional population imperilment risk was noted for the dark pigtoe, thereby including it in viability outcome categories 4 and 5. Based on the watershed assessment completed in conjunction with the Forest Plan EIS (Appendix B), sedimentation, point-source pollution and flow alterations may contribute the greatest risk to the viability of this species. These risk factors appear to be impaired to some extent in all of the watersheds. Overall watershed condition (Clingenpeel 2003) is rated as “excellent” in all watersheds where this species potentially occurs. The opportunities for Forest Service influence, either positive or negative, are limited, however, primarily due to the overwhelming effects of Lewis Smith Reservoir and development within the lower portion of the watersheds. Clear Creek has limited opportunities for restoration due to the small proportion of Forest Service system lands and the ongoing impacts of upper basin strip mining.

Potential Effects

For the populations of dark pigtoes on or downstream of the National Forests in Alabama, potential influences include any activities that could increase sedimentation, siltation, or turbidity, contribute pollutants, adjust water chemistry or nutrient cycling, raise water temperatures, change flow, modify habitat, alter streamside vegetation, or block fish passage. Such effects would be minimized given the protection measures that would be applied under all of the action alternatives for the revised Forest Plan (see section 3.B.4.0 for a full discussion on effects common to all species and watersheds). However, as discussed at the beginning of this section, the increased potential for watershed effects in alternative D, would be common to all species; otherwise, the alternatives are similar with a slight reduction in the anticipated watershed effects under alternatives G and B and a larger decrease in potential watershed effects for alternatives I, E, and A. Under all of the alternatives one on-Forest and several off-Forest reservoirs may continue to affect mussel prey populations through altered flow, chemistry, and nutrient cycling, and as barriers to host fish passage. Effects are expected to be similar across all of the action alternatives. Direct effects of mechanical damage would decline under all of the action alternatives due to the inclusion of strengthened standards that would minimize heavy equipment use and low water fords at road and trail crossings.

Direct effects, such as mortality of glochidia, juveniles, or adults, are not expected to occur because of the proposed actions under the revised Forest Plan. Under all of the alternatives would continue the current situation of limited Forest Service roads and motorized trails within the streams and small river habitat areas of this species. Revised Forest Plan standards would minimize opportunities for mechanical damage due to vehicles or equipment. Moreover, on the Bankhead National Forest, roadways are limited and not located adjacent to dark pigtoe habitat within the Sipsey Wild and Scenic River corridor and the Wilderness.

Habitat and watershed protection and monitoring would be the primary objectives for this species. Sipsey Fork has been identified as a possible priority watershed and would therefore receive additional emphasis through focused funding of watershed restoration efforts and additional consideration of mitigation measures for projects that could add to cumulative effects on this species. As appropriate, additional suitable habitat may be identified and cooperative action taken to repatriate dark pigtoes into unoccupied areas on National Forest lands.

Given the positive opportunities and the implementation of the Forest-wide and riparian standards, the selection of any of the alternatives for the National Forests in Alabama is not likely to adversely affect the dark pigtoe and is not likely to adversely modify proposed critical habitat.

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Southern pigtoe (*Pleurobema georgianum*) Lea

Affected Environment

Southern pigtoes are listed as endangered under the Endangered Species Act (USFWS 1993b). Southern pigtoes historically occurred in the Coosa River system and its tributaries in Alabama, Georgia, and Tennessee. Southern pigtoes are currently confirmed in the Conasauga River and Holly Creeks in Georgia, and Shoal, Big Canoe, and Cheaha Creeks in Alabama (USFWS 2003c). Critical habitat has been proposed for nine watersheds in Alabama, Georgia, and Tennessee (USFWS 2003c). Portions of proposed critical habitat are within Terrapin and Shoal Creeks on the Shoal Creek District of the Talladega National Forest, Hatchet Creek downstream of the Talladega District, and Cheaha Creek largely on the Talladega District. Extant populations, potential habitats, and viability assessment results are displayed in Appendix B, discussed in greater detail within the Biological Assessment (USFS 2003a), and summarized in the Aquatic Species Viability Section. An additional extant population inhabits the Conasauga River in Georgia and Tennessee on the Cherokee National Forest. Populations are small and restricted (USFWS 2003c).

Southern pigtoes typically inhabit coarse gravel and sand substrates in moderate current of shallow riffles in small rivers and large tributary streams (Parmalee and Bogan 1998, USFWS 2003c). Host fish are Alabama shiner (*Cyprinella callistia*), blacktail shiner (*C. venusta*), and tricolor shiner (*C. trichroistia*) (USFWS 2003c). As for most freshwater mussels, this species is likely long-lived, and not reproductively mature until attaining eight or more years of age (Neves and Moyer 1988). The primary constituent elements identified as of importance for proposed critical habitat include: stable channels, appropriate flows, necessary water quality, clean substrates, available fish hosts, and lack of competitive non-native species (USFWS 2003c).

The six known or suspected extant populations of Southern pigtoe mussels probably inhabit the majority of suitable habitat for this species within the National Forests in Alabama. However, recent drought conditions and existing barriers to fish passage may limit populations within the upper portions of these watersheds. The decline of Southern pigtoe populations may be attributed to channel modification, habitat fragmentation, and point-source pollution associated with reservoirs, channelization, industry, and development. Such historical conditions have led to the current status of this species being considered as at a high risk of continued decline in 2 out of six potentially species-inhabited Forest Service watersheds. An additional population imperilment risk was noted for the Southern pigtoe, thereby including it in viability outcome category. Based on the watershed assessment completed in conjunction with the Forest Plan EIS (Appendix B), excessive sediment, point-source pollution, and flow alterations may contribute the greatest risk to the viability of this species. These risk factors appear to be impaired in 5 out of 6 watersheds (all except upper Choccolocco). Overall watershed condition (Clingenpeel 2003) is rated as “below average” in the middle Choccolocco watershed, “average” in the Uphapee and Chewacla watersheds, and “excellent” in all other watersheds where this species potentially occurs. Within the Middle Choccolocco watershed, the opportunities for Forest Service influence, either positive or negative, are limited given the overwhelming effects of lower basin development, reservoirs, industry, agriculture, and other land uses. The Forest Service is more likely to have a role in restoration within the Upper Chocolocco and Terrapin watersheds. However, since this is a riverine species, other factors such as off-Forest habitat fragmentation and pollution may over-ride Forest Service watershed improvements. Two populations are potentially at risk of population decline due to reservoir fragmentation of habitat in the Upper Terrapin and base flow reductions due to surrounding off-Forest land uses in the Uphapee.

Potential Effects

For the Southern pigtoe populations on and near the National Forests in Alabama, potential influences include any activities that could increase sedimentation, siltation, or turbidity, contribute pollutants, adjust water chemistry or nutrient cycling, raise water temperatures, change flow, modify habitat, alter streamside vegetation, or block fish passage. Such effects would be minimized given the protection measures that would be applied under all of the action alternatives for the revised Forest Plan (see section 3.B.4.0 for a full discussion on effects common to all species and watersheds). However, as discussed at the beginning of this section, the increased potential for watershed effects in alternative D, would be common to all species; otherwise, the alternatives are similar with a slight reduction in the anticipated watershed effects under alternatives G and B and a larger decrease in potential watershed effects for alternatives I, E, and A. Under all of the alternatives one on-Forest and several off-Forest reservoirs may continue to affect mussel prey populations through altered flow, chemistry, and nutrient cycling, and as barriers to host fish passage. Direct effects of mechanical damage would decline under all of the action alternatives due to the inclusion of strengthened standards that would minimize heavy equipment use and low water fords at road and trail crossings.

Given the positive opportunities and the implementation of the Forest-wide and riparian standards, the selection of any of the alternatives for the National Forests in Alabama is not likely to adversely affect the Southern pigtoe and is not likely to adversely modify proposed critical habitat.

Ovate clubshell (*Pleurobema perovatum*) Lea

Affected Environment

Ovate clubshells are listed as endangered under the Endangered Species Act (USFWS 1993b). The species historically occurred in the Tombigbee, Black Warrior, Alabama, Cahaba, Tallapoosa and Coosa Rivers, and their tributaries in Mississippi, Alabama, and Georgia. Apparently, the species is extirpated from the Black Warrior, Cahaba, and Alabama River basins and it may no longer survive in the mainstem Tombigbee River, and Uphapee and Opintlocco Creeks (USFWS 2003c). Critical habitat has been proposed for 20 watersheds in Alabama, Mississippi, Georgia, and Tennessee (USFWS 2003c). Portions of proposed critical habitat are within Uphapee and Chewacla Creeks on the Tuskegee National Forest, Terrapin Creek on the Shoal Creek District of the Talladega National Forest, Hatchet Creek downstream of the Talladega District, Sipsey Fork largely on the Bankhead National Forest, and the Cahaba River upstream from the Oakmulgee Division of the Talladega National Forest. Extant populations, potential habitats, and viability assessment results are displayed in Appendix B, discussed in greater detail within the Biological Assessment (USFS 2003a), and summarized in the Aquatic Species Viability Section. Additional populations may be located on the Cherokee National Forest in Tennessee and Georgia. Populations are small and localized (USFWS 2003c).

Ovate clubshells typically inhabit sand fine gravel substrates under moderate current in shoals and runs of large streams and small rivers (Parmalee and Bogan 1998). Host fish are unknown for this species but may be primarily cyprinids. As for most freshwater mussels, this species is likely long-lived, and not reproductively mature until attaining 8 or more years of age (Neves and Moyer 1988). The primary constituent elements identified as of importance for proposed critical habitat include: stable channels, appropriate flows, necessary water quality, clean substrates, available fish hosts, and lack of competitive non-native species (USFWS 2003).

The eight known or suspected extant populations of ovate clubshell mussels probably inhabit less than half of the suitable habitat remaining for this species within the National Forests in Alabama. Recent drought conditions and existing barriers to fish passage, such as the presence of numerous reservoirs, may limit populations within the upper portions of these watersheds. Impediment of host fish passage may also be a factor. The decline of ovate clubshell populations may be attributed to channel modification, habitat fragmentation, and point-source pollution associated with reservoirs, channelization, industry, agriculture, silviculture, and development. Such historical conditions have led to the current status of this species being considered as at a high risk of continued decline in 2 out of 8 potentially species-inhabited Forest Service watersheds. An additional population imperilment risk was noted for the ovate clubshell, thereby including it in viability outcome categories 4 and 5.

Based on the watershed assessment completed in conjunction with the Forest Plan EIS (Appendix B), excessive sediment, point-source pollution, and altered flows may contribute the greatest risk to the viability of this species. These risk factors appear to be impaired in seven of the eight watersheds (all except Upper Choccolocco). General watershed condition (Clingenpeel 2003) is rated as "average" in the Uphapee and Chewacla watersheds and "excellent" in all other watersheds where this species potentially occurs. The Forest Service may have a role in restoration within the Upper Chocolocco, Terrapin, and Uphapee watersheds. The Upper Terrapin population is at risk due to a reservoir fragmenting habitat and reducing the ability of the species to re-colonize the upper watershed. However, since this is a riverine species, other factors such as off-Forest habitat fragmentation and pollution may over-ride upper watershed improvements. The Upper Sipsey Fork population is at risk due to reduced base reference flows and a downstream reservoir making it difficult for the species to re-colonize the upper watershed. Restoration is unlikely in the Upper Sipsey Fork watershed, unless efforts are undertaken to repatriate the species into additional areas within it's currently extirpated range.

Potential Effects

For the ovate clubshell populations on or near the National Forests in Alabama, potential influences include any activities that could increase sedimentation, siltation, or turbidity; contribute pollutants; adjust water chemistry or nutrient cycling; raise water temperatures; change flow; modify habitat; alter streamside vegetation; or block fish passage. Such effects would be minimized given the protection measures that would be applied under all of the action alternatives for the revised Forest Plan (see section 3.B.4.0 for a full discussion on effects common to all species and watersheds). However, as discussed at the beginning of this section, the increased potential for watershed effects in alternative D, would be common to all species; otherwise, the alternatives are similar with a slight reduction in the anticipated watershed effects under alternatives G and B and a larger decrease in potential watershed effects for alternatives I, E, and A. Under all of the alternatives two on-Forest and several off-Forest reservoirs may continue to affect mussel prey populations through altered flow, chemistry, and nutrient cycling, and as barriers to host fish passage. Direct effects of mechanical damage would decline under all of the action alternatives due to the inclusion of strengthened standards that would minimize heavy equipment use and low water fords at road and trail crossings.

Protection, monitoring, and augmentation would be the primary recovery objectives for this species. Actions would be taken in order to identify additional suitable habitat and re-patriate fish hosts and mussels to areas on National Forest lands.

Given the positive opportunities for pro-active conservation of the species and the protection afforded by the Forest-wide and riparian standards under all of the alternatives, the selection of any of the Forest Plan alternatives for the National Forests in Alabama is not likely to adversely affect the ovate clubshell and is not likely to adversely modify proposed critical habitat.

Triangular kidneyshell (*Ptychobranchus greeni)*

Affected Environment

Triangular kidneyshells are listed as endangered under the Endangered Species Act (USFWS 1993b). The species historically occurred in the Black Warrior, Cahaba, Alabama, and Coosa

River systems, and their tributaries in Alabama, Georgia, and Tennessee. The species may be extirpated from the Alabama River and may no longer inhabit the mainstem Black Warrior and Coosa Rivers (USFWS 2003c). Critical habitat has been proposed for 13 watersheds in Alabama, Georgia, and Tennessee (USFWS 2003c). Portions of proposed critical habitat are within Terrapin and Shoal Creeks on the Shoal Creek District of the Talladega National Forest, Hatchet Creek downstream of the Talladega District, Cheaha Creek on the Talladega District, Sipsey Fork largely on the Bankhead National Forest, and the Cahaba River upstream from the Oakmulgee Division of the Talladega National Forest. Extant populations, potential habitats, and viability assessment results are displayed in Appendix B, discussed in greater detail within the Biological Assessment (USFS 2003a), and summarized in the Aquatic Species Viability Section. Additional populations may occur within the Cherokee National Forest in Tennessee and Georgia. This species is considered locally common in the Sipsey Fork drainage and the Conasauga River (USFWS 2003c).

Triangular kidneyshells typically inhabit runs and shoals with firm coarse gravel and sand substrates and good currents in large streams and small rivers (Parmalee and Bogan 1998). The Warrior darter (*Etheostoma bellator*), Tuscaloosa darter (*E. douglasi*), redfin darter (*E. whipplei*), blackbanded darter (*Percina nigrofasciata*), river darter (*P. shumardi*), and logperch (*Percina caproides*) have been identified as suitable fish hosts for the glochidia (Haag and Warren 1997, Parmalee and Bogan 1998). As for most freshwater mussels, this species is likely long-lived, and not reproductively mature until attaining eight or more years of age (Neves and Moyer 1988). The primary constituent elements identified as of importance for proposed critical habitat include: stable channels, appropriate flows, necessary water quality, clean substrates, available fish hosts, and lack of competitive non-native species (USFWS 2003c).

The eight known or suspected extant populations of triangular kidneyshell probably inhabit less than half of the suitable habitat for this species within the National Forests in Alabama. Recent drought conditions and existing barriers to fish passage may further limit populations within the upper portions of these watersheds. The decline and extirpation of most populations of triangular kidneyshell may be attributed to habitat modification, sedimentation, eutrophication, and other forms of water quality degradation associated with reservoirs, channelization, industry, agriculture, silviculture, and development. Impediment of host fish passage may also be a factor. Such historical conditions have led to the current status of this species being considered as at a high risk of continued decline in 3 out of 8 potentially species-inhabited Forest Service watersheds. An additional population imperilment risk was noted for the triangular kidneyshell, thereby including it in viability outcome categories 4 and 5. Based on the watershed assessment completed in conjunction with the Forest Plan EIS (Appendix B), all of the analyzed factors (sediment, point-source pollution, temperature, and flow) contribute to the risks to the viability of this species. These risk factors appear to be impaired in 5 of the 8 watersheds (Lower Sipsey Fork, upper Terrapin, middle Choccolocco, upper Hatchet, and Cahaba). Overall watershed condition (Clingenpeel 2003) is rated as “below average” in the middle Choccolocco watershed and “excellent” in all of the other watersheds where this species potentially occurs. Within the Middle Choccolocco watershed, the opportunities for Forest Service influence, either positive or negative, are limited given the interspersion of private and due to the overwhelming of lower basin development, industry, agriculture, and other land uses. The Forest Service may have a greater role in restoration within the Upper Chocolocco, Terrapin, and Hatchet watersheds. However, since this is a riverine species, other factors such as off-Forest habitat fragmentation and pollution may over-ride Forest Service watershed improvements. The Upper Terrapin population is at risk due to reservoirs fragmenting habitat that may reduce the ability of this species to re-colonize the upper watershed. Restoration is possible in the Sipsey Fork watershed, although the ongoing effects of reservoir habitat fragmentation would require some active mitigation (such as repatriation into portions of Brushy Creek).

Potential Effects

For the triangular kidneyshell populations on or near the National Forests in Alabama, potential influences include any activities that could increase sedimentation, siltation, or turbidity, contribute pollutants, adjust water chemistry or nutrient cycling, raise water temperatures, change flow, modify habitat, alter streamside vegetation, or block fish passage. Such effects would be minimized given the protection measures that would be applied under all of the action alternatives for the revised Forest Plan (see section 3.B.4.0 for a full discussion on effects common to all species and watersheds). However, as discussed at the beginning of this section, the increased potential for watershed effects in alternative D, would be common to all species; otherwise, the alternatives are similar with a slight reduction in the anticipated watershed effects under alternatives G and B and a larger decrease in potential watershed effects for alternatives I, E, and A. Under all of the alternatives two on-Forest and several off-Forest reservoirs may continue to affect mussel prey populations through altered flow, chemistry, and nutrient cycling, and as barriers to host fish passage. Direct effects of mechanical damage would decline under all of the action alternatives due to the inclusion of strengthened standards that would minimize heavy equipment use and low water fords at road and trail crossings.

Protection, monitoring, and augmentation would be the primary recovery objectives for this species. Actions would be taken in order to identify additional suitable habitat and re-patriate fish hosts and mussels to areas on National Forest lands.

Given the positive opportunities for pro-active conservation of the species and the protection afforded by the Forest-wide and riparian standards under all of the alternatives, the selection of any of the Forest Plan alternatives for the National Forests in Alabama is not likely to adversely affect the triangular kidneyshell and is not likely to adversely modify proposed critical habitat.

Lacy elimia (*Elimia crenatella*)

Environmental Baseline

Lacy elimia snails are listed as endangered under the Endangered Species Act (USFWS 1998). The snail is endemic to the Coosa portion of the Alabama River system. Historically, the snail ranged from St. Clair to Chilton counties within the Coosa River, and was known to inhabit several large tributaries, including Big Will's Creek, Kelley's Creek, Choccolocco Creek, and Tallaseehatchee Creek. None of these historical sites has proved to be occupied. Currently, the Lady elimia snail is restricted to several disjunct populations within the lower portions of Cheaha, Emauhee, and Weewoka Creeks, tributary to the middle Coosa River. One of these populations (Cheaha) is located downstream of the Talladega District. Lacy elimia are locally abundant in the lower reaches of Cheaha Creek but apparently very rare elsewhere (USFWS 1998). Extant populations, potential habitats, and viability assessment results are displayed in

Appendix B, discussed in greater detail within the Biological Assessment (USFS 2003a), and summarized in the Aquatic Species Viability Section. There are no other occurrences of this species on National Forest system lands.

Lacy elimia snails prefer riffles, bars, and shoals of medium to large tributary streams. This species is typically inhabits undersides of rock slabs or lives among gravel and cobble substrates (Hartfield 1994). The Lady elimia is a gill-breathing snail and therefore requires clear well-oxygenated water. The extent of snail movements are not well known; however, there is evidence that snails make some longitudinal movements along streams and rivers, and that upstream movements may be blocked by suspended culverts (Dillon 1988, Vaughan 2002).

The decline of Lady elimia populations may be attributed to impoundment, sedimentation, and nutrient enrichment (USFWS 2000b). Such historical conditions have led to the current status of this species being considered as at a high risk of continued decline in 2 out of 5 potentially species-inhabited Forest Service watersheds. An additional population imperilment risk was noted for the lady elimia, thereby including it in viability outcome category 5. Based on the watershed assessment completed in conjunction with the Forest Plan EIS (Appendix B), sedimentation, point-source pollution, and altered flows have been identified as the primary risks to the viability of this species. These risk factors appear to be impaired to some extent in all of the watersheds. General watershed condition (Clingenpeel 2003) is rated as “below average” in the middle Choccolocco and Tallaseehatchee watersheds, “average” in the Talladega watershed, and “excellent” in the Cahaba and Cheaha watersheds. Within the Cahaba River, the opportunities for Forest Service influence, either positive or negative, are limited given the questionable status of the species, small portion of habitat under Forest Service management (< ½ acre) and due to the overwhelming of upper basin development, industry, agriculture, and other land uses. The Forest Service may have a limited role in restoration within the Middle Chocolocco, Talladega, and Tallaseehatchee watersheds, since other factors such as off-Forest habitat fragmentation and pollution may over-ride Forest Service watershed improvements. The opportunities for Forest Service influence, either positive or negative, are limited, however, due to the small proportion of each watershed under Forest Service management and the interspersion of private lands.

Potential Effects

For the Lady elimia populations on or near the National Forests in Alabama, potential influences include any activities that could increase sedimentation, siltation, or turbidity, contribute pollutants, adjust water chemistry or nutrient cycling, raise water temperatures, change flow, modify habitat, alter streamside vegetation, or block fish passage. Such effects would be minimized given the protection measures that would be applied under all of the action alternatives for the revised Forest Plan (see section 3.B.4.0 for a full discussion on effects common to all species and watersheds). However, as discussed at the beginning of this section, the increased potential for watershed effects in alternative D, would be common to all species; otherwise, the alternatives are similar with a slight reduction in the anticipated watershed effects under alternatives G and B and a larger decrease in potential watershed effects for alternatives I, E, and A. Several on-Forest (but not Forest Service controlled) reservoirs may continue to affect snail populations through altered flow, chemistry, and nutrient cycling. Direct mechanical damage is unlikely since roadway and trail crossings are generally limited to bridges within the habitat areas of this species.

Protection, monitoring, and augmentation would be the primary recovery objectives for this species. Actions would be taken in order to identify additional suitable habitat and repatriate fish hosts and mussels to areas on National Forest lands.

Given the positive opportunities for pro-active conservation of the species and the protection afforded by the Forest-wide and riparian standards under all of the alternatives, the selection of any of the Forest Plan alternatives for the National Forests in Alabama is not likely to adversely affect the Lady elimia snail.

Round rocksnail (*Leptoxis ampla*)

Environmental Baseline

Round rocksnails are listed as threatened under the Endangered Species Act (USFWS1998). The snail is endemic to the Alabama-Mobile River basin and currently only occupies habitat above the fall-line in the Cahaba River. It is possible that round rocksnails are within 5 miles upstream from the Oakmulgee Division of the Talladega National Forest. However, given the differences in habitat above and below the fall-line, it is unlikely that this snail successfully lives within habitat on or downstream from the National Forests. Extant populations, potential habitats, and viability assessment results are displayed in Appendix B, discussed in greater detail within the Biological Assessment (USFS 2003a), and summarized in the Aquatic Species Viability Section. There are no other occurrences of this species on National Forest system lands.

The round rocksnail inhabits riffles and shoals over gravel, cobble, or other rocky substrates of the Cahaba River above the fall-line (USFWS 2000b). The round rocksnail is a gill-breathing snail and therefore requires clear well-oxygenated water. Snails graze on periphyton growing on benthic substrates. Adult snails are fairly sedentary; however, juvenile snails may disperse during periods of higher flow. Reproductive biology and early life history are not well known. Eggs are probably affixed onto cobble surfaces (USFWS 1998).

The decline of the round rocksnail may be attributed to siltation, sedimentation, impoundment, habitat modification, eutrophication, and other forms of water quality degradation. Such historical conditions have led to the current status of this species being considered as at a moderate risk of continued decline in the one potentially species-inhabited Forest Service watershed. An additional population imperilment risk was noted for the round rocksnail, thereby including it in viability outcome category 5. Based on the watershed assessment completed in conjunction with the Forest Plan EIS (Appendix B), excessive sediment has been identified as the primary risk to the viability of this species in the Cahaba River. Within the Cahaba River, the opportunities for Forest Service influence, either positive or negative, are limited given the small portion of habitat under Forest Service management (< ½ acre) and due to the overwhelming of upper basin development, industry, agriculture, and other land uses. General watershed condition (Clingenpeel 2003) is rated as “excellent” in all watersheds where this species potentially occurs.

Potential Effects

Round rocksnails are only known to inhabit portions of the Cahaba River upstream from the Oakmulgee Division of the Talladega National Forest. Therefore, Forest Service activities are unlikely to influence this species or its habitat. Under the direction of the revised Forest Plan, surveys to find this species would be a low priority, but may be conducted in conjunction with other comprehensive surveys and/or project-specific monitoring. There are no established Forest Service recovery objectives for this species.

Given the currently known distribution of round rocksnails and their habitat, there would be no effects from any of the alternatives for the revised Forest Plan.

Painted rocksnail *(Leptoxis taeniata)*

Environmental Baseline

Painted rocksnails are listed as threatened under the Endangered Species Act (USFWS 1998). Historically, the snail ranged widely within the Coosa, Cahaba, and Alabama Rivers and their tributaries. It is now extant within two reaches of the mainstem Choccolocco Creek and lower reaches of Buxahatchee and Ohatchee Creeks. Extant populations, potential habitats, and viability assessment results are displayed in Appendix B, discussed in greater detail within the Biological Assessment (USFS 2003a), and summarized in the Aquatic Species Viability Section. There are no other occurrences of this species on National Forest system lands.

The painted rocksnail appears to prefer medium to large rivers with ample flow and cobble or slab rapids and shoals (USFWS 2000b). All rocksnails are gill-breathers and therefore require clear well-oxygenated water. Reproductive biology and early life history are not well known. Eggs are probably affixed onto cobble surfaces (USFWS 1998). The extent of snail movements are not well known; However there is evidence that snails make some longitudinal movements along streams and rivers, and that upstream movements may be blocked by suspended culverts (Dillon 1988, Vaughan 2002).

The decline of painted rocksnail populations may be attributed to impoundment, sedimentation, and nutrient enrichment (USFWS 2000). Such historical conditions have led to the current status of this species being considered as at a high risk of continued decline in 2 out of 4 potentially species-inhabited Forest Service watersheds. An additional population imperilment risk was noted for the painted rocksnail, thereby including it in viability outcome category 5. Based on the watershed assessment completed in conjunction with the Forest Plan EIS (Appendix B), sedimentation, point-source pollution, and altered flows are the primary risks to the viability of this species. These risk factors appear to be impaired to some extent in all watersheds; however, Forest Service influence is limited due to the overwhelming effects of off-Forest residential development, silviculture, agriculture, and downstream barriers. Overall watershed condition (Clingenpeel 2003) is rated as “below average” in the Middle Choccolocco and Tallaseehatchee watersheds, “average” in the Talladega watersheds, and “excellent” in the Cheaha watershed. The opportunities for Forest Service influence, either positive or negative, are limited given the interspersion of private lands and other factors such as off-Forest habitat fragmentation and pollution.

Potential Effects

For the populations on or near the National Forests in Alabama, potential influences include any activities that could increase sedimentation, siltation, or turbidity, contribute pollutants, adjust water chemistry or nutrient cycling, raise water temperatures, change flow, modify habitat, alter streamside vegetation, or block fish passage. Such effects would be minimized given the protection measures that would be applied under all of the action alternatives for the revised Forest Plan (see section 3.B.4.0 for a full discussion on effects common to all species and watersheds). However, as discussed at the beginning of this section, the increased potential for watershed effects in alternative D, would be common to all species; otherwise, the alternatives are similar with a slight reduction in the anticipated watershed effects under alternatives G and B and a larger decrease in potential watershed effects for alternatives I, E, and A. Several on-Forest (but not Forest Service controlled) reservoirs may continue to affect snail populations through altered flow, chemistry, and nutrient cycling. Direct mechanical damage is unlikely since roadway and trail crossings are generally limited to bridges within the habitat areas of this species.

Protection, monitoring, and augmentation would be the primary recovery objectives for this species. Actions would be taken in order to identify additional suitable habitat and re-patriate snails to areas on National Forest lands.

Given the positive opportunities for pro-active conservation of the species and the protection afforded by the Forest-wide and riparian standards under all of the alternatives, the selection of any of the Forest Plan alternatives for the National Forests in Alabama is not likely to adversely affect the painted rocksnail.

Flat pebblesnail (*Lepyrium showalteri*)

Environmental Baseline

Flat pebblesnails are listed as endangered under the Endangered Species Act (USFWS 1998). The Mobile River Basin multi-species recovery plan (2000b) covers round rocksnails. The snail is endemic to the Alabama-Mobile River basin and historically occupied habitat above the fall-line in the Cahaba River. It is not certain whether this species was also historically found in the Coosa River Basin (NS 2001). Currently, this species is only known to inhabit one shoal complex within the Cahaba River and the Little Cahaba River (both sites in Bibb County). Flat pebblesnails are common at this multiple site complex, but they are rare to unknown elsewhere (USFWS 2000b). It is possible that flat pebblesnails are within 5 miles upstream from the Oakmulgee Division of the Talladega National Forest. However, given the differences in habitat above and below the fall-line, it is unlikely that this snail successfully lives within habitat on or downstream from the National Forests. Extant populations, potential habitats, and viability assessment results are displayed in Appendix B, discussed in greater detail within the Biological Assessment (USFS 2003a), and summarized in the Aquatic Species Viability Section. There are no other occurrences of this species on National Forest system lands.

The flat pebblesnail is known to inhabit “clean” (i.e. relatively silt free) smooth cobble, boulder, or bedrock substrates within high gradient swift current riffles or shoals of the mainstem Cahaba above the fall line (USFWS 1995). Eggs are singly laid in capsules on hard surfaces

(Thompson 1984). Other information on life history is lacking. The extent of snail movements are not well known; However there is evidence that snails make some longitudinal movements along streams and rivers, and that upstream movements may be blocked by suspended culverts (Dillon 1988, Vaughan 2002).

The decline of flat pebblesnail populations may be attributed to habitat modification, sedimentation, eutrophication, and other forms of water quality degradation. Such historical conditions have led to the current status of this species being considered as at a high risk of continued decline in one out two potentially species-inhabited Forest Service watersheds. An additional population imperilment risk was noted for the flat pebblesnail, thereby including it in viability outcome category 5. Based on the watershed assessment completed in conjunction with the Forest Plan EIS (Appendix B), excessive sediment, point-source pollution, and altered flows have been identified as the primary risks to the viability of this species. These risk factors appear to be impaired in both watersheds (Middle Choccolocco and Cahaba); however, Forest Service influence is limited due to the overwhelming effects of off-Forest residential development, industry, silviculture, agriculture, and downstream barriers. Overall watershed condition (Clingenpeel 2003) is rated as “below average” in the middle Choccolocco and “excellent” in the Cahaba watershed. Within the Cahaba River, the opportunities for Forest Service influence, either positive or negative, are limited given the uncertain status of the species, location of potential habitat within the watershed, and overwhelming effects of upper basin development, industry, agriculture, and other land uses. The Forest Service may have a greater role in restoration within the Middle Chocolocco watershed. However, since this is primarily a riverine species, other factors such as off-Forest habitat fragmentation and pollution may over-ride upper watershed improvements.

Potential Effects

Flat pebblesnails are only known to currently inhabit portions of the Cahaba River upstream from the Oakmulgee Division of the Talladega National Forest. There may be historic habitat downstream from the Talladega District. Therefore, unless future surveys discover a downstream population, Forest Service activities are unlikely to influence this species. Under the direction of the revised Forest Plan, surveys for this species would be a low priority, but may be conducted in conjunction with other comprehensive surveys and/or project-specific monitoring.

Given the currently known distribution of flat pebblesnails and their habitat, the selection of any of the Forest Plan alternatives for the National Forests in Alabama, is likely to have no effect on the flat pebblesnail. Additional conservation measures would be discussed with FWS, if and when recovery actions may reveal expansion of suitable habitat and/or species establishment on or downstream from the National Forests.

Cylindrical lioplax (*Lioplax cyclostomaformis*)

Environmental Baseline

Cylindrical lioplax snails are listed as endangered under the Endangered Species Act (USFWS 1998). The snail was historically recorded in the Coosa, Cahaba, Black Warrior, and Alabama Rivers of Alabama and Georgia. It has also been reported from the Tensaw River in Louisiana

(USFWS 1998). Currently, this species is only known to inhabit two to three sites within a 15-mile reach of the Cahaba River above the fall-line. The cylindrical Lioplax snail is uncommon at these known sites of occurrence (USFWS 2000b). It is possible that cylindrical Lioplax snails are within 5 miles upstream from the Oakmulgee Division of the Talladega National Forest. Given the differences in habitat above and below the fall-line, it is unlikely that this snail successfully lives within habitat on or downstream from the National Forests. Extant populations, potential habitats, and viability assessment results are displayed in Appendix B, discussed in greater detail within the Biological Assessment (USFS 2003a), and summarized in the Aquatic Species Viability Section. There are no other occurrences of this species on National Forest system lands.

The cylindrical lioplax snail is known to inhabit mud and shell fragment interstitial spaces among tabular boulders and bedrock slabs in moderate to fast current shoals in high to moderate gradient of rivers and streams (USFWS 2000b). This snail is a gill-breather, therefore requiring clear (relatively silt free) well-oxygenated water. This species filter feeds on plankton and detritus suspended in the water column. Adult snails are fairly sedentary; however, juvenile snails may disperse during periods of higher flow. Reproductive biology and early life history are not well known. The extent of snail movements are not well known; however there is evidence that snails make some longitudinal movements along streams and rivers, and that upstream movements may be blocked by suspended culverts (Dillon 1988, Vaughan 2002).

The decline and extirpation of cylindrical lioplax populations may be attributed to habitat modification, impoundments, sedimentation, eutrophication, and other forms of water quality degradation (Hartfield 1994). Such historical conditions have led to the current status of this species being considered as at a high risk of continued decline in one out of two potentially species-inhabited Forest Service watersheds. An additional population imperilment risk was noted for the cylindrical Lioplax, thereby including it in viability outcome category 5. Based on the watershed assessment completed in conjunction with the Forest Plan EIS (Appendix B), excessive sediment, point-source pollution, and altered flows have been identified as the primary risks to the viability of this species in the Cahaba River. These risk factors appear to be impaired in both watersheds (Middle Choccolocco and Cahaba); however, Forest Service influence is limited due to the overwhelming effects of off-Forest residential development, industry, silviculture, agriculture, and downstream barriers. Overall watershed condition (Clingenpeel 2003) is rated as “below average” in the middle Choccolocco and “excellent” in the Cahaba watersheds. Within the Cahaba River, the opportunities for Forest Service influence, either positive or negative, are limited given the small portion of habitat under Forest Service management (< ½ acre) and due to the overwhelming of upper basin development, industry, agriculture, and other land uses. If rediscovered or repatriated to the Choccolocco watershed, the Forest Service may have a greater role in restoration and recovery. However, since this is a riverine species, other factors such as off-Forest habitat fragmentation and pollution may over-ride upper watershed improvements.

Potential Effects

Cylindrical lioplax are only known to currently inhabit portions of the Cahaba River upstream from the Oakmulgee Division of the Talladega National Forest. It probably has been extirpated from the middle Choccolocco watershed downstream from the Talladega District. Therefore, Forest Service activities are unlikely to influence this species or its habitat.

Under the direction of the revised Forest Plan, surveys for this species would be a low priority, but may be conducted in conjunction with other comprehensive surveys and/or project-specific monitoring. There are no established Forest Service recovery objectives for this species.

Given the currently known distribution of cylindrical lioplax snails and their habitat, there would be no effect of the Forest Service proposed actions.

Tulotoma snail (*Tulotoma magnifica*)

Environmental Baseline

Tulotoma snails are listed as endangered under the Endangered Species Act (USFWS 1991). The snail is endemic to the Coosa portion of the Alabama River system. Historically, the snail ranged widely from Big Canoe Creek south to the confluence with the Tallapoosa River. Historical localities were numerous throughout the mainstem of the Coosa River as well as the lower reaches of several large tributaries. Currently, the Tulotoma snail is restricted to several large populations within the mainstem Coosa and a few small populations within the tributaries. Two of these populations are located downstream of the Talladega District in tributaries of the Coosa River. Tulotoma snails are unlikely to inhabit the Talladega National Forest, as they prefer the larger riverine habitat downstream of the Forest boundaries. Extant populations, potential habitats, and viability assessment results are displayed in Appendix B, discussed in greater detail within the Biological Assessment (USFS 2003a), and summarized in the Aquatic Species Viability Section. There are no other occurrences of this species on National Forest system lands. Populations are extremely restricted, but relatively abundant in Kelly, Weogufka, Hatchet, and Choccolocco Creeks; the mainstem Coosa River below Jordan Dam has highest densities of Tulotoma snails (USFWS 2000b).

This species is a large river inhabitant that may only be peripheral in tributaries. The Tulotoma snail congregates in colonies among boulders and rocky ledges of riverine and lower watershed tributary shoal and run habitats (Devries 1994). It clings tightly to the undersides of large cobble, boulders, or bedrock shelves and prefers microhabitats with moderate to swift currents (Hershler et al. 1990). The Tulotoma snail filter feeds on plankton, diatoms, or detritus from the water column or the interstitial spaces of the substrate. Dispersal is concentrated during periods of high water. The extent of snail movements are not well known; However there is evidence that snails make some longitudinal movements along streams and rivers, and that upstream movements may be blocked by suspended culverts (Dillon 1988, Vaughan 2002).

Tulotoma populations have been on the decline for over 50 years. Major habitat alterations of dams, dredging, and channelization are largely the cause of the decline. Water quality degradation associated with agriculture and industry has also been implicated. Such historical conditions have led to the current status of this species being considered as at a high risk of continued decline in 2 out of 4 potentially species-inhabited Forest Service watersheds. An additional population imperilment risk was noted for the Tulotoma, thereby including it in viability outcome category 5. Based on the watershed assessment completed in conjunction with the Forest Plan EIS (Appendix B), excessive sediment, point-source pollution, and altered flows have been identified as the primary risks to the viability of this species. These risk factors appear to be impaired in two watersheds (upper Hatchet and Weogufka); however, Forest Service influence is limited due to the overwhelming effects of off-Forest silviculture, and agriculture. Overall watershed condition (Clingenpeel 2003) is rated as "below average" in the middle Choccolocco and "average" in the Talladega watersheds. Within the Middle Choccolocco, Talladega, and Upper Hatchet watersheds, the opportunities for Forest Service influence, either positive or negative, are limited given the interspersion of private lands the overwhelming influence of downstream reservoirs, development, industry, agriculture, and other land uses. The Forest Service may have a greater role in restoration within the Weogufka watershed. The opportunities for Forest Service influence, either positive or negative, are also limited, however, due to the small proportion of the watershed under Forest Service management and the interspersion of private lands.

Potential Effects

For populations downstream from the National Forests in Alabama, potential influences include any activities that could increase sedimentation, siltation, or turbidity, contribute pollutants, adjust water chemistry or nutrient cycling, raise water temperatures, change flow, modify habitat, alter streamside vegetation, or block fish passage. Such effects would be minimized given the protection measures that would be applied under all of the action alternatives for the revised Forest Plan (see section 3.B.4.0 for a full discussion on effects common to all species and watersheds). However, as discussed at the beginning of this section, the increased potential for watershed effects in alternative D, would be common to all species; otherwise, the alternatives are similar with a slight reduction in the anticipated watershed effects under alternatives G and B and a larger decrease in potential watershed effects for alternatives I, E, and A. Several on-Forest (but not Forest Service controlled) reservoirs may continue to affect snail populations through altered flow, chemistry, and nutrient cycling. Direct mechanical damage is unlikely since roadway and trail crossings are generally limited to bridges within the habitat areas of this species.

Protection and monitoring would be the primary recovery objectives for this species. Inventories of additional potential habitat areas would also be conducted.

Given the positive opportunities for pro-active conservation of the species and the protection afforded by the Forest-wide and riparian standards under all of the alternatives, the selection of any of the Forest Plan alternatives for the National Forests in Alabama is not likely to adversely affect the Tulotoma snail.

Black Warrior waterdog (*Necturus alabamensis)*

Environmental Baseline

The Black Warrior waterdog is a candidate for possible future federal listing and a Forest Service sensitive species. Within Alabama, the species is ranked as "critically imperiled" (S1) (NatureServe 2003). Black Warrior waterdogs are endemic to the upper Black Warrior River system in Alabama. Currently, the species is known or suspected to inhabit four watersheds associated with the Bankhead National Forest. Extant populations, potential habitats, and viability assessment results are displayed in Appendix B, discussed in greater detail within the Biological Assessment (USFS 2003a), and summarized in the Aquatic Species Viability Section. Black Warrior waterdogs are not known to occur on any other National Forest management units within the southeast or elsewhere in the United States. The National Forests represent approximately 40 percent of the species' range within the State of Alabama. Within the Bankhead National Forest, Black Warrior waterdogs are scattered in distribution and locally rare in abundance.

Black Warrior waterdogs are found in a variety of headwater and mainstem streams upstream from the influence of Lewis Smith Lake (a reservoir). Optimal habitat appears to be free-flowing large streams or small rivers having healthy forested streamside zones. They require detectable flow and ample leaf packs for cover and foraging. Other factors contributing to habitat quality include a low silt load and substrate deposits, low nutrient content and bacterial counts, moderate temperatures, and minimal overall pollution. Siltation may affect this species by burying leaf packs where they seek food and cover, reducing the availability of oxygen, and accumulating toxic chemicals and pathogens that are detrimental to their health.

The decline of the Black Warrior waterdog may be attributed to siltation, chemical pollution, eutrophication, and habitat modification. Such historical conditions have led to the current status of this species being considered as at a high risk of continued decline in 1 out of 4 potentially species-inhabited Forest Service watersheds. An additional population imperilment risk was noted for the Black Warrior waterdog, thereby including it in viability outcome categories 4 and 5. Based on the watershed assessment completed in conjunction with the Forest Plan EIS (Appendix B), all of the analyzed factors (sediment, point-source pollution, temperature, and flow) contribute to the risks to the viability of this species. These risk factors appear to be impaired in two watersheds (Lower Sipsey and Lower Brushy Forks); however, Forest Service influence is limited due to the overwhelming effects of off-Forest residential development, agriculture, and Lewis Smith reservoir. General watershed condition (Clingenpeel 2003) is rated as "excellent" in all watersheds where this species potentially occurs.

Potential Effects

For the populations on or near the Bankhead National Forest, potential influences include any activities that could increase sedimentation, siltation, or turbidity, contribute pollutants, adjust water chemistry or nutrient cycling, raise water temperatures, change flow, modify habitat, alter streamside vegetation, or block fish passage. Such effects would be minimized given the protection measures that would be applied under all of the action alternatives for the revised Forest Plan (see section 3.B.4.0 for a full discussion on effects common to all species and watersheds). However, as discussed at the beginning of this section, the increased potential for watershed effects in alternative D, would be common to all species; otherwise, the alternatives are similar with a slight reduction in the anticipated watershed effects under alternatives G and B and a larger decrease in potential watershed effects for alternatives I, E, and A. Several on-Forest (but not Forest Service controlled) reservoirs may continue to affect mussel populations through altered flow, chemistry, and nutrient cycling, and as barriers to fish passage. Direct mechanical damage is unlikely since roadway and trail crossings are generally limited to bridges within the habitat areas of this species.

Protection, monitoring, and augmentation would be the primary recovery objectives for this species. Given the positive opportunities for pro-active conservation of the species and the protection afforded by the Forest-wide and riparian standards under all of the alternatives, the selection of any of the Forest Plan alternatives for the National Forests in Alabama may affect but is not likely to adversely affect the Black Warrior waterdog.

Alabama shad (*Alosa alabamae*)

Environmental Baseline

Alabama shad is a candidate for federal listing and a Forest Service sensitive species. Historically, Alabama shad inhabited most coastal drainages from the Mississippi River east to the Suwannee River. Currently, Alabama shad have become greatly limited in distribution. A population occurs in the Apalachicola River below Woodruff Dam, individuals occur in the Alabama River below Claiborne and Millers Ferry dams, and they still regularly enter and move up into the Conecuh and Choctawhatchee river systems to spawn. Alabama shad are therefore a possible inhabitant of sections of the Conecuh River downstream from the Conecuh National Forest. Extant populations, potential habitats, and viability assessment results are displayed in Appendix B, discussed in greater detail within the Biological Evaluation (USFS 2003b), and summarized in the Aquatic Species Viability Section.

The Alabama shad is the only anadromous clupeid in Alabama. Adults live in saltwater and migrate into rivers to spawn. Spawning occurs in free-flowing water over sand bars. Alabama shad have greatly declined in distribution and abundance over the last twenty years, due largely to blockage of spawning runs by dams, and to habitat alteration and water pollution. Such historical conditions have led to the current status of this species being considered as at a high risk of continued decline in 1 out of 4 potentially species-inhabited Forest Service watersheds. An additional population imperilment risk was noted for the Alabama shad, thereby including it in viability outcome category 5. Based on the watershed assessment completed in conjunction with the Forest Plan EIS (Appendix B), excessive sediment and altered flows have been identified as the primary risks to the viability of this species. These risk factors appear to be impaired in two watersheds (Lower Conecuh and Cahaba); however, Forest Service influence is limited due to the overwhelming effects of off-Forest residential development, silviculture, agriculture, and downstream barriers. General watershed condition (Clingenpeel 2003) is rated as “excellent” in all watersheds where this species potentially occurs.

Potential Effects

For Alabama shad populations on or near the National Forests in Alabama, potential influences include any activities that could increase sedimentation, siltation, or turbidity, contribute pollutants, adjust water chemistry or nutrient cycling, raise water temperatures, change flow, modify habitat, alter streamside vegetation, or block fish passage. Such effects would be minimized given the protection measures that would be applied under all of the action alternatives for the revised Forest Plan (see section 3.B.4.0 for a full discussion on effects common to all species and watersheds). However, as discussed at the beginning of this section, the increased potential for watershed effects in alternative D, would be common to all species; otherwise, the alternatives are similar with a slight reduction in the anticipated watershed effects under alternatives G and B and a larger decrease in potential watershed effects for alternatives I, E, and A. No reservoirs under Forest Service management could affect flows or fish passage for this species. Since Alabama shad primarily utilize the mainstem large river reaches, and most road crossings are County controlled bridges, it is unlikely that Forest Service roads would act as barriers. Direct mechanical damage is unlikely since roadway and trail crossings are generally limited to bridges within the habitat areas of this species.

The National Forests would manage and protect extant populations of Alabama shad as they are identified or where they are suspected to reside within historical habitat.

Given the positive opportunities for pro-active conservation of the species and the protection afforded by the Forest-wide and riparian standards under all of the alternatives, the selection of any of the Forest Plan alternatives for the National Forests in Alabama, is likely to be beneficial and is not likely to cause a trend towards federal listing or a loss of viability for the Alabama shad because: 1) Forest Plan standards would provide protective measures which would avoid or minimize and fully mitigate negative effects so that they are insignificant and discountable to the viability of the populations and the species, and 2) Forest Plan direction encourages actions that would restore watersheds and habitat, and improve water quality, resulting in conservation of the species.

Alabama pearlshell (*Margaritifera marrianae*)

Affected Environment

The Alabama pearlshell is a candidate for possible future federal listing and a Forest Service sensitive species. It is considered at risk of population decline according to Williams et al. (1992) and it is ranked as "critically imperiled" with Alabama (S1S2) (NatureServe 2003). The Alabama pearlshell has been identified as a priority 1 species of highest concern (i.e. critically imperiled) within the State of Alabama (ADCNR 2003).

Alabama pearlshells are restricted to only a small south-central portion of the Alabama River and the Escambia River basin within the lower coastal plain of Alabama (ADCNR 2003). Historically this species may have been endemic to only the Escambia River basin. Currently there are only four extant populations of Alabama pearlshells within the headwater streams of the upper Conecuh River watershed and one within a tributary to the Alabama River (Shelton 1997). Only two populations show evidence of recent recruitment (NatureServe 2003). The closest known extant population is within a small tributary stream over five miles upstream from the Conecuh National Forest. However, it is possible that this species still inhabits two watersheds of the Conecuh National Forest. Extant populations, potential habitats, and viability assessment results are displayed in Appendix B, discussed in greater detail within the Biological Evaluation (USFS 2003b), and summarized in the Aquatic Species Viability Section. Alabama pearlshells are not known to occur on any other National Forest management units within the southeast or elsewhere in the United States. The National Forests represent less than 5 percent of the species' range within the State of Alabama. Alabama pearlshells are endemic and limited in their distribution. Where encountered, they are generally rare and in low abundance (Metee et al. 1996, Smith et al. 2002, ACDNR 2003).

Alabama pearlshells primarily inhabit low gradient slow to moderate shallow (<0.5m) currents over sand gravel substrates within pools and riffles of small headwater and tributary pine-barren streams (Shelton 1997, ACDNR 2003). This species is found in greatest abundance in association with blackwater (i.e. tannic-acid) and high organic particulates (NatureServe 2003). Glochidia fish hosts are unknown. Most mussels are long-lived and late maturing, potentially masking evidence of population declines and viability problems (Neves & Moyer 1988). As with many other freshwater mussels, Alabama pearlshells require clean gravel riffles and are especially susceptible to the threat of stream degradation resulting from low dissolved oxygen levels or high chlorine concentrations in waterways. Additionally, this species does not survive in impoundments and reservoirs. Other factors that can negatively impact freshwater mussels include contamination of waterways with pesticides, heavy metals, and other substances and the competition of nonindigenous mollusks, such as the Asian clam and zebra mussel (*Dreissena polymorpha).* Alabama pearlshells are thus considered sensitive to siltation, point source pollution, changes in pH, loss of riparian vegetation, and altered flows (NatureServe 2003).

The decline and extirpation of Alabama pearlshell populations may be attributed to habitat modification, sedimentation, eutrophication, and other forms of water quality degradation. Passage of host fish may also be a factor. Based upon the description of off-Forest occupied habitat (Shelton 1997), there may be 10 or more miles of suitable habitat on the Conecuh National Forest. Recent drought conditions and existing barriers to fish passage may limit the extent of fish hosts and thus the ability for the species to perpetuate or re-populate these areas. Such historical conditions have led to the current status of this species being considered as at a high risk of continued decline in 1 out of 2 potentially species-inhabited Forest Service watersheds. An additional population imperilment risk was noted for the Alabama pearlshell, thereby including it in viability outcome category 5. Based on the watershed assessment completed in conjunction with the Forest Plan EIS (Appendix B), excessive sediment and altered flows have been identified as the primary risks to the viability of this species. These risk factors appear to be impaired in both watersheds (Upper and lower Conecuh); however, Forest Service influence is limited due to the overwhelming effects of upstream residential development, silviculture, and agriculture. General watershed condition (Clingenpeel 2003) is rated as "excellent" in all watersheds where this species potentially occurs.

Potential Effects

For Alabama pearlshell populations on or near the National Forests in Alabama, potential influences include any activities that could increase sedimentation, siltation, or turbidity, contribute pollutants, adjust water chemistry or nutrient cycling, raise water temperatures, change flow, modify habitat, alter streamside vegetation, or block fish passage. Such effects would be minimized given the protection measures that would be applied under all of the action alternatives for the revised Forest Plan. However, as discussed at the beginning of this section, the increased potential for watershed effects in alternative D, would be common to all species; otherwise, the alternatives are similar with a slight reduction in the anticipated watershed effects under alternatives G and B and a larger decrease in potential watershed effects for alternatives I, E, and A. Existing average and excellent watershed conditions would be expected to continue or improve. Therefore, plan implementation may affect individuals but effects are not likely to be of a magnitude or duration to adversely affect the viability of the species. Direct effects of mechanical damage would decline under all of the action alternatives due to the inclusion of strengthened standards that would minimize heavy equipment use and low water fords at road and trail crossings.

Likewise, forest-wide standards and prescribed levels of activities would result in progress towards watershed and riparian corridor restoration. Restoration of riparian corridors would generally lead to greater sediment and nutrient run-off buffering, reduced siltation, improved habitat stability and complexity, decreasing water temperatures, and greater availability of large woody debris. In all watersheds, implementation of the riparian prescription and streamside management zone standards is expected to improve conditions at local sites where this species occurs. Although the watersheds thought to harbor this species are rated as in "excellent" condition, additional improvements may be possible with full implementation of the Forest Plan direction. Cumulatively, many of the habitats on private lands are currently in a degraded state, making presence of quality habitats on National Forest land increasingly important to this species.

At this time, it is unlikely that Alabama pearlshells inhabit the Conecuh National Forest. However, the standards of the draft revised Land Resource Management Plan should provide adequate protection to their suitable habitat and provide the framework for eventual restoration and re-patriation.

Overall, implementation of the plan may impact individuals but is likely to be beneficial and is not likely to cause a trend towards federal listing or loss of viability for the Alabama pearlshell because: 1) Forest Plan standards would provide protective measures which would avoid or minimize and fully mitigate negative effects so that they are insignificant and discountable to the viability of the populations and the species, and 2) Forest Plan direction encourages actions that would restore watersheds and habitat, improve water quality, and remove barriers to movements, resulting in conservation of the species.

Georgia pigtoe (*Pleurobema hanleyianum*)

Affected Environment

The Georgia pigtoe is a candidate for possible future federal listing and a Forest Service sensitive species. It is considered at risk of population decline according to Williams et al. (1992). Georgia pigtoes are endemic to the Mobile River Basin. They where historically distributed within the Coosa River and probably many of the tributaries in Alabama, Georgia, and Tennessee. Historic collections are from Terrapin, Talladega, and Hatchet Creeks on the Talladega National Forest (USFWS 1999). Live specimens have not been seen for a decade or more within the State of Alabama and it may be extirpated (USFWS 1999). It is thought to be extirpated from over 90% of its entire historical range (NatureServe 2003). Extant populations, potential habitats, and viability assessment results are displayed in Appendix B, discussed in greater detail within the Biological Evaluation (USFS 2003b), and summarized in the Aquatic Species Viability Section. Extant populations are known to inhabit the upper Coosa River basin in the Cherokee National Forest of Georgia and Tennessee.

Georgia pigtoes primarily inhabit moderate gradient and swift shallow currents over coarse sand gravel substrates within runs, riffles, or shoals of small to medium rivers and large tributary streams (Parmalee & Bogan 1998, NatureServe 2003). Most mussels are long-lived and late maturing, potentially masking evidence of population declines and viability problems (Neves & Moyer 1988). The breeding season and fish host for the glochidia are unknown. As with many other freshwater mussels, this species probably requires clean gravel riffles, low turbidity, and some water flow. Georgia pigtoes are thus considered sensitive to siltation and altered flow (NatureServe 2003).

The two known or suspected extant populations of Georgia pigtoe mussels probably inhabit less than half of the suitable habitat for this species within the National Forests in Alabama. Recent drought conditions and existing barriers to fish passage may limit populations from the upper portions of these watersheds. The decline and extirpation of most populations of Georgia pigtoe may be attributed to habitat modification, sedimentation, eutrophication, and other forms of water quality degradation. Such historical conditions have led to the current status of this species being considered as at a high risk of continued decline in 1 out of 2 potentially species-inhabited Forest Service watersheds. An additional population imperilment risk was noted for the Georgia pigtoe, thereby including it in viability outcome category 5. Based on the watershed assessment completed in conjunction with the Forest Plan EIS (Appendix B), point-source pollution and altered flows may contribute the greatest risk to the viability of this species. These factors may be impaired within both the Talladega and upper Terrapin watersheds. Within the Talladega watershed, the opportunities for Forest Service influence, either positive or negative, are limited given the interspersion of private and upstream lands, and due to the overwhelming downstream development, industry, agriculture, and other land uses. The Forest Service may have a greater role in restoration within the upper Terrapin watershed. However, since this is a riverine species, other factors such as off-Forest habitat fragmentation due to reservoirs and point-source pollution may over-ride upper watershed improvements. Overall watershed conditions (Clingenpeel 2003), are rated as excellent in the upper Terrapin and average in the Talladega watersheds.

Potential Effects

For the populations on or near the National Forests in Alabama, potential influences include any activities that could increase sedimentation, siltation, or turbidity, contribute pollutants, adjust water chemistry or nutrient cycling, raise water temperatures, change flow, modify habitat, alter streamside vegetation, or block fish passage. Such effects would be minimized given the protection measures that would be applied under all of the action alternatives for the revised Forest Plan. However, as discussed at the beginning of this section, the increased potential for watershed effects in alternative D, would be common to all species; otherwise, the alternatives are similar with a slight reduction in the anticipated watershed effects under alternatives G and B and a larger decrease in potential watershed effects for alternatives I, E, and A. Under current management, vegetation treatments have been largely limited within the streamside and riparian zones. Exceptions have included the temporary loss of small patches of streamside forest canopies due to insect infestations and control measures such as cut and leave or cut and remove. Primary effects to mussels have been increased light and water temperatures, and altered food availability within localized areas. Several on-Forest (but not Forest Service controlled) reservoirs may continue to affect mussel populations through altered flow, chemistry, and nutrient cycling, and as barriers to fish passage. Direct effects of mechanical damage are unlikely since this species may be extirpated from its historical habitat on the National Forests.

Protection, monitoring, and augmentation would be the primary recovery objectives for this species. Actions would be taken in order to identify additional suitable habitat and re-patriate fish hosts and mussels to areas on National Forest lands.

Implementation of any of the Forest Plan alternatives is likely to be beneficial and is not likely to cause a trend towards federal listing or loss of viability for the Georgia pigtoe because: 1) this species may be extirpated from National Forest habitat and thus effects on individuals are unlikely, 2) Forest Plan standards would provide protective measures which would avoid or minimize and fully mitigate negative effects on historical and potential habitat, and 3) Forest Plan direction encourages actions that may reintroduce the species and would restore watersheds and habitat, improve water quality, and remove barriers to movements, resulting in conservation of the species.

Alabama clubshell (*Pleurobema troshelianum*)

Environmental Baseline

The Alabama clubshell is a candidate for possible future federal listing and a Forest Service sensitive species. It is ranked as "historic and possibly extirpated" (SH) (NatureServe 2003). Alabama clubshells are endemic to the Mobile River Basin. They where historically distributed within the Coosa River and probably many of the tributaries in Alabama, Georgia, and Tennessee. Historic collections are from Terrapin, Shoal, and Hatchet Creeks on the Talladega National Forest (USFWS 1999). Live specimens have not been seen for a decade or more within the State of Alabama and it may be extirpated (USFWS 1999). It is thought to be extirpated from over 90% of its entire historical range (NatureServe 2003). Extant populations are known to inhabit the upper Coosa River basin in the Cherokee National Forest of Georgia and Tennessee. Currently, the species is only known to be historic in three watersheds associated with the Talladega National Forest. Extant populations, potential habitats, and viability assessment results are displayed in Appendix B, discussed in greater detail within the Biological Evaluation (USFS 2003b), and summarized in the Aquatic Species Viability Section.

Alabama clubshells primarily inhabit moderate gradient and swift shallow currents over coarse sand gravel substrates within runs, riffles, or shoals of small to medium rivers and large to medium sized tributary streams (NatureServe 2003). Most mussels are long-lived and late maturing, potentially masking evidence of population declines and viability problems (Neves & Moyer 1988). The breeding season and fish host for the glochidia are unknown. As with many other freshwater mussels, this species probably requires clean gravel riffles, low turbidity, and some water flow. Other factors that can negatively impact freshwater mussels include contamination of waterways with pesticides, heavy metals, and other substances and the competition of nonindigenous mollusks, such as the Asian clam and zebra mussel (*Dreissena polymorpha).* Mussels are particularly sensitive to channel alterations since substrate qualities such as particle composition, consolidation, oxygen levels, subsurface flow, and susceptibility to souring or deposition can change dramatically with relatively small adjustments in channel dimensions or structural components (Brim Box & Moosa 1999). Logs, stumps, and brush appear to create pockets of some of the most stable refugia areas for mussels during floods and drought (Pierson 1991). Alabama clubshells are thus considered sensitive to siltation and altered flow (NatureServe 2003).

The decline and extirpation of Alabama clubshell populations may be attributed to habitat modification, sedimentation, eutrophication, and other forms of water quality degradation. Impediment of host fish passage may also be a factor. Such historical conditions have led to the current status of this species being considered as at a high risk of continued decline in 1 out of 3 potentially species-inhabited Forest Service watersheds. An additional population imperilment risk was noted for the Alabama clubshell, thereby including it in viability outcome category 5. Based on the watershed assessment completed in conjunction with the Forest Plan EIS (Appendix B), excessive sediment, point-source pollution, and altered flows have been identified as the primary risks to the viability of this species. These risk factors appear to be impaired in two out of 3 potentially inhabited watersheds. General watershed condition (Clingenpeel 2003) is rated as “excellent” in all watersheds where this species potentially occurs.

Potential Effects

If Alabama clubshells are still present on or downstream from the National Forests in Alabama, potential influences could include any activities that could increase sedimentation, siltation, or turbidity, contribute pollutants, adjust water chemistry or nutrient cycling, raise water temperatures, change flow, modify habitat, alter streamside vegetation, or block fish passage. Such effects would be minimized given the protection measures that would be applied under all of the action alternatives for the revised Forest Plan. However, as discussed at the beginning of this section, the increased potential for watershed effects in alternative D, would be common to all species; otherwise, the alternatives are similar with a slight reduction in the anticipated watershed effects under alternatives G and B and a larger decrease in potential watershed effects for alternatives I, E, and A. Existing average and excellent watershed conditions would be expected to continue or improve. Therefore, plan implementation could affect individuals, if present, but effects are not likely to be of a magnitude or duration to adversely affect the viability of the species. Direct effects are unlikely since this species probably is extirpated from its former historical habitat on the National Forests.

Likewise, Forest-wide standards and prescribed levels of activities would result in progress towards watershed and riparian corridor restoration. Restoration of riparian corridors would generally lead to greater sediment and nutrient run-off buffering, reduced siltation, improved habitat stability and complexity, decreasing water temperatures, and greater availability of large woody debris. In all watersheds, implementation of the riparian prescription and streamside management zone standards is expected to improve conditions at local sites where this species occurs. Moreover, Terrapin Creek is an important watershed for several aquatic T&E species and consequently, protection and restoration of habitat would likely be identified as a high priority when a conservation strategy is developed according to revised Forest Plan objectives. Cumulatively, many of the habitats on private lands are currently in a degraded state, making presence of quality habitats on National Forest land increasingly important to this species.

Given the positive opportunities for pro-active conservation of the species and the protection afforded by the Forest-wide and riparian standards under all of the alternatives, the selection of any of the Forest Plan alternatives for the National Forests in Alabama is likely to be beneficial and is not likely to cause a trend towards federal listing or loss of viability for Alabama clubshell because: 1) this species may be extirpated from National Forest habitat and thus effects on individuals are unlikely, 2) Forest Plan standards would provide protective measures which would avoid or minimize and fully mitigate negative effects on historical and potential habitat, and 3) Forest Plan direction encourages actions that may reintroduce the species and would restore watersheds and habitat, improve water quality, and remove barriers to movements, resulting in conservation of the species.

Sipsey Warrior darter (*Etheostoma* sp. Cf. *bellator*)

Environmental Baseline

The Sipsey Warrior darter is a Forest Service sensitive species considered at risk of population decline ("vulnerable") (Warren et al. 2000) and identified as a priority 1 species of highest concern (i.e. critically imperiled) within the State of Alabama (ADCNR 2003). Sipsey Warrior darters are believed to be endemic only to the Sipsey Fork of the upper Black Warrior River basin in Alabama (as split out from the original Warrior darter distribution throughout the Locust Fork, Mulberry Fork, and Sipsey Forks of the upper Black Warrior River). Currently, the species potentially inhabits two watersheds within the Bankhead National Forest. Extant populations, potential habitats, and viability assessment results are displayed in Appendix B, discussed in greater detail within the Biological Evaluation (USFS 2003b), and summarized in the Aquatic Species Viability Section. Sipsey Warrior darters are not known to occur on any other National Forest management units within the southeast or elsewhere in the United States. The National Forests represent approximately 80 percent of the species' range within the State of Alabama and the Nation. Sipsey Warrior darters are disjunct in their distribution. Where encountered, they are generally rare and in low abundance (Metee et al. 1996, Powers et al. 2001, Smith et al. 2002, ACDNR 2003).

Sipsey Warrior darters primarily inhabit shallow moderate currents over gravel and cobble substrates within riffles of headwater streams and rivers (Dycus & Howell 1974). Sipsey Warrior darters are thus considered sensitive to siltation, water temperature, point source pollution, and altered flows.

Reservoirs and strip mining have most likely greatly influenced this species. Such historical conditions have led to the current status of this species being considered as at a high risk of continued decline in 1 out of 2 potentially species-inhabited Forest Service watersheds. Based on the watershed assessment completed in conjunction with the Forest Plan EIS (Appendix B), excessive sediment, point-source pollution, and altered flows have been identified as the primary risks to the viability of this species. These risk factors appear to be impaired in the lower Sipsey Fork watershed; however, Forest Service influence is limited due to the overwhelming effects of residential development, agriculture, and the Lewis Smith reservoir. General watershed condition (Clingenpeel 2003) is rated as "excellent" in all watersheds where this species potentially occurs.

Potential Effects

For Sipsey Warrior darter populations on or downstream from the National Forests in Alabama, potential influences include any activities that could increase sedimentation, siltation, or turbidity, contribute pollutants, adjust water chemistry or nutrient cycling, raise water temperatures, change flow, modify habitat, alter streamside vegetation, or block fish passage.

Such effects would be minimized given the protection measures that would be applied under all of the action alternatives for the revised Forest Plan. However, as discussed at the beginning of this section, the increased potential for watershed effects in alternative D, would be common to all species; otherwise, the alternatives are similar with a slight reduction in the anticipated watershed effects under alternatives G and B and a larger decrease in potential watershed effects for alternatives I, E, and A. Existing average and excellent watershed conditions would be expected to continue or improve. Therefore, plan implementation may affect individuals but effects are not likely to be of a magnitude or duration to adversely affect the viability of the species. Direct effects of mechanical damage would decline under all of the action alternatives due to the inclusion of strengthened standards that would minimize heavy equipment use and low water fords at road and trail crossings.

Likewise, Forest-wide standards and prescribed levels of activities would result in progress towards watershed and riparian corridor restoration. Restoration of riparian corridors would generally lead to greater sediment and nutrient run-off buffering, reduced siltation, improved habitat stability and complexity, decreasing water temperatures, and greater availability of large woody debris. In all watersheds, implementation of the riparian prescription and streamside management zone standards is expected to improve conditions at local sites where this species occurs. Moreover, the Sipsey Fork watersheds are an important for several aquatic T&E species and consequently, protection and restoration of habitat would likely be identified as a high priority when a conservation strategy is developed according to revised Forest Plan objectives. Although the watersheds thought to harbor this species are rated as in “excellent” condition, additional improvements may be possible with full implementation of the Forest Plan direction. Cumulatively, many of the habitats on private lands are currently in a degraded state, making presence of quality habitats on National Forest land increasingly important to this species.

Given the positive opportunities for pro-active conservation of the species and the protection afforded by the Forest-wide and riparian standards under all of the alternatives, the selection of any of the Forest Plan alternatives for the National Forests in Alabama, may impact individuals but is likely to be beneficial and is not likely to cause a trend towards federal listing or loss of viability for the Sipsey Warrior darter because: 1) Forest Plan standards would provide protective measures which would avoid or minimize and fully mitigate negative effects so that they are insignificant and discountable to the viability of the populations and the species, and 2) Forest Plan direction encourages actions that would restore watersheds and habitat, improve water quality, and remove barriers to movements, resulting in conservation of the species.

Tuskaloosa darter (*Etheostoma douglasi*)

Environmental Baseline

The Tuskaloosa darter is a Forest Service sensitive species considered “currently stable” (Warren et al. 2000) and ranked as “imperiled” within Alabama (S2) (NatureServe 2003). Tuskaloosa darters are endemic to the Sipsey and Locust Forks of the upper Black Warrior River basin in Alabama. Historically, Tuskaloosa darters probably ranged throughout these upper basin drainages, and possibly included the Clear Creek branch of the Black Warrior River headwaters; however, its range is now limited to less than ten extant populations. Currently, the species potentially inhabits three watersheds associated with the Bankhead National Forest. Extant populations, potential habitats, and viability assessment results are displayed in Appendix B, discussed in greater detail within the Biological Evaluation (USFS 2003b), and summarized in the Aquatic Species Viability Section. Tuskaloosa darters are not known to occur on any other National Forest management units within the southeast or elsewhere in the United States. The National Forests represent approximately 20 percent of the species' range within the State of Alabama. Tuskaloosa darters are generally disjunct in their distribution. Within the Bankhead National Forest, Tuskaloosa darters are found in variable levels of abundance ranging from abundant to sparse (Metee et al. 1996, Powers et al. 2001, Smith et al. 2002, ACDNR 2003).

Tuskaloosa darters primarily inhabit moderately swift currents over gravel-cobble and boulder-bedrock substrates within riffles of medium to large streams (Wood & Mayden 1993). This species is found in greatest abundance in association with slab boulders and bedrock. The diet is thought to be aquatic insect larvae and occasionally some mollusks (Mettee et al. 1996). Tuskaloosa darters are thus considered sensitive to siltation, water temperature, point source pollution, and altered flows.

Decline of Tuskaloosa darters may be attributed to reservoirs and strip mining. Such historical conditions have led to the current status of this species being considered as at a high risk of continued decline in 2 out of 5 potentially species-inhabited Forest Service watersheds. Based on the watershed assessment completed in conjunction with the Forest Plan EIS (Appendix B), all of the analyzed factors (sediment, point-source pollution, temperature, and flow) contribute to the risks to the viability of this species. These risk factors appear to be impaired in the lower Sipsey Fork and lower Brushy Fork watersheds; however, Forest Service influence is limited due to the overwhelming effects of residential development, agriculture, and the Lewis Smith reservoir. General watershed condition (Clingenpeel 2003) is rated as "excellent" in all watersheds where this species potentially occurs.

Potential Effects

For Tuskaloosa darter populations on or downstream from the National Forests in Alabama, potential influences include any activities that could increase sedimentation, siltation, or turbidity, contribute pollutants, adjust water chemistry or nutrient cycling, raise water temperatures, change flow, modify habitat, alter streamside vegetation, or block fish passage. Such effects would be minimized given the protection measures that would be applied under all of the action alternatives for the revised Forest Plan. However, as discussed at the beginning of this section, the increased potential for watershed effects in alternative D, would be common to all species; otherwise, the alternatives are similar with a slight reduction in the anticipated watershed effects under alternatives G and B and a larger decrease in potential watershed effects for alternatives I, E, and A. Direct effects of mechanical damage would decline under all of the action alternatives due to the inclusion of strengthened standards that would minimize heavy equipment use and low water fords at road and trail crossings. Under all of the alternatives one on-Forest and one off-Forest reservoir may continue to affect populations through altered flow, chemistry, and nutrient cycling, and as barriers to fish passage. Effects are expected to be similar across all of the action alternatives. There could potentially be short-term and localized elevations in sediment run-off due to such Forest health activities as cutting or burning; however, application of Forest Plan standards would minimize the extent and magnitude of effects and full consideration of watershed restoration and species conservation priorities within project planning would further minimize the likelihood of multiple concurrent actions causing significant cumulative adverse effects. Existing average and excellent watershed conditions would be expected to continue or improve.

Likewise, forest-wide standards and prescribed levels of activities would result in progress towards watershed and riparian corridor restoration. Restoration of riparian corridors would generally lead to greater sediment and nutrient run-off buffering, reduced siltation, improved habitat stability and complexity, decreasing water temperatures, and greater availability of large woody debris. In all watersheds, implementation of the riparian prescription and streamside management zone standards is expected to improve conditions at local sites where this species occurs. Although the watersheds thought to harbor this species are rated as in "excellent" condition, additional improvements may be possible with full implementation of the Forest Plan direction. Cumulatively, many of the habitats on private lands are currently in a degraded state, making presence of quality habitats on National Forest land increasingly important to this species.

Given the positive opportunities for pro-active conservation of the species and the protection afforded by the Forest-wide and riparian standards under all of the alternatives, the selection of any of the Forest Plan alternatives for the National Forests in Alabama, may impact individuals but is likely to be beneficial and is not likely to cause a trend towards federal listing or loss of viability for the Tuskaloosa darter because: 1) Forest Plan standards would provide protective measures which would avoid or minimize and fully mitigate negative effects so that they are insignificant and discountable to the viability of the populations and the species, and 2) Forest Plan direction encourages actions that would restore watersheds and habitat, improve water quality, and remove barriers to movements, resulting in conservation of the species.

Alabama spike (*Elliptio arca*)

Environmental Baseline

The Alabama spike is a Forest Service sensitive species considered at risk of population decline (Williams et al. 1992) and ranked as "imperiled" within Alabama (S2) (NatureServe 2003). This species has been identified as a priority 1 species of highest concern (i.e. critically imperiled) within the State of Alabama (ADCNR 2003).

Alabama spikes range through Gulf coast large river systems in Alabama, and four other States. Historically, Alabama spikes probably ranged throughout the Alabama River tributaries; however, it is now dwindling everywhere except within the Sipsey River. Currently, the species potentially inhabits four watersheds associated with the Bankhead and Talladega National Forests. Extant populations, potential habitats, and viability assessment results are displayed in Appendix B, discussed in greater detail within the Biological Evaluation (USFS 2003b), and summarized in the Aquatic Species Viability Section. Alabama spikes may occur on several other National Forest management units within the southeast. The National Forests represent less than 5 percent of the species' range within the State of Alabama. Alabama spikes are generally scattered in their distribution. Within the Sipsey River they are locally common; elsewhere, they are generally sparse in their abundance (Smith et al. 2002, ACDNR 2003).

Alabama spikes primarily inhabit high gradient swift currents over gravel substrates within lateral bars and riffles of large streams and rivers (Hartfield & Jones 1990, ACDNR 2003). This species appears to be tolerant of silt and pollution. Most mussels are long-lived and late maturing, potentially masking evidence of population declines and viability problems (Neves & Moyer 1988). It may have a narrow range of suitable fish hosts including *Etheostoma artosiae* and *Percina nigrofasciata* (Haag & Warren 2001). Alabama spikes are thus considered sensitive to barriers, channelization, and altered flows (NatureServe 2003).

The decline and extirpation of most populations of mussels may be attributed to habitat modification, sedimentation, eutrophication, and other forms of water quality degradation. Impediment of host fish passage may also be a factor. Such historical conditions have led to the current status of this species being considered as at a high risk of continued decline in 2 out of 4 potentially species-inhabited Forest Service watersheds. Based on the watershed assessment completed in conjunction with the Forest Plan EIS (Appendix B), excessive sediment, point-source pollution, and altered flows have been identified as the primary risks to the viability of this species. These risk factors appear to be impaired in the lower Sipsey Fork, upper Bear, and upper Terrapin watersheds; however, Forest Service influence is limited due to the overwhelming effects of residential development, agriculture, and reservoirs. General watershed condition (Clingenpeel 2003) is rated as “excellent” in all watersheds where this species potentially occurs.

Potential Effects

For Alabama spike populations on or downstream from the National Forests in Alabama, potential influences include any activities that could increase sedimentation, siltation, or turbidity, contribute pollutants, adjust water chemistry or nutrient cycling, raise water temperatures, change flow, modify habitat, alter streamside vegetation, or block fish passage. Such effects would be minimized given the protection measures that would be applied under all of the action alternatives for the revised Forest Plan. However, as discussed at the beginning of this section, the increased potential for watershed effects in alternative D, would be common to all species; otherwise, the alternatives are similar with a slight reduction in the anticipated watershed effects under alternatives G and B and a larger decrease in potential watershed effects for alternatives I, E, and A. Existing average and excellent watershed conditions would be expected to continue or improve. Direct effects of mechanical damage would decline under all of the action alternatives due to the inclusion of strengthened standards that would minimize heavy equipment use and low water fords at road and trail crossings. Therefore, plan implementation is unlikely to contribute to adverse impacts and may benefit this species.

Likewise, forest-wide standards and prescribed levels of activities would result in progress towards watershed and riparian corridor restoration. Restoration of riparian corridors would generally lead to greater sediment and nutrient run-off buffering, reduced siltation, improved habitat stability and complexity, decreasing water temperatures, and greater availability of large woody debris. In all watersheds, implementation of the riparian prescription and streamside management zone standards is expected to improve conditions at local sites where this species occurs. Moreover, the Sipsey Fork and Terrapin watersheds are important for several aquatic T&E species and consequently, protection and restoration of habitat would likely be identified as a high priority when a conservation strategy is developed according to revised Forest Plan objectives. Although the watersheds thought to harbor this species are rated as in "excellent" condition, additional improvements may be possible with full implementation of the Forest Plan direction. Cumulatively, many of the habitats on private lands are currently in a degraded state, making presence of quality habitats on National Forest land increasingly important to this species.

Given the positive opportunities for pro-active conservation of the species and the protection afforded by the Forest-wide and riparian standards under all of the alternatives, the selection of any of the Forest Plan alternatives for the National Forests in Alabama, is likely to be beneficial and is not likely to cause a trend towards federal listing or loss of viability for the Alabama spike because: 1) Forest Plan standards would provide protective measures which would avoid or minimize and fully mitigate negative effects so that they are insignificant and discountable to the viability of the populations and the species, and 2) Forest Plan direction encourages actions that would restore watersheds and habitat, improve water quality, and remove barriers to movements, resulting in conservation of the species.

Alabama rainbow (*Villosa nebulosa*)

Environmental Baseline

The Alabama rainbow is a Forest Service sensitive species considered at risk of population decline (Williams et al. 1992) and ranked as "vulnerable" within Alabama (S3) (NatureServe 2003). Alabama rainbows range across five Appalachian southeastern states (NatureServe 2003). Within Alabama, Alabama rainbows are found within the Mobile River Basin above the fall line (ACDNR 2003). Currently, the species potentially inhabits eight watersheds associated with the Bankhead National Forest and the Oakmulgee and main division of the Talladega National Forest. Extant populations, potential habitats, and viability assessment results are displayed in Appendix B, discussed in greater detail within the Biological Evaluation (USFS 2003b), and summarized in the Aquatic Species Viability Section. Alabama rainbows also occur on the Cherokee National Forest in Georgia and Tennessee. The National Forests represent approximately 10 percent of the species' range within the State of Alabama. Alabama rainbows are generally scattered in their distribution. Where encountered, they are uncommon and in low abundance (Metee et al. 1996, Smith et al. 2002, ACDNR 2003).

Alabama rainbows primarily inhabit small headwater streams (ACDNR 2003). This species appears to utilize a number of bass species as their glochidial host (Haag & Warren 1997). Most mussels are long-lived and late maturing, potentially masking evidence of population declines and viability problems (Neves & Moyer 1988). As with many other freshwater mussels, this species probably requires clean gravel riffles, low turbidity, and some water flow. Other factors that can negatively impact freshwater mussels include contamination of waterways with pesticides, heavy metals, and other substances and the competition of nonindigenous mollusks, such as the Asian clam and zebra mussel (*Dreissena polymorpha).* Mussels are particularly sensitive to channel alterations since substrate qualities such as particle composition, consolidation, oxygen levels, subsurface flow, and susceptibility to souring or deposition can change dramatically with relatively small adjustments in channel dimensions or structural components (Brim Box & Moosa 1999). Logs, stumps, and brush appear to create pockets of some of the most stable refugia areas for mussels during floods and drought

(Pierson 1991). Alabama rainbows are thus considered sensitive to siltation, point source pollution, warming water temperatures, barriers, and altered flows.

The decline and extirpation of Alabama rainbow populations may be attributed to habitat modification, sedimentation, eutrophication, and other forms of water quality degradation. Impediment of host fish passage may also be a factor. Such historical conditions have led to the current status of this species being considered as at a high risk of continued decline in 3 out of 8 potentially species-inhabited Forest Service watersheds. Based on the watershed assessment completed in conjunction with the Forest Plan EIS (Appendix B), excessive sediment, point-source pollution, and altered flows have been identified as the primary risks to the viability of this species. These risk factors appear to be impaired in 6 out of 8 potentially inhabited watersheds. Watershed condition ratings (Clingenpeel 2003) are “below average” in one of the watersheds in which the species may occur (Lower Flint). This rating is primarily due to fine sediments eroding from upstream and downstream private agricultural lands, and consequently beyond the control of the Forest Service.

Potential Effects

For Alabama rainbow populations on or downstream from the National Forests in Alabama, potential influences include any activities that could increase sedimentation, siltation, or turbidity, contribute pollutants, adjust water chemistry or nutrient cycling, raise water temperatures, change flow, modify habitat, alter streamside vegetation, or block fish passage. Such effects would be minimized given the protection measures that would be applied under all of the action alternatives for the revised Forest Plan. However, as discussed at the beginning of this section, the increased potential for watershed effects in alternative D, would be common to all species; otherwise, the alternatives are similar with a slight reduction in the anticipated watershed effects under alternatives G and B and a larger decrease in potential watershed effects for alternatives I, E, and A. Direct effects of mechanical damage would decline under all of the action alternatives due to the inclusion of strengthened standards that would minimize heavy equipment use and low water fords at road and trail crossings. Although watershed conditions are below average in one watershed, Forest Service activities would not contribute to further degradation, and may at least locally improve conditions. Therefore, plan implementation may affect individuals but effects are not likely to be of a magnitude or duration to adversely affect the viability of the species.

Likewise, forest-wide standards and prescribed levels of activities would result in progress towards watershed and riparian corridor restoration. Restoration of riparian corridors would generally lead to greater sediment and nutrient run-off buffering, reduced siltation, improved habitat stability and complexity, decreasing water temperatures, and greater availability of large woody debris. In all watersheds, implementation of the riparian prescription and streamside management zone standards is expected to improve conditions at local sites where this species occurs. Forest Service restoration activities may also be able to influence and contribute to improved watershed conditions in the upper Choccolocco watershed. Moreover, upper Choccolocco, Terrapin, and upper Hatchet, and Sipsey Fork are important watersheds for several aquatic T&E species and consequently, protection and restoration of habitat would likely be identified as a high priority when a conservation strategy is developed according to revised Forest Plan objectives. However, overall watershed conditions are not likely to improve in the lower Flint watershed, as these conditions would continue to be caused by off-Forest factors beyond Forest Service control. Regardless of Forest Service actions, off-Forest silviculture, agriculture, and development would undoubtedly continue to contribute to various forms of habitat degradation, particularly within the lower Flint, Hurricane, upper Hatchet, and Cahaba watersheds where excessive siltation has been identified as a high viability concern for this species (USFS 2003b). Cumulatively, many of the habitats on private lands are currently in a degraded state, making presence of quality habitats on National Forest land increasingly important to this species.

Given the positive opportunities for pro-active conservation of the species and the protection afforded by the Forest-wide and riparian standards under all of the alternatives, the selection of any of the Forest Plan alternatives for the National Forests in Alabama, is may impact individuals but is likely to be beneficial and is not likely to cause a trend towards federal listing or loss of viability for the Alabama rainbow because: 1) Forest Plan standards would provide protective measures which would avoid or minimize and fully mitigate negative effects so that they are insignificant and discountable to the viability of the populations and the species, and 2) Forest Plan direction encourages actions that would restore watersheds and habitat, improve water quality, and remove barriers to movements, resulting in conservation of the species.

5.3 Threatened, Endangered, and Candidate Plant Species

Alabama leather flower (*Clematis socialis*)

Affected Environment

The Alabama leather flower was federally listed as an endangered species in 1986. The species is typically found in mesic flats near intermittent streams where plants are rooted in silty-clay soils of the Conasauga Soil Series. These soils are circumneutral or slightly basic with a high hydroperiod. Plants occur in full sun or partial shade in a grass-sedge-rush community (Recovery Plan, 1989) and contiguous leather flower occurs with Mohr's Barbara's buttons (*Marshallia mohrii*) at two locations in northeastern Alabama (Barbara's buttons Recovery Plan, 1991).

The Alabama leather flower is rhizomatous and forms dense clones with erect stems (singly or in clusters) reaching 7-12 inches. The flowers are solitary, urn- to bell-shaped, and blue-violet in color. Flowering occurs in April and May. However, most reproduction occurs vegetatively by rhizomes (Recovery Plan, 1989).

At listing, three locations were known to occur in Alabama in Cherokee and St. Clair Counties (Recovery Plan, 1989). No known populations occur on the National Forests in Alabama; however, suitable habitat is present on the Talladega Division of the Talladega National Forest and potentially on the Oakmulgee Ranger District of the Talladega National Forest and Bankhead National Forest.

Primary threats to the species include highway rights-of-way maintenance (e.g., herbicides and excessive mowing/scraping) and potential loss of habitat resulting from land use changes. Due to the small population size and limited distribution of this plant, indiscriminate collection could result in its extinction (Recovery Plan, 1989). Kral (1983) indicated that prescribe burning may damage existing populations while intensive site preparation of known localities would destroy the plant. Potential beneficial management practices, if done properly, might include thinning and cutting of overstory trees.

All three of the known populations are in private ownership, although one occurs on land owned by The Nature Conservancy. All three populations support 12-50 individual plants (Recovery Plan, 1989).

Potential Effects

Alabama leather flower is not found on the National Forests in Alabama, therefore there are not direct, indirect or cumulative effects of implementing alternative I.

Determination of Effect

Because there are no known sites found directly on National Forests in Alabama lands, the selection of any alternatives will have No Effect on the Alabama leather flower.

Leafy Prairie-Clover (*Dalea foliosa*)

Affected Environment

The leafy prairie-clover was federally listed as endangered in 1991. This species typically prefers thin-soiled limestone or dolomite glades and limestone barrens. The plant may also be found on wet calcareous barrens and moist prairies or cedar glades, usually near a stream or seepage from limestone that provides seasonal moisture. Sabatia angularis and Rudbeckia triloba are associates of this species. The plant requires full sun, and high competition from other plant species may interfere with the plants ability to reproduce. (NatureServe Explorer, 2001)

The leafy prairie-clover is a stout perennial herb, 18-30 inches tall. The plant has no hair except on the inflorescence. Several stems rise out of a hardened root crown. Flower spikes are small, purple, and dense. The plant flowers from late July to early August, but may also bloom sporadically into September. (Isely, 1990)

This species occurs in Tennessee, Alabama, and Illinois. There are 44 occurrences in Tennessee; however, only 17 populations are considered marginal or better. Illinois has three known occurrences and there are four different populations in Alabama. In Tennessee and Alabama the plant tends to be found mainly on open limestone glades, and in Tennessee, it may also be found growing on wet calcareous barrens and moist prairies. In Illinois, the plant seems restricted to thin-soiled, wet or moist, open dolomite prairies and on river terraces in the northeastern part of the state. (NatureServe Explorer, 2001)

Decline of the leafy prairie-clover may be attributed for the most part to habitat destruction and alteration caused by commercial and industrial development, overgrazing, and fire suppression. The species is also greatly threatened by encroachment of exotic species, especially exotic shrub species, particularly privet (Ligustrum sinense) and Eurasian bush honeysuckle (Lonicera maackii). Fire suppression resulting in succession of other woody vegetation also threatens the populations of the leafy prairie-clover. This species is short-lived and does not spread vegetatively therefore; population survival is dependent on seed production. Natural communities containing the leafy prairie-clover need to be subjected to periodic prescribed burning to help build a persistent seed bank of the species (NatureServe Explorer, 2001).

The species appears to maintain itself only in areas that are naturally or artificially cleared, and where hardwood and understory shrubs are at low densities. In Alabama, the majority of the populations are found on cedar glades.

Potential Effects

All cedar glade communities, habitat for leafy prairie-clover, would be managed under the 9F (rare community) prescription under all alternatives. Several standards for rare communities ensure their maintenance and restoration across the landscape. Rare communities would be protected from detrimental effects caused by management actions across all alternatives. Rare communities would be inventoried in proposed project areas when projects are being proposed which have the potential to adversely affect them.

Since federally listed plants receive little or no legal protection on private land, this makes these species may be vulnerable to extirpation. Since no populations are known to occur on National Forest land, the direct and cumulative effects of National Forest planning alternatives on this plant are likely to be negligible.

Determination of Effect

Through implementation of the Forest-wide, Rare Community, T&E species, and Riparian Standards, the selection of any of the alternatives will have No Effect on leafy prairie-clover.

Eggert's Sunflower (*Helianthus eggertii*)

Affected Environment

Another plant that lives in open oak/pine woodlands and grasslands is the federally listed threatened Eggert's sunflower (Helianthus eggertii). It blooms in July and August, like most sunflowers; its flowers (actually composite heads of many small flowers) are relatively large (about 3.5 inches across), its stem is smooth and waxy, and the tapering leaves with rounded bases are smooth except for a scattered roughness on the upper surface (Pyne, 1998).

The habitat has been described as rocky hills, barrens, or open upland oak-pine woods. Soils can be sands, clays, chert or gravel or open upland woods (Kral 1983). The open wood habitats are often dominated by oak forests, specifically white oak, black oak and southern red oaks, as well as hickories and pines. The barrens are openings dominated by perennial grasses and herbs (Jones 1994).

It prefers a habitat type that was presumably more widespread when fire was a more common event in the landscape. This grass and herb-dominated habitat type is grasslands, woodlands and barrens, and is related to the prairies of the Midwest, both in structure, species composition, and ecology (Pyne, 1998). Eggert's sunflower is thought to be a relict species of the fire-dependent barrens habitats, sustained by lightning fires and aboriginal burning at a landscape scale (Jones, 1994).

Presumably, when fire occurred more frequently, and large grazing animals (such as bison) roamed free, there were large areas of parts of Tennessee and the Southeast which had relatively few trees, with abundant stands of native grasses and flowering herbs, like composites and legumes (Pyne, 1998). Under present conditions, this community persists on roadsides and recently disturbed areas. In Alabama, this species occurs in Winston County, within a mile of the Bankhead National Forest administrative boundary, in open ridgetop oak savannahs.

Potential Effects

Maintenance of existing potential habitat sites would likely involve prescribed burning, but could also include other vegetation management treatments, such as vegetation cutting where needed to control competing vegetation. Broadcast herbicide is detrimental to any broadleaf herbaceous species. Site-specific planning of these activities would be used to ensure that adverse effects to any potential populations would not occur. Seed collection, propagation, or out planting, may also be used to begin reintroduction of populations on suitably identified national forest lands.

Additional objectives included in the Revised Forest Plan should increase abundance of optimal habitat for this species and create opportunity for establishment of new populations. Objectives call for restoration and maintenance of woodland, savanna, and grassland habitats. Expected levels of such restoration and maintenance vary by alternative (see section on Woodlands, Savannas, and Grasslands), but all would provide some potential benefit. Permanently open woodlands, savannas, or grasslands will be provided across the greater landscape in Alternative I. In addition, glades and barrens, with which this species is sometimes associated, are identified as rare communities and would be restored or maintained across all alternatives. Ongoing inventories would continue to document new occurrences in these habitats, providing them with the site-specific protections afforded to existing sites.

Determination of Effect

Through implementation of the Forest-wide, Rare Community, T&E species, and Riparian Standards, the selection of any of the alternatives will have No Effect on Eggert's sunflower.

Lyrate Bladderpod (*Lesquerella lyrata*) Rollins

Affected Environment

Lyrate bladderpod was federally listed as threatened in 1990. The species is typically found in disturbed limestone outcroppings, cedar glades and glade-like areas, which includes, open pastures, cultivated fields, and roadsides in calcareous areas. The plant prefers thin soils covering limestone as well as red soils and is a plant of full sunlight (NatureServe Explorer, 2001). This species may be found growing in association with Juniperus virginiana and some species of Leavenworthia (Kral, 1983).

Lyrate bladderpod is an annual herb up to 12 inches in height. The stems are pale green and usually numerous with long, soft hairs. The plant is leafy from the base to the flower head. The basal leaves form a rosette about 4 – 10 cm long and resembles that of a dandelion. Leaf color is pale green and has many hairs, especially at the margins and along the midrib beneath. The plant flowers from late February into late April and produces flowers on ascending stalks. The flowers have small weak hairs and are bright yellow with backs that are yellowish-green. The species closely resembles Lesquerella densipila in type, amount of hairs, in flower size and color, in pedicel and fruit shape but differs in that it has slightly smaller fruit, together with persistent styles, are perfectly smooth. (Kral, 1983)

In 1983, the only populations of the lyrate bladderpod were known from cedar glade areas in the eastern part of Franklin County in northwestern Alabama (Kral, 1983). In 2001, this species was reported from Franklin, Lawrence, and Colbert counties, Alabama. It occurs within the administrative boundary of the Bankhead National Forest on private land; no populations have yet been found on national forest lands. Only six populations have been found in Alabama (NatureServe Explorer, 2001).

Primary threats to the species include woody plant succession and urban and intensive agricultural development that destroys cedar glades. According to Kral (1983), the establishment of pine plantations would probably destroy the plant populations and grazing may cause damage to the species. Potential beneficial management practices, if done properly, might include thinning and cutting of overstory trees and would probably increase populations. They are definitely decreased by intensive row crop agriculture, or by the improvement of lowland pasture with grass species, which would close the canopy.

The species appears to maintain itself only in areas that are naturally or artificially cleared, and where hardwood and understory shrubs are at low densities. The majority of the populations are found along roads rights-of-way and in pastures on private land.

Potential Effects

All cedar glade communities, habitat at for lyrate bladderpod, would be managed under the 9F (rare community) prescription under all alternatives. Several standards for rare communities ensure their maintenance and restoration across the landscape. Rare communities would be protected from detrimental effects caused by management actions across all alternatives. Rare communities would be inventoried in proposed project areas when projects are being proposed which have the potential to adversely affect them.

Since federally listed plants receive little or no legal protection on private land, this species may be vulnerable to extirpation. Since no populations are known to occur on National Forest land, the direct and cumulative effects of National Forest planning alternatives on this plant are likely to be negligible.

Determination of Effects

Through implementation of the Forest-wide, Rare Community, T&E species, and Riparian Standards, the selection of any of the alternatives will have No Effect on lyrate bladderpod.

Mohr's Barbara's buttons (*Marshallia mohrii*)

Affected Environment

Mohr's Barbara's buttons is a federally threatened species of moist prairie-like openings in woodlands and along shale-bedded streams in a grass-sedge community. Additionally, several populations are located within, or extend into, rights-of-ways. Soil associations are typically alkaline sandy clays that are seasonally wet and have high organic matter content. Plant associations include *Helenium autumnale*, *Helianthus angustifolius, Lythrum alatum, Ruellia caroliniensis*, and prairie elements such as *Asclepias viridis, Asclepias hirtella, Helianthus mollis*, and *Silphium terebinthinaceum*.

Mohr's Barbara's buttons is an erect, perennial herb up to 30 inches tall, with a short, thickened, fibril-bearing, erect and thick-rooted rhizome. Stems branch only at the inflorescence and are often purplish. The flowers are all discoid, the corollas whitish, with linear, spreading lobes from which project the pale lavender anthers and the narrow, blunt-tipped whitish style branches. The fruit is an achene. Blooming occurs from mid-May through June (Kral, 1983).

At listing, 22 locations were known to occur in Alabama and Georgia in the Cumberland Plateau and Ridge and Valley physiographic regions (Recovery Plan, 1991). One extant population was recently discovered within the administration boundary of the Bankhead National Forest (Whetstone, 2002, personal communication), but on private lands, not on national forest lands. Approximately 10 new locations have been found in Georgia since listing (Protected Plants of Georgia).

Primary threats to the species include loss of habitat resulting from fire suppression and conversion of suitable habitat to pine plantations and agricultural land (Protected Plants of Georgia). Drainage of sites where extant populations occur would most likely be detrimental (Kral, 1983). Herbicide use, mowing during the flowering period, and installation of underground cable or gas lines also has the potential to impact populations that occur within rights-of-ways (Recovery Plan, 1991).

The species appears to maintain itself only in areas that are naturally or artificially cleared, and where hardwood and understory shrubs are at low densities. Historically, fire may have maintained the open conditions required by this plant. The largest populations of this species occur in Cherokee County, Alabama, with an estimated 1000 plants at each of two sites. Ten populations in Alabama and Georgia are moderate-sized with 100-300 individuals present. The remainder of extant populations support limited populations of 12-50 individuals.

Potential Effects

Mohr's Barbara's buttons are associated with riparian and rare communities and suitable habitat is present; therefore, these areas would be protected and managed under the 9F (rare community) and 11 (riparian) prescriptions under all alternatives. Several standards for rare communities ensure their maintenance and restoration across the landscape. Rare communities would be protected from detrimental effects caused by management actions across all alternatives. Rare communities would be inventoried in proposed project areas when projects are being proposed which have the potential to adversely affect them

Federally listed plants receive little or no legal protection on private land, thus this species may be vulnerable to extirpation. Since one population is known to occur within the Bankhead National Forest administrative boundary directly adjacent to but not on national forest lands, , the direct and cumulative effects of National Forest planning alternatives on this plant should have no effect on this species

Determination of Effect

Through implementation of the Forest-Wide, Rare Community, T&E species and Riparian Standards, the selection of alternative I will result in a No Effect determination for Mohr's Barbara's buttons.

Harperella (*Ptilimnium nodosum*)

Affected Environment

Harperella was federally listed as an endangered species in 1988. The species is typically found in seasonally flooded streams and coastal plain ponds and low savannah meadows. One known population occurs on a granite outcrop. The plant only occurs in a narrow range of water depths and is intolerant of deep water or conditions that are too dry. In it's riverine habitat, the plant is found in areas that are sheltered from rapidly moving water (Recovery Plan, 1990).

Harperella is an annual herb that sometimes overwinters (riverine habitat) by vegetative buds produced in the axils of lower stem leaves. Plants are 4-16 inches tall, rarely more robust, sometimes reclining and rooting from the lower stem when submerged. Plants vary in size and fluctuate year-to-year in abundance. The flowering period for this species is late May to early August, with fruiting occurring from July to August (Protected Plants of Georgia)

At listing, thirteen locations were known to occur in seven southeastern states. Historically, there were twenty-six known populations (Recovery Plan, 1990). No known populations occur on the National Forests in Alabama; however, suitable habitat is present on the Talladega National Forest and Bankhead National Forest.

Primary threats to the species include hydrological manipulation and physical destruction of pond habitat (Recovery Plan, 1990). Kral (1983) indicated that prescribe burning, site preparation, plantation establishment, and grazing would destroy this plant. However, thinning and/or cutting of the overstory may be beneficial if done properly.

Potential Effects

Harperella is associated with rare communities and riparian areas; therefore, these areas would be protected and managed under the 9F (rare community) and 11 (riparian) prescriptions under all alternatives. Several standards for rare communities ensure their maintenance and restoration across the landscape. Rare communities would be protected from detrimental effects caused by management actions across all alternatives. Rare communities would be inventoried in proposed project areas when projects are being proposed which have the potential to adversely affect them.

Federally listed plants receive little or no legal protection on private land, thus this species may be vulnerable to extirpation. Since no populations are known to occur on National Forest land, the direct and cumulative effects of National Forest planning alternatives on this plant are likely to be negligible.

Determination of Effect

Through implementation of the Forest-Wide, Rare Community, T&E species and Riparian Standards, and due to the fact that there are no known sites found directly on National Forests in Alabama lands, the selection of any alternatives will have No Effect on the Harperella.

Kral's water-plantain (*Sagittaria secundifolia*)

Affected Environment

Kral's water-plantain was listed as threatened by the USFWS in 1990. It was first listed as occurring in Little River drainage system, but in recent years, 3 sites were discovered in the Sipsey fork on the Bankhead National Forest. In the summer of 2000 one additional population was found in Brushy Creek (unpublished CCS reports, USFWS), also on the Bankhead National Forest, National Forests in Alabama.

This species typically occurs on frequently exposed shoals, or rooted among loose boulders in quiet pools up to 1 meter in depth. Plants grow in pure stands or in association with various submergents (Bowker 1991). Flowering is infrequent, and occurs from May into July and intermittently into the fall (Kral 1983). Flowering has only been observed in areas of direct sunlight, and at a water level that allows emergent leaves (Whetstone 1988).

Sphagnum seeps are frequently found with this species, and it prefers areas with stream bottoms that are narrow and bounded by steep slopes. Extant populations have only been found to occur on underlying formations of Pottsville sandstone (Bowker 1991). Eight of the twelve populations on the Little River system occur in pools or in riverine areas with partial canopy coverage, reporting individuals of 5-40. The remaining 4 occur in shallow shoals, supporting several dozen plants (Whetstone 1988).

Potential Effects

The most severe threat to this species is the elimination or adverse modification of the already limited habitat. Clearing, sedimentation, hydrological function alteration, and similar impacts have already caused the extirpation of at least one population (Kral 1983). Extreme water turbidity and dense filamentous algae decrease the amount of light available to the plants for growth and flowering.

A number of sites on the Bankhead National Forest as well as on private lands occupied by Kral's water-plantain are used as fords and are often a center for recreational activity, subjecting them to damage by off-road vehicle use (Bowker 1991). These sites are vulnurable to direct and indirect impacts by human-caused disturbances. Impoundments may have destroyed additional undocumented populations, since populations have been found above and below impoundments currently in place (Bowker 1991). These populations are particularly vulnerable to single disaster or human caused disturbances that could conceivably wipe out over a third of the known populations in a single event. Any management other than strict protection of these sites may be detrimental to the habitat and populations. Thus, it is even more critical that the populations that occur on federal lands be protected and managed to retain and improve habitat critical to this species. The preferred alternative provides guidance to minimize or eliminate impacts, while it provides management direction for protection for this species and it's habitat.

Determination of Effect

The sites located on the Bankhead all occur on the mid-reaches of the Brushy and Sipsey Rivers, above the Smith Lake impoundment. However, the protection measures and management guidelines provided in the preferred alternative are not likely to adversely affect Kral's water-plantain.

Green pitcher plant (*Sarracenia oreophila*)

Affected Environment

The U. S. Fish and Wildlife Service (USFWS) listed the green pitcher plant (Sarracenia oreophila) as an endangered species on September 21, 1979. Much of the following is taken from the 1994 revision of the Recovery Plan (U.S. Fish and Wildlife Service 1994) written for the species.

The green pitcher plant is restricted to sites in the Cumberland Plateau and Ridge and Valley Provinces in northeast Alabama, and to the Blue Ridge Province in Georgia and North Carolina. Only 35 natural populations of this species are known to be extant in Alabama (32), Georgia (1), and southwest North Carolina (2). Habitat for the plant is variable, and consists of both moist upland areas, many of which are described as seepage bogs, as well as boggy, sandy stream edges (U.S. Fish and Wildlife Service 1994).

Historical Sarracenia oreophila populations have been destroyed by residential development and clearing and disruption of the hydrological regime for agriculture, silviculture, and industrial use. Flooding of sites through construction of reservoirs, collection of plants, and cattle grazing are also cited as reasons sites have been destroyed. All of these activities continue to be threats to extant populations of the green pitcher plant. Plant succession and woody encroachment in green pitcher plant bogs also threaten the bog habitat where this species occurs (U.S. Fish and Wildlife Service 1994).

This pitcher plant is not known to naturally occur on National Forest lands in the analysis area. However, there are populations that are in 4 of the counties (north, east & west) of the Talladega/Shoal Creek units, and both of these units are within the historical range.. Suitable habitat has been found, but is currently unoccupied. Surveys will continue to include analysis of areas suitable for the green pitcher plant, and there is potential for establishing an orphan site in suitable habitat on-forest. Private landowners are not required to protect federally listed plants, and thus public land is critical in protecting and aiding in recovery of Sarracenia oreophila where possible.

Potential Effects

Recovery opportunities on National Forest lands consist primarily of continuing to survey for additional populations, protecting and managing populations if they are found, and protecting and managing any transplanted populations. Management actions are primarily those of controlling vegetative competition through pruning and prescribed burning, increasing light levels in the sites, and restoring the natural hydrological regime where necessary (U.S. Fish and Wildlife Service 1994). Effects to the green pitcher plant could occur through habitat manipulation, but any canopy opening or prescribed burning should be beneficial to the plants. Mechanical soil disturbance, compaction, rutting, and activities that could alter the hydrology of the potential suitable sites should be avoided. Because the pitcher plant is protected under the Endangered Species Act, no activities with potential to affect areas where the plants are found either adversely or beneficially can take place in the sites without concurrence from, or consultation with, USFWS.

Fire is needed to maintain suitable pitcher plant habitat (NatureServe 2001, USFWS 1994). Prescribed burning on the Little River Canyon Wildlife Refuge green pitcher plants sites in 2000, 2001 and 2002, conducted jointly between the USFWS, Alabama Natural Heritage Program and the USFS have shown dramatic increases in flowering, numbers of plants and increase in suitable habitat. Myers (1997) noted in his paper on management of a green pitcher plant bog in North Carolina, that without fire the site would eventually become a shrub-dominated bog. Sutter et al. (1994) reported positive effects to green pitcher plants following prescribed burning.

The National Forests in Alabama conduct project-level analyses. This will continue to occur under all alternatives. This species often occurs in riparian corridors, and protection will be provided for any pitcher plants if they are found located there. Forest-wide standards in National Forests in the Alabama Forest Plan revision that provide additional protection to the green pitcher plant are those that protect wetland rare communities, standards that protect individuals and sites of federally listed species and those that control exotic species where they are adversely affecting federally listed species.

Of the 35 natural green pitcher plant populations, the 1994 Recovery Plan revision (U.S. Fish and Wildlife Service) states that 6 sites are protected and considered secure in the long-term. In addition, The Nature Conservancy recently acquired the population located on private land in Georgia, thereby assuring its protection. There are 12 green pitcher plant populations protected on private land through Conservation Agreements with US Fish and Wildlife Service. Thus, 19 natural populations are currently protected, with 16 being at risk. However, the 12 populations on privately owned land are under Conservation Agreements and protected only as long as the landowner agrees to do so (U.S. Fish and Wildlife Service 1994). Continued protection and management of the established populations in Alabama will mitigate and should prevent any cumulative effects to the species. Throughout its range, however, the green pitcher plant remains at risk where it occurs on private land.

Determination of Effect

To ensure no adverse effects to green pitcher plant occur on the Forest, project-level analyses will be conducted. Site manipulation for introduction of green pitcher plant populations and habitat will be conducted only in consultation with USFWS. Because of the protective measures discussed above and the fact that no populations are currently known to occur on the National Forests in Alabama, implementation of any Plan alternative will have no effect on the green pitcher plant.

Alabama Canebrake Pitcher Plant (*Sarracenia rubra* ssp. *alabamensis*)

Affected Environment

The Alabama Canebrake Pitcher plant was federally listed as endangered in 1989 by the USFWS. This pitcher plant is endemic to Bibb, Autauga, Chilton, and Elmore Counties in Alabama. Fifteen populations are currently known to occur – one within the Oakmulgee administrative boundary, on private land; no populations are currently documented on national forest lands. Seventeen other populations within this area are believed to be extirpated (Neal et al 1992).

The Alabama Canebrake Pitcher plant is a carnivorous plant that occurs in sandhill seeps, swamps, bogs, and canebrakes along the fall-line of Alabama. This species produces two types of pitchers, and occasional phyllodia each season. Spring pitchers appear with the flowers, while summer pitchers are much larger (Neal et al 1992). Flowers are a dark maroon in color; the fruit is a capsule. Flowering occurs from late April to early June (Case and Case 1974, Kral 1983).

Habitat includes acidic, highly saturated deep peaty sands or clay. Recent pitcher plant populations were found to occur on the first terrace floodplain, directly at the end of a toe-slope (Goddard & Stewart, pers observation 1999). Colony sites are wet most of the year, and are often characterized as being on the upper slopes, rather than the traditional inset floodplain drainheads (Emanuel, pers comm 2000). Within this habitat type, the species are dependent upon intact hydrological function and maintenance of early successional stage herbaceous vegetation, including canopy openings (Neal et al 1992). Although this species does appear to be more shade tolerant than other species, its most vigorous flowering and growth occurs in full sunlight (Case and Case, 1974).

Habitat surveys were conducted in the 1990s on the Oakmulgee unit for this species. Additional surveys were initiated in 2001 and 2002, to not only survey potential habitat for occupation by the Alabama Canebrake pitcher plant, but to document suitable habitat. This may prove to be beneficial in aiding restoration or re-introduction of this species to federal lands, a critical juncture, since all but one population are currently located on private lands.

Potential Effects

Threats to this species include woody successional encroachment, lack of fire, conversion of land, development, soil compaction, construction of stock ponds on bog sites, drainage for pasture and development, and herbicide spraying as well as overcollection by plant dealers. At this time, the USFWS views recovery as an unrealistic goal due to the small number of populations, no establishment on federal lands, poor status of many of the sites, and limited protection on private lands.

Encroachment of competing vegetation resulting from changes in fire cycles, and changes altering the hydrology have limited its current distribution and abundance. Plant dealers and hobbyists have exacerbated these adverse effects by over-collecting and poaching (Neal et al 1992). Over 50% of this species' populations have been lost due to habitat destruction, woody encroachment, poaching and over-collection, and adverse land use practices (Neal et al 1992). Most of the current remaining sites are small, and nearly all are located on private lands. Federal lands could provide critical refugia for this species recovery, if suitable habitat is found.

Determination of Effect

To ensure no adverse effects to Alabama canebrake pitcher plant occur on the Forest, project-level analyses will be conducted. Site manipulation for introduction of Alabama canebrake pitcher plant populations and habitat will be conducted only in consultation with USFWS. Because of the protective measures discussed above and the fact that no populations are currently known to occur on the National Forests in Alabama, implementation of any Plan alternative will have no effect on the Alabama canebrake pitcher plant.

Alabama streak-sorus Fern (*Thelypteris pilosa* var. *alabamensis*)

Affected Environment

The Alabama streak-sorus fern was federally listed as threatened in 1992 (Gunn 1994). It was first discovered in 1949 on sandstone cliffs above the Sipsey Fork, in Winston County, Alabama. Construction of a bridge destroyed the type locality, and was believed to have been extirpated until its rediscovery approximately 8 miles upstream (Short & Freeman 1978). Subsequent field surveys have found at least 15 other sites along 4 miles of the Sipsey Fork, however this species has not been found elsewhere, despite numerous field surveys. Due to its limited distribution along a single river, a single catastrophic event, including an increase in the downstream lake level, could produce negative results.

The Alabama streak-sorus fern is a relatively small spray-cliff fern. It differs from other Thelypteris species in that it has no indusia and has sinuses of the pinnule margins reached by one lateral vein rather than by two (Smith 1993, Kral 1983). It is confined to Pottsville sandstone formations and requires high substrate moisture, high humidity, and shade. Plants are located within crevices or fissures, on ceilings and recessed walls or ledges on overhangs associated with small waterfalls. Occasionally plants could be found in moist seepage areas on exposed vertical rock faces. It is a spray-cliff dependent species, and must have moisture by seepage, humidity, shade, but also adequate diffuse light. The herbaceous species assemblage of the sandstone overhangs is part of the river gorge's long-established hemlock forest association on the Bankhead (Kral 1983, Gunn 1997).

Potential Effects

The Alabama streak-sorus fern is known to occur only in Winston County, Alabama, on the Bankhead National Forest. The type locality was destroyed, but subsequent work by the Alabama Natural Heritage program revealed 17 distinct extant occurrences distributed along 4 miles of the Sipsey Fork (Gunn 1997). The minimum historical distribution is assumed to include this area plus the stretch of the stream that is now inundated by the Smith Lake impoundment. It is probable that the species also occurred downstream, and perhaps even on the Brushy Creek or Rockhouse Creek (Gunn 1997). The overall greatest threat is described as its vulnerability to a single natural or human-induced disturbance, given its extremely restricted range and the relatively small number of plants that make up its total population (USFS 1997).

The Alabama streak-sorus fern is found primarily on a single drainage on the Bankhead National Forest. The Sipsey River contains the only populations known in the world. It is thought that water impoundments on streams in the Black Warrior River drainage have destroyed a large number of fern colonies, and it is vulnerable to any activities that would change the hydrology of its habitat and dehydrate its microhabitat (USFS, 1997). The proposed action emphasizes protection and restoration actions for this species.

Determination of Effect

The section of the Sipsey River, above the Smith Lake impoundment on the Bankhead National Forest is the only known site in the world to contain the Alabama streak-sorus fern. However, based on the management recommendations and protections provided in the preferred alternative, the proposed actions are not likely to adversely affect the Alabama Streak-sorus fern.

Relict Trillium – (*Trillium reliquum*)

Affected Environment

Relict trillium is a federally endangered species of basic mesic hardwood forests occurring on soils that contain a high level of organic matter and medium to high levels of calcium. The largest and most vigorous populations are located in the lower piedmont/fall line sandhills province, in drainages of both the Savannah and Chattahoochee Rivers of Georgia and South Carolina. Relict trillium is known to occur from 21 populations (U.S. Fish and Wildlife Service, 1990) in Alabama, Georgia, and South Carolina, but none of the populations occurs on National Forest land. Primary threats to the species are loss of habitat resulting from urban development, and in some cases, competition with invasive exotic species, logging, species conversion, or fire (TNC, 1990).

Although no populations are known from National Forest Land in Alabama, South Carolina, or Georgia, habitat is known to exist there. However, the likelihood of occurrence is low.

Potential Effects

All high quality basic mesic forest communities, habitat for relict trillium, would be managed under the 9F (rare community) prescription under all alternatives. Several standards for rare communities ensure their maintenance and restoration across the landscape. Rare communities would be protected from detrimental effects caused by management actions across all alternatives. Rare communities would be inventoried in proposed project areas when projects are being proposed which have the potential to adversely affect them.

Since federally listed plants receive little or no legal protection on private land, this species may be vulnerable to extirpation. Since no populations are known to occur on National Forest land, the direct and cumulative effects of National Forest planning alternatives on this plant are likely to be negligible.

Determination of Effect

Since no populations are known to occur on National Forest land, and since habitat will be protected across all alternatives, a determination of "No Effect" is made for this species across all alternatives.

Tennessee Yellow-Eyed Grass (*Xyris tennesseensis*) Kral

Affected Environment

The Tennessee yellow-eyed grass (*Xyris tennesseensis*) was first described as a separate species by Robert Kral in 1978. It was listed as an endangered species in 1991.

The Ridge and Valley physiographic region is a key area for this species, as are portions of the Highland Rim & Upper Gulf Coastal Plain. There are less than 4 locations documented in Georgia (Bartow & Whitfield counties), two documented locations in Tennessee (Lewis county) and less than 12 locations documented in Alabama. Nine of the Alabama sites are located in three Alabama counties – Franklin, Calhoun & Bibb, all of which are counties-of-occurrence for the Bankhead National Forest, the Shoal Creek & Talladega Districts, and the Oakmulgee District, respectively. This alone represents over half of the sites known worldwide. The Gordon County, Georgia population is considered to be extirpated, as is one of the Bartow county, GA populations (Kral, 1990).

The Lewis county population is in the highland rim, as is a single population in Alabama. The Georgia populations and the majority of the Alabama populations are located within the Ridge & Valley. However, the populations in Franklin County, Alabama and the Bibb County sites are just below the fall line occur in the Upper Gulf Coastal Plain (Kral, 1990).

The Tennessee yellow-eyed grass is a perennial herb with basal, erect linear leaves (NatureServe, 2002). The plant typically occurs in clumps, with the leaves clustered at the bulbous base, the outermost leaves being small and having a dark purplish-maroon to pinkish red scale-like appearance (Patrick et al, 1995). The inner leaves are larger and linear in shape, varying in length from 3-18 inches long, deep green in color, and slowly twisting as it ascends the stalk (Gothard, 1995). The unbranched flowering inflorescence consists of brown cone-like spikes, single at the tips of each one to three foot tall flower stalk, containing small, pale yellow flowers (three petals) which open in the morning, wither in the afternoon, and only appear a few at a time (Somers, 1993, Gothard, 1995). Roots are slender, shallow, and fibrous (Kral, 1983). Fruits are obovoid or broadly ellipsoid capsules with thin, plano-convex walls and three sutures, with numerous ellipsoid seeds covered by 18-20 fine, longitudinal lines that are sometimes interconnected (Kral, 1983, Somers, 1993). Blooming occurs from August to September, with fruiting from September to October.

All yellow-eyed grasses require habitats that are moist to wet year round, ranging from sunny to partial shade or very thinly wooded (with little canopy cover) conditions. Preferred landforms include drains, swales, seeps, springs, springy meadows, bogs, fens, and banks of small streams. The Tennessee yellow-eyed grass differs from other Xyridaceae in that instead of preferring acidic sites, it is found where calcareous rock such as shale, limestone and dolomite are at, near or have been deposited near the soil surface, or where thin calcareous soils are present (NatureServe 2002, Somers 1993). This character results in soils that are more neutral to basic than acidic (Gothard, 1995). Community types include seepage slopes, springy meadows, bogs, and streamside (Kral, 1983, Natureserve 2002). Substrates include gravelbars, sandbars, shallow sand/soil deposits or cracks in the limestone, narrow sandbars located on ketone dolomite, wet ditches of mixed clay and sand, and rich deposits of marshland. One site occurs on an earth dike in an impounded swamp. Soils are slow to establish and prone to erode during heavy rain events because most sites are wet and relatively steep (Somers, 1993). The sites tend to be open, wet disturbance or open-canopy early successional-related herbaceous understory habitats, with an abundant herbaceous layer and few woody shrubs and a thin canopy of trees.

Where populations of Tennessee yellow-eyed grass occur along separate parts of the same stream, continuous corridors of suitable habitat are not available and they are often widely separated (USFWS 1994). In these instances, propagules may move downstream to mix with those of other populations or colonize suitable habitat where it exists, however only seldom would there be opportunity for upstream movement of propagules or pollinators from site to site (Somers, 1993).

Despite extensive surveys, fewer than 20 populations are known to be extant, with each site occupying less than ½ an acre. Only one site is known to contain more than a few hundred plants, with at least three containing less than 20 individuals (Kral, 1990, Patrick et al, 1995). Due to the small size of most of these population sites, Kral suggested that Tennessee yellow-eyed grass was historically rare throughout its range. Three historical populations have been lost, and at least 4 of the remaining populations are in decline due to highway construction/right-of-way maintenance and other habitat destruction (NatureServe, 2002). In addition to sites lost during road construction, other significant habitat losses have been sustained as a result of drainage of lowland wetlands, conversion to agricultural fields, careless forest management practices and impoundment of wetlands (Patrick et al, 1995, Kral 1990, NatureServe 2002, USFWS 1994).

Potential Effects

The endangered status of the Tennessee yellow-eyed grass is primarily a result of its apparent limited distribution and the fragile nature of the habitat upon which it depends (Gothard, 1995). The activities responsible for loss of habitat are varied but they all lead to habitat destruction through conversion or loss of the original hydrological function. For the Tennessee yellow-eyed grass, ground disturbing activities, impoundments, road construction and unrestricted herbicide foliar spraying have the greatest potential to affect both individuals and populations. The other sources of habitat modification or destruction, described above, are not permitted on National Forest lands.

Based on the plant's wetland habitat and the general biology of yellow-eyed grasses, Tennessee yellow-eyed grass could be positively managed by protecting sites from encroachment by woody shrub species; leaving a partial (or thinned) overstory canopy in place; and ensuring that activities taking place in areas where the plant occurs do not adversely affect the hydrology of the site (Moffett, 2002). Management options would include hand removal of woody midstory/shrub encroachment, thinning based on site-specific recommendations and mitigation, and burning. Total canopy removal is not recommended (Moffett 2002). In cases where National Forest lands lie downstream from known populations, suitable habitat sites need to be monitored to survey for new colonies.

There are no known populations located on the National Forests in Alabama, however, three populations in Calhoun County occur near the Talladega National Forest, there is a site within 2 miles of the Bankhead National Forest, and a series of populations along the Cahaba River both above and below the Oakmulgee unit where it crosses the Cahaba. Habitat meeting the general description necessary for the Tennessee yellow-eyed grass is present on those three units for the National Forests in Alabama. Protection, monitoring and continuous surveys for habitat and new populations will be included in our recovery objectives. In addition, habitat surveys will include evaluation for potential of introduction/reintroduction to promote recovery efforts. All ground disturbing activities that occur on national forest lands will employ the Forest-Wide and Riparian Standards. Implementation of these standards will be monitored and corrected as needed or as new information becomes available.

The effects of management show that although total canopy cover removal induces enhanced flowering of the Tennessee yellow-eyed grass for the first year following the action, subsequent years show that the woody encroachment and other herbaceous species out-compete this species, resulting in a decline (Moffett, 2002). Mowing does not seem to have a direct impact on the Tennessee yellow-eyed grass, however some indirect effects produced are positive (removal of midstory & shrub encroachment) while others are negative (rutting and compacting of the soil by the machines, resulting in change in hydrology) (Moffett 2002). This puts mowing in a no-net-gain category for suggested management actions. Prescribed burning during the winter and early spring (opposite the flowering period) seem to produce positive results, as does careful midstory removal, taking care to keep soil compaction to a minimum and allowing no rutting to occur.

Annually, a portion of the existing populations on national forest lands will be monitored by Forest Biologists and Specialists, and surveys will be conducted to identify and assess potential reintroduction sites. The results will be reported in Monitoring and Evaluation Report. At least once every five years, a professional botanist or ecologist will survey the entire suitable habitat managed by the National Forests in Alabama to evaluate the expansion or contraction in habitat suitability or utilization. If augmentation of existing or re-introduced populations is determined to be necessary, the Forest will assist the lead agency.

Determination of Effect

Through implementation of the Forest-Wide, Rare Community, T&E species and Riparian Standards, and due to the fact that there are no sites found directly on National Forests in Alabama lands, the selection of any of the alternatives will have No Effect on the Tennessee yellow-eyed grass (*Xyris tennesseensis*).

6.0 Viability

6.1 Terrestrial Species Viability Evaluation

National Forest Management Act (NFMA) regulations, adopted in 1982, require that habitat be managed to support viable populations of native and desirable non-native vertebrates within the planning area (36 CFR 219.19). USDA regulation 9500-004, adopted in 1983, reinforces the NFMA viability regulation by requiring that habitats on national forests be managed to support viable populations of native and desired non-native plants, fish, and wildlife. These regulations focus on the role of habitat management in providing for species viability. Supporting viable populations involves providing habitat in amounts and distributions that can support interacting populations at levels that result in continued existence of the species well distributed over time.

The Southern Appalachian region supports extremely high levels of biological diversity relative to other regions, viewed both nationally and globally. As a result, large numbers of species are present for which population viability may be of concern. Detailed demographic or habitat capability analysis to evaluate population viability is not feasible for this large number of species. Therefore, our goal for this evaluation is to use a clearly defined, transparent process to identify species for which there are substantive risks to maintenance of viable populations, and to ensure consideration of appropriate habitat management strategies to reduce those risks to acceptable levels where feasible.

For comprehensiveness and consistency, evaluation of species viability was coordinated across several national forests undergoing simultaneous plan revisions. These forests are the Jefferson National Forest, Cherokee National Forest, Sumter National Forest, Chattahoochee and Oconee National Forests, and National Forests in Alabama. These forests encompass portions of the Southern Appalachian, Piedmont, and East Gulf Coastal Plain ecoregions. However, the scale for this assessment is set by NFMA regulations as the “planning area,” or the area of the National Forest System covered by a single forest plan. Therefore, separate risk assessment was done for each national forest covered by a separate forest plan. Risk assessment was further split where national forest units under the same forest plan occur in different ecoregions, or are widely separated geographically. There are five separate management units on the National Forests in Alabama that are geographically separated from each other. The Bankhead National Forest lies in the Southern Cumberland Plateau. The Talladega Division occurs on the southern edge of the Southern Ridge and Valley, with portions of its southern extent in the Piedmont physiographic region. These two management units fall within the Southern Appalachian ecoregion. The Oakmulgee Division and Tuskegee National

Forest lie at the edge of the Fall Line that demarcates the Upper Coastal Plain. The Oakmulgee Division is in west central Alabama, and the Tuskegee is in east central Alabama. The Conecuh National Forest is in the Lower Coastal Plain physiographic region, bordering the state of Florida. The Oakmulgee, Tuskegee, and Conecuh management units fall within the East Gulf Coastal Plain ecoregion. Although viability evaluation was coordinated across the ecoregions, analysis presented here focuses on information relevant to the five management units of the National Forests in Alabama.

Because NFMA regulations require providing habitat for species viability within the planning area, focus of this evaluation is on habitat provided on national forest land. Surrounding private lands may contribute to, or hinder, maintenance of species viability on national forest land, but are not relied upon to meet regulation requirements. For this reason, habitat abundance was assessed based on conditions found on national forest land. Habitat distribution, however, was assessed considering the condition of intermixed ownerships and conditions, which may affect the interactions of species among suitable habitat patches on national forest land.

Evaluation of migratory birds focused on breeding populations only, unless otherwise indicated. This focus does not mean that wintering and migrating populations were not considered during planning, but that viability evaluation makes most sense when viewed in terms of the relative stability of breeding populations.

Much of the foundational information used in this evaluation was compiled by NatureServe, under a Participating Agreement with the Forest Service. NatureServe is an international non-profit organization, formerly part of The Nature Conservancy. Its mission is to develop, manage, and distribute authoritative information critical to conservation of the world's biological diversity. Partnership with NatureServe was sought as a means to ensure the best available information on species status and habitat relationships was used in this evaluation. Under this agreement, NatureServe staff engaged numerous species experts and state heritage programs to develop a relational database that includes relevant information on species' status, habitat relationships, and threats to viability.

Viability Evaluation Process

Risk to maintenance of viability over the next 50 years was assessed for each species in relation to each of its principle habitat relationships by plan revision alternative. Risk assessment was based on three factors: 1) current species abundance, 2) expected habitat abundance in 50 years, and 3) expected habitat distribution in 50 years (Figure 3B-2). Once risk ratings were developed, we assessed how well management strategies across alternatives provide for species viability.

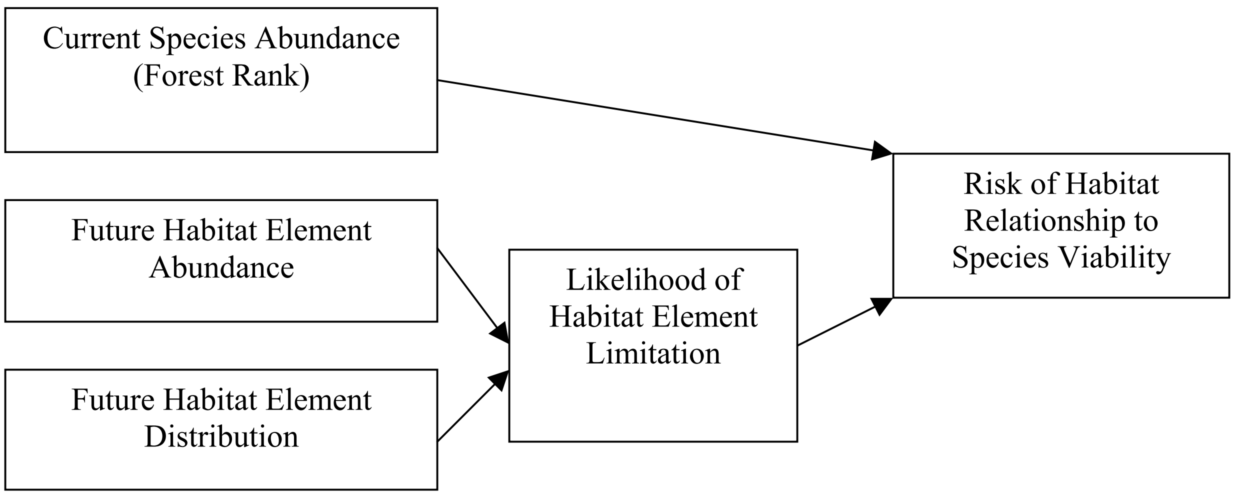


Figure 3B-2. Relationship of variables used to rate the risk to viability resulting from a species' relationship with a habitat element.

A comprehensive list of species with potential viability concern was compiled for the National Forests in Alabama. The list includes those species found, or potentially found, on the National Forests in Alabama from the following categories:

- Species listed as proposed, threatened, or endangered under the federal Endangered Species Act,
- Species listed on the Regional Forester's Sensitive Species list,
- Species identified as locally rare on the National Forest by Forest Service biologists,
- Birds of conservation concern as identified by the US Fish and Wildlife Service, and
- Declining species of high public interest.

Species lists from all national forests in the Southern Appalachian and Piedmont Eco-regions, and Coastal Plain forests in Alabama, were pooled to create comprehensive lists of species of potential viability concern. NatureServe staff and contractors assigned abundance ranks for each species on the comprehensive eco-region list for each unit of the National Forests in Alabama. These Forest Ranks, or F Ranks, follow the conventions used by NatureServe and others in defining State and Global Ranks (Table 3B-80).

F Ranks were used in viability risk assessment as a categorical variable representing a species' current abundance. Forest Service biologists reviewed F Ranks developed by NatureServe to identify any inconsistencies between these rankings and Forest Service information. Discrepancies in this abundance variable were resolved through coordination with NatureServe and its contractors. Where conflicting information or opinion on species abundance occurs, the most conservative information (i.e., that indicating lowest abundance) was used.

Only those species that are both confirmed present and rare or of unknown abundance (F1 through F3, and F?) on the National Forests in Alabama were assessed for viability risk. Species ranked as F? were treated as F1 species to provide a conservative approach to those species for which abundance information is not available. Species that are currently abundant on the forest (F4, F5) are assumed to be at low risk of losing viability within the next 50 years, and, therefore, were not further evaluated for viability risk.

Table 3B-80. Forest Ranks (F Ranks) and definitions used to define status of species on National Forests in Alabama as part of species viability evaluation for forest plan revision, 2002.

F Rank	F Rank Definition
F0	Not present; no known occurrence on the forest unit and forest is outside species' range or habitat not present.
F1	Extremely rare on the forest unit, generally with 1-5 occurrences.
F2	Very rare on the forest unit, generally with 6-20 occurrences.
F3	Rare and uncommon on the forest unit, from 21-100 occurrences.
F4	Widespread, abundant, and apparently secure on the forest unit.
F5	Demonstrably secure on the forest unit.
F?	Present on the forest, but abundance information is insufficient to develop rank.
FP	Possibly could occur on the forest unit, but documented occurrences are not known.
FH	Of documented historical occurrence on the forest unit; may be rediscovered.
FX	Once occurred but has been extirpated from the forest unit; not likely to be rediscovered.

Because viability regulations focus on the role of habitat management in providing for species viability, habitat condition was the primary factor used to drive species viability evaluation. NatureServe staff and contractors identified habitat relationships for all species of potential viability concern, linking each species to vegetation community types, successional stages, and habitat attributes as appropriate. Based on this information, each species was linked by Forest Service biologists to one or more habitat elements. These habitat elements (Table 3B-81) roughly correspond to categories of management direction included in the revised Plan, and to sections of effects analysis included in this environmental impact statement. NatureServe staff reviewed and provided adjustments to species' assignment to these habitat element groups.

Table 3B-81. Habitat elements used to plan for, and assess risk to, viability of terrestrial species during forest plan revision, National Forests in Alabama.

Habitat Element	Element Description
Bogs, Fens, Seeps, Seasonal Ponds	Bogs, fens, seeps, seasonal ponds characterized by saturated soils

Table 3B-81. Habitat elements used to plan for, and assess risk to, viability of terrestrial species during forest plan revision, National Forests in Alabama.

Habitat Element	Element Description
Open Wetlands	Open wetlands, marshes, beaver ponds, generally characterized by having some permanent standing water
River Channels	Riverine gravel and sand bars, and river banks subject to flood scour
Glades and Barrens	Glades and barrens characterized by shallow soils, exposed parent material, and sparse or stunted vegetation
Basic Mesic Forests	Basic mesic or "rich cove" forests characterized by calciphilic herbs and usually dominated by maples, basswood, and buckeye.
Rock Outcrops and Cliffs	Rock outcrops and cliffs characterized by exposed rock, shallow soils and sparse vegetation
Spray Cliffs	Rock that remains wet for all or most of the year, associated with waterfalls or seepage
Canebrakes	Canebrakes characterized by dense stands of cane and open canopies, usually within riparian areas
Caves and Mines	Caves and mines with microclimates capable of supporting associated biota
Baygalls and Bayheads	Coastal plain baygalls and bayheads
Coastal Plain Ponds and Swamps	Coastal plain ponds and cypress tupelo swamps
Sandhills	Longleaf pine sandhills in the coastal plan
Wet Savannas and Flatwoods	Coastal plain wet savannas and flatwoods
Mature Mesic Hardwood Forests	Mid- and late-successional mesic deciduous forests, including northern hardwood, mixed mesophytic, mesic oak, and bottomland hardwood forests
Mature Hemlock Forests	Mid- and late-successional eastern hemlock and eastern hemlock-white pine forests in native settings, typically on stream terraces and other mesic sites
Mature Oak Forests	Dry to mesic mid- and late-successional oak and oak-pine forests subject to moderate levels of disturbance sufficient to maintain the oak component
Mature Yellow Pine Forests	Mid- and late-successional southern yellow pine and pine-oak forests maintained in open conditions by frequent fire
Mature Longleaf Pine Forests	Mid- and late-successional longleaf pine forests in the coastal plain maintained in open conditions by frequent fire
Mature Mountain Longleaf Pine Forests	Mid- and late-successional mountain longleaf pine forests maintained in open conditions by frequent fire

Table 3B-81. Habitat elements used to plan for, and assess risk to, viability of terrestrial species during forest plan revision, National Forests in Alabama.

Habitat Element	Element Description
Early-Successional Forests	Early-successional forests, typically aged 0-10 years and dominated by woody species
Mature Forest Interiors	Mature forest interiors with minimal adverse effects due to forest edge.
Canopy Gaps	Mid- and late-successional mesic deciduous forests with a diverse vertical and horizontal structure as a result of gaps in the canopy
Woodlands and Savannas	Open woodlands and savannas characterized by low canopy cover and rich grass-dominated understories, and maintained in open conditions by periodic fire
Grasslands	Grasslands with little to no overstory, usually occurring as patches within woodland and savanna complexes and maintained by periodic fire
Mixed Landscapes	Landscapes characterized by a broad mix of successional habitats
Late Successional Riparian	Riparian areas dominated by mid- and late-successional deciduous forests
Early-Successional Riparian	Riparian areas with a dense understory or early-successional forest in riparian areas
Snags	Forests containing an abundance of snags
Downed Wood	Forests containing an abundance of downed wood and thick leaf litter
Den Trees	Forests containing an abundance of large hollow trees suitable as den trees
Hard Mast	Forests producing abundant hard mast
Remoteness	Remote habitats away from frequent human disturbance
Lakeshores	Forested shores of lakes and ponds
Water Quality	High water quality in streams and lakes

Effects to these habitat elements are analyzed in this EIS under other sections. Based on these analyses, each habitat element was assigned categorical values by alternative to indicate future abundance (Table 3B-82) and distribution (Table 3B-83), general likelihood that the habitat element would limit viability of associated species (Table 3B-84), and overall effect of national forest management on the habitat element (Table 3B-85).

The future abundance variable (Table 3B-82) is defined as the abundance of the associated habitat element in fifty years if the alternative were selected and implemented over that fifty-year period. This variable indicates the abundance of the habitat element on national forest land only, to provide focus on the role of the national forest planning area in supporting associated species. Its focus on national forest land only reflects recognition that viability is to be provided within the "planning area" (area covered by the forest plan). Definitions of abundance categories are stated in quantifiable terms in order to be objective as possible; however, in many cases quantifiable estimates of future abundance are not available. In these cases, knowledge of Forest Service biologists was used to assign abundance values based on current conditions and the magnitude and direction of effects expected under each alternative.

Table 3B-82. Values used to categorize projected abundance of each habitat element after 50 years of implementing each forest plan revision alternative.

Habitat Abundance Value	Description
Rare	The habitat element is rare, with generally less than 100 occurrences, or patches of the element generally covering less than 1 percent of the national forest planning area.
Occasional	The habitat element is encountered occasionally, and generally is found on 1 to 10 percent of the national forest planning area.
Common	The habitat element is abundant and frequently encountered, and generally is found on more than 10 percent of the national forest planning area.

Similar to the future abundance variable, the future distribution variable (Table 3B-83) is defined as the distribution of the associated habitat element in fifty years if the alternative were selected and implemented over that fifty-year period. In contrast to the abundance variable, it includes consideration of intermixed ownership patterns and conditions, and their general effects on movements and interactions of individuals among the suitable habitat patches found on national forest land. Because assessing adequacy of habitat distribution for a species requires a level of knowledge not available for most species, and the number of species being evaluated is very large, we have defined habitat distribution in terms of a historical reference condition—that which was present prior to the major perturbations associated with European settlement of the planning area. This period is generally defined as 1000 to 1700 A.D. This approach relies on the assumption that a habitat distribution similar to that which supported associated species during recent evolutionary history will likely contribute to their maintenance in the future, and that the further a habitat departs from that historical distribution, the greater the risk to viability of associated species. This approach has its own set of difficulties, as evidence of presettlement conditions relevant to the planning area is often anecdotal and scarce. In addition, the reference period may have included a wide variety of conditions because of growing aboriginal populations and accompanying use of agriculture and fire during the early portion of this period, and their subsequent dramatic decline due to disease epidemics following early European contact. Nevertheless, the precision required to assign the categorical values for this variable is not high, and may be supported by general positions described in mainstream conservation literature (see Wear and Greis 2002). Knowledge of Forest Service biologists was used to assign distribution values, based on interpretations of historical conditions supported by conservation literature, current conditions, and magnitude and direction of effects expected under each alternative.

A difference in scale between the Habitat Abundance and Habitat Distribution variables is intentional in order to bring two different pieces of information into the analysis. Habitat Abundance has been defined in terms of the amount of habitat on national forest land only.

This definition reflects the amount of habitat available to support a species on the national forest, in recognition of regulation requirements that viability be provided within the "planning area" (area covered by the forest plan). Habitat Distribution, on the other hand, is defined to include the landscape setting of National Forest lands, which includes the intermingled private lands and broken ownership patterns that provides the context for national forest populations and may affect ability of individuals living on national forest lands to interact with each other.

Table 3B-83. Values used to categorize projected distribution of each habitat element after 50 years of implementing each forest plan revision alternative.

Habitat Distribution Value	Description
Poor	The habitat element is poorly distributed within the planning area and intermixed lands relative to conditions present prior to European settlement. Number and size of habitat patches and/or their evenness in distribution across the landscape is greatly reduced.
Fair	The habitat element is fairly well distributed within the planning area and intermixed lands relative to conditions present prior to European settlement. Number and size of habitat patches and/or their evenness in distribution across the landscape is somewhat reduced.
Good	The habitat element is well distributed within the planning area and intermixed lands relative to conditions present prior to European settlement. Number and size of habitat patches and/or their evenness in distribution across the landscape is similar to or only slightly reduced relative to reference conditions.

Habitat element abundance and distribution variables were combined to create one variable to indicate the general likelihood that the habitat element would be limiting to populations of associated species (Table 3B-84). In this general context, habitat limitation refers to a habitat factor—quantity, distribution, or quality—that results in risk to continued existence of the species within the planning area. Everything else being equal, quality habitat elements that are rare and poorly distributed are those most likely to cause risk to viability of associated species; those that are common and well distributed are least likely to cause risk to viability of associated species.

Table 3B-84. Likelihood of habitat limitation (High, Moderate, and Low) to associated species as derived from habitat abundance and distribution values.

Habitat Abundance	Habitat Distribution		
	Poor	Fair	Good
Rare	High	High	Moderate
Occasional	High	Moderate	Low
Common	Moderate	Low	Low

Providing for species viability requires providing abundant and well-distributed habitat in ways that allow existing populations to persist or expand. The ability of existing populations to respond to available habitat depends in part on their current robustness, which is generally a function of population size. In general, for a given habitat condition, small populations will be at more risk than large populations. To reflect this fact, likelihood of habitat limitation variable was combined with a species' F Rank for each species/habitat element interaction to generate viability risk ratings (Table 3B-85). Associations of very rare species with habitat elements that are likely to be most limiting were identified as those most at risk; associations of more common species with habitats less likely to be limiting received lower risk ratings. Ratings include three levels of "high" risk (Table 3B-85) to ensure that results err on the side of caution.

Table 3-85. Viability risk ratings for species/habitat interactions as a function of a species' F Rank and likelihood of habitat element limitation variables.

Likelihood of Habitat Element Limitation	Species F Rank		
	F1 or F?	F2	F3
High	Very High	High	Moderately -High
Moderate	High	Moderately-High	Moderate
Low	Moderately-High	Moderate	Low

Once viability risk ratings were developed for each species/habitat relationship, habitat elements most commonly associated with risks to species viability were identified by counting the number of very high, high, and moderately high ratings associated with each. To assess the role of national forest management in minimizing viability risk associated with each habitat element, a management effects variable was assigned to each habitat element by alternative. The management effects variable (Table 3B-86) categorizes the goal of management for the habitat element, the expected resulting trend, and any additional opportunity for minimizing viability risk. Numbers of very high, high, and moderately-high risk ratings were summarized by management effects variable by alternative to assess how well alternatives address viability-related habitat needs.

Table 3B-86. Values used to categorize the effect of national forest management in minimizing or contributing to species viability risk associated with each habitat element by forest plan revision alternative.

Management Effect Value	Description
1	Abundance and distribution of the habitat element is maintained or improved by providing optimal protection, maintenance, and restoration to all occurrences (with limited exceptions in some cases). Little additional opportunity exists to decrease risk to viability of associated species because management is at or near optimal.
2	Abundance and distribution of the habitat element is improved through purposeful restoration, either through active management or passively by providing for successional progression. Opportunity for decreasing risk to associated species is primarily through increasing rates of restoration, where possible.
3	The habitat element is maintained at approximately current distribution and abundance, though location of elements may shift over time as a result of management action or inaction. Opportunity to reduce risk to viability of associated species is primarily through adopting and implementing objectives to increase abundance and distribution of the habitat element.

Table 3B-86. Values used to categorize the effect of national forest management in minimizing or contributing to species viability risk associated with each habitat element by forest plan revision alternative.

Management Effect Value	Description
4	Regardless of management efforts, the habitat element is expected to decrease in distribution and abundance as a result of factors substantially outside of Forest Service control (e.g., invasive pests, acid deposition). Opportunity to reduce risk to viability of associated species is primarily through cooperative ventures with other agencies and organizations.
5	The habitat element is expected to decrease in distribution and abundance as a result of management action or inaction. Opportunity to reduce risk to viability of associated species is primarily through adopting and implementing objectives to maintain or increase this habitat element.

Distribution of viability risk was also summarized by species status, i.e., federally listed under the Endangered Species Act, listed as Regional Forester's sensitive species, or identified as locally rare or of other concern. The species status summary highlights the relative role of other provisions included in law and policy that result in additional consideration of at-risk species during planning.

Viability Evaluation Results

Species viability evaluation for the Bankhead National Forest and Talladega Division of the Talladega National Forest included consideration of 1368 species of the Southern Appalachian ecoregion. Of these species, 149 on Bankhead, and 199 on Talladega Division from the Southern Appalachian ecoregion are considered rare and are known to occur on these management units. Species viability evaluation for the Conecuh National Forest, Tuskegee National Forest, and the Oakmulgee Division of the Talladega National Forest included consideration of 199 species of the Alabama Coastal Plain. Of these species, 115 on Conecuh, 17 on Tuskegee, and 40 on Oakmulgee Division from the Alabama Coastal Plain are considered rare and are known to occur on Conecuh National Forest, Tuskegee National Forest, and Oakmulgee Division of the Talladega National Forest.

Outcomes for habitat elements, as described under individual effects analysis sections, are summarized in Appendix F, Table K, using the four variables described above. These variables indicate expected habitat condition following fifty years of implementing each forest plan revision alternative.

Ratings of risk to viability for each species/habitat relationship by alternative are presented in Appendix F. To facilitate comparison of effects of alternatives on species viability, the number of very-high, high, and moderately-high risk ratings are summarized for each alternative by habitat element, management effect, and species status. (See tables below.)

Viability risk rating summaries indicate relatively small differences among alternatives relative to effects on species viability. This similarity results from planning efforts to include in all alternatives provisions to provide for species viability in compliance with NFMA regulations. Examples of such provisions common to all alternatives (except Alternative F, which represents the current forest plan) are the prescriptions for rare communities and riparian corridors.

Similarity of viability outcomes among alternatives also results from the influence of external forest health threats, which represent serious risks to forest communities and associated species regardless of alternative. Differences among alternatives are also muted by the small scale of actions contemplated under all alternatives relative the more extensive effects to ecological systems that have occurred to national forest landscapes since European settlement. Broader scale effects will likely continue to have similar important effects to species viability regardless of which alternative is selected.

Management Area 1 – Bankhead National Forest

The Bankhead National Forest lies in the Southern Cumberland Plateau physiographic region. This represents the southwesterly extent of the Southern Appalachian ecoregion. Species viability evaluation for the Bankhead National Forest included consideration of 1368 species of the Southern Appalachian ecoregion. Of these species, 149 from the Southern Appalachian ecoregion are considered rare and are known to occur on Bankhead National Forest.

Table 3B-87. Number of species/habitat relationships rated as very high, high, and moderately high risk to terrestrial species viability for each habitat element by forest plan revision alternative, Bankhead National Forest.

	Alternative						
Habitat Element/Risk	A	B	D	E	F	G	I
Bogs, Fens, Seeps, Seasonal Ponds							
Very High	7	7	7	7	7	7	7
High	2	2	2	2	2	2	2
Moderately High	1	1	1	1	1	1	1
Total	10	10	10	10	10	10	10
Open Wetlands							
Very High	2	2	2	2	2	2	2
High	1	1	1	1	1	1	1
Moderately High	1	1	1	1	1	1	1
Total	4	4	4	4	4	4	4
River Channels							
Very High	1	1	1	1	1	1	1
High	1	1	1	1	1	1	1
Moderately High	1	1	1	1	1	1	1
Total	3	3	3	3	3	3	3
Glades and Barrens							
Very High	0	0	0	0	0	0	0
High	12	12	12	12	12	12	12
Moderately High	2	2	2	2	2	2	2
Total	14	14	14	14	14	14	14
Basic Mesic Forests							
Very High	0	0	0	0	12	0	0
High	12	12	12	12	4	12	12
Moderately High	4	4	4	4	1	4	4
Total	16	16	16	16	17	16	16
Rock Outcrops and Cliffs							
Very High	0	0	0	0	0	0	0
High	20	20	20	20	20	20	20

Moderately High	5	5	5	5	5	5	5
Total	25	25	25	25	25	25	25
Spray Cliffs							
Very High	0	0	0	0	0	0	0
High	10	10	10	10	10	10	10
Moderately High	2	2	2	2	2	2	2
Total	12	12	12	12	12	12	12
Canebrakes							
Very High	0	0	0	0	0	0	0
High	0	0	0	0	0	0	0
Moderately High	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0
Caves and Mines							
Very High	2	2	2	2	2	2	2
High	2	2	2	2	2	2	2
Moderately High	1	1	1	1	1	1	1
Total	5	5	5	5	5	5	5
Mature Mesic Hardwood Forests							
Very High	0	0	0	0	0	0	0
High	0	0	0	0	0	0	0
Moderately High	24	24	24	24	24	24	24
Total	24	24	24	24	24	24	24
Mature Hemlock Forests							
Very High	16	16	16	16	16	16	16
High	1	1	1	1	1	1	1
Moderately High	1	1	1	1	1	1	1
Total	18	18	18	18	18	18	18
Mature Oak Forests							
Very High	0	0	0	0	0	0	0
High	0	0	0	0	0	0	0
Moderately High	6	6	6	6	6	6	6
Total	6	6	6	6	6	6	6
Mature Yellow Pine Forests							
Very High	5	5	5	0	0	0	0
High	0	0	0	5	5	5	5
Moderately High	1	1	1	0	0	0	0
Total	6	6	6	5	5	5	5
Early-Successional Forests							
Very High	0	0	0	0	0	4	0
High	0	0	0	4	0	1	0
Moderately High	4	4	4	1	4	1	4
Total	4	4	4	5	4	6	4
Mature Forest Interiors							
Very High	0	0	0	0	0	0	0
High	0	0	0	0	0	0	0
Moderately High	3	3	3	3	3	3	3
Total	3	3	3	3	3	3	3
Canopy Gaps							
Very High	0	0	0	0	0	0	0
High	0	0	3	0	0	0	0
Moderately High	3	3	0	3	3	3	3

Total	3	3	3	3	3	3	3
Woodlands, Savannas, and Grasslands							
Very High	10	0	10	0	10	0	0
High	2	0	2	10	2	10	10
Moderately High	1	10	1	2	1	2	2
Total	13	10	13	12	13	12	12
Cedar Woodlands							
Very High	0	0	0	0	0	0	0
High	0	0	0	0	0	0	0
Moderately High	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0
Mixed Landscapes							
Very High	0	0	0	0	0	0	0
High	0	0	0	0	0	0	0
Moderately High	3	3	3	3	3	3	3
Total	3	3	3	3	3	3	3
Late Successional Riparian							
Very High	0	0	0	0	0	0	0
High	0	0	0	0	0	0	0
Moderately High	35	35	35	35	35	35	35
Total	35	35	35	35	35	35	35
Early-Successional Riparian							
Very High	4	4	4	4	4	4	4
High	1	1	1	1	1	1	1
Moderately High	1	1	1	1	1	1	1
Total	6	6	6	6	6	6	6
Snags							
Very High	0	0	0	0	0	0	0
High	0	0	0	0	0	0	0
Moderately High	2	2	2	2	2	2	2
Total	2	2	2	2	2	2	2
Downed Wood							
Very High	0	0	0	0	0	0	0
High	0	0	0	0	0	0	0
Moderately High	6	6	6	6	6	6	6
Total	6	6	6	6	6	6	6
Den Trees							
Very High	0	0	0	0	0	0	0
High	0	0	0	0	0	0	0
Moderately High	1	1	1	1	1	1	1
Total	1	1	1	1	1	1	1
Hard Mast							
Very High	0	0	0	0	0	0	0
High	0	0	0	0	0	0	0
Moderately High	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0
Remoteness							
Very High	0	0	0	0	0	0	0
High	0	0	0	0	0	0	0
Moderately High	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0

Lakeshores							
Very High	0	0	0	0	0	0	0
High	0	0	0	0	0	0	0
Moderately High	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0
Water Quality							
Very High	0	0	0	0	0	0	0
High	0	0	0	0	0	0	0
Moderately High	3	3	3	3	3	3	3
Total	3	3	3	3	3	3	3
All Habitat Elements							
Very High	47	37	47	32	54	36	32
High	64	62	67	81	61	78	77
Moderately High	111	120	108	108	107	108	111
Total	222	219	222	221	222	222	220

Evaluation results indicate, under all alternatives, high levels of risk to species viability are associated with certain key habitats. Highest levels of risk are associated with 1) mature hemlock forests, 2) woodlands, savannas, and grasslands, 3) and bogs, fens, seeps and seasonal ponds. Highest levels of risk are minimized on Bankhead Management Unit by Alternatives E and I.

Mature hemlock forests are critical to maintaining species viability because they are naturally limited to the riparian areas and canyons of Bankhead National Forest, and represent the edge of range for many associated species. They therefore support large numbers of species of potential viability concern. While their distribution may be somewhat reduced over historical conditions, the biggest threats to this community and associated species are impacts from further conversion of remnants of the forest type on private property, and the possibility of future hemlock wooly adelgid infestation. Mature hemlock forests are provided optimal protection and management under the rare community (9F) and canyon corridor (4L) prescription, external threats are more likely to determine the fate of this community and viability of associated species. Little opportunity for reducing risks through typical national forest management is apparent under any alternative.

Woodlands, savannas and grasslands are critical to maintaining species viability due to their present rarity on the landscape, their decline following European settlement due to fire suppression and land use conversion, and their unusual structure and species composition complexes. Several vascular plants, reptiles, birds, and insects of viability concern are associated with the open, park-like structure and herbaceous layer of woodland and savanna communities. Highest levels of risk are produced by Alternatives A, D, and F. Opportunities for woodland restoration occur in Alternatives B, E, G and I.

Bogs, fens, seeps, and seasonal ponds are critical to maintaining species viability due to their natural rarity on the landscape, their decline during European settlement due to beaver control and drainage for agriculture, and the number of rare species associated with them. Provisions of the rare community prescription provide for optimal protection and management of all occurrences of these habitats under all alternatives except Alternative F; therefore, opportunities for further reducing risk to viability of associated species are limited. Under

Alternative F such habitats would likely be maintained, but would not receive the focused attention provided by the rare community prescription.

Table 3B-88. Number of species/habitat relationships rated as very high, high, and moderately high risk to terrestrial species viability for each category of management effect by forest plan revision alternative, Bankhead National Forest.

	Alternative						
Management Effect/Risk	A	B	D	E	F	G	I
Provide Optimal Protection and Management for All Habitat Occurrences							
Very High	12	12	12	12	2	12	12
High	60	60	60	60	2	60	60
Moderately High	20	20	20	20	4	20	20
Total	92	92	92	92	8	92	92
Improve Habitat Abundance and Distribution Through Restoration							
Very High	9	9	9	4	4	4	4
High	1	1	4	16	6	16	16
Moderately High	42	58	15	45	41	45	43
Total	52	68	28	65	51	65	63
Maintain Habitat Abundance and Distribution							
Very High	10	0	10	0	32	0	0
High	2	0	2	0	52	0	0
Moderately High	48	41	39	41	61	41	47
Total	60	41	51	41	145	41	47
Reduce Habitat Abundance and Distribution as Result of External Factors							
Very High	16	16	16	16	16	16	16
High	1	1	1	1	1	1	1
Moderately High	1	1	1	1	1	1	1
Total	18	18	18	18	18	18	18
Decline in Habitat Abundance and Distribution as Result of Management							
Very High	0	0	0	0	0	4	0
High	0	0	0	4	0	1	0
Moderately High	0	0	33	1	0	1	0
Total	0	0	33	5	0	6	0
Total for All Management Effect Categories							
Very High	47	37	47	32	54	36	32
High	64	62	67	81	61	78	77
Moderately High	111	120	108	108	107	108	111
Total	222	219	222	221	222	222	220

Despite similarities, some differences in effects of alternatives are apparent. Alternative I optimizes management effects to viability concern species by providing optimal protection to 92 species/habitat relationships and improving habitat and abundance and distribution through restoration to 20 very-high, and high risk species/habitat relationships. Alternative D results in greater risk to more species than other alternatives primarily because of its focus on establishing balanced age-class distributions. This focus results in reduced distribution and abundance of older forests and the diverse structure they provide. Additional risks are incurred from the reduced distribution of mature mesic hardwoods, mature oak forests, and mature forest interior habitats, also as a result of achieving balanced age-class distributions.

Of key interest are habitats elements that are both associated with high risk to species viability, and for which management can reduce risk by improving abundance and distribution. Alternatives D, E, and G would reduce habitat elements with high-risk species relationships as a direct result of management. Under Alternative D, these associations involve mature mesic hardwood forests, mature oak forests, and mature forest interiors. Under Alternative E and G, these associations involve early successional forests habitats. Other alternatives are expected to maintain or increase levels of these habitat elements.

Planning for, and evaluation of, species viability for forest plan revision has focused primarily on providing desired abundance and distribution of habitat elements, in compliance with NFMA regulations. Risks to species viability can be much reduced by additional provisions present in existing law and policy. These include specific consideration of effects to federally-listed threatened and endangered species, those proposed for such listing, and Regional Forester's Sensitive Species, in biological assessments and evaluations conducted as part of all national forest management decisions. These assessments and evaluations identify where additional protective measures are warranted to provide for continued existence of the species on national forest land. Projects that may affect federally listed or proposed species must be coordinated with the US Fish and Wildlife Service. In support of these requirements, these species are also often the focus of inventory and monitoring efforts. Additional species-based provisions included in all forest plan revision alternatives supplement existing law and policy. All alternatives include general and species-specific provisions for federally listed species, developed through coordinated planning with the US Fish and Wildlife Service.

Table 3B-89. Number of species/habitat relationships rated very high, high, and moderately high risk to terrestrial species viability for each category of species status by forest plan revision alternative, Bankhead National Forest.

	Alternative						
Species Status/Viability Risk	A	B	D	E	F	G	I
Federally Listed or Proposed as Threatened or Endangered							
Very High	3	3	3	3	3	3	3
High	1	1	1	1	1	1	1
Moderately High	6	6	6	6	6	6	6
Total	10	10	10	10	10	10	10
Regional Forester's Sensitive Species							
Very High	5	4	5	4	6	4	4
High	13	13	13	14	12	14	14
Moderately High	14	15	14	14	14	14	14
Total	32	32	32	32	32	32	32
Locally Rare and Other Species							

Very High	39	30	39	25	45	29	25
High	50	48	53	66	48	63	62
Moderately High	91	99	88	88	87	88	91
Total	180	177	180	179	180	180	178
Total for All Species Status Categories							
Very High	47	37	47	32	54	36	32
High	64	62	67	81	61	78	77
Moderately High	111	120	108	108	107	108	111
Total	222	219	222	221	222	222	220

All Alternatives are equal with regard to federally-listed, species associations. Alternatives E and I result in fewer very-high risk species associations among Regional Forester's Sensitive Species, compared to the remaining alternatives. Overall, Alternatives B and I optimize locally rare species' risk associations.

Management Area 2 – Conecuh National Forest

Conecuh National Forest is in the Lower East Gulf Coastal Plain, bordering the state of Florida. Species viability evaluation for the Conecuh National Forest included consideration of 199 species of the Coastal Plain. Of these species, 115 from the Coastal Plain are considered rare and are known to occur on Conecuh National Forest.

Table 3B-90. Number of species/habitat relationships rated as very high, high, and moderately high risk to terrestrial species viability for each habitat element by forest plan revision alternative, Conecuh National Forest.

	Alternative						
Habitat Element/Risk	A	B	D	E	F	G	I
Bogs, Fens, Seeps, Seasonal Ponds							
Very High	34	34	34	34	34	34	34
High	6	6	6	6	6	6	6
Moderately High	3	3	3	3	3	3	3
Total	43	43	43	43	43	43	43
Open Wetlands							
Very High	0	0	0	0	0	0	0
High	13	13	13	13	13	13	13
Moderately High	2	2	2	2	2	2	2
Total	15	15	15	15	15	15	15
River Channels							
Very High	1	1	1	1	1	1	1
High	0	0	0	0	0	0	0
Moderately High	0	0	0	0	0	0	0
Total	1	1	1	1	1	1	1
Canebrakes							
Very High	3	3	3	3	3	3	3
High	0	0	0	0	0	0	0
Moderately High	1	1	1	1	1	1	1

Total	4	4	4	4	4	4	4
Baygalls and Bayheads							
Very High	0	0	7	0	0	0	0
High	7	7	3	7	7	7	7
Moderately High	3	3	1	3	3	3	3
Total	10	10	11	10	10	10	10
Coastal Plain Ponds and Swamps							
Very High	27	27	27	27	27	27	27
High	6	6	6	6	6	6	6
Moderately High	3	3	3	3	3	3	3
Total	36	36	36	36	36	36	36
Sandhills							
Very High	0	0	0	0	0	0	0
High	4	4	4	4	4	4	4
Moderately High	1	1	1	1	1	1	1
Total	5	5	5	5	5	5	5
Wet Savannas and Flatwoods							
Very High	0	0	0	0	0	0	0
High	48	48	48	48	48	48	48
Moderately High	7	7	7	7	7	7	7
Total	55	55	55	55	55	55	55
Mature Mesic Hardwood Forests							
Very High	0	0	0	0	0	0	0
High	1	1	1	1	1	1	1
Moderately High	1	1	1	1	1	1	1
Total	2	2	2	2	2	2	2
Mature Oak Forests							
Very High	0	0	0	0	0	0	0
High	0	0	0	0	0	0	0
Moderately High	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0
Mature Yellow Pine Forests							
Very High	0	0	0	0	0	0	0
High	0	0	0	0	0	0	0
Moderately High	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0
Longleaf Pine Forests							
Very High	0	0	0	0	0	0	0
High	0	0	0	0	0	0	0
Moderately High	6	6	6	6	6	6	6
Total	6	6	6	6	6	6	6
Early-Successional Forests							
Very High	0	0	0	0	0	1	0
High	0	0	0	1	0	0	0
Moderately High	1	1	1	0	1	1	1
Total	1	1	1	1	1	2	1
Mature Forest Interiors							
Very High	0	0	0	0	0	0	0
High	0	0	0	0	0	0	0
Moderately High	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0

Canopy Gaps							
Very High	0	0	0	0	0	0	0
High	0	0	0	0	0	0	0
Moderately High	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0
Woodlands, Savannas, and Grasslands							
Very High	5	0	5	0	5	0	0
High	3	0	3	5	3	5	5
Moderately High	3	5	3	3	3	3	3
Total	11	5	11	8	11	8	8
Mixed Landscapes							
Very High	0	0	0	0	0	0	0
High	0	0	0	0	0	0	0
Moderately High	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0
Late Successional Riparian							
Very High	0	0	0	0	0	0	0
High	0	0	0	0	0	0	0
Moderately High	3	3	3	3	3	3	3
Total	3	3	3	3	3	3	3
Early-Successional Riparian							
Very High	3	3	3	3	3	3	3
High	1	1	1	1	1	1	1
Moderately High	1	1	1	1	1	1	1
Total	5	5	5	5	5	5	5
Snags							
Very High	0	0	0	0	0	0	0
High	0	0	0	0	0	0	0
Moderately High	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0
Downed Wood							
Very High	0	0	0	0	0	0	0
High	0	0	0	0	0	0	0
Moderately High	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0
Den Trees							
Very High	0	0	0	0	0	0	0
High	0	0	0	0	0	0	0
Moderately High	1	1	1	1	1	1	1
Total	1	1	1	1	1	1	1
Hard Mast							
Very High	0	0	0	0	0	0	0
High	0	0	0	0	0	0	0
Moderately High	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0
Remoteness							
Very High	0	0	0	0	0	0	0
High	0	0	0	0	0	0	0
Moderately High	1	1	1	1	1	1	1
Total	1	1	1	1	1	1	1
Lakeshores							

Very High	0	0	0	0	0	0	0
High	3	3	3	3	3	3	3
Moderately High	0	0	0	0	0	0	0
Total	3	3	3	3	3	3	3
Water Quality							
Very High	0	0	0	0	0	0	0
High	0	0	0	0	0	0	0
Moderately High	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0
All Habitat Elements							
Very High	73	68	80	68	73	69	68
High	92	89	88	95	92	94	94
Moderately High	37	39	35	36	37	37	37
Total	202	196	203	199	202	200	199

Despite similarities, some differences in effects of alternatives are apparent. Alternative A, D, and F result in greater risk to more species than other alternatives primarily because of its focus on forest production and establishing balanced age-class distributions. This focus results in reduced distribution and abundance of older forests and the diverse structure they provide. Additional risks are incurred from the reduced distribution of mature woodland and savanna complexes, also as a result of optimized forest productivity and achieving balanced age-class distributions. Alternatives A, D, and F show higher numbers of very-high risk species/habitat relationships than other alternatives. Alternatives B, E, and I provide mixes of habitats for the full range of species' needs.

Evaluation results indicate, under all alternatives, high levels of risk to species viability are associated with certain key habitats. Highest risks are associated with 1) bogs, fens, seeps, and seasonal ponds, 2) coastal plain ponds and swamps, and 3) wet savannas and flatwoods.

Bogs, fens, seeps, and seasonal ponds are critical to maintaining species viability due to their natural rarity on the landscape, their decline following European settlement due fire suppression, drainage, and land use conversion, and the number of rare species associated with them. Provisions of the rare community prescription provide for optimal protection and management of all occurrences of these habitats under all alternatives except Alternative F; therefore, opportunities for further reducing risk to viability of associated species are limited. Under Alternative F such habitats would likely be maintained, but would not receive the focused attention provided by the rare community prescription.

Coastal Plain ponds and swamps are critical to maintaining species viability due to their natural rarity on the landscape, their decline following European settlement due to drainage, fisheries management, and land use conversion, and the number of rare species associated with them. Provisions of the rare community prescription provide for optimal protection and management of all occurrences of these habitats under all alternatives except Alternative F; therefore, opportunities for further reducing risk to viability of associated species are limited. Under Alternatives D and F riparian protections include only streamside management zones, where the remaining alternatives apply the riparian corridor prescription. Under these alternatives (D and F) such habitats would likely be maintained, but would not receive the focused attention provided by the rare community prescription.

Wet savannas and flatwoods are critical to maintaining species viability due to their present rarity on the landscape, their decline following European settlement due to fire suppression and land use conversion, and their unusual structure and species composition complexes. However, these communities are naturally limited due to hydrologic characteristics required for community development. Several vascular plants, reptiles, birds, and insects of viability concern are associated with the open, park-like structure, volatile hydrologic regime, and herbaceous layer of wet savannas and flatwoods communities.

Table 3B-91. Number of species/habitat relationships rated as very high, high, and moderately high risk to terrestrial species viability for each category of management effect by forest plan revision alternative, Conecuh National Forest.

	Alternative						
Management Effect/Risk	A	B	D	E	F	G	I
Provide Optimal Protection and Management for All Habitat Occurrences							
Very High	62	62	69	62	0	62	62
High	87	87	83	87	3	87	87
Moderately High	19	19	17	19	0	19	19
Total	168	168	169	168	3	168	168
Improve Habitat Abundance and Distribution Through Restoration							
Very High	6	6	6	6	3	6	6
High	2	2	1	7	1	7	7
Moderately High	5	16	4	7	3	13	14
Total	13	24	11	20	7	26	27
Maintain Habitat Abundance and Distribution							
Very High	5	0	5	0	67	0	0
High	3	0	3	0	88	0	0
Moderately High	13	4	7	10	33	4	4
Total	21	4	15	10	188	4	4
Reduce Habitat Abundance and Distribution as Result of External Factors							
Very High	0	0	0	0	0	0	0
High	0	0	0	0	0	0	0
Moderately High	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0
Decline in Habitat Abundance and Distribution as Result of Management							
Very High	0	0	0	0	3	1	0
High	0	0	1	1	0	0	0
Moderately High	0	0	7	0	1	1	0
Total	0	0	8	1	4	2	0
Total for All Management Effect Categories							
Very High	73	68	80	68	73	69	68
High	92	89	88	95	92	94	94
Moderately High	37	39	35	36	37	37	37
Total	202	196	203	199	202	200	199

Of key interest are habitats elements that are both associated with high risk to species viability, and for which management can reduce risk by improving abundance and distribution. Alternatives D, E, F, and G would reduce habitat elements with high-risk species relationships as a direct result of management. Under Alternative D, these associations involve mature mesic hardwood forests and mature longleaf pine forests. Under Alternative F, these associations involve canebrake communities. Under Alternative G, these associations involve early successional forest communities. Alternatives B, E, G, and I, will benefit the highest number of high-risk species associations.

Planning for, and evaluation of, species viability for forest plan revision has focused primarily on providing desired abundance and distribution of habitat elements, in compliance with NFMA regulations. Risks to species viability can be much reduced by additional provisions present in existing law and policy. These include specific consideration of effects to federally-listed threatened and endangered species, those proposed for such listing, and Regional Forester's Sensitive Species, in biological assessments and evaluations conducted as part of all national forest management decisions. These assessments and evaluations identify where additional protective measures are warranted to provide for continued existence of the species on national forest land. Projects that may affect federally listed or proposed species must be coordinated with the US Fish and Wildlife Service. In support of these requirements, these species are also often the focus of inventory and monitoring efforts. Additional species-based provisions included in all forest plan revision alternatives supplement existing law and policy. All alternatives include general and species-specific provisions for federally listed species, developed through coordinated planning with the US Fish and Wildlife Service.

Table 3B-92. Number of species/habitat relationships rated very high, high, and moderately high risk to terrestrial species viability for each category of species status by forest plan revision alternative, Conecuh National Forest.

	Alternative						
Species Status/Viability Risk	A	B	D	E	F	G	I
Federally Listed or Proposed as Threatened or Endangered							
Very High	1	1	1	1	1	1	1
High	2	2	2	2	2	2	2
Moderately High	2	2	2	2	2	2	2
Total	5	5	5	5	5	5	5
Regional Forester's Sensitive Species							
Very High	21	20	23	20	21	20	20
High	30	29	29	30	30	30	30
Moderately High	12	13	11	13	12	13	13
Total	63	62	63	63	63	63	63
Locally Rare and Other Species							
Very High	51	47	56	47	51	48	47
High	60	58	57	63	60	62	62
Moderately High	23	24	22	21	23	22	22
Total	134	129	135	131	134	132	131

Total for All Species Status Categories							
Very High	73	68	80	68	73	69	68
High	92	89	88	95	92	94	94
Moderately High	37	39	35	36	37	37	37
Total	202	196	203	199	202	200	199

All Alternatives are equal with regard to federally-listed, species associations. Alternatives B, E, G, and I result in fewer very-high risk species associations for Regional Forester's Sensitive Species, compared to the remaining alternatives. Overall, Alternative B optimizes locally rare list, while Alternatives E and I also result in fewer high-risk species/habitat associations, compared to remaining alternatives.

Management Area 3 – Oakmulgee Division, Talladega National Forest

The Oakmulgee Division lies at the edge of the Fall Line that demarcates the Upper Coastal Plain, in west central Alabama. The Oakmulgee management unit falls within the East Gulf Coastal Plain ecoregion. Species viability evaluation for the Oakmulgee Division of the Talladega National Forest included consideration of 199 species of the Alabama Coastal Plain. Of these species, 40 from the Alabama Coastal Plain are considered rare and are known to occur on Oakmulgee Division of the Talladega National Forest.

Table 3B-93. Number of species/habitat relationships rated as very high, high, and moderately high risk to terrestrial species viability for each habitat element by forest plan revision alternative, Oakmulgee District of the Talladega National Forest.

	Alternative						
Habitat Element/Risk	A	B	D	E	F	G	I
Bogs, Fens, Seeps, Seasonal Ponds							
Very High	1	1	1	1	1	1	1
High	1	1	1	1	1	1	1
Moderately High	0	0	0	0	0	0	0
Total	2	2	2	2	2	2	2
Open Wetlands							
Very High	0	0	3	0	3	0	0
High	3	3	2	3	2	3	3
Moderately High	2	2	0	2	0	2	2
Total	5	5	5	5	5	5	5
River Channels							
Very High	2	2	2	2	2	2	2
High	0	0	0	0	0	0	0
Moderately High	0	0	0	0	0	0	0
Total	2	2	2	2	2	2	2
Glades and Barrens							
Very High	0	0	0	0	0	0	0
High	1	1	1	1	1	1	1
Moderately High	0	0	0	0	0	0	0
Total	1	1	1	1	1	1	1
Canebrakes							

Very High	0	0	0	0	0	0	0
High	0	0	0	0	0	0	0
Moderately High	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0
Baygalls and Bayheads							
Very High	0	0	3	0	0	0	0
High	3	3	0	3	3	3	3
Moderately High	0	0	0	0	0	0	0
Total	3	3	3	3	3	3	3
Coastal Plain Ponds and Swamps							
Very High	4	4	4	4	4	4	4
High	0	0	0	0	0	0	0
Moderately High	1	1	1	1	1	1	1
Total	5	5	5	5	5	5	5
Mature Mesic Hardwood Forests							
Very High	0	0	0	0	0	0	0
High	6	6	6	6	6	6	6
Moderately High	5	5	5	5	5	5	5
Total	11	11	11	11	11	11	11
Mature Oak Forests							
Very High	0	0	0	0	0	0	0
High	0	0	0	0	0	0	0
Moderately High	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0
Mature Yellow Pine Forests							
Very High	0	0	0	0	0	0	0
High	0	0	0	0	0	0	0
Moderately High	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0
Longleaf Pine Forests							
Very High	0	0	0	0	0	0	0
High	0	0	0	0	0	0	0
Moderately High	2	2	2	2	2	2	2
Total	2	2	2	2	2	2	2
Early-Successional Forests							
Very High	0	0	0	0	0	0	0
High	0	0	0	0	0	0	0
Moderately High	0	0	0	0	0	1	0
Total	0	0	0	0	0	1	0
Mature Forest Interiors							
Very High	0	0	0	0	0	0	0
High	0	0	0	0	0	0	0
Moderately High	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0
Canopy Gaps							
Very High	0	0	0	0	0	0	0
High	0	0	0	0	0	0	0
Moderately High	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0
Woodlands, Savannas, and Grasslands							
Very High	6	0	6	0	6	0	0

High	1	0	1	6	1	6	6
Moderately High	2	6	2	1	2	1	1
Total	9	6	9	7	9	7	7
Mixed Landscapes							
Very High	0	0	0	0	0	0	0
High	0	0	0	0	0	0	0
Moderately High	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0
Late Successional Riparian							
Very High	0	0	0	0	0	0	0
High	0	0	0	0	0	0	0
Moderately High	4	4	4	4	4	4	4
Total	4	4	4	4	4	4	4
Early-Successional Riparian							
Very High	2	2	2	2	2	2	2
High	2	2	2	2	2	2	2
Moderately High	0	0	0	0	0	0	0
Total	4	4	4	4	4	4	4
Snags							
Very High	0	0	0	0	0	0	0
High	0	0	0	0	0	0	0
Moderately High	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0
Downed Wood							
Very High	0	0	0	0	0	0	0
High	0	0	0	0	0	0	0
Moderately High	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0
Den Trees							
Very High	0	0	0	0	0	0	0
High	0	0	0	0	0	0	0
Moderately High	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0
Hard Mast							
Very High	0	0	0	0	0	0	0
High	0	0	0	0	0	0	0
Moderately High	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0
Remoteness							
Very High	0	0	0	0	0	0	0
High	0	0	0	0	0	0	0
Moderately High	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0
Lakeshores							
Very High	0	0	0	0	0	0	0
High	0	0	0	0	0	0	0
Moderately High	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0
Water Quality							
Very High	0	0	0	0	0	0	0
High	0	0	0	0	0	0	0

Moderately High	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0
All Habitat Elements							
Very High	15	9	21	9	18	9	9
High	17	16	13	22	16	22	22
Moderately High	16	20	14	15	14	16	15
Total	48	45	48	46	48	47	46

Alternative D results in greater risk to more species than other alternatives primarily because of its focus on establishing balanced age-class distributions. This focus results in reduced distribution and abundance of older forests and the diverse structure they provide. Alternatives D and F result in greater risk to species associated with wetland communities due to the lesser protections afforded to streamside management zones. The remaining alternatives include the greater protections of the riparian corridor prescription (11). Alternatives A, D and F show significantly higher numbers of very-high risk species/habitat relationships than other alternatives. Alternatives B, E, and I provide a more optimal mix of habitats for the full range of species' needs.

Evaluation results indicate, under all alternatives, high levels of risk to species viability are associated with certain key habitats. Highest risks are associated with 1) woodlands, savannas, and grasslands, 2) open wetlands, 3) coastal plain ponds and swamps, and 4.) mature mesic hardwood forests.

Woodlands, savannas and grasslands are critical to maintaining species viability due to their present rarity on the landscape, their decline following European settlement due to fire suppression and land use conversion, and their unusual structure and species composition complexes. Several vascular plants, reptiles, birds, and insects of viability concern are associated with the open, park-like structure and herbaceous layer of woodland and savanna communities. Opportunities for woodland restoration occur in Alternatives B, E, G and I.

Open wetlands are critical to maintaining species viability because they are naturally limited to small portions of the landscape in the upper coastal plain. They therefore support large numbers of species of potential viability concern. While their distribution may be reduced over historical conditions on surrounding privately owned landscapes, the biggest threats to this community on National Forest lands are drainage and sedimentation. Open wetlands are provided optimal protection and management under the Riparian prescription (11). Little opportunity for reducing risks or expanding late-successional riparian areas through typical national forest management is apparent under any alternative.

Coastal Plain ponds and swamps are critical to maintaining species viability due to their natural rarity on the landscape, their decline following European settlement due to drainage, fisheries management, and land use conversion, and the number of rare species associated with them. Provisions of the rare community prescription provide for optimal protection and management of all occurrences of these habitats under all alternatives except Alternative F; therefore, opportunities for further reducing risk to viability of associated species are limited. Under Alternatives D and F riparian protections include only streamside management zones, where the remaining alternatives apply the riparian corridor prescription. Under these alternatives (D and F) such habitats would likely be maintained, but would not receive the focused attention provided by the rare community prescription.

Mature mesic hardwood forests are critical to maintaining species viability because they are naturally limited to small portions of the landscape in Alabama by the combined effects of slope, aspect, soils, and natural disturbance and fire regimes. Historically, these habitats have been disproportionately converted to other land uses due to their fertility. The remaining mature mesic hardwood forests on National Forests therefore support large numbers of species of potential viability concern. While their distribution may be reduced over historical conditions on surrounding privately owned landscapes, the biggest threats to this community on National Forest lands are forest health risks. Opportunity for reducing risks or expanding mature mesic hardwood forest areas through national forest management is primarily through increasing rates of restoration where possible. Alternatives B and I emphasize restoration of native communities to the greatest extent; however, all alternatives except Alternative F include the restoration component.

Table 3B-94. Number of species/habitat relationships rated as very high, high, and moderately high risk to terrestrial species viability for each category of management effect by forest plan revision alternative, Oakmulgee Ranger District of the Talladega National Forest.

	Alternative						
Management Effect/Risk	A	B	D	E	F	G	I
Provide Optimal Protection and Management for All Habitat Occurrences							
Very High	7	7	10	7	0	7	7
High	5	5	2	5	0	5	5
Moderately High	1	1	1	1	0	1	1
Total	13	13	13	13	0	13	13
Improve Habitat Abundance and Distribution Through Restoration							
Very High	2	2	5	2	5	2	2
High	11	11	4	17	4	17	17
Moderately High	7	15	0	8	0	10	10
Total	20	28	9	27	9	29	29
Maintain Habitat Abundance and Distribution							
Very High	6	0	6	0	13	0	0
High	1	0	1		12	0	0
Moderately High	8	4	6	6	14	4	4
Total	15	4	13	6	39	4	4
Reduce Habitat Abundance and Distribution as Result of External Factors							
Very High	0	0	0	0	0	0	0
High	0	0	0	0	0	0	0
Moderately High	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0
Decline in Habitat Abundance and Distribution as Result of Management							
Very High	0	0	0	0	0	0	0
High	0	0	6	0	0	0	0
Moderately High	0	0	7	0	0	1	0
Total	0	0	13	0	0	1	0

	A	B	D	E	F	G	I
Total for All Management Effect Categories							
Very High	15	9	21	9	18	9	9
High	17	16	13	22	16	22	22
Moderately High	16	20	14	15	14	16	15
Total	48	45	48	46	48	47	46

Of key interest are habitats elements that are both associated with high risk to species viability, and for which management can reduce risk by improving abundance and distribution. Alternative B, G, and I would benefit the largest number of high-risk species associations through restoration. Canebrake community-, woodlands, savannas and grassland complex community-, early-successional riparian forest community-, and mature mesic hardwood forest community-associations would be benefited by restoration in Alternatives B, E, and I.

Alternatives D and G would reduce habitat elements with high-risk species relationships as a direct result of management (Table 6.1-9). These associations involve mature mesic hardwood forests, mature longleaf pine forests, and the canebrake community. All other alternatives are expected to maintain or increase levels of these habitat elements.

Planning for, and evaluation of, species viability for forest plan revision has focused primarily on providing desired abundance and distribution of habitat elements, in compliance with NFMA regulations. Risks to species viability can be much reduced by additional provisions present in existing law and policy. These include specific consideration of effects to federally-listed threatened and endangered species, those proposed for such listing, and Regional Forester's Sensitive Species, in biological assessments and evaluations conducted as part of all national forest management decisions. These assessments and evaluations identify where additional protective measures are warranted to provide for continued existence of the species on national forest land. Projects that may affect federally listed or proposed species must be coordinated with the US Fish and Wildlife Service. In support of these requirements, these species are also often the focus of inventory and monitoring efforts. Additional species-based provisions included in all forest plan revision alternatives supplement existing law and policy. All alternatives include general and species-specific provisions for federally listed species, developed through coordinated planning with the US Fish and Wildlife Service.

Table 3B-95. Number of species/habitat relationships rated very high, high, and moderately high risk to terrestrial species viability for each category of species status by forest plan revision alternative, Oakmulgee Ranger District of the Talladega National Forest.

	Alternative						
Species Status/Viability Risk	A	B	D	E	F	G	I
Federally Listed or Proposed as Threatened or Endangered							
Very High	0	0	0	0	0	0	0
High	0	0	1	0	1	0	0
Moderately High	1	1	0	1	0	1	1
Total	1	1	1	1	1	1	1
Regional Forester's Sensitive Species							
Very High	4	3	7	3	6	3	3

High	4	4	1	5	2	5	5
Moderately High	5	6	5	5	5	5	5
Total	13	13	13	13	13	13	13
Locally Rare and Other Species							
Very High	11	6	14	6	12	6	6
High	13	12	11	17	13	17	17
Moderately High	10	13	9	9	9	10	9
Total	34	31	34	32	34	33	32
Total for All Species Status Categories							
Very High	15	9	21	9	18	9	9
High	17	16	13	22	16	22	22
Moderately High	16	20	14	15	14	16	15
Total	48	45	48	46	48	47	46

Alternatives D and F result in slightly higher risk to federally listed, species associations. Alternatives B, E, G, and I result in fewer very-high risk species associations, for both Regional Forester's Sensitive species, and to all species status categories, compared to the remaining alternatives. Overall, Alternative B optimizes Regional Forester's Sensitive Species list associations, and all species status categories. Alternatives G and I are also favorable to a majority of high-risk species/habitat associations.

Management Area 4 – Talladega Division, Talladega National Forest

The Talladega Division occurs on the southern edge of the Southern Ridge and Valley, with portions of its southern extent in the Piedmont physiographic region. This management unit falls within the Southern Appalachian ecoregion. Species viability evaluation for the Talladega Division of the Talladega National Forest included consideration of 1368 species of the Southern Appalachian ecoregion. Of these species, 199 from the Southern Appalachian ecoregion are considered rare and are known to occur on Talladega Division of the Talladega National Forest.

Table 3B-96. Number of species/habitat relationships rated as very high, high, and moderately high risk to terrestrial species viability for each habitat element by forest plan revision alternative, Talladega Division of the Talladega National Forest.

	Alternative						
Habitat Element/Risk	A	B	D	E	F	G	I
Bogs, Fens, Seeps, Seasonal Ponds							
Very High	18	18	18	18	18	18	18
High	6	6	6	6	6	6	6
Moderately High	0	0	0	0	0	0	0
Total	24	24	24	24	24	24	24
Open Wetlands							
Very High	6	6	6	6	6	6	6
High	1	1	1	1	1	1	1
Moderately High	3	3	3	3	3	3	3
Total	10	10	10	10	10	10	10

River Channels							
Very High	6	6	6	6	6	6	6
High	2	2	2	2	2	2	2
Moderately High	0	0	0	0	0	0	0
Total	8	8	8	8	8	8	8
Glades and Barrens							
Very High	0	0	0	0	0	0	0
High	15	15	15	15	15	15	15
Moderately High	4	4	4	4	4	4	4
Total	19	19	19	19	19	19	19
Basic Mesic Forests							
Very High	0	0	0	0	18	0	0
High	18	18	18	18	5	18	18
Moderately High	5	5	5	5	0	5	5
Total	23	23	23	23	23	23	23
Rock Outcrops and Cliffs							
Very High	0	0	0	0	0	0	0
High	20	20	20	20	20	20	20
Moderately High	5	5	5	5	5	5	5
Total	25	25	25	25	25	25	25
Spray Cliffs							
Very High	0	0	0	0	0	0	0
High	2	2	2	2	2	2	2
Moderately High	1	1	1	1	1	1	1
Total	3	3	3	3	3	3	3
Canebrakes							
Very High	0	0	0	0	0	0	0
High	0	0	0	0	0	0	0
Moderately High	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0
Caves and Mines							
Very High	0	0	0	0	0	0	0
High	1	1	1	1	1	1	1
Moderately High	0	0	0	0	0	0	0
Total	1	1	1	1	1	1	1
Mature Mesic Hardwood Forests							
Very High	0	0	0	0	0	0	0
High	34	34	34	34	34	34	34
Moderately High	17	17	17	17	17	17	17
Total	51	51	51	51	51	51	51
Mature Oak Forests							
Very High	0	0	0	0	0	0	0
High	0	0	0	0	0	0	0
Moderately High	20	20	20	20	20	20	20
Total	20	20	20	20	20	20	20
Mature Yellow Pine Forests							
Very High	0	0	0	0	0	0	0
High	0	0	0	0	0	0	0
Moderately High	5	5	5	5	5	5	5
Total	5	5	5	5	5	5	5
Mountain Longleaf Pine Forests							

Very High	0	0	0	0	0	0	0
High	0	0	7	0	0	0	0
Moderately High	7	7	2	7	7	7	7
Total	7	7	9	7	7	7	7
Early-Successional Forests							
Very High	0	0	0	0	0	2	0
High	0	0	0	2	0	1	0
Moderately High	2	2	2	1	2	2	2
Total	2	2	2	3	2	5	2
Mature Forest Interiors							
Very High	2	0	2	2	2	2	2
High	2	2	2	2	2	2	2
Moderately High	1	2	1	1	1	1	1
Total	5	4	5	5	5	5	5
Canopy Gaps							
Very High	0	0	0	0	0	0	0
High	8	8	8	8	8	8	8
Moderately High	3	3	3	3	3	3	3
Total	11	11	11	11	11	11	11
Woodlands, Savannas, and Grasslands							
Very High	28	0	28	0	28	0	0
High	10	0	10	28	10	28	28
Moderately High	4	28	4	10	4	10	10
Total	42	28	42	38	42	38	38
Cedar Woodlands							
Very High	0	0	0	0	0	0	0
High	0	0	0	0	0	0	0
Moderately High	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0
Mixed Landscapes							
Very High	0	0	0	0	0	0	0
High	0	0	0	0	0	0	0
Moderately High	4	4	4	4	4	4	4
Total	4	4	4	4	4	4	4
Late Successional Riparian							
Very High	0	0	0	0	0	0	0
High	0	0	0	0	0	0	0
Moderately High	26	26	26	26	26	26	26
Total	26	26	26	26	26	26	26
Early-Successional Riparian							
Very High	11	11	11	11	11	11	11
High	2	2	2	2	2	2	2
Moderately High	0	0	0	0	0	0	0
Total	13	13	13	13	13	13	13
Snags							
Very High	0	0	0	0	0	0	0
High	0	0	0	0	0	0	0
Moderately High	1	1	1	1	1	1	1
Total	1	1	1	1	1	1	1
Downed Wood							
Very High	0	0	0	0	0	0	0

High	0	0	0	0	0	0	0
Moderately High	3	3	3	3	3	3	3
Total	3	3	3	3	3	3	3
Den Trees							
Very High	0	0	0	0	0	0	0
High	0	0	0	0	0	0	0
Moderately High	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0
Hard Mast							
Very High	0	0	0	0	0	0	0
High	0	0	0	0	0	0	0
Moderately High	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0
Remoteness							
Very High	1	1	1	1	1	1	1
High	0	0	0	0	0	0	0
Moderately High	0	0	0	0	0	0	0
Total	1	1	1	1	1	1	1
Lakeshores							
Very High	0	0	0	0	0	0	0
High	2	2	2	2	2	2	2
Moderately High	0	0	0	0	0	0	0
Total	2	2	2	2	2	2	2
Water Quality							
Very High	0	0	0	0	0	0	0
High	0	0	0	0	0	0	0
Moderately High	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0
All Habitat Elements							
Very High	72	42	72	44	90	46	44
High	123	113	130	143	110	142	141
Moderately High	111	136	106	116	106	117	117
Total	306	291	308	303	306	305	302

Despite similarities, some differences in effects of alternatives are apparent. Alternatives A, D, and F result in greater risk to more species than other alternatives primarily because of their focus on commodity production and establishing balanced age-class distributions. This focus results in reduced distribution and abundance of older forests and the diverse structure they provide. Additional risks are incurred from the reduced distribution of mature mesic hardwood forests, mature oak forests, mature yellow pine forests, and mature mountain longleaf pine forests. These shifts would occur under Alternatives A, D, and F also as a result of the alternative's emphasis on producing forest products and achieving balanced age-class distributions. Alternatives A, D, and F show higher numbers of very-high risk species/habitat relationships than other alternatives. Alternatives B, E, and I provide a more optimal mix of habitats for the full range of species' needs.

Evaluation results indicate, under all alternatives, highest levels of risk to species viability are associated with certain key habitats. Highest risks are associated with 1) woodlands, savannas, and grasslands, 2) bogs, fens, seeps, seasonal ponds, 3) early-successional riparian, and 4) mature mesic hardwood forests.

Woodlands, savannas and grasslands are critical to maintaining species viability due to their present rarity on the landscape, their decline following European settlement due to fire suppression and land use conversion, and their unusual structure and species composition complexes. Several vascular plants, reptiles, birds, and insects of viability concern are associated with the open, park-like structure and herbaceous layer of woodland and savanna communities. Opportunities for woodland restoration occur in Alternatives B, E, G and I.

Bogs, fens, seeps, and seasonal ponds are critical to maintaining species viability due to their natural rarity on the landscape, their decline during European settlement due to beaver control and drainage for agriculture, and the number of rare species associated with them. Provisions of the rare community prescription provide for optimal protection and management of all occurrences of these habitats under all alternatives except Alternative F; therefore, opportunities for further reducing risk to viability of associated species are limited. Under Alternative F such habitats would likely be maintained, but would not receive the focused attention provided by the rare community prescription.

Early-successional riparian habitats are critical to maintaining species viability because they are fleeting in duration and limited on the landscape. Because early-seral riparian habitats combine herbaceous, shrub-scrub, or dense young forest structure with wet conditions they potentially support habitat specialists of potential viability concern. The distribution of herbaceous, shrub-scrub or young forest riparian habitats at the landscape scale is reduced over historical conditions due to land use conversion and development. Their distribution on national forest lands is also reduced as forests have matured, management protections have reduced regeneration in riparian habitats, and natural disturbance regimes such as fires, have been suppressed. Riparian communities are provided optimal protection and management under the Riparian prescription. Opportunity for restoring very limited early-successional riparian habitats through restoration exists under all alternatives, except Alternative F.

Mature mesic hardwood forests are critical to maintaining species viability because they are naturally limited to small portions of the landscape in Alabama by the combined effects of slope, aspect, soils, and natural disturbance and fire regimes. Historically, these habitats have been disproportionately converted to other land uses due to their fertility. The remaining mature mesic hardwood forests on National Forests therefore support large numbers of species of potential viability concern. While their distribution may be reduced over historical conditions on surrounding privately owned landscapes, the biggest threats to this community on National Forest lands are forest health risks. Opportunity for reducing risks or expanding mature mesic hardwood forest areas through national forest management is primarily through increasing rates of restoration where possible. Alternatives B and I emphasize restoration of native communities to the greatest extent; however, all alternatives except Alternative F include the restoration component.

Table 3B-97. Number of species/habitat relationships rated as very high, high, and moderately high risk to terrestrial species viability for each category of management effect by forest plan revision alternative, Talladega Division of the Talladega National Forest.

	Alternative						
Management Effect/Risk	A	B	D	E	F	G	I

Provide Optimal Protection and Management for All Habitat Occurrences							
Very High	30	30	30	30	0	30	30
High	67	67	67	67	3	67	67
Moderately High	18	18	18	18	0	18	18
Total	115	115	115	115	3	115	115
Improve Habitat Abundance and Distribution Through Restoration							
Very High	13	11	11	13	11	13	13
High	46	46	2	74	2	74	74
Moderately High	27	88	6	55	6	67	49
Total	86	145	19	142	19	154	136
Maintain Habitat Abundance and Distribution							
Very High	29	1	29	1	79	1	1
High	10	0	10	0	105	0	0
Moderately High	66	30	34	42	100	30	50
Total	105	31	73	43	284	31	51
Reduce Habitat Abundance and Distribution as Result of External Factors							
Very High	0	0	0	0	0	0	0
High	0	0	0	0	0	0	0
Moderately High	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0
Decline in Habitat Abundance and Distribution as Result of Management							
Very High	0	0	2	0	0	2	0
High	0	0	51	2	0	1	0
Moderately High	0	0	48	1	0	2	0
Total	0	0	101	3	0	5	0
Total for All Management Effect Categories							
Very High	72	42	72	44	90	46	44
High	123	113	130	143	110	142	141
Moderately High	111	136	106	116	106	117	117
Total	306	291	308	303	306	305	302

Alternative F provides optimal protection and restoration management to the fewest number of species/habitat relationships. Of key interest are habitats elements that are both associated with high risk to species viability, and for which management can reduce risk by improving abundance and distribution. Alternatives B, E, G, and I would allow restoration of significantly higher numbers of habitat elements associated with high-risk species relationships.

Alternative D, E and G would reduce habitat elements with high-risk species relationships as a direct result of management (Table 6.1-9D). Under Alternative D, these associations involve mature mesic hardwood forests, mature oak forests, mature yellow pine forests, and mature mountain longleaf forests. Under Alternatives E and G, these associations involve a lack of creation of early successional forests. All other alternatives are expected to maintain or increase levels of these habitat elements.

Planning for, and evaluation of, species viability for forest plan revision has focused primarily on providing desired abundance and distribution of habitat elements, in compliance with NFMA regulations. Risks to species viability can be much reduced by additional provisions present in existing law and policy. These include specific consideration of effects to federally listed threatened and endangered species, those proposed for such listing, and Regional Forester's Sensitive Species, in biological assessments and evaluations conducted as part of all national forest management decisions. These assessments and evaluations identify where additional protective measures are warranted to provide for continued existence of the species on national forest land. Projects that may affect federally listed or proposed species must be coordinated with the US Fish and Wildlife Service. In support of these requirements, these species are also often the focus of inventory and monitoring efforts. Additional species-based provisions included in all forest plan revision alternatives supplement existing law and policy. All alternatives include general and species-specific provisions for federally listed species, developed through coordinated planning with the US Fish and Wildlife Service.

Table 3B-98. Number of species/habitat relationships rated very high, high, and moderately high risk to terrestrial species viability for each category of species status by forest plan revision alternative, Talladega Division of the Talladega National Forest.

	Alternative						
Species Status/Viability Risk	A	B	D	E	F	G	I
Federally Listed or Proposed as Threatened or Endangered							
Very High	0	0	0	0	0	0	0
High	1	1	2	1	1	1	1
Moderately High	3	3	2	3	3	3	3
Total	4	4	4	4	4	4	4
Regional Forester's Sensitive Species							
Very High	10	4	10	4	13	4	4
High	23	22	24	28	20	28	28
Moderately High	11	17	10	12	11	12	12
Total	44	43	44	44	44	44	44
Locally Rare and Other Species							
Very High	62	38	62	40	77	42	40
High	99	90	104	114	89	113	112
Moderately High	97	116	94	101	92	102	102
Total	258	244	260	255	258	257	254
Total for All Species Status Categories							
Very High	72	42	72	44	90	46	44
High	123	113	130	143	110	142	141
Moderately High	111	136	106	116	106	117	117
Total	306	291	308	303	306	305	302

Alternative D has slightly higher risk species associations with regard to federally listed species. All remaining alternatives are equal with regard to federally listed, species associations.

Alternatives B, E, G, and I result in fewer very-high risk species associations among Regional Forester's Sensitive Species and locally rare species, compared to the remaining alternatives. Overall, Alternative B optimizes Regional Forester's Sensitive Species list-, locally rare list-, and all species status category risk associations. Alternative I provides the second best species/habitat risk outcomes.

Management Area 5 – Tuskegee National Forest

The Tuskegee National Forest lies at the edge of the Fall Line that demarcates the Upper Coastal Plain, in east central Alabama. The Tuskegee management unit falls within the larger East Gulf Coastal Plain ecoregion. Species viability evaluation for the Tuskegee National Forest included consideration of 199 species of the Coastal Plain of Alabama. Of these species, 17 from the Coastal Plain of Alabama are considered rare and are known to occur on Tuskegee National Forest.

Table 3B-99. Number of species/habitat relationships rated as very high, high, and moderately high risk to terrestrial species viability for each habitat element by forest plan revision alternative, Tuskegee National Forest.

	Alternative						
Habitat Element/Risk	A	B	D	E	F	G	I
Bogs, Fens, Seeps, Seasonal Ponds							
Very High	1	1	1	1	1	1	1
High	0	0	0	0	0	0	0
Moderately High	0	0	0	0	0	0	0
Total	1	1	1	1	1	1	1
Open Wetlands							
Very High	2	2	2	2	2	2	2
High	2	2	2	2	2	2	2
Moderately High	0	0	0	0	0	0	0
Total	4	4	4	4	4	4	4
River Channels							
Very High	0	0	0	0	0	0	0
High	0	0	0	0	0	0	0
Moderately High	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0
Canebrakes							
Very High	0	0	0	0	0	0	0
High	0	0	0	0	0	0	0
Moderately High	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0
Baygalls and Bayheads							
Very High	0	0	1	0	0	0	0
High	1	1	0	1	1	1	1
Moderately High	0	0	0	0	0	0	0
Total	1	1	1	1	1	1	1
Coastal Plain Ponds and Swamps							
Very High	1	1	1	1	1	1	1
High	0	0	0	0	0	0	0
Moderately High	2	2	2	2	2	2	2

Total	3	3	3	3	3	3	3
Mature Mesic Hardwood Forests							
Very High	0	0	0	0	0	0	0
High	3	3	3	3	3	3	3
Moderately High	1	1	1	1	1	1	1
Total	4	4	4	4	4	4	4
Mature Oak Forests							
Very High	0	0	0	0	0	0	0
High	0	0	0	0	0	0	0
Moderately High	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0
Mature Yellow Pine Forests							
Very High	0	0	0	0	0	0	0
High	0	0	0	0	0	0	0
Moderately High	1	1	1	1	1	1	1
Total	1	1	1	1	1	1	1
Longleaf Pine Forests							
Very High	0	0	0	0	0	0	0
High	0	0	0	0	0	0	0
Moderately High	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0
Early-Successional Forests							
Very High	0	0	0	0	0	1	0
High	0	0	0	1	0	0	0
Moderately High	1	1	1	0	1	2	1
Total	1	1	1	1	1	3	1
Mature Forest Interiors							
Very High	0	0	0	0	0	0	0
High	0	0	0	0	0	0	0
Moderately High	0	0	1	1	1	1	1
Total	0	0	1	1	1	1	1
Canopy Gaps							
Very High	0	0	0	0	0	0	0
High	0	0	0	0	0	0	0
Moderately High	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0
Woodlands, Savannas, and Grasslands							
Very High	2	0	2	0	2	0	0
High	1	0	1	2	1	2	2
Moderately High	1	2	1	1	1	1	1
Total	4	2	4	3	4	3	3
Mixed Landscapes							
Very High	0	0	0	0	0	0	0
High	0	0	0	0	0	0	0
Moderately High	1	1	1	1	1	1	1
Total	1	1	1	1	1	1	1
Late Successional Riparian							
Very High	0	0	0	0	0	0	0
High	0	0	0	0	0	0	0
Moderately High	3	3	3	3	3	3	3
Total	3	3	3	3	3	3	3

Early-Successional Riparian							
Very High	1	1	1	1	1	1	1
High	0	0	0	0	0	0	0
Moderately High	1	1	1	1	1	1	1
Total	2	2	2	2	2	2	2
Snags							
Very High	0	0	0	0	0	0	0
High	0	0	0	0	0	0	0
Moderately High	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0
Downed Wood							
Very High	0	0	0	0	0	0	0
High	0	0	0	0	0	0	0
Moderately High	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0
Den Trees							
Very High	0	0	0	0	0	0	0
High	0	0	0	0	0	0	0
Moderately High	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0
Hard Mast							
Very High	0	0	0	0	0	0	0
High	0	0	0	0	0	0	0
Moderately High	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0
Remoteness							
Very High	0	0	0	0	0	0	0
High	0	0	0	0	0	0	0
Moderately High	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0
Lakeshores							
Very High	0	0	0	0	0	0	0
High	0	0	0	0	0	0	0
Moderately High	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0
Water Quality							
Very High	0	0	0	0	0	0	0
High	0	0	0	0	0	0	0
Moderately High	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0
All Habitat Elements							
Very High	7	5	8	5	7	6	5
High	7	6	6	9	7	8	8
Moderately High	11	12	12	11	12	13	12
Total	25	23	26	25	26	27	25

Alternatives A, D and F result in greater risk to more species than other alternatives primarily because of commodity production and balanced age-class distribution maintenance. This focus results in reduced distribution and abundance of older forests and the diverse structure they provide. Additional risks are incurred from the reduced distribution of mature mesic hardwood forests, mature yellow pine forests, and mature forest interior habitats, also as a result of achieving balanced age-class distributions. Alternatives B, E, G, and I show slightly lower numbers of very-high risk species/habitat relationships than other alternatives. This lower risk rating results from emphasis on restoring native communities, including woodland and savanna complexes.

Evaluation results indicate, under all alternatives, high levels of risk to species viability are associated with certain key habitats. Highest risks are associated with 1) woodlands, savannas, and grassland complexes; 2) coastal plain ponds and swamps; 3) open wetlands; and 4) mature mesic hardwood forests.

Woodlands, savannas and grasslands are critical to maintaining species viability due to their present rarity on the landscape, their decline following European settlement due to fire suppression and land use conversion, and their unusual structure and species composition complexes. Several vascular plants, reptiles, birds, and insects of viability concern are associated with the open, park-like structure and herbaceous layer of woodland and savanna communities. Opportunities for woodland restoration occur in Alternatives B, E, G and I.

Coastal Plain ponds and swamps and open wetlands are critical to maintaining species viability due to their natural rarity on the landscape, their decline following European settlement due to drainage, fisheries management, and land use conversion, and the number of rare species associated with them. Provisions of the rare community prescription provide for optimal protection and management of all occurrences of these habitats under all alternatives except Alternative F; therefore, opportunities for further reducing risk to viability of associated species are limited. Under Alternatives D and F riparian protections include only streamside management zones, where the remaining alternatives apply the riparian corridor prescription. Under these alternatives (D and F) such habitats would likely be maintained, but would not receive the focused attention provided by the rare community prescription.

Mature mesic hardwood forests are critical to maintaining species viability because they are naturally limited to small portions of the landscape in Alabama by the combined effects of slope, aspect, soils, and natural disturbance and fire regimes. Historically, these habitats have been disproportionately converted to other land uses due to their fertility. The remaining mature mesic hardwood forests on National Forests therefore support large numbers of species of potential viability concern. While their distribution may be reduced over historical conditions on surrounding privately owned landscapes, the biggest threats to this community on National Forest lands are forest health risks. Opportunity for reducing risks or expanding mature mesic hardwood forest areas through national forest management is primarily through increasing rates of restoration where possible. Alternatives B and I emphasize restoration of native communities to the greatest extent; however, all alternatives except Alternative F include the restoration component.

Table 3B-100. Number of species/habitat relationships rated as very high, high, and moderately high risk to terrestrial species viability for each category of management effect by forest plan revision alternative, Tuskegee National Forest.

	Alternative						
Management Effect/Risk	A	B	D	E	F	G	I
Provide Optimal Protection and Management for All Habitat Occurrences							

Very High	4	4	5	4	0	4	4
High	3	3	2	3	0	3	3
Moderately High	2	2	2	2	0	2	2
Total	9	9	9	9	0	9	9
Improve Habitat Abundance and Distribution Through Restoration							
Very High	1	1	1	1	1	1	1
High	3	3	0	5	0	5	5
Moderately High	3	6	2	4	2	5	6
Total	7	10	3	10	3	11	12
Maintain Habitat Abundance and Distribution							
Very High	2	0	2	0	6	0	0
High	1	0	1	0	7	0	0
Moderately High	6	4	5	5	10	4	4
Total	9	4	8	5	23	4	4
Reduce Habitat Abundance and Distribution as Result of External Factors							
Very High	0	0	0	0	0	0	0
High	0	0	0	0	0	0	0
Moderately High	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0
Decline in Habitat Abundance and Distribution as Result of Management							
Very High	0	0	0	0	0	1	0
High	0	0	3	1	0	0	0
Moderately High	0	0	3	0	0	2	0
Total	0	0	6	1	0	3	0
Total for All Management Effect Categories							
Very High	7	5	8	5	7	6	5
High	7	6	6	9	7	8	8
Moderately High	11	12	12	11	12	13	12
Total	25	23	26	25	26	27	25

Of key interest are habitats elements that are both associated with high risk to species viability, and for which management can reduce risk by improving abundance and distribution. For the Tuskegee these include woodlands, savannas and grassland complexes, canebrakes, mature mesic hardwood forests, and early successional forests. The number of high risk species associations potentially benefited by restoration is maximized under Alternatives B, E, G, and I.

Alternatives D, E, and G would reduce habitat elements with high-risk species relationships as a direct result of management. Under Alternative D, these associations involve mature mesic hardwood forests, mature yellow pine forests, and mature forest interiors. Under Alternatives E and G these associations involve a lack of creation of early successional forest habitats. Under Alternative F the canebrake association is not an object of restoration, resulting in several high-risk associations. All other alternatives are expected to maintain or increase levels of these habitat elements.

Planning for, and evaluation of, species viability for forest plan revision has focused primarily on providing desired abundance and distribution of habitat elements, in compliance with NFMA regulations. Risks to species viability can be much reduced by additional provisions present in existing law and policy. These include specific consideration of effects to federally-listed threatened and endangered species, those proposed for such listing, and Regional Forester's Sensitive Species, in biological assessments and evaluations conducted as part of all national forest management decisions. These assessments and evaluations identify where additional protective measures are warranted to provide for continued existence of the species on national forest land. Projects that may affect federally listed or proposed species must be coordinated with the US Fish and Wildlife Service. In support of these requirements, these species are also often the focus of inventory and monitoring efforts. Additional species-based provisions included in all forest plan revision alternatives supplement existing law and policy. All alternatives include general and species-specific provisions for federally listed species, developed through coordinated planning with the US Fish and Wildlife Service.

Table 3B-101. Number of species/habitat relationships rated very high, high, and moderately high risk to terrestrial species viability for each category of species status by forest plan revision alternative, Tuskegee National Forest.

	Alternative						
Species Status/Viability Risk	A	B	D	E	F	G	I
Federally Listed or Proposed as Threatened or Endangered							
Very High	0	0	0	0	0	0	0
High	1	1	1	1	1	1	1
Moderately High	0	0	0	0	0	0	0
Total	1	1	1	1	1	1	1
Regional Forester's Sensitive Species							
Very High	3	2	4	2	3	3	2
High	1	1	0	3	1	2	2
Moderately High	1	2	1	0	1	0	1
Total	5	5	5	5	5	5	5
Locally Rare and Other Species							
Very High	4	3	4	3	4	3	3
High	5	4	5	5	5	5	5
Moderately High	10	10	11	11	11	13	11
Total	19	17	20	19	20	21	19
Total for All Species Status Categories							
Very High	7	5	8	5	7	6	5
High	7	6	6	9	7	8	8
Moderately High	11	12	12	11	12	13	12
Total	25	23	26	25	26	27	25

All Alternatives are equal with regard to federally-listed, species associations. Alternatives B, E, and I result in fewer very-high species associations, compared to the remaining alternatives for

Regional Forester's sensitive species and all species status categories. Overall, Alternatives B, E, and I optimize risks to rare species/habitat associations.

Summarized results for National Forests in Alabama

The scale for this assessment is set by NFMA regulations as the "planning area," or the area of the National Forest System covered by a single forest plan. All of the management units in National Forests in Alabama are under a single forest plan. Risk assessment was further split where national forest units under the same forest plan occur in different ecoregions, or are widely separated geographically. There are five separate management units on National Forests in Alabama that are geographically separated from each other. The Bankhead National Forest lies in the Southern Cumberland Plateau. The Talladega Division occurs on the southern edge of the Southern Ridge and Valley, with portions of its southern extent in the Piedmont physiographic region. These two management units fall within the Southern Appalachian ecoregion. The Oakmulgee Division and Tuskegee National Forest lie at the edge of the Fall Line that demarcates the Upper Coastal Plain. Oakmulgee Division is in west central Alabama, and Tuskegee is in east central Alabama. Conecuh National Forest is in the Lower Coastal Plain physiographic region, bordering the state of Florida. The Oakmulgee, Tuskegee and Conecuh management units fall within the East Gulf Coastal Plain ecoregion. Although each management unit's risk assessment was separate, viability evaluation was coordinated across management units and across the ecoregions. Analysis presented here focuses on information relevant to the five management units of the National Forests in Alabama, collectively.

Trends in alternative effects are remarkably similar across management units. Alternatives B, E, G and I consistently produced the lowest number of very-high species risk associations, across all management units. Alternative B consistently produced the lowest overall number of high risk species associations, across all management units. Alternatives D and F (followed by Alternative A) produced the highest number of high risk species associations. However, the relative differences were often very small.

In conclusion, differences in effects to viability risk among alternatives are relatively small. High- risk species/habitat relationships are primarily a result of historical influences that have reduced distribution and abundance of some habitat elements and/or species populations. Future impacts from forest health threats also influenced high-risk species habitat relationships. In general, effects of proposed management strategies are small relative to historical impacts and future external threats. In general, risks to species viability are minimized by forest plan revision alternatives that provide a balanced mix of low-disturbance and disturbance-dependent habitat elements. Some elements in this mix are best provided through passive management and protection, while others require active management for restoration and maintenance.

Slight differences in results presented here from those in the DEIS are primarily the result of updates to species' status information (F Ranks) made during the comment period through review and coordination with NatureServe and their contractors. Additional changes are the result of adding species inadvertently omitted from the DEIS, and, in some cases, adjustments to habitat condition variables based on further analysis and interdisciplinary review. These adjustments have not resulted in substantial changes to overall patterns of risk, or conclusions relative to overall effects of alternatives. It is important to note that information on the status and ecology of this great diversity of species is constantly changing and will continue to do so as the revised forest plan is implemented. Lists of species of viability concern and related information will be maintained and updated as part of plan implementation; however, this updating will typically be small and incremental, and is not expected to change the overall conclusions of this analysis during this planning period.

Literature Cited

Wear, D.N. and J.G. Greis, eds. 2002. Southern Forest Resource Assessment. Gen. Tech. Rep. SRS-53. Asheville, NC: US Department of Agriculture. Forest Service, Southern Research Station. 635 pp.

6.2 Aquatic Species Viability

At least 400 aquatic vertebrates and a great diversity of invertebrates inhabit 43 watersheds of the National Forests in Alabama. It is impossible to determine the viability for each of these individual species. Therefore, 172 federally listed (proposed, endangered, or threatened = "PET"), Forest Service sensitive (S), and locally rare species (R) were utilized as surrogates for assessing the overall viability of aquatic. By definition, these PET, sensitive, and locally rare species are at the highest risk for loss of population viability and species extinction. Listed and sensitive species have been identified as those species with critically low abundance, limited distribution, and demonstrated rate of decline. Most PET species are habitat specialists with extreme sensitivity to environmental perturbations. Rare species may be somewhat less sensitive to environmental factors, however their limited distribution puts them at risk of decline due to systematic or catastrophic loss of their habitat.

Species environmental sensitivities provide the linkage between watershed conditions, habitat, and species viability. Towards this end, species were assigned sensitivity levels to four major categories of potential stress (sedimentation, point-source pollution, temperature change, and altered flow) according to a process developed by Leftwich (2003). Watershed conditions were characterized by GIS based metrics corresponding to the four stressors (Clingenpeel 2003. Watershed condition metrics were combined with species presence or absence and sensitivity levels in order to yield summary species viability outcomes 1a, 1b, 1c, 2, and 3 (habitat suitability based). Three levels of potential viability risk were identified for each species, stressor, and watershed, including low, moderate, or high risks of population decline and loss of species viability. These categories were further defined according to the apparent opportunity for Forest Service influence and consequently, the potential role of the National Forests in mitigation of conditions. Additionally, critically low overall species abundance and/or recent deleterious population trends (for instance, as indicated by USFWS endangered or threatened designation and/or NatureServe S rankings of S1, S2, SH) may warrant elevation of a species' viability risk evaluation. In such cases, a population imperilment risk adjustment is included and categorized as viability outcomes 4 or 5 if the risk to overall species viability may potentially be considered greater than indicated by analysis of watershed conditions alone. Supporting data and the details on the methods of the viability evaluation can be found in Appendix B. The resulting species viability outcomes are displayed in the tables below.

Tables Below: Viability risks for each of the 172 species analyzed under current conditions (Alternative F). Watershed conditions are rated as "excellent" (E), "average" (A), or "below average" (BA). Risk factors include sediment (S), point source pollution (P), temperature (T), or altered flow (F). Risk categories are 1a) no apparent impairment of risk factors and therefore likely "low" viability risk, 1b) impairment of one to several risk factors and therefore likely of "moderate" viability risk with some opportunities for Forest Service influence, 1c) as in 1b, but with limited opportunities for Forest Service influence, 2) impairment of a high proportion of risk factors and therefore likely of "high" viability risk with some opportunities for Forest Service influence, 3) as in 2, but with limited opportunities for Forest Service influence, 4) various levels of impairment as well as fragmented habitat and extreme rarity placing the species at "high" risk with some opportunities for Forest Service influence, and 5) as in 4, but with limited opportunities for Forest Service influence. See Appendix B for details on the assessment categories and methods. Status = Federally proposed (P), endangered (E), threatened (T), FS sensitive (S) or locally rare (R) species. Within the relative risk histograms, "black bar" = risk to viability based upon analysis of watershed-wide habitat conditions (viability outcomes 1a, 1b, 1c, 2, 3), "gray bar" = additional adjustment to viability risk to reflect potential overall population/species imperilment (viability outcomes 4 or 5).

Table 3B-102: Viability risks for the snails analyzed under current conditions (Alternative F).

Species Name	Status	Watersheds	Watersheds per Viability Risk Category							Risk Factors
			1 a	1b FS	1c	2 FS	3	4 FS	5	
Broken hornsnail	R	3	0	0	0	0	3	0	0	SPF
Spiral hornsnail	R	3	0	0	0	0	3	0	0	SPTF
Warty rocksnail	R	1	0	0	0	0	1	0	0	SF
Walnut Elimia	R	1	0	0	0	0	1	0	0	PF
Acute Elimia	R	4	0	0	1	0	3	0	0	SPF
Tulotoma	E	4	0	0	2	0	2	0	4	SPF
Cylindr. Lioplax	E	2	0	0	1	0	1	0	2	SPF
Flat pebblesnail	E	2	0	0	1	0	1	0	2	SPF
Painted rocksnail	T	4	0	0	2	0	2	0	0	SPF
Prune Elimia	R	2	0	0	1	0	1	0	0	SP
Lacy Elimia	T	5	0	0	3	0	2	0	0	SPF
Spindle Elimia	R	3	0	0	2	0	1	0	0	SPF
Rusty Elimia	R	9	0	0	6	0	3	0	0	SPTF
Domed ancylid	R	7	2	0	1	0	4	0	7	SPTF
Rough hornsnail	R	11	2	0	6	0	3	0	11	SPF
Ringed hornsnail	R	1	0	0	1	0	0	0	1	S
Round rocksnail	T	1	0	0	1	0	0	0	1	S
Compact Elimia	R	5	1	0	3	0	1	0	5	SPF
Lilyshoals Elimia	R	1	0	0	1	0	0	0	1	S
Ample Elimia	R	1	0	0	1	0	0	0	1	S
Riffle Elimia	R	2	1	0	1	0	0	0	2	S
Mud Elimia	R	2	1	0	1	0	0	0	2	P
Cahaba Elimia	R	3	2	0	1	0	0	0	0	S
Caper Elimia	R	4	3	0	1	0	0	0	4	S
Princess Elimia	R	2	2	0	0	0	0	0	2	

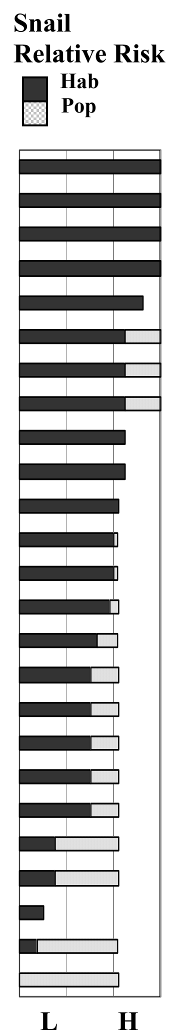


Table 3B-103: Viability risks for the fish analyzed under current conditions (Alternative F).

Species Name	Status	Wtrshd	Watersheds per Viability Risk Category							Risk Factors
			1 a	1b FS	1c	2 FS	3	4 FS	5	
Suckermouth minnow	R	1	0	0	0	0	1	0	0	SPF
Slenderhead darter	R	1	0	0	0	0	1	0	0	SPF
Longhead darter	S	4	0	0	0	0	4	0	0	SPF
Rosyface shiner	R	4	0	0	0	0	4	0	0	SPTF
Am. brook lamprey	R	3	0	0	0	0	3	0	0	STF
TN snubnose darter	R	3	0	0	0	0	3	0	0	SPTF
Rush darter	S	1	0	0	0	0	1	0	0	SPTF
Stripetail darter	R	4	0	0	0	0	4	0	0	SPTF
Pygmy sculpin	T	1	0	0	0	0	1	0	0	SPTF
Flame chub	R	6	0	0	1	0	5	0	0	SPTF
Gulf C. Striped bass	R	10	0	1	3	0	6	0	0	SPTF
Warrior bridled darter	R	2	0	1	0	0	1	0	0	STF
Blueface darter	R	2	0	1	0	0	1	0	0	SPTF
Sipsey Warrior darter	S	2	0	1	0	0	1	0	0	STF
Tuskaloosa darter	S	5	0	3	0	0	2	0	0	SPTF
Florida sand darter	S	6	1	0	3	0	2	0	0	SPF
Gulf sturgeon	T	6	1	0	3	0	2	0	6	SPF
Coal darter	S	8	2	0	3	0	3	0	8	SPF
Ironcolor shiner	R	8	1	0	5	0	2	0	8	SPF
Lined chub	S	10	1	0	7	0	2	0	0	SPTF
Blue shiner	T	7	2	1	1	1	2	2	5	SPTF
Bronze darter	S	13	2	0	8	0	3	0	0	SPTF
Alabama sturgeon	E	1	0	0	1	0	0	0	1	S
Muscadine Br. darter	R	10	2	2	4	1	1	0	0	SP
Brindled madtom	R	1	0	0	1	0	0	0	1	PF
Stippled studfish	R	3	0	0	3	0	0	0	3	P
Coldwater darter	S	4	1	0	2	0	1	0	4	PT
Choctawhatchee darter	S	6	1	0	4	0	1	0	0	SP
Holiday darter	S	1	0	0	1	0	0	0	1	F
Blue sucker	R	1	0	0	1	0	0	0	1	S
Alligator gar	R	8	1	0	6	0	1	0	8	SP
Freckled darter	S	7	3	0	2	0	2	0	0	PF
Crystal darter	S	6	3	0	1	0	2	0	0	SPF
Tallapoosa b.sculpin	R	5	1	0	4	0	0	0	0	SP
Goldstripe darter	S	13	4	0	8	0	1	0	13	SPT
Alabama shad	SC	4	2	0	1	0	1	0	4	SF
Lipstick darter	R	3	1	0	2	0	0	0	3	SP
Bluenose shiner	R	16	7	0	8	0	1	0	16	PS
Southern logperch	S	2	1	0	1	0	0	0	2	F
Skygazer shiner	S	6	3	0	3	0	0	0	6	SPF
Cahaba shiner	E	2	1	0	1	0	0	0	2	S
MS silvery minnow	R	4	3	0	0	0	1	0	4	PF
Backwater darter	S	4	2	0	2	0	0	0	0	P
Alabama darter	S	5	3	0	2	0	0	0	0	S
Goldline darter	T	3	2	0	1	0	0	0	3	S
N. starhead topminnow	R	8	7	0	1	0	0	0	8	F
Frecklebelly madtom	S	1	1	0	0	0	0	0	1	

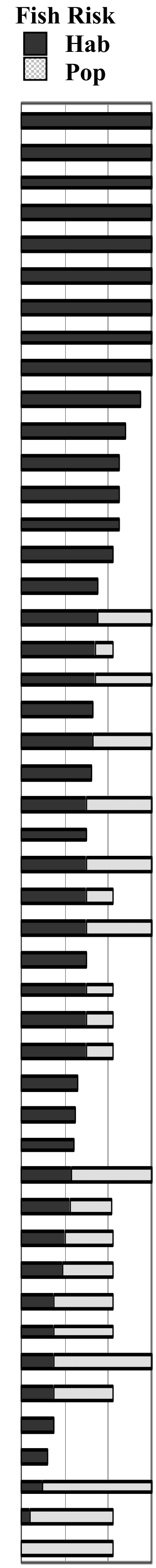


Table 3B-104: Viability risks for insects analyzed under current conditions (Alt. F).

Species Name	Status	Watersheds	Watersheds per Viability Risk Category							Risk Factors
			1 a	1b FS	1c	2 FS	3	4 FS	5	
Hydroptila cheaha	S	4	0	0	1	0	3	0	4	SPTF
Appalachian snaketail	S	4	0	0	2	0	2	0	0	SPF
Hydroptila choccolocco	S	2	0	0	1	0	1	0	2	SPTF
Alloperla furcula	R	2	0	0	1	0	1	0	0	SF
Carlson's P. caddisfly	S	3	0	0	2	0	1	0	3	SPTF
Hydroptila setigera	S	4	0	0	3	0	1	0	4	
Brachycercus nasutus	R	6	0	0	5	0	1	0	0	SP
Hydroptila talladega	R	14	1	0	10	0	3	0	14	SPTF
Hodges' clubtail	S	8	1	0	5	0	2	0	0	SPF
Twin-striped clubtail	S	8	1	0	5	0	2	0	0	SPF
Peter's Cheumatopsyche	R	8	1	0	5	0	2	0	8	SPF
Chimarra augusta	R	12	1	0	9	0	2	0	12	
Agapetus iridis	R	12	1	0	9	0	2	0	12	SPF
Somatochlora calverti	R	8	1	0	6	0	1	0	8	SPF
Smokey showdragon	S	2	0	0	2	0	0	0	0	SPF
Hydropsyche hageni	S	1	0	0	1	0	0	0	1	S
Robust baskettail	S	8	1	0	6	0	1	0	0	SP
C. kinlockensis	R	2	0	2	0	0	0	2	0	SF
Helma's net-spinning c.	S	3	0	0	3	0	0	0	3	PF
Baetisca becki	R	8	1	0	6	0	1	0	8	SP
Treetop emerald dragonfly	S	11	4	0	4	0	3	0	0	SPF
Belle's sanddragon	S	6	1	0	5	0	0	0	6	SP
Alleghany snaketail	S	5	2	0	2	0	1	0	0	SPTF
Hydroptila patriciae	S	4	2	0	1	0	1	0	4	SPTF
Cheaha Beloneurian st.	R	4	2	0	1	0	1	0	4	SP
Berner's microcaddisfly	R	19	8	0	8	0	3	0	19	SPTF
Septima's clubtail	R	7	4	0	1	0	2	0	7	SPF
Auroral damsel	R	23	11	0	10	0	2	0	0	PTF
Townes'clubtail	S	2	1	0	1	0	0	0	2	S
Laura's clubtail	S	4	3	0	0	0	1	0	4	SF
Piedmont clubtail	R	12	7	0	4	0	1	0	0	SPT
Double-ringed pennant	R	33	20	0	13	0	0	0	0	P
Brachycentrus numerosus	R	3	2	0	1	0	0	0	3	S
Cocoa clubtail	S	4	3	0	1	0	0	0	0	S
Sandhill clubtail	R	8	6	0	2	0	0	0	0	P
Say's spiketail	S	8	6	0	2	0	0	0	8	P
Morse's Long-horn Sedge	S	2	2	0	0	0	0	0	2	
Hydroptila paralatosa	S	2	2	0	0	0	0	0	2	
Hydroptila lagoi	R	1	1	0	0	0	0	0	1	
Cheumatopsyche bibbensis	S	3	3	0	0	0	0	0	3	

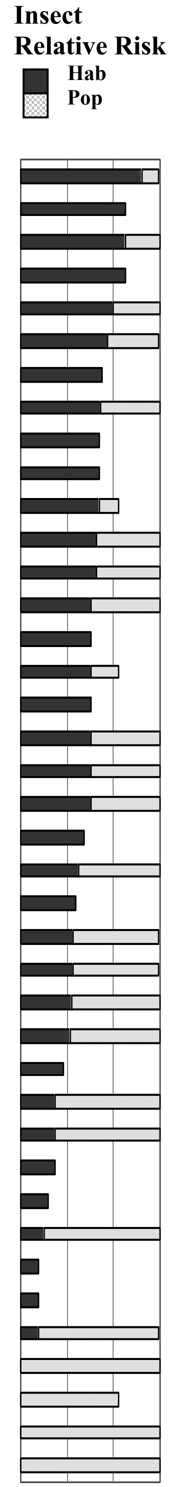


Table 3B-105: Viability risks for the mussels analyzed under current conditions (Alternative F).

Species Name	Status	Watersheds	Watersheds per Viability Risk Category							Risk Factors
			1 a	1b FS	1c	2 FS	3	4 FS	5	
Painted creekshell	R	4	0	0	0	0	4	0	0	SPF
Rainbow	R	4	0	0	0	0	4	0	0	SPF
Southern kidneyshell	S	1	0	0	0	0	1	0	0	SF
Wavyrayed lampmussl	R	4	0	0	0	0	4	0	0	SPF
Cumber. combshell	E	1	0	0	0	0	1	0	0	PF
Slippershell mussel	R	4	0	0	0	0	4	0	0	SPTF
Orange-nacre mucket	T	7	0	0	1	2	4	0	0	SPF
Black sandshell	R	5	0	0	1	0	4	0	0	SPF
Alabama lampmussel	E	8	0	0	2	3	3	3	5	SPF
Dark pigtoe	E	5	0	2	1	0	2	2	3	SPF
Coosa combshell	S	4	0	0	2	0	2	0	0	SPF
Alabama rainbow	S	8	0	1	3	1	3	0	0	SPF
Georgia pigtoe	SC	2	0	0	1	0	1	0	0	PF
Coosa moccasinshell	E	6	0	1	2	1	2	2	4	SPF
Alabama pearlshell	SC	2	0	0	1	0	1	0	2	SF
Southern acornshell	E	6	0	0	3	0	3	0	6	SPF
Alabama spike	S	4	0	2	0	0	2	0	0	SPF
Upland combshell	E	5	0	1	2	0	2	1	4	SPF
Triangular kidneyshell	E	8	0	2	3	1	2	3	5	SPTF
Alabama clubshell	RC	3	0	0	2	0	1	0	3	SPF
Southern pigtoe	E	6	0	0	4	0	2	0	6	SPF
Southern sandshell	S	6	0	0	4	0	2	0	6	SPF
Purple pigtoe	S	6	0	0	4	0	2	0	6	SPF
Delicate spike	R	3	0	2	0	0	1	2	1	SPF
Coosa fiveridge	R	7	0	0	5	0	2	0	0	SPF
Ovate clubshell	E	8	0	2	4	0	2	2	6	SPF
Southern clubshell	E	8	0	0	6	0	2	0	8	SPF
Fine-lined pocketbook	E	15	1	2	8	2	2	4	11	SPF
Ridged mapleleaf	S	6	0	0	5	0	1	0	6	PF
Choctaw bean	S	8	1	0	5	0	2	0	0	SPF
Southern creekmussel	S	4	1	0	2	0	1	0	0	SF
Alabama creekmussel	S	2	0	0	2	0	0	0	0	SF
Tennessee heelsplitter	S	1	0	0	1	0	0	0	0	PF
Rayed creekshell	S	5	1	0	3	0	1	0	5	SPF
AL. moccasinshell	T	4	1	3	0	0	0	3	1	SF
Alabama heelsplitter	S	3	1	0	2	0	0	0	3	SPF
Round ebonyshell	R	2	1	0	1	0	0	0	2	F
Alabama hickorynut	S	4	3	0	1	0	0	0	4	S

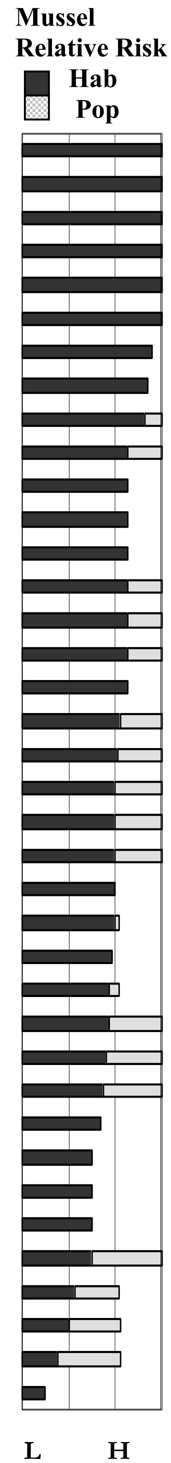


Table 3B-106: Viability risks for the crayfish analyzed under current conditions (Alternative F).

Species Name	Status	Watersheds	Watersheds per Viability Risk Category							Risk Factors
			1 a	1b	1c	2FS	3	4FS	5	
Orconectes holti	R	3	0	0	1	0	2	0	0	SPF
Cambarus halli	R	5	1	0	4	0	0	0	0	SP
Cambarus englishi	S	5	2	0	3	0	0	0	0	P
P. marthae	S	3	3	0	0	0	0	3	0	
Rusty gravedigger	S	2	2	0	0	0	0	2	0	

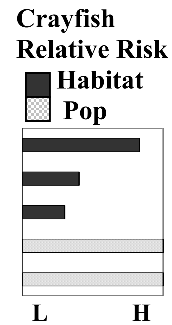


Table 3B-107: Viability risks for the reptiles analyzed under current conditions (Alternative F).

Species Name	Status	Watersheds	Watersheds per Viability Risk Category							Risk Factors
			1 a	1b FS	1c	2 FS	3	4 FS	5	
Flattened musk turtle	T	5	0	1	0	1	3	0	0	SPTF
N. map turtle	R	14	0	0	5	1	8	0	0	SPF
AL map turtle	R	19	2	1	11	0	5	0	0	SPF
Escambia map turtle	S	7	1	0	4	0	2	0	0	SPF
E. Spiny softshell	R	2	0	0	2	0	0	0	0	PF
Alligator snapper turtle	R	16	5	0	8	0	3	0	0	PF
Am. alligator	R	11	6	0	5	0	0	0	0	PF
Loggerh. musk turtle	-	27	17	0	9	0	1	0	0	P
Mud snake	R	16	12	0	4	0	0	0	0	P
Rainbow snake	R	18	14	0	4	0	0	0	0	P
N. FL swamp snake	R	5	4	0	1	0	0	0	0	P

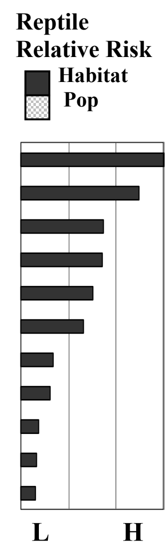
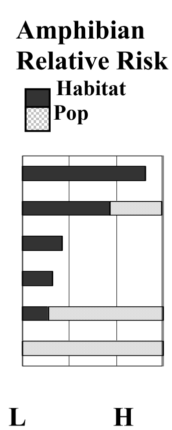


Table 3B-108: Viability risks the amphibians analyzed under current conditions (Alternative F).

Species Name	Status	Watersheds	Watersheds per Viability Risk Category							Risk Factors
			1 a	1b FS	1c	2FS	3	4FS	5	
Hellbender	R	4	0	0	1	0	3	0	0	SPTF
Black Warrior waterdog	SC	4	0	2	1	1	0	3	1	SPTF
Two-toed amphiuma	R	9	5	0	3	0	1	0	0	P
E. mud salamander	R	7	4	1	2	0	0	0	0	P
River frog	R	8	5	0	3	0	0	0	8	PF
One-toed amphiuma	R	3	3	0	0	0	0	0	3	P



Affected Environment

Based on species viability analyses derived from indicators of watershed-wide habitat conditions, 115 out of 172 (67%) aquatic PETS and rare (PETS_R) species are at high risk for loss of viability in at least one watershed. Sixty-nine of these species are at risk in multiple watersheds. Thirty percent of the species are in the high-risk category, 47 percent are in the moderate risk category, and 23% are in the low risk category. Eighteen mussels, 15 fishes, 11 snails, 4 insects, 2 reptiles, 1 crayfish, and 1 amphibian fall within the highest risk category. Mollusks represent over 54% of the total number of high-risk species but only 37% of the total PETS and rare species. Mussels, snails, and fish have the largest proportions of their PETS and rare species ranking within the high levels of viability risk. Additionally, a substantial population imperilment risk adjustment was included for 35 PETS species: 12 fishes, 10 mussels, 9 insects, 2 crayfish, 1 snail, and 1 amphibian, thereby elevating their potential viability risks to high under outcome categories 4 and 5. In these cases where the analysis of watershed-wide habitat conditions yields a much lower risk to species viability than might be indicated by an overall population imperilment approach (such as Federal listing and S-ranks), species imperilment is likely due to broader off-Forest and State-wide conditions.

Figure 3B-3: Proportion of Alabama aquatic PETS and rare species categorized by taxa (n=172).

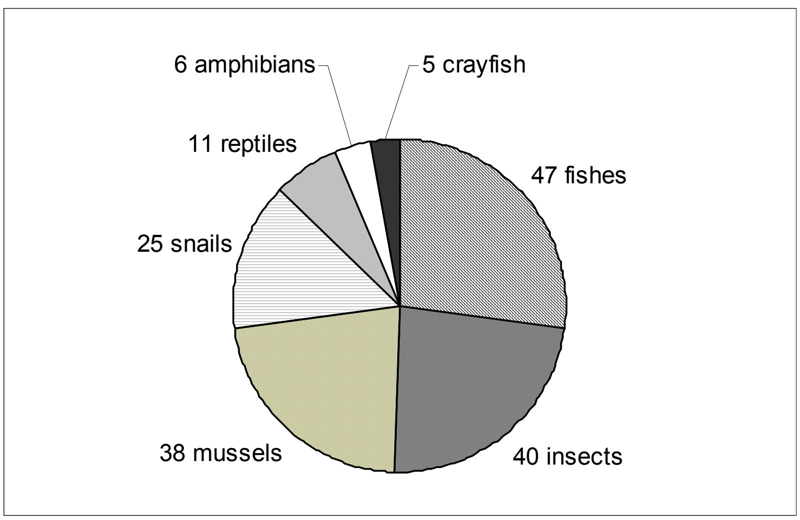
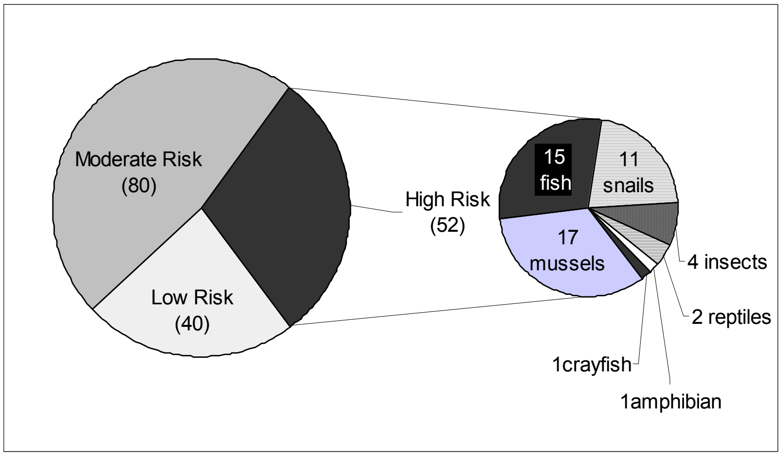
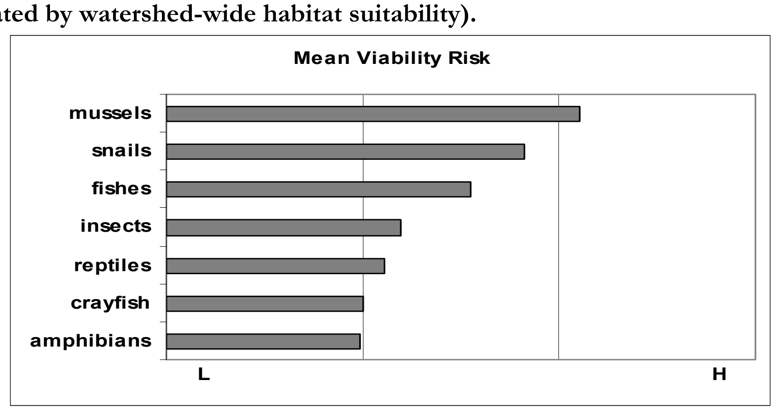


Figure 3B-4: Proportions of Alabama aquatic PETS and rare species categorized by risk for loss of viability (as indicated by watershed-wide habitat suitability).



While thirty percent of the analyzed PETS and rare species ranked as a high risk, only about a quarter of these species were in watersheds with potential opportunities for Forest Service influence. The viability assessment indicated that 14 species are at high risk and 11 species are at moderate risk of declining due to watershed conditions in a situation where the Forest Service can exert some influence on the outcome. Only nine high-risk species (17% of high risk species) have opportunities for substantial Forest Service mitigation. Six Federally listed species fall within this category and include the following: flattened musk turtle, upland combshell, orange-nacre-mucket, Alabama lampmussel, Coosa moccasinshell, and dark pigtoe. The flattened musk turtle, upland combshell, Alabama lampmussel, Coosa moccasinshell, and dark pigtoe are all species where the Forest Service includes a disproportionate component of the available habitat in the State of Alabama. The Forest Service therefore has opportunity to not only reduce species viability risks, but also to contribute to the security of the species in the State of Alabama and across the southeastern United States.

Figure 3B-5: Relative viability risks for major taxons across all watersheds of the National Forests in Alabama (as indicated by watershed-wide habitat suitability).



In summary, the Forest Service has substantial opportunities to positively influence the viability of at least 9 high risk and 6 moderate risk aquatic species. Presumably, the National Forests may also be providing ongoing protective measures for the 40 species categorized as of low risk of loss of viability. There are also 107 aquatic species in either the moderate or the high-risk categories, where the Forest Service is unlikely to be able to influence the viability outcomes.

Potential Effects

Due to the watershed-based evaluation process, the viability rankings are indicators of cumulative effects rather than direct and indirect effects. Direct and indirect Forest Service effects are more appropriately gauged at the habitat and species-specific levels, as discussed in sections 3.B.4.0 and 3.B.6.0.

Cumulative Effects

Watershed stressor and species viability associations are primarily a result of historical influences that have reduced distribution and abundance of some habitat elements and species populations. In general, effects of the proposed alternative management strategies are small relative to historical impacts and future off-Forest threats. Risks to species viability are minimized by the application of riparian prescription direction and riparian, streamside management zone, and ephemeral channel management standards. Moreover, under all of the management alternatives there would be Forest Plan objectives for pro-active conservation measures that would further minimize species viability risks.

Watershed health indices are projected to remain the same for all alternatives. Possible watershed health indices are excellent, average, or below average (section 3.A.2, water). Forest objectives for watersheds with an “excellent” watershed health index (35 watersheds) are to maintain or improve aquatic health through the implementation of riparian prescription standards. The probability is low for adverse effects to aquatic species and their associated habitats in these watersheds. Forest objectives for watersheds with an “average” watershed health index (5 watersheds) are the same as for watersheds with “excellent” ratings; however, additional attention may be placed on aquatic ecosystem assessments, project-level planning and analyses, monitoring, and restoration treatments. No additional adverse effects to water quality or aquatic species should occur. The three watersheds with “below average” watershed health indices and over one percent Forest Service ownership (Lower Flint, Middle Choccolocco, and Tallaseehatchee) have substantial downstream and off-Forest influences that may limit effectiveness of Forest Service improvements. Conversely, Forest Service actions under any of the Plan alternatives are not likely to add to the extent of impairment within these watersheds. However, programmatic and project effects within these watersheds need to be evaluated with care, in order to insure that there are not circumstances where cumulative thresholds of concern are exceeded for the high risk species.

Species that are rated as having low risk of loss of viability (40), are those species that have low sensitivity to environmental stressors and are situated in watersheds considered as healthy (WHI = excellent). These species are likely to remain in that category with the continued application of the streamside management zone standards of alternative F. Under the action alternatives, riparian prescription direction would provide additional protective measures. Therefore, there is a high likelihood of maintaining viability in these watersheds under all of the alternatives. Note that some species (~27) which ranked at only low risk in the watershed-wide habitat suitability portion of the viability analysis but which have a substantial population imperilment risk may warrant elevation of their risk evaluation into viability outcome categories 4 or 5.

For the species that are in watersheds with a moderate viability risk (80), the species are potentially at risk in the watershed due to one rather than multiple stressors. In these cases, the species are situated on the National Forest and the stressors may be under at least partial Forest Service control. Approximately eight percent (6) of these species are in situations where the Forest Service could provide continued or improved protective measures, and thus possibly decrease the risk to the species. Note that some species (~49) which ranked at moderate risk in the watershed-wide habitat suitability portion of the viability analysis but which have a substantial population imperilment risk may warrant adjustment of their risk evaluation into outcome categories 4 or 5. Continued application of the streamside management zone standards (alternative F) would be expected to maintain or improve habitat conditions, at least at localized sites. Under the action alternatives, the addition of riparian prescription direction may positively influence local conditions. Therefore, the likelihood of maintaining viability in these watersheds is projected to continue at a moderate level under all of the alternatives.

Species that are ranked as high viability risk (52) are those species that are considered at high risk due to their inhabitation of watersheds of “average” and “below average” watershed health and sensitivity to multiple stressors of potential concern. Only 14 species in viability category 2 are situated on the National Forests where the stressors are under at least partial Forest Service control (9 of these substantial) and the Forest Service could improve conditions and influence population viability. Continued application of the streamside management zone standards under alternative F would be expected to maintain or improve habitat conditions. Under the action alternatives, the addition of the riparian prescription direction may positively influence local conditions. Therefore, the likelihood of maintaining viability in these watersheds is projected to continue either at current or improved levels under all of the alternatives

In conclusion, species viability is expected to remain the same across all of the action alternatives. Although there may be subtle differences in the magnitude of localized management effects (see sections 3.A.2 and 3.B.4), when combined with the strengthened riparian, streamside management zone, and ephemeral channel standards across all action alternatives, differences in effects among alternatives would be minor and not sufficient to result in differences in species viability. Section 3.B.6 discusses the minor differences among alternatives in localized effects on high risk threatened, endangered, candidate, or sensitive species.

7.0 DEMAND SPECIES EFFECTS ANALYSIS

WHITE-TAILED DEER

Affected Environment

White-tailed deer use a variety of forest types and successional stages to meet their year-round needs. In the Southern Appalachians, regeneration areas and older forests provide complementary benefits to deer (Johnson et al. 1995). Older forests generally are most important in the fall and winter. When available, acorns are the dominant fall and winter food item (Wentworth et al. 1990a). When acorns are scarce, the bulk of the diet consists of leaves from broadleaf evergreen shrubs, primarily rhododendron (*Rhododendron maximum*). Deer nutrition, reproduction, weights, and antler characteristics are influenced by the availability of acorns (Harlow et al. 1975, Feldhammer et al. 1989, Wentworth et al. 1990a, 1992). Use of even-aged regeneration areas was very low in winter (Wentworth et al. 1990b). However, in the spring and summer, regeneration areas provide an abundance of food and are heavily utilized (Wentworth et al.1990b, Ford et al. 1993). Young regenerating stands contain substantial quantities of woody browse, herbs, fungi, and soft mast, all of which are limited in older forests (Johnson et al. 1995). Food plots, especially those containing clover-grass mixtures, are used most intensively in early spring. They also are an important source of nutritious forage in winter, especially when acorns are in short supply (Wentworth et al. 1990b).

In eastern hardwood forests, Barber (1984) recommended that at least 50 % of the acreage should consist of mature mast trees, with the remainder containing an interspersion of evergreens, shrubs and vines, and openings with herbaceous and young-growth woody vegetation. Based on utilization data, current deer densities in the Southern Appalachians can be maintained by providing approximately 5% in regenerating stands (Wentworth et al. 1990b). Wentworth et al. (1989) concluded that approximately 2% of the area in high quality wildlife openings would be necessary to adequately buffer the effects of a poor acorn year.

Acorns also are important for deer in the Piedmont (Harlow and Hooper 1971). However, because of the availability of alternative high quality foods, especially Japanese honeysuckle and agricultural crops, deer are less mast dependant than in the mountains. Prescribed burning, thinning, and regulated timber harvest all can be used to improve habitat conditions for deer. Whittington (1984) described a management system where pine forests are managed on an 80- year rotation with an 8-year cutting cycle. Each entry, 85% of the area is thinned, 10% is regenerated and 5% is retained in wildlife openings. Approximately 20% is maintained in mast-producing hardwood stands.

White-tailed deer are present throughout the National Forests in Alabama with population densities ranging from relatively low in the Southern Appalachians to medium and high for other portions of the state (Miller 2001). High population densities are associated with greater amounts of cropland and lesser amounts of developed and coniferous forestland. Deer densities throughout Alabama have greatly increased in the last 25 years. This increase likely is related to both nonhabitat factors such as extensive restoration efforts, protection, and conservative harvest strategies as well as increased acorn capability resulting from the increase in mid-to late-successional oak forests.

Deer hunting in Alabama likely produces more revenue annually than any other hunting related activity. Game harvest regulations and habitat improvement techniques—such as forest thinnings, prescribed burning, and wildlife opening development—have helped create healthy deer populations throughout the State. There are five State Wildlife Management Areas (WMAs) on the Forest.

Deer populations tend to increase as the amount of early successional habitat increases. Current data indicates that the amount of early successional habitat on the National Forest in Alabama has declined over the previous 16 years. Nevertheless, there appears to be an overall increase in deer numbers on the forest. This may be due to several factors: 1) prescribed burning that maintains open mature pine stands and creates browse and cover, 2) the influence of surrounding private lands, and 3) the increase in the size of the State's deer herd.

Current data indicates that deer population levels are increasing on the Bankhead National Forest and the Talladega Division and decreasing on the Conecuh and the Oakmulgee Division.

During the 2001-2002 season, just over 65,000 man-days were spent hunting deer on State WMAs with nearly 18,000 of those days spent on WMAs located on Forest Service lands. During the 2000-2001 season, nearly 59,000 man-days were spent on State WMAs with just over 16,000 of those days spent on WMAs located on Forest Service lands. (ADWFF 2002).

Direct and Indirect Effects

As discussed above, white-tailed deer require a mixture of forest/successional stage habitats to meet their year-round habitat needs. Key requirements include the interspersion of mature mast-producing stands during the fall and winter, early successional habitats to provide browse and soft mast, and permanent openings. The effects of each of the alternatives on these key habitat features are discussed in detail in previous sections.

Areas with high habitat diversity will most often be higher quality deer habitat. Since a single forest type or condition rarely provides all of a deer's habitat requirements, habitats can be improved for deer by using timber harvest, prescribed fire, and/or agricultural food plots to increase habitat diversity (Miller 2001). As previously stated, hunting demand for white-tailed deer is high on all National Forests in Alabama management units. Therefore, white-tailed deer is selected as an indicator of the effects of management to meet the demand for this species.

Management indicator species may provide additional discerning information for evaluating the relative effects of management alternatives. MIS population trends are expected to be directly proportional to trends in habitat quantity and quality. The expected population trends for white-tailed deer after 10, and 50 years of revised forest plan implementation are shown in Table 3B-109.

Table 3B-109. Expected population trends[1] of MIS, white-tailed deer by alternative, National Forests in Alabama. Population trends are based on expected trends in habitat quantity and quality.

	A	B	D	E	F	G	I
WHITE-TAILED DEER							
+10 YEARS	+	+	=	+	=	-	+
+50 YEARS	+	+	+	+	+	-	+

1 Population trend expressed as change from current levels: "++" = relatively large increase, "+" = increase, "=" = little to no change, "-" = decrease, "—" relatively large decrease.

Alternative A would benefit deer because it allows for active timber management and would result in an increase in early successional habitats. Early successional habitats created by this alternative would increase the quality and quantity of available browse for use by deer. Applying this alternative would likely aid in increasing deer numbers and hunter success rates. Alternative A would also allocate some old growth that is important for maintaining mast production.

Alternative B would be beneficial to deer because it allows for timber management that would result in the creation of early successional habits important for providing forage and cover for deer. Applying this alternative would likely aid in increasing deer numbers and hunter success rates. Large and small openings, which provide early successional habitat, and old growth, important for mast production, are also important in maintaining or increasing deer populations would be emphasized under alternative B. Alternative B also emphasizes the restoration of native ecosystems and the prescribed fire regimes necessary to restore native forest structure. This would greatly benefit deer forage quality in upland forests.

Alternatives D and F would be beneficial to deer because they allow for sustained-yield timber management that would result in the creating or important early successional habitats. However, these alternatives both rely on streamside management zones alone to protect riparian areas, where alternatives A, B, E, G, and I apply the additional Riparian Prescription (11) protections. Since riparian areas are so important to mast producing hardwoods in Alabama, the beneficial effects of Alternative D and F in producing early successional forest habitats are moderated by lesser protections to riparian character.

Alternative E, the recreation emphasis alternative, recognizes upland game hunting as the largest outdoor recreational activity on public lands in Alabama, and therefore focuses management on providing optimal habitats for demand species. Alternative G would produce negative impacts to deer, because of the low habitat interspersion. The proposed old growth would provide adequate amounts of mast producing species important for providing winter foods. Limiting timber harvest would negatively impact the availability of early successional habitats and likely limit the quality and quantity of important forage species. This alternative will likely negatively affect deer numbers and hunter success rates.

Alternative I would have beneficial effects to deer populations. The result of restoration activities, including thinning, burning, and restoration harvests would create improve forage abundance and quality. Old growth areas also would be emphasized under this alternative. Old growth hardwoods are important for ensuring that adequate amounts of mast producing species are available.

Cumulative Effects

The abundance of deer and the ability of the forests to meet hunter demand will largely be determined by which of the above alternatives are selected for implementation. However, it is important to keep in mind that factors such as deer harvest regulation, law enforcement capabilities, and wildlife diseases also play an important role in determining deer population numbers.

Alternatives A, B, E, and I would be beneficial to deer to some level because they provide for timber management and will provide for at least minimal amounts of early successional habitats. These alternatives also provide for old growth hardwoods that provide important winter mast. Alternative G would have some beneficial impacts because of the old growth emphasis and the resulting availability of hard mast. However, early successional habitats would likely be limiting because of limited timber management. Alternative G is likely insufficient to provide enough quality habitat to meet hunter demands as deer population levels would likely decrease. Any of the other alternatives would likely provide conditions that would meet hunter demands and expectations for numbers of deer.

EASTERN WILD TURKEY

Affected Environment

Wild turkey occupy a wide range of habitats, with diversified habitats providing optimum conditions (Schroeder 1985). This includes mature mast-producing stands during fall and winter, shrub-dominated stands for nesting, and herb-dominated communities, including agricultural clearings for brood rearing. Habitat conditions for wild turkey can be enhanced by management activities such as prescribed burning and thinning (Hurst 1978; Pack et al. 1988), and development of herbaceous openings (Nenno and Lindzey 1979, Healy and Nenno 1983).

For the eastern hardwood region, Wunz and Pack (1992) recommended maintaining 50 to 75% of the area in mast producing condition and approximately 10% in widely distributed permanent herbaceous openings in addition to the temporary openings that result from timber harvest and other activities. They suggest that regeneration area should be 30 acres in size or less. Light thinnings (<20% of BA) are recommended to enhance the herbaceous component of the stands. Heavier thinnings, which increase the quantity of woody species, are less desirable. Prescribed burning in conjunction with thinning in oak forests can be used to enhance brood habitat. Another important habitat component includes a diversity of soft mast producing plants (e.g. dogwood, black gum, grape, blueberries, etc).

For the southern pine region, Hurst and Dickson (1992) recommended that at least 15% of the area should be kept in mature hardwoods such as streamside zones or pine-hardwood corridors. Forest openings and soft mast species also are important habitat components. Pine plantations should be thinned frequently and burned on a 3-to-5 year rotation to enhance herbaceous vegetation and soft mast production.

Eastern wild turkeys are present throughout the State of Alabama. Population densities generally are medium to high throughout the State. High population densities are associated with greater amounts of oak forest and cropland, and lesser amounts of developed and coniferous forestland. Current turkey densities generally are higher on private land, state, and national forest lands than other ownerships. Wild turkey populations have expanded in range and density in the last 25 years. As with deer, this increase likely is related to both nonhabitat factors such as extensive restoration efforts, protection, and conservative harvest strategies as well as increased acorn capability resulting from the increase in mid-to late-successional oak forests. Also as with deer, turkeys have been chosen as MIS, indicating the effects of management to meet the demand for this species.

Annual harvest rates for wild turkeys indicate that hunter success has increased on both Divisions of the Talladega National Forest but declined on the Bankhead and Conecuh. During the 2002 turkey-hunting season, nearly 16,000 man-days were spent on State WMAs. Of those days spent afield, one-third was spent on WMAs located on National Forest land (ADWFF 2002).

Direct and Indirect Effects

As discussed above, wild turkeys require a mixture of forest/successional stage habitats to meet their year-round habitat needs. Key requirements include the interspersion of mature mast producing stands during fall and winter, shrub dominated stands for nesting, and herb dominated communities, including permanent openings for brood rearing. Disturbance also may be a concern during the nesting season. The effects of each of the alternatives on these key habitat features are discussed in detail in previous sections.

Table 3B-110. Expected population trends[1] of MIS, Eastern wild turkey by alternative, National Forests in Alabama. Population trends are based on expected trends in habitat quantity and quality.

	A	B	D	E	F	G	I
EASTERN WILD TURKEY							
+10 YEARS	+	+	-	+	-	+	+
+50 YEARS	+	+	=	+	=	=	+

1 Population trend expressed as change from current levels: "++" = relatively large increase, "+" = increase, "=" = little to no change, "-" = decrease, "—" relatively large decrease.

Management indicator species may provide additional information for evaluating the relative effects of management alternatives. MIS population trends are expected to be directly proportional to trends in habitat quantity and quality. The expected population trends for Eastern wild turkeys after 10, and 50 years of revised forest plan implementation are shown in Table 3B-110.

Alternative A would be beneficial to turkeys because it allows for active timber management that would provide early successional habitats. Early successional habitats are very important areas for wild turkeys to nest, forage, and raise their young. The old growth associated with alternative A would provide for adequate amounts and a diversity of hardwood species important for providing a winter food source. Implementing alternative A would likely assist in increasing the number of turkeys to adequately meet hunter demands.

Alternative B would be beneficial to turkeys because it allows for manipulation of timber to meet demands for wildlife species dependant to some level on early successional habitats. Large and small openings, which provide for early successional habitat scattered throughout the forests, created by implementation of alternative B would be beneficial to turkeys. Old growth and the retention of a diversity of mast producing species would likely meet winter demands of the wild turkey. Implementation of alternative B would likely assist in increasing the number of turkeys and meet hunter demands and expectations. Alternative E, the recreation emphasis alternative, recognizes upland game hunting as the largest outdoor recreational activity on public lands in Alabama, and therefore focuses management on providing optimal habitats for demand species.

Alternatives D and F would be beneficial to turkeys because they allow for sustained-yield timber management that allows for early successional habitat important for nesting and brood rearing. Alternative D also allows for an equal number of acres for each of the 10-year age classes. Implementing D would substantially increase the amount in the 0-10 age class and would provide much additional early successional habitat. Adequate amounts of old growth hardwood would likely be retained to meet the turkeys demand for winter foods. Implementation of alternative D would likely assist in increasing the number of turkeys and meet hunter demands and expectations. However, lesser riparian protection in Alternatives D and F moderates the beneficial management effects of these alternatives.

Alternative G would have both positive and negative impacts to turkeys. The proposed old growth would provide for winter mast production but limited timber harvest would limit the amount of early successional habitats important for providing nesting and brood-rearing sites. Limited early successional habitats may cause turkey population numbers to decrease to levels where hunter expectations and demands are not met.

Alternative I would have beneficial effects to turkeys. The result of restoration activities would create adequate amounts of early successional habitats important for nesting and brood rearing. The old growth component of this alternative would provide adequate amounts and diversity of important winter mast producing species. This alternative would likely assist in increasing numbers of turkeys and would be adequate for meeting hunter demands and expectations.

The abundance of turkeys and the ability of the forests to meet hunter demands will largely be determined by which of the above alternatives are selected for implementation. Alternatives A, B, E, and I would be beneficial to turkeys to some level because they provide for timber management and will provide for at least some early successional habitats. These alternatives also provide for old growth hardwoods that provide important winter mast. Alternative G would have some beneficial impacts because of the old growth emphasis and the resulting availability of hard mast. However, early successional habitats would likely be limiting because of limited timber management. Alternative G is likely insufficient to provide suitable enough quality habitat to meet hunter demands as turkey population levels would likely decline. Any of the other alternatives would likely provide conditions that would meet hunter demands and expectations for numbers of turkeys.

Northern bobwhite quail

Affected Environment

The northern bobwhite is associated with early successional plant communities (Spears et al. 1993). The bobwhite may be associated with a climax community such as mature longleaf pine if disturbance (fire) occurs frequent enough to maintain early successional grass/forb ground cover. In forested landscapes, the midstory and understory conditions influence habitat suitability because of the affects (shading) on ground layer vegetation. Bobwhites depend of multiple cover types to meet daily, seasonal, and annual habitat needs. Therefore, the interspersion of multiple microhabitats is essential in providing quality habitat. Bobwhites are very specific in their habitat requirements largely due to difference in habitat use by season. During winter, woody or brushy cover, adequate and accessible food sources, and grassland and annual weed communities are necessary for providing suitable habitat (Rosenbery and Klimstra 1984). Prime nesting cover is described as scattered shrubs interspersed with dense herbaceous and grassy vegetation (Roseberry and Klimstra 1984:21). Breeding season ranges occur in open sites dominated by herbaceous vegetation. Brood-rearing habitat is described as broad-leaved herbaceous vegetation with 20% to 50% of the area in bare ground, an abundance of insects, critical for chick development, and scattered shrubs and brush for thermal cover (Lehman 1984, DeVos and Mueller 1993, Burger et al. 1994, Taylor and Guthrie 1994, Taylor 1996). Structural characteristics of sites used by bobwhite broods vary in relation to time of day and activity (Taylor and Guthrie 1994).

In southern pine forests, quality habitats for the bobwhite can be maintained using prescribed fire on a 1- to 3-year rotation. A fire maintained southern forest is characterized by an open canopy, sparse scattered shrubs, and a grass/forb ground layer. Thinning dense timber stands also is important in providing quality habitat for the bobwhite. The level of thinning optimal for timber management purposed may still be too dense for optimal quail production. For quail, 30% to 50% canopy closure is optimal for producing an herbaceous community that is most beneficial. Clearcuts can provide quality quail habitat for 2 to 4 years following harvest and even longer when properly maintained (Burger 2001).

The northern bobwhite is present throughout the State of Alabama. Population densities throughout the state have declined over the last 30 years. The decrease in numbers of quail has been attributed to a loss of ideal habitat in combination with predation (Alabama Wildlife Federation 1999).

Quail numbers on the National Forests in Alabama have declined on every unit during the previous 10 years, except the Conecuh, where populations have remained relatively stable. The probable reason for decline is a reduction in early successional habitats due to a decrease in active timber management.

State Wildlife Management Areas are important in providing opportunities for quail hunters. During the 2001-2002 hunting season, just more than 4,000 hunters took to the field. Wildlife Management Areas located on National Forest land accounted for one-forth of all days hunted (ADWFF 2002).

Direct and Indirect Effects

Quail population response is strongly tied to the availability of early successional habitat created through timber harvest and maintained by prescribed fire.

As discussed above, quail require early successional habitats with scattered shrubs and some bare ground to meet their year-round habitat needs. Key requirements include substantial amounts of early successional habitats dominated by a grass/forb ground layer with the interspersion of shrubs and bare ground. Northern bobwhite quail is selected as an indicator of the effects of management to meet the demand for this species.

Each alternative is analyzed in general terms below (Table C.) as to effects on quail populations. A "+" indicates an alternative would be beneficial to the needs of quail. A "–" indicates an alternative would not be beneficial to the needs of quail.

Table 3B-111. Expected population trends[1] of MIS, Northern bobwhite quail by alternative, National Forests in Alabama. Population trends are based on expected trends in habitat quantity and quality.

	A	B	D	E	F	G	I
NORTHERN BOBWHITE QUAIL							
+10 YEARS	+	+	+	+	=	-	+
+50 YEARS	+	+	-	+	=	-	+

1 Population trend expressed as change from current levels: "++" = relatively large increase, "+" = increase, "=" = little to no change, "-" = decrease, "—" relatively large decrease.

Management indicator species may provide additional information for evaluating the relative effects of management alternatives. MIS population trends are expected to be directly proportional to trends in habitat quantity and quality. The expected population trends for Northern bobwhite quail after 10, and 50 years of revised forest plan implementation are shown in Table 3B-111.

Alternative A would be beneficial to quail because it allows for active timber management. Active timber management will allow timber stands to be thinned and encourages the grass/forb layer that is important in maintaining and increasing quail numbers. Implementing an aggressive prescribed fire program in conjunction with alternative A would provide early successional habitats that would likely meet year-round habitat demands of quail. Depending on the treatments associated with this alternative, its implementation has the potential to assist in creating additional quail habitat and assist in meeting hunter demands.

Alternative B would be beneficial to quail because it allows for manipulation of timber to meet demands for many wildlife species including the quail. Large and small openings, which provide for early successional habitat, would be emphasized under alternative B. Implementing a prescribed burning program in conjunction with alternative B has potential to increase quail numbers to help meet hunter demand. Alternative E, the recreation emphasis alternative, recognizes upland game hunting as the largest outdoor recreational activity on public lands in Alabama, and therefore focuses management on providing optimal habitats for demand species.

Alternatives D and F would be beneficial to quail because they allow for sustained-yield timber management. They also allow for an equal number of acres for each of the 10-year age classes, would substantially increase the number of acres in the 0-10 age class, and would provide additional early successional habitat. When combined with a prescribed burning program, alternative D has the potential to increase quail numbers to help meet hunter demand.

Alternative G would have negative impacts to quail, due to the low emphasis on habitat interspersion. Limited timber harvest would limit the amount of early successional habitats important for providing nesting, loafing, foraging, and brood-rearing sites. Alternative G would not be adequate for maintaining or increasing quail numbers and would not help increase quail numbers to meet hunter demands.

Alternative I would have beneficial effects to quail. The result of restoration activities would create adequate amounts of early successional habitats across the forests. Combining alternative I with a prescribed burning program would assist in increasing quail numbers and meeting hunter demand.

Cumulative Effects

The abundance of quail and the ability of the forests to meet hunter demands will largely be determined by which of the above alternatives are selected for implementation. Alternatives A, B, E, and I would be most beneficial to quail because they provide for timber management and will provide for early successional habitats. Alternatives B and I are slightly more advantageous due to their emphasis on restoring native forest structure, disturbance regimes, and species composition. Increased woodland and savanna condition restoration will benefit quail populations.

Implementation of alternative G would not likely help to produce adequate numbers of quail to meet hunter demands. Although this alternative emphasizes old growth important for many wildlife species, old growth without the creation of early successional habitat will not benefit quail populations. Alternative G is likely insufficient to provide suitable enough habitat to meet hunter demands as turkey population levels would likely be low. Any of the other alternatives would likely provide conditions that would meet hunter demands and expectations for numbers of turkeys.

7.4 FISH

Affected Environment

The National Forests provide only a small fraction (< 1%) of the recreational fishing opportunities in the State of Alabama. Off-Forest reservoirs and large rivers receive the highest use. Throughout the State, the recreational demand appears to be greatest for a variety of bass species, followed by bream, crappie, and catfish. Crayfish and minnows may be collected for use as bait. Crayfish may also be trapped for personal consumption. The Forest Service does not have jurisdiction over fishing regulations. Forest Service collecting permits are required for commercial and scientific uses. There are no currently active aquatic species commercial collecting permits on the National Forests. Several scientific collectors permits are granted each year.

There are 4,386 acres of 38 reservoirs, lakes, or ponds situated on or adjacent to the National Forests in Alabama. Almost half of these water bodies (18, for a total of 750 acres) are actively managed for recreational fishing opportunities. Current lake and reservoir recreational facilities include campgrounds, picnic areas, restrooms, boat ramps, trails, roads, beaches, fishing piers, and fish cleaning stations. Many of the most popular developed recreational sites are situated near water. Demand for developed campsites, fishing, and boating is expected to continue to rise in the future.

In addition to providing lake and reservoir recreational facilities, the Forest Service may be involved in such management activities as dam maintenance, water level and depth manipulations, fish stocking, liming, fertilization, and placement of habitat enhancement structures. Most dams are not located on Forest Service property and are operated by municipalities primarily for water supplies or flood control. Consequently, facility repairs and reservoir manipulations are rarely under Forest Service control. Only four active dams are located on Forest Service lands - Brushy on the Bankhead National Forest, Payne on the Oakmulgee District, and Chutkee and Thloko on the Tuskegee National Forest. In these circumstances, maintenance or improvement activities are generally coordinated with fisheries management opportunities. Occasionally, reservoirs are in need of dredging due to sediment input from the upper watershed or detritus derived from the elevated productivity within the reservoir.

Although fish stocking is conducted within nearly half (17) of the lakes, ponds, and reservoirs associated with the National Forests in Alabama, it is under the authority and generally under the control of the Alabama Department of Conservation and Natural Resources. Currently, the Forest Service actively pursues cooperative stocking of only a few water bodies each year. In support of community based kids fishing derbies, catchable-sized fish are periodically stocked into small artificial ponds and block-netted sections of larger reservoirs. More comprehensive stocking efforts are occasionally conducted by the State within large reservoirs. The State also carries much of the responsibility for monitoring recreational fishery conditions and use within these reservoirs.

Table 3B-112. Lake and reservoir management activities on the National Forests in Alabama. Management units (Mgt Unit) include: Ba = Bankhead; Co = Conecuh; O = Oakmulgee; Sh = Shoal Creek; Ta = Talladega; Tu = Tuskegee.

Lake Name	Mgt Unit	Acres	Type	% FS	Stocked	Fertilized	Demand Fish Species
Brushy Lake	Ba	35	reservoir	100	Y	N	bass-bream-catfish-crappie
Lewis Smith Lake	Ba	2838	reservoir	14	Y	N	bass-bream-catfish-crappie
Open Pond	Co	35	natural	100	Y	Y	bass-bream-catfish-crappie
Buck Pond	Co	7	natural	100	Y	Y	Bass-bream-catfish
Ditch Pond	Co	8	natural	100	Y	Y	Bass-bream-catfish
Otter Pond	Co	8	natural	100	N	Y	bass-bream
Blue Lake	Co	39	natural	100	N	N	bass-bream
Leon Brook Hines	Co	184	reservoir	90	Y	Y	bass-bream-catfish
Gum pond	Co	5	temp	100	N	N	None
Mossy Pond	Co	5	temp	100	N	N	None
Trout Pond	Co	6	temp	100	N	N	None
Nellie Pond	Co	8	temp	100	N	N	None
Yellow Hill Pond	Co	6	temp	100	N	N	None
Dowdy Pond	Co	30	natural	25	N	N	None
Payne	Oa	110	reservoir	100	Y	Y	bass-bream-catfish-crappie
Coleman Lake	Sh	21	reservoir	100	Y	Y	bass-bream-catfish
Morgan Lake	Sh	7	reservoir	100	Y	Y	bass-bream-crappie
Sweetwater Lake	Sh	58	reservoir	100	Y	Y	bass-bream-catfish
Liberty Hill Lake	Sh	3	reservoir	100	Y	Y	bass-bream-crappie
High Rock Lake	Sh	18	reservoir	100	N	N	bass-bream
Terrapin (Site 31)	Sh	49	reservoir	100	Y	N	bass-bream-catfish
Terrapin (Site 22)	Sh	25	reservoir	22	N	N	bass-bream
Whitesides Mill	Sh	265	reservoir	40	N	N	bass-bream-crappie
Rabbittown Lake	Sh	29	reservoir	100	N	N	bass-bream
Bennett Pond	Sh	2	reservoir	100	N	N	bass-bream
Hillabee Creek L.	Sh	182	reservoir	20	N	N	bass-bream
Choccolocco site 3	Sh	6	reservoir	10	N	N	bass-bream
Lake Chinnabee	Ta	20	reservoir	100	N	N	bass-bream-catfish
Virginia	Ta	87	reservoir	99	Y	Y	bass-bream-catfish
Little Wills	Ta	19	reservoir	50	Y	N	bass-bream-catfish
Lake Howard	Ta	139	reservoir	95	Y	N	bass-bream-catfish
Big Wills	Ta	23	reservoir	90	N	Y	bass-bream
Scott Lake	Ta	6	reservoir	100	N	N	bass-bream-catfish
Mump Creek R.	Ta	42	reservoir	40	N	N	bass-bream-crappie
Cheaha Creek L.	Ta	33	reservoir	85	N	N	bass-bream
Lake Socapatoy	Ta	22	reservoir	20	N	N	bass-bream
Chutkee Pond	Tu	2	reservoir	100	Y	Y	bass-bream-catfish
Thloko Pond	Tu	4	reservoir	100	Y	Y	bass-bream-catfish
TOTAL 38		4386			17	14	

Lakes and reservoirs are of variable productivity depending on the nutrient transport from upstream watersheds and the intensity and frequency of liming and fertilization programs. Liming is often an integral step in lake or reservoir management given the acidic nature of many of the watersheds and the accumulated acidifying effect of fertilizers. At higher acidity levels (lower pH), the additional nutrients are unavailable for uptake into to the fish food chain. Liming and fertilization has been a regular occurrence in the past. Water and sediment chemistry was usually monitored, and treatments were undertaken based on the results. The usual frequency of treatment would range between annually to biannually. Over the last five years, lime and fertilizer has dropped in frequency of use, primarily due to budgetary and personnel constraints.

Habitat enhancements are another means of increasing recreationally important fish populations. The National Forests generally engage in several fisheries habitat enhancement projects each year. Projects range from brush bundles to shoreline plantings. Addition of structure provides cover for either prey species or predatory game fish. Cover structures may enhance overall population numbers, allow fish to grow larger, or simply concentrate fish within more readily fishable areas. Over the last five years, approximately 400 fisheries enhancement structures have been installed in lakes and reservoirs associated with the National Forests in Alabama.

Stream and river fishing opportunities appear to be in less demand than lake and reservoir fishing throughout the State and within the National Forests in Alabama. Stream and river fishing occurs as a secondary component of dispersed recreational activity. Target species include redeye bass and bream. The Forest Service does not actively manage for enhanced stream and river fishing. Although there were fish stocking programs in the past, the State of Alabama no longer stocks streams and rivers within the National Forests. Currently, the main emphasis within rivers and streams is on maintenance and restoration of native aquatic communities and the recovery of federally listed species.

Based upon estimates of use, current fish populations are generally sufficient to meet public demand. Lake and reservoir fishing opportunities are probably close to meeting overall public demand; however, there may be areas where local demand could support an increase in catchable fish populations and fishing facilities.

Direct and Indirect Effects

Under current management direction and all action alternatives, emphasis would remain on demand species within reservoirs and native aquatic communities and PETS species within streams and rivers. Current trends of riparian and aquatic habitat restoration would continue, resulting in stable or improved conditions for stream demand species such as redeye bass. Such improvements may be slightly accelerated by more aggressive restoration activities of alternatives B, G, and I. National Forest involvement and influence is limited in large rivers. Current habitat conditions and trends will continue and consequently, riverine demand species such as catfish and bass will likely remain at present levels.

Table 3B-113. Comparison of effects of Forest Plan alternatives on various sub-categories of aquatic demand species: + is positive effects resulting in an upward trend; o is neutral effects or no change; - is negative effects or a downward trend. Multiple characters indicate the relative magnitude of the effect or trend.

Categories of demand species	Alternatives						
	A	B	D	E	F	G	I
Streams (bass)	o	+	o	o	o	+	+
Rivers (catfish, bass)	o	O	o	o	o	o	o
Reservoirs (bass, bream, catfish)	o	O	o	++	o	o	o
Natural lakes or ponds (bream)	o	-	o	o	o	-	-

Lake and reservoir management activities will continue at current levels under the no action alternative (F). Management activities may include recreational facility improvements, reservoir maintenance, fish stocking, liming, fertilization, and placement of habitat enhancement structures. Among the alternatives, there may be some minor differences in the extent of these activities and consequently their effects, as discussed in the remainder of this section and outlined in Table 3B-114.

Table 3B-114. Comparison of effects of lake and reservoir management activities on demand fish species under each Forest Plan alternative: + is befits resulting in an upward trend; o is neutral effects or no change; - is negative effects or a downward trend. Multiple characters indicate the relative magnitude of the effect or trend.

Effects of lake management activities on demand species	Alternatives						
	A	B	D	E	F	G	I
Recreational Facilities	o	O	o	-+	o	o	o
Reservoir Maintenance	o	O	o	+	o	o	o
Fish Stocking	o	O	o	o	o	o	o
Fertilization & Liming	o	O	o	+	o	o	o
Fisheries Habitat Enhancements	o	O	o	+	o	o	o

Recreational Facilities

Current lake and reservoir recreational facilities include campgrounds, picnic areas, restrooms, boat ramps, trails, roads, beaches, and fishing piers. Many of the most popular developed recreational sites are situated near water. Several lakeside recreational areas are regularly over their design capacity on weekends and holidays. Developed recreation sites can affect water quality through runoff and seepage of contaminants and nutrients. Gas-powered boat motors contribute significant amounts of petro-chemicals through periodic leakage and spills. Personal watercraft have the highest rate of pollution due to incomplete fuel combustion and chronic leakage. Boating also has the potential for transporting and introducing fish disease or invasive species such as aquatic macrophytes and zebra mussels. Current levels of maintenance and use would likely continue under all of the action alternatives, except E. The recreation emphasis of alternative E may result in additional recreational development in and around lakes and reservoirs. If recreational program funding is increased, there may be opportunity to mitigate water quality and invasive species effects through stepped up lake enhancement programs. Consequently, net effects on game fish and other demand species would be expected to be similar for all alternatives except for alternative E which would have mixed benefits and negative effects.

Reservoir Maintenance

Within the four reservoirs primarily under Forest Service management, maintenance activities include dam repairs and periodic dredging of accumulated sediments. Dam repair and sediment removal both serve to maintain or restore deepwater fisheries habitat. Deeper water is beneficial to most game fish species as it provides additional habitat volume, a balance of cover and open water, available prey, and potentially cooler temperatures. Reservoir dredging is an expensive project that occurs only occasionally and requires its own NEPA analysis (Section 3.B.4 Aquatic Habitats). The frequency and extent of dredging activities are unlikely to differ between most alternatives. However, if additional funds are applied to enhance recreation under alternative E, there could be an increase in active reservoir maintenance resulting in benefits to game fish and recreational fishing opportunities.

Fish stocking

Fish stocking programs are regulated and administered by the State of Alabama and are thus not usually under the control of the Forest Service. Reservoir and lake fish stocking is therefore expected to continue at current levels regardless of the selected alternative. Stocking would most likely not occur within unimpounded streams and rivers. Under all alternatives, comprehensive lake and reservoir management plans would be developed or updated within the first 10 years of plan implementation. Under all alternatives, opportunities would be pursued to enhance recreational fishing while also conserving native aquatic species.

Fertilization and Liming

Although effects on native aquatic communities have not been fully researched (Section 4.0, Aquatic Habitat), it is known that well designed fertilization programs can be beneficial to recreationally important fish species. Under any alternative, the potential effects on PETS species would need to be addressed through project or programmatic level analysis prior to initiation of fertilization projects. Based on other aquatic resource concerns, it is possible that some fertilization projects could be curtailed or modified. Other management options include timed-release fertilization to minimize downstream nutrient export or increased stocking of catchable sized fish. Such shifts in the application of lake management techniques would occur regardless of the selected alternative; however, implementation would be dependant on funding levels. If additional funds were to become available for enhancement of recreational opportunities under alternative E, demand species populations might benefit and increase from current levels. A slight decline in availability of lake and reservoir fish populations could occur under the other alternatives, assuming budgets continue at current levels therefore limiting application of the various productivity enhancing options.

Fisheries Habitat Enhancements

Habitat enhancements are another means of increasing recreationally important fish populations. The National Forests generally engage in several fisheries habitat enhancement projects each year. Projects range from brush bundles to shoreline plantings. Addition of structure provides cover for either prey species or predatory game fish. Cover structures may enhance overall population numbers, allow fish to grow larger, or simply concentrate fish in more readily fishable areas. Over the last five years, approximately 400 fisheries enhancement structures have been installed in lakes and reservoirs associated with the National Forests in Alabama.

Current levels of fish habitat enhancement are expected to continue under the no action alternative (F) and most other alternatives. Fish habitat enhancements are largely dependant on budgets, personnel, and available cooperators. If additional funds become available for recreational improvements under alternative E, fisheries enhancement work may increase and demand species populations could benefit.

Summary of Direct and Indirect effects

In summary, current management (Alternative F) would likely retain game fish and other demand species populations at or near present levels. Given the additional standards provided in the Forest-wide and riparian direction, as well as the fisheries goals and objectives, most of the action alternatives are also expected to result in stable trends in availability of recreationally desirable species. However, since recreational facilities might be expected to expand under alternative E, there could be both positive and negative effects on demand species. As shown in the tables, the net effect is likely to be positive for recreationally important lake and reservoir fish species. Recreational fisheries would be expected to be sufficient to meet future levels of public demand in most areas of the National Forest. However, lake and reservoir fish populations would continue to fall short of demand in some localized areas, regardless of the selected alternative.

Cumulative Effects

Since recreationally desirable fish species are relatively tolerant of a wide range of environmental conditions, it is unlikely that there will be adverse cumulative effects associated with Forest Service management activities. Moreover, the additional standards provided in the Forest-wide and riparian direction, as well as the fisheries goals and objectives, should minimize Forest Service effects on the watersheds. However, the direct and indirect effects of Forest Service management activities could be magnified due to ongoing trends in off-Forest activities. For example, increasing off-Forest development and water manipulations could contribute to reduced water quality and quantity. The slight negative effects of increased Forest Service recreational developments could be increased when added to overall watershed trends. These cumulative effects are not expected to be sufficient to outweigh positive benefits of habitat enhancements under Alternative E. Recreationally important fish populations are expected to remain stable and of sufficient quantity and quality to meet current demand in most areas. However, if demand increases as projected, Forest Service contributions may fall short of meeting future demand in some localized areas regardless of the selected alternative.

8.0 Special Areas

8.1 Affected Environment

This section will cover the proposed Flint Creek Botanical Area, the Bear Bay Swamp Special Interest Area, and the existing Reed Brake Research Natural Area and Bartram Botanical Area. All of these have been designated of special interest for intrinsic botanical and ecological properties, as well as the relative rarity of such large-scale complexes within the landscape of Alabama, as well as the National Forests in Alabama.

Bear Bay Swamp

The Bear Bay Swamp or Thicket is situated nearly in the center of the Conecuh National Forest. The soils are perpetually saturated, except in rare cases of drought. The overstory in the center is dominated by Cypress and Tupelo, while the outer ring and insets of higher ground are threaded through with baygall thickets. Some few pitcher plants have been found inside the boundaries as proposed, but the area is dominated by heavy dense vegetation (USFS, 2002). This very closely resembles areas in the Big Thicket (East Texas/Western Louisiana) and, indeed, many of the species found within the Bear Bay Swamp are similar to those found in the Big Thicket.

The geological formations that help define this area consist of alluvial deposits mixed with marine clay sediments. The high rainfall in the area has leached much of the existing calcium from the soils, resulting in an acidic nature (USFS 2002). However, in the Bear Bay Swamp, the soils have not lost fertility. In fact, sediments are still being deposited. The soils are tight and impermeable, and a low, slow drainage contributes to the general lack of herbaceous understory in the swamp proper.

A dense canopy of cypress (*Taxodium distichum*) and tupelo *(Nyssa biflora)* dominates, interspersed with overcup oak *(Quercus lyrata)* and laurel oak (*Quercus laurifolia*), all draped with Spanish moss (*Tillandsia usneoides*). Other water-tolerant hardwoods, woody vines, and occasional loblolly, pond & slash pine (*Pinus taeda, P. serotina,* and *P. elliottii)* may be scattered throughout. This area also has the potential to harbor pond cypress (*Taxodium ascendens)*. Dwarf palmetto (*Sabal minor*) may cover small areas with little other vegetation.

The baygalls contained within Bear Bay Swamp are quite extensive, some stretching nearly a mile or so. Sweet bay (*Magnolia virginica)* and gallberry holly (*Ilex coriacea)* are dominant shrubs or small trees, lending their names to the colloquial name of baygall (Ajilvsgi, 1979). Associate species may include an understory of black titi (*Cyrilla racemiflora)*, Virginia sweet spire (*Itea virginica)*, and redbay (*Persea borbonia).* As the Bear Bay Swamp continues to fill with organic debris, plants that are more diverse have begun to establish themselves. Some areas contain thick mats of sphagnum moss, while small debris-formed knolls covered with mosses and liverworts provide ground for orchids and rare saprophytic plants, such as burmannia (*Burmannia capitata)* and nodding nixie (*Apteria aphylla)*, which also cling to decaying logs. Cinnamon and royal ferns (*Osmunda cinnamomea* and *O. regalis)* may often be shoulder high. The closed canopy overhead allows little sunlight to penetrate. This dense swampy area provides the most intense thicket characteristics.

Shade, frequent or continual inundation, and hard soils all combine to make this one of the least herbaciously diverse areas. However, the presence of the baygalls, as well as loblolly bay (*Gordonia lasianthus)*, climbing fetterbush (*Pieris phillyreifolia)* and other rare shrubs and vines in the Cypress/Tupelo swamps, make this area rich in woody species diversity.

Fire only plays an occasional role in this area. Only twice in the past decade have fires penetrated into the Bear Bay Swamp, both due to extreme drought conditions during which the water had dropped to exceedingly low levels (Conecuh, 2002). There are no records of fire penetrating to the center of this area. Flooding and drainage from the surrounding upland recharge areas play the most critical roles in maintaining this unique assemblage of swampland communities.

Bartram Botanical Area

The Bartram Botanical Area, located on the Tuskegee National Forest, is an incredibly intact composite of riparian communities. Situated alongside and across the floodplain of the Choctafaula Creek, this area has been only lightly impacted by previous private-owner land management practices. The Bartram trail entering the botanical area runs alongside one of the few rock/boulder outcrops on the unit. This area contains several rare or unusual intact riparian communities, including a globally rare community of Spruce pine/Southern Magnolia/Cherrybark Oak/Needlepalm plant association. Forested canebrakes are present, as well as alluvial calcareous mesic bottomland forests (Pyne & Stewart, 1999). Several PETS and locally rare species of plants are only found in this area on the district.

Fire certainly plays a part in the establishment of this system, as evidenced by the mosaic fingering down the steep mesic slopes, the presence of cane, and the burn marks at the bases of the hardwoods. These fires would generally have a low intensity and duration due to the nature of the fuels, except during times of extreme drought. However, the existing hydrological regime including periodic inundation and drainage from the uplands define the main portions of the Bartram Botanical Area. Alluvial pools provide insets, around which needlepalms (*Rhapidophyllum hystrix*) have become established. Single tree canopy gaps in the overstory allow for the reproduction of spruce pine and cane as well as other species (USFS surveys, 1999, 2000).

This area is particularly unique in character when the surrounding private lands are considered. Riparian floodplains containing these unique communities rarely exist on private lands, and where present, have been heavily impacted or are tiny (less than one acre) in size. The Bartram Botanical area may be one of the last strongholds of intact riparian corridors in that portion of the upper gulf coastal plain. Conversion of similar sites on private lands has resulted in the loss of previously documented rare communities and rare plant sites (Kral, 2002).

Flint Creek Botanical Area

The Flint Creek Botanical Area, located on the Bankhead National Forest contains a number of diverse forest community types. Of these, the limestone rock outcrops, basic mesic forests, streamside, caves, and limestone glades comprise the most recognizable rare communities. This area runs along, and follows the fingers of the West Flint Creek drainage system. It was first proposed as a botanical area by the Bankhead Watershed Project in 1996 (BWP, 1996).

The soils are a prader silt loam derived from alluvial deposits of sandstone, shale and limestone (USFS, 2000). There are wide riparian floodplains, limestone valleys and areas which transition from the sandy hilltops to the calcareous stream scours. Calcareous outcrops dot the landscape and hillsides, especially on the steeper slopes. These areas may receive runoff from the colluvial slopes near the base of Sand and Little Mountains (BWP, 1996).

The Flint Creek Botanical Area is perhaps one of the best botanically surveyed areas on the Bankhead unit. This has elicited interest from numerous botanist and ecologist both instate and out of state. The limestone glades and cedar woodlands, when surveyed, have been found to contain many rare plant species.

The overstory conifers may range from shortleaf pine, to eastern hemlock, to red cedar. Deciduous Oak/Hickory forest contain over 15 species of oak and 8 species of hickory, including the rare Butternut Hickory (*Juglans cinerea).* Cucumber magnolia, bigleaf magnolia, spicebush, beech, white basswood and bladdernut can also be found interspersed throughout, adding to the distinctive visual characteristics of this area.

The herbaceous understory is rich in diversity, with numerous lilies and orchids, and is the only place on the National Forests in Alabama to contain ramps. Perhaps the most outstanding feature is the abundance of flowering trillium species, including lemon trillium. During the spring, this has been described as a carpet of trilliums in bloom (USFS 2001). The soils along the Flint Creek drainage harbor a large diversity of flowering plants (BWP, 1996), making these alluvial bottomlands a rare landscape-scale assemblage of distinct plant communities.

The caves within the Flint Creek Botanical Area have been found to harbor Northern Long-eared Bats (*Myotis septremtalis*) and Eastern pipestrelles (*Myotis pippestrellis)*. One entrance to the cave system is currently being heavily utilized by people and the impacts are becoming more pronounced. One mitigation effort that may be used would be gating the entrances where people can easily access the caves.

Fire plays only an intermittent role in this area. During the late winter and spring, the fuels tend to contain high fuel moisture, and the composition and structure of the fuel types do not lend themselves to burning. However, during periods of drought, the late summer and fall seasons may see fires burn across the drainage. This corresponds with natural lightning fire data in which spring/early summer lightning strikes may be more frequent but burn fewer acres per strike, while late summer/fall lightning strikes are less frequent but burn hundreds more acres per strike (Robbins et al, 1992). This would also have less impact on the profuse spring bloomers, which do not tend to leave aboveground vegetative portions in the late summer/fall season. The remaining summer blooming species are fire-adapted species, again supporting late summer/fall seasonal burning. The fire frequency would be at less frequent intervals, again due to the composition of the fuels and naturally slow rate of buildup.

Primarily the Flint Creek Botanical Area is directly dependent upon the upland recharge areas to supply the overland and subsurface hydrological flow. In addition, stream scouring and frequent flash flooding events play a major role in determining the makeup of the botanical communities. Single tree canopy gaps, or, more rarely, larger canopy gaps may be provided by insect and disease, occasional windstorms, ice storms and infrequent tornadic winds. This complex of communities is not to be found on adjacent private lands except for small areas of size less than 10 acres, making the National Forests in Alabama an important refugium for preserving these types of plant communities (BWP, 1996).

Reed Brake Research Natural Area

The Reed Brake Research Natural Area is located on the Oakmulgee Ranger District, National Forests in Alabama. It was named for the canebrakes predominant throughout the area. Rare communities contained within the research natural area include forested canebrakes, upland longleaf, xeric sandhills, streamsides, calcareous mesic bottomland, alluvial floodplains and sloughs, and deep moist ravines.

This area contains soils ranging from deep sandy caps at the tops of the hills or ridges, to clay soils transitioning down to alluvial deposits of sand, silt and calcareous material. Soils at the bottom of the drains are moist and often saturated soils, while the open riparian flats contain rich loamy material.

One of the outstanding characteristics of this area is the intact stands of both forested and unforested canebrake (*Arundinaria gigantea)*. On some sites, Giant cane (*Arundinaria gigantean ssp. Gigantea*) was found. Stands of this association were historically widespread, but now are rare or small in size (less than 1 acre) (TNC, 2000). Dense stands were historically found in bottomland sites throughout the southeast, but currently only small remnants exist, and high-quality examples are extremely rare (TNC, 2000).

Typically, canebrakes exist on frequently flooded alluvial riparian areas or streamside flats, and are often associated with bottomland hardwood forest vegetation (NatureServe, 2002). Canebrakes existed (both in the past and present) with no canopy, with sparse scattered trees and in places with a well-developed overstory. Most of the sites that remain today are in the latter condition. Canebrakes also exist at the heads of drains and on the upper floodplain terraces as well.

The canebrake communities as a whole were historically widespread, and may have been a result of burning by Native Americans, or may have been successional on extensive aboriginal floodplain agricultural lands that were abandoned following the collapse of the Native American populations. They may also have been a result of large windstorm events (including hurricanes and tornados). At the current time, however, canebrakes are increasingly rare, if not absent from the landscape (TNC, 2000).

The Reed Brake Research Natural Area contains a high diversity of plant species and rare ecological communities. The landform is characterized by the many drains and streams that run through it. Several of the rare plant species are found in the transitional zones of upland to riparian. Many more are directly associated with the mesic and riparian communities.

The communities making up the central composition of the Reed Brake Research Natural Area are predominantly fire-dependent. At the very least, they are fire tolerant, even in the riparian sites. As a rule, canebrakes tend to be extremely fire dependent and are maintained by frequent fires (TNC, 2000; Platt 1997). Fire intensities can be quite hot, dependent upon season and fuel composition and buildup. Fire frequency can be as often as 1-3 years (USFWS, 1998).

As canebrake communities continue to disappear from the landscape, the role of National Forest lands becomes even more critical. These community types are increasingly uncommon, and landscape size, high quality examples, such as exists in the Reed Brake Research Natural Area have been extirpated from private lands. Federal lands contain some of the last large canebrakes in the state.

8.2 Direct and Indirect Effects

All of these Special Interest Areas and Research Natural Area will continue to receive protection and management under all alternatives. Alternatives B and G would provide the greatest opportunity for increase in prescriptive management specific to restoration goals. This, however, should occur at varying levels under all alternatives.

Alternatives A and F may have a negative to neutral impact on these special areas, due mainly to activities which may occur upslope from these administratively defined areas. Buffer zones may be proposed to keep mechanical or other manmade disturbances to a minimum. The other alternatives would carry a neutral to positive impact.

8.3 Cumulative Effects

As areas such as the Bartram Botanical Area, Bear Bay Swamp, Flint Creek, and Reed Brake Research Natural Area are becoming more rare upon the landscape on privately owned lands, it makes the establishment of special areas for botanical and ecological values even more critical. National Forests in Alabama lands may be the last refugia for large-scale opportunities such as this in the future.

Since the underlying characteristic defining these special areas is riparian or hydrologically driven, most of these areas would be protected under the riparian prescription. However, the uniqueness and the high quality aspect of these complex ecological areas, all intertwined, lend themselves to be classified as an entire set of communities, with administratively designated boundaries. This should ensure that unique ecological characteristics and qualities of these areas are conserved and managed for future generations

Canyon Corridor Prescription

Affected Environment

The Canyon Corridor prescription (4L) applies only to the Cumberland Plateau physiographic region, on the Bankhead National Forest. The canyon corridor is characterized by a narrow river valley and its adjacent steep cliffs or hillslopes. This includes the aquatic component (with its associated water, biotic communities, and the habitat features), the riparian component, the ecotone of transition between riparian and upland ecosystems, and the canyon bluff lines or steep hillslopes. The canyon corridor contains the habitat for many threatened, endangered, sensitive (TES) or locally rare aquatic and plant species, as well as habitat for the Gray bat. It also encompasses many cultural resources sites.

While the canyon corridor may contain up to 3% of the land base on the Bankhead National Forest, fully 1/3 to ½ of the canyon corridors are contained within the Sipsey Wilderness Area. Major streams and rivers include (but are certainly not limited to) the Sipsey, Thompson Creek, Brushy Creek, Hubbard Creek, and Rush Creek.

Most canyon corridors contain major forest communities including eastern hemlock, riparian, mixed mesophytic forests and mesic oak forests. Interspersed within these forests are a mosaic of rare communities including (but not limited to) spraycliffs, rock outcrops and bluffs, seeps, springs, rock houses, glades, basic mesic forests, coves and caves. Predominant forest trees within the canyon ecosystem include beech, hemlock, sweet birch, cucumber tree and oak species. Ground cover may contain a diversity of herbacious/shrubby species or may appear as a continuous mat of vary depths and composed of lichens, mosses and ferns.

Main habitat associations include warm water aquatic habitats, streamside associates, mid- to late-successional deciduous forest associates, and eastern and bottomland hardwood associates. Large diameter hardwood, lush understory and/or old growth forest structure would characterize the canyon corridors. The habitat conditions will be suitable for the basic and mixed mesic associates and the mixed xeric associates. The mix of habitats will also provide suitable habitat for the eastern wild turkey and low levels of suitable habitat for early successional forest associates. The management and/or protection of rare communities and species associates will take precedence, along with the management and/or protection measures for population occurrences for threatened, endangered, sensitive and locally rare species. This will provide a high likelihood that rare communities and species within these associations will continue to persist on National Forest System lands.

The eastern hemlock forests typically occur on acidic soils and often have a dense shrub layer composed of ericaceous species. They are usually associated with north facing coves and slopes, canyons and riparian systems. These communities are typically low in herbaceous diversity, but may support rich bryophyte communities.

The combination of a largely evergreen canopy and a dense midstory in naturally occurring hemlock forests provide for a variety of benefits, including shading and cooling of riparian systems, thermal cover for wildlife, and nesting and foraging habitat for several species of neotropical migrant birds which are dependent upon the layered canopy structure and understory thickets (Rhea and Watson 1994). Eastern hemlock forests may also be important refugia for species typically adapted to higher elevations.

The mixed mesophytic community type within the canyons typically thrives on north or north- east facing slopes in association with small streams, narrow drains, and sheltered coves. Mixed mesophytic forests are among the most biologically diverse ecosystems in the temperate regions of the world and can consist of over 30 canopy species.

The riparian forest or river floodplain hardwood community type is common in active flood plains on large river systems and sandbanks. This community type also occurs within the canyon corridor in the narrow box canyons, V- shaped ravines, on colluvial deposits, and on narrow, confined terraces. Flooding is usually infrequent; however, they may be temporarily flooded in the spring.

Oak dominated forests include the dry and dry-mesic oak-hickory-pine forests containing over 15 species of oak and 8 species of hickory, and can be found on the south- and west-facing slopes of the canyons. Often rock chestnut oak and scarlet oaks mixed with white oaks and hickories can be found, although the presence of specific oak and oak-pine forest types may vary as a result of soils, moisture, topography, geography, and other factors. Cucumber magnolia, big leaf magnolia, spicebush, beech, white basswood and bladdernut can also be found interspersed throughout, adding to the distinctive visual characteristics of this area. These also contain a significant pine component. Virginia pine is common along dry, rocky ridge tops, but shortleaf pine and loblolly pine may also be present coming down the slopes.

The periodic occurrence of insect pathogens, ice storms, lightning fires, and the use of fire by Native Americans may have maintained, in varying degrees and to a small extent, each of these forest types in the canyon corridor. However, within the canyon corridor, these forest types are mainly characterized by relatively low levels of disturbance, and from a habitat perspective, their primary value is providing habitat for a variety of species dependent on mid- to late-successional forest stages.

Several rare communities occur within the canyon corridor. Glades and barrens, marked by the occasional Virginia pine and ericaceous species, are a recurring community along the upper rim of the canyons. The cliffs sport rock outcrops at both top and bottom, while areas adjacent to white-water and waterfalls provide spray-cliff habitat. Seeps and springs can be found intermittently along the corridors and cliff walls, while rich basic mesic forests have formed on colluvial deposits within the stream courses. The communities forming on the alluvial deposits offer a rare assemblage of distinct plant communities. Rich coves have been found at the heads of many of these canyon corridors, or along feeder streams.

The most spectacular rare communities featured within the canyon corridors are the rock houses. While most of these are fairly small, others have been found and identified that are significant in size and extent. Some are a single rock house, while others may contain triple stacks or a complex. The Kinlock Rock Shelter and the Big Tree Rock House are two sites that contain some of the larger representations of this community type. A single rock house at the Big Tree Rock complex measures approximately 350 feet across, and well over 70 feet high.

Within these rare communities are over 55 species of viability concern. Several non-vascular plant type localities, both nationally and for the state, are found within these canyon corridors. Two plant species sheltered within these canyons include the Alabama streak-sorus fern and Kral's water-plantain, both federally threatened. In the case of the Alabama streak-sorus fern, the species has not been found elsewhere, despite numerous field surveys.

Many plants are located within crevices or fissures, on ceilings and recessed walls or ledges on overhangs associated with small waterfalls. Occasionally other plants can be found in moist seepage areas on exposed vertical rock faces. A majority of these species must have moisture by seepage, humidity, shade, but also adequate diffuse light. The herbaceous species assemblage of the sandstone overhangs is part of the river gorge's well-developed canyon corridor association.

Primarily the canyon corridors are directly dependent upon the upland recharge areas, drains and feeder streams to supply the overland and subsurface hydrological flow. In addition, stream scouring and frequent flash flooding events play a major role in determining the makeup of the botanical communities. Single tree canopy gaps, or, more rarely, larger canopy gaps may be provided by insect and disease, occasional windstorms, ice storms and infrequent tornadic winds. This complex of communities is not to be found on adjacent private lands except for small areas of size less than 10 acres, making the National Forests in Alabama an important refugium for preserving these types of plant communities (BWP, 1996).

Direct and Indirect Effects

These canyon corridors are naturally limited in distribution, occurring primarily in association with north facing coves and slopes and riparian systems. Under all alternatives forest-wide standards are included that defer existing hemlock forests from regeneration cutting during this plan period, thus classifying a majority of these as ineligible for suitable timber. In general, the use of prescribed fire will be consistent with the vegetation management, which is low. Prescribed burning in canyon corridors will only occur as part of a larger prescribed burn and will only be allowed to back through these sites. No fire lines will be constructed in these areas.

Disturbances caused by natural processes (floods, wind storms, and fires) will occur, however, detrimental impacts to facilities or improvements may be corrected. This prescription would be classified as unsuitable for timber production. Occasionally, some vegetation manipulation and open forest canopies would be present due to TES or locally rare species habitat improvement or protection and restoration of the canyon character.

The area will be managed to maintain a naturally appearing landscape character. Dispersed recreation would be offered where it meets the intent of these Desired Conditions and management objectives for in those areas with motorized access. Roads or non-motorized trails will provide the water quality and riparian areas. Hiking, backpacking, dispersed camping, hunting, and fishing are typical activities available. Human activities may be evident in some places, especially at road and trail crossings. Some lengthy segments of foot trails may be contained within this prescription. Forest visitors will occasionally see other people especially near popular stream related sites, or predominant means of access. Outdoor skills are of moderate importance to visitors in these areas except where knowledge of specialized activities such as canoeing or kayaking is critical. Existing recreation sites are allowed to continue and may be expanded to meet visitor demands where compatible with the capabilities and functions of canyon corridors. The development of new recreation activities (i.e. horse trails, interpretive trails) will be weighed against Desired Conditions and potentially damaging impacts. Attention would be given to improving conditions where human activities are, i.e. roads, trails, dispersed sites, or have degraded water quality or riparian functions.

The Canyon corridor Prescription (4L) is only present under Alternative I. However, it should be noted that the canyon corridor encompasses portions of the riparian and streamside zones, as well as containing components of rare communities and threatened, endangered, sensitive and locally rare species. As a result, under other alternatives, portions of the canyon corridor will continue to receive protection and management under the riparian prescription, rare communities prescription, rare species guidelines and streamside management zones. In addition, specific major forest community guidelines will provide management objectives and goals for areas within these corridors. Since the majority of the best canyon corridors occur on either private lands or lands administered by other agencies, any management for the protection and continuation of canyon corridors may be crucial to the recovery and maintenance of embedded rare community types.

The canyon corridor in its entirety may experience direct and indirect effects. Under Alternative I, this area will be managed to (1) protect canyon corridors and associated aquatic, riparian and upland flora and fauna; (2) restore degraded canyon character; (3) recover threatened, endangered, sensitive and/or locally rare species that may occur as part of the canyon corridor; and (4) offer a variety of dispersed recreational opportunities including environmental education and interpretation. Buffer zones may be proposed to keep mechanical or other manmade disturbances to a minimum. This is expected to have neutral to positive effects under Alternative I.

Although the canyon corridor prescription is not covered under any other alternatives specifically, the Alternatives B & G would provide the greatest opportunity for increase in prescriptive management specific to restoration goals, thus resulting in neutral to positive effects. Alternatives A & F may have negative impacts on the canyon corridor, due mainly to activities that may occur upslope from the canyons and associated rare communities. The other alternatives would carry a neutral impact.

Cumulative Effects

As areas such as these landscape-scale canyon corridors are becoming more rare upon the landscape on privately owned lands, it makes the establishment of the canyon corridor prescription for biological and ecological values even more critical. The National Forests in Alabama lands may be the last refugia for large-scale opportunities such as this in the future.

Cumulative effects on the quantity and distribution of the canyon corridors and the embedded rare communities is predicted by considering opportunities to inventory and restore these communities across alternatives and across private and public ownerships. Ability to protect and restore these communities on the National Forest is limited by exact knowledge regarding their condition and ecological integrity on the landscape. If only 25% of all the potential canyon corridors occur on National Forest land where management would be optimal, the majority likely occurs on private lands where they may be vulnerable to development, competition with successional vegetation, and extirpation. Restoration and management activities on the National Forests in Alabama would play a critical role in the conservation of the associated and embedded communities within the canyon corridor landscapes containing national forest land.

Cumulatively, effects of Forest Plan revision implementation are likely to be critical to the maintenance of the canyon corridor on a landscape scale, with their complex of forest and rare communities and associated rare species. The importance of national forest management is expected to increase with time, as national forest inventories and restoration efforts improve and private land examples of the community are subject to increasing pressures or neglect.

Since the underlying characteristic defining the canyon corridors is riparian or hydrologically driven, many portions of these areas would be protected under the riparian prescription. However, the uniqueness and the high quality aspect of these complex ecological areas, all intertwined, lend themselves to be classified as an entire set of communities entitled the canyon corridor, with an administratively designated boundary. This should ensure that unique ecological characteristics and qualities of the canyon corridors are conserved and managed for future generations.

9.0 Migratory Birds

9.0.1 Affected Environment

Migratory birds have become a focus of conservation concern due to evidence of declining population trends for many species. To ensure that forest plan revision alternatives include provisions for migratory bird habitat, planning efforts included coordination with the Migratory Bird Office of the U.S. Fish and Wildlife Service and others under the umbrella of Partners in Flight (PIF). PIF is a cooperative effort involving partnerships among federal, state, and local government agencies, foundations, professional organizations, conservation groups, industry, the academic community, and private individuals. It was launched in response to growing concerns about declines in populations of land bird species and to emphasize conservation of birds not covered by existing conservation initiatives.

PIF has developed Bird Conservation Plans for each physiographic area relevant to the National Forest planning area. These plans are science-based, long-term, proactive strategies for bird conservation across all land ownerships and are designed to ensure long-term maintenance of healthy populations of native land birds. Forest Service biologists worked with PIF regional and local coordinators to identify key management issues and opportunities for high priority species on National Forest lands, and developed related goals, objectives, and standards for incorporation into the draft revised forest plan. In addition, *The Southern National Forest's Migratory and Resident Landbird Conservation Strategy* (Gaines and Morris 1996) was also reviewed and incorporated into planning efforts. This strategy identifies priority species and provides a framework for monitoring populations. The monitoring program described in this document is currently being implemented, and would continue under all alternatives.

Because migratory and resident landbirds are so ubiquitous and diverse, they are relevant to the majority of ecological communities and habitat elements considered during forest planning. As a result, provisions for these species are integrated into numerous plan objectives and standards focused on achieving desired habitat conditions. Effects of these provisions on ecological communities and associated species are addressed throughout the EIS. Effects to specific species of birds are addressed under appropriate sections for those chosen as Management Indicator Species. In addition, all relevant conservation priority species, as identified by the U.S. Fish and Wildlife Service, are assessed under the terrestrial species viability evaluation.

9.0.2 Direct and Indirect Effects

An overarching issue related to migratory birds is habitat fragmentation. This issue is driven by the landscape context within which each forest occurs. Fragmentation is juxtaposed with the issue regarding the potential effects of a lack of structural diversity in mid- and late-successional forest stands. Both of these issues are discussed in the Fragmentation Section of the analysis.

Alternatives B and I are the most advantageous to migratory birds, as both emphasize the restoration of native communities and historic forest structure. Most of the following conservation issues addressed in the PIF Bird Conservation Plans are addressed under the restoration alternatives. Refer to the Woodlands and Savannas Section for the tabular data for interpretation. While Alternative I provides more potential restoration acres, management actions necessary to attain restoration (thinning and restoration harvesting, chemical/mechanical midstory removal, and prescribed burning) must be mitigated against visual and recreational impacts to a greater degree under Alternative I. This will cause higher unit costs for implementation and result in fewer acres restored, than would be possible under Alternative B. Alternative B is driven by wildlife habitat restoration and maintenance, and therefore, would be most amenable and adaptable to the greatest number of migratory bird species.

Southern Cumberland Plateau/Ridge & Valley (Physiographic Area 13)

The Southern Cumberland Plateau/Ridge and Valley (SCPR&V) is approximately 23,170 square miles and occupies portions of Tennessee, Georgia, and Alabama. The Forest Service is the largest federal landowner in this region. The Talladega Division of the Talladega National Forest, the Bankhead National Forest, and the Armuchee District of the Chattahoochee National Forest contribute over 470,000 acres (3.2 % of the total area) to SCPR&V habitats. The Southeastern portion of the Talladega Ranger District is in the Piedmont Bird Conservation Region, which shares many of the same conservation issues. The Talladega Division was treated as if it fell entirely into the Southern Cumberland Plateau/Ridge and Valley Region, in order to produce uniform, concise management direction.

The SCPR&V Bird Conservation Plan cites the vital role of public lands in developing quality bird habitats through the restoration and maintenance of longleaf pine forests, mixed mesophytic hardwood forests, and upland hardwood forests. The Plan points out "large areas of any habitat type managed for conservation efforts must ensure that all seral stages and natural vegetative diversity occur, in order to supply the entire range of needs of bird species using the area." Forest management is the tool to provide this mix of seral stages and forest conditions. Another goal of the Bird Conservation Plans is to provide areas of restored tree and shrub structure, including areas of open-canopied woodlands and savannas, and areas of forest with dense, multi-layered canopies.

The riparian portions of these forests provide the best potential habitat for bird species preferring floodplains, bottomland forests, and native cane thickets. Varied topography in this physiographic area, defines the extent of riparian forests, which make up nearly 15% of these National Forests' area. Riparian areas will be managed to protect and enhance these values through the Riparian Prescription. Additional areas of similar habitat will be conserved through allocation to the Canyon Corridor Prescription on the Bankhead National Forest. The Riparian Prescription includes conservation and restoration activities such as conserving mast bearing, and other native species, controlling exotic plants, and maintaining a range of habitat conditions including areas of diverse canopy heights and areas of non-forested riparian habitats, such as canebrakes.

Federal lands are currently undergoing an ecosystem approach to management. Ecosystem management and bird conservation strategies require that public land management consider landscape contexts. Due to the rarity of fire-maintained forests of longleaf pine, shortleaf pine, and pine-oak woodland communities, and the difficulty of restoration and maintenance of such communities, federal lands must provide a disproportionate share of these communities on their lands. The Talladega Division of the Talladega National Forest, made up of the Shoal Creek and Talladega Ranger Districts in Alabama, provides most of the longleaf pine forests remaining in the SCPR&V bird conservation region. Small areas of longleaf forest also remain on the Armuchee Ranger District and the Bankhead National Forest. These forests are the interior terminuses of the longleaf pine ecosystem. In addition to a need to restore longleaf pine ecosystems, upland fire climax forests must also be restored on these federal lands, since all are severely limited in this landscape.

Fire-maintained ecosystems occupy the upland portions of these forests and are dominated by tree species that tolerate, are benefited by, or are perpetuated by frequent fires. They include longleaf pine, shortleaf pine, and pine-oak woodlands and forests in the SCPR&V. Forests, as described here, have closed canopies and average basal areas of 70 BA or greater. Closed canopies preclude the development of herbaceous understories, and favor the development of shade-tolerant midstories. Historically, the effect of fires on the landscape, promoted the development of open, park-like, conditions in which grasses and forbs dominated ground covers. The juxtaposition of sparse overstory trees and native herbaceous ground covers provided especially important bird habitats that have virtually been eliminated from today's landscape.

At least one-third of the fire climax communities on the National Forests in Alabama in SCPR&V should be restored to occur as woodlands (40-60 average BA - about 20% of the fire climax communities) or savannas ($\leq$40 average BA - about 10% of the fire climax communities). Woodlands and savannas provide important herbaceous understory habitats for early successional forest birds such as Bachman's sparrows, prairie warblers, Northern and bobwhite quail, while maintaining mature overstory trees that serve as nesting and feeding substrate for red-cockaded woodpeckers, brown-headed nuthatches, great-crested flycatchers, and black-throated green warblers. Native, warm-season grasses should be repatriated into these open, park-like, communities through planting and management favoring the development of an herbaceous understory. Favorable management for native, warm-season grasses includes restoration or maintenance of low overstory tree densities (average $\leq$ 60 BA) and the reintroduction of frequent growing season burn regimes.

Portions of these forests approach elevations and vegetative conditions similar to the Southern Blue Ridge. North- and east-facing slopes that occur in conjunction with slight surface concavities may result in cove-like conditions. Mature mixed mesophytic forests occurring on this type of topographic feature are considered especially important to Cerulean Warblers, Wood Thrushes, and Hooded Warblers. Upland hardwood forests occupy the highest elevations on these forests, and they may be present on southerly and westerly slopes at lower elevations where fire has been excluded. Ovenbirds, Summer Tanagers, Scarlet Tanagers, and Eastern Wood Pewees favor mature upland hardwoods communities.

East Gulf Coastal Plain (Physiographic Area 4)

The East Gulf Coastal Plain (EGCP) is approximately 94,670 square miles and occupies portions of Florida, Alabama, Mississippi, Louisiana, Tennessee, Kentucky, and Illinois. The Forest Service is the largest federal landowner in this region. The National Forests in Alabama (Oakmulgee, Tuskegee, and Conecuh) and Mississippi (Holly Springs, Tombigbee, Bienville, DeSoto, and Homochitto) contribute 1.3 million acres (2.2% of the total area) to EGCP habitats. Only three of the National Forests in Alabama are part of the Southern Appalachian Assessment Forest Planning effort. Combined, they constitute 0.42% (252,699 acres) of the EGCP.

The EGCP Bird Conservation Plan cites the vital role of public lands in developing quality bird habitats through the restoration and maintenance of longleaf pine forests, bottomland hardwood forests, and coastal habitats. The U.S. Fish and Wildlife Service administers significant portions of the coastal habitats and bottomland hardwood forests in federal ownership through the National Wildlife Refuge System. The USDA Forest Service, through the National Forest system, administers most of the longleaf habitats, upland forests, and small headwater basins in federal ownership in the EGCP area. The riparian portions of these forests provide the best potential habitat for bird species preferring floodplains, bottomland forests, deciduous forests, and native cane thickets. Riparian areas will be managed to protect and enhance these values through the Riparian Prescription. The Riparian Prescription includes conservation and restoration activities described in the EGCP bird conservation plan, such as conserving mast bearing, and other native species, controlling exotic plants, and maintaining a range of habitat conditions including areas of diverse canopy heights and natural, non-forested habitats such as canebrakes.

Federal lands are currently undergoing an ecosystem approach to management. Ecosystem management and bird conservation strategies require that public land management consider landscape contexts. Due to the rarity of fire-maintained forests of longleaf pine, slash pine, and pine-oak communities, and the difficulty of restoration and maintenance of such communities, federal lands must provide a disproportionate share of these communities on their lands. The National Forests in Alabama make up only 0.4% of EGCP area, but currently provide approximately 4% of the fire climax communities, especially longleaf pine forests, in the EGCP bird conservation region.

Fire climax forests are dominated by tree species that tolerate, are benefited by, or are perpetuated by frequent fires. They include longleaf pine, slash pine, and pine/oak forests in the EGCP. Forests, as described here, have closed canopies and average basal areas of 70 BA or greater. Closed canopies preclude the development of herbaceous understories and favor the development of shade-tolerant midstories. Historically, the effect of fires on the landscape, promoted the development of open, park-like, conditions in which grasses and forbs dominated ground covers. The juxtaposition of sparse overstory trees and native herbaceous ground covers provided especially important bird habitats that have virtually been eliminated from today’s landscape.

At least one-third of the fire climax communities on the National Forests in Alabama in EGCP should be restored to occur as woodlands (40-60 average BA - about 20% of the fire climax communities) or savannas (≤40 average BA - about 10% of the fire climax communities). Woodlands and savannas provide important herbaceous understory habitats for early successional forest birds such as Bachman's sparrows, prairie warblers, Northern bobwhite quail, Eastern kingbirds, and American kestrels, while maintaining mature overstory trees that serve as nesting and feeding substrate for red-cockaded woodpeckers, brown-headed nuthatches, great-crested flycatchers, and black-throated green warblers. Native, warm-season grasses should be repatriated into these open, park-like, communities through planting and management favoring the development of an herbaceous understory. Favorable management for native, warm-season grasses includes restoration or maintenance of low overstory tree densities (average ≤ 60 BA) and the reintroduction of frequent growing season burn regimes.

In addition to focus on providing a diversity of habitats for migratory birds on the landscape, collision of migratory birds with communications towers was considered during plan revision. The U.S. Fish and Wildlife Service (2000) has identified this as an issue needing attention:

> "Construction of these towers (including radio, television, cellular, and microwave) increases at an estimated 6 to 8 percent annually in the United States. According to the Federal Communication Commission's *2000 Antenna Structure Registry*, the number of lighted towers greater than 199 feet above ground level (AGL) currently number over 45,000 and the total number of towers over 74,000. Non-compliance with the registry program is estimated at 24 to 38 percent, bringing the total to 92,000 to 102,000. By 2003, all television stations must be digital, adding potentially 1,000 new towers exceeding 1,000 feet AGL."...."The construction of new towers creates a potentially significant impact on migratory birds, especially some 350 species of night-migrating birds. Communications towers are estimated to kill 4-5 million birds per year."

Two mechanisms of bird mortality occur at communications towers (World Wide Web 2002). The first occurs when birds flying in poor visibility conditions do not see the structure (i.e., blind collision). Towers that are lighted at night for aviation safety may help reduce blind collisions, but they bring about a second mechanism for mortality. When there is a low cloud ceiling or foggy conditions, refracted light creates an illuminated area around the tower. Migrating birds lose their stellar cues for nocturnal migration and a broad orienting perspective on the landscape in these weather conditions. The lighted area may be the strongest cue for navigation, and birds remain in the lighted space by the tower. Mortality occurs when they collide with the structure and guy wires, or even other migrating birds, as an increasing number of passing birds cram into the relatively small, lighted space. The lights apparently do not attract birds from afar, but hold birds that pass within the vicinity.

The National Forests in Alabama have adopted Forest-wide standards requiring removal of obsolete communications towers, location of new communications equipment on existing towers where possible, and coordination of new tower planning and construction with U.S. Fish and Wildlife Service in an effort to reduce tower collision mortality and to comply with the Migratory Bird Treaty Act, the Endangered Species Act, and the Bald and Golden Eagle Act.

9.0.3 Cumulative Effects

Because migratory birds cover such large areas, their conservation is dependent on the distribution of suitable habitats across large regions. Currently, national forests provide some of the largest blocks of forested habitat when viewed at a regional scale. As habitat quality and quantity continues to decline on many privately owned lands due to conversion to urban and suburban land uses, national forest lands will become even more critical to migratory birds in the future. Efforts by the Forest Service to coordinate closely with partners in bird conservation and to incorporate proactive conservation measures into forest plan revisions are designed to ensure national forests continue to support at-risk migratory birds.

9.1 Forest Interior Birds

9.1.1 Affected Environment

Habitat fragmentation is a key issue for viability of local populations of breeding birds in some mature mesic deciduous forest settings. Forest communities comprising mesic deciduous forests in Alabama include, coastal plain upland mesic hardwoods, mixed mesophytic forests, and river floodplain forests. Mesic deciduous forest communities cover 10% of the forested acres on Bankhead National Forest, 21 % of the Conecuh National Forest, 13% of the Oakmulgee Division, 8% of the Talladega Division, and 35 % of the Tuskegee National Forest. Mesic deciduous forests currently make up about 12% of the total forested acres on National Forests in Alabama. Approximately 65% of these acres are in mid- and late- successional conditions. Mesic deciduous forest communities are a smaller portion of the landscape, south of the Blue Ridge physiographic province. In most of Alabama, mesic deciduous communities are represented by riparian and river floodplain forests, that occur in a matrix of more xeric upland forest communities.

Birds that are considered to be Forest Interior specialists, avoid forest edges during nesting and are adapted to forest interior conditions in mature mesic deciduous forest settings. Most are neotropical migrants that primarily nest and raise young in the temperate Americas. These species are grouped for effects analysis due to their sensitivity to forest fragmentation and edge effects (Hamel 1992: Appendix G, G1-G2).

Studies conducted in the mid-western U.S. have documented that forest interior species may not successfully breed in small patches of otherwise suitable habitat. Quality of their forest interior habitat is measured in part by proportion of edge, an artifact of juxtaposing forested and non-forested habitats. Edges fragment forest interior habitats and are associated with increased predation and brood parasitism by the brown-headed cowbird in agricultural settings (Primack 1993; Yahner 1998). However, characteristics of the surrounding landscape, such as percent forest cover, determine the magnitude of local edge effects. Findings of Robinson et al. (1995) indicate that large landscapes with at least 70-80% forest cover offer high potential as quality habitat for forest interior species, where adverse effects of edge are reduced to levels compatible with productive populations.

Donovan et al. (1997) found that abundance of the brown-headed cowbird in a midwestern U.S. setting was significantly greater in highly fragmented landscapes (< 15% forested) than in moderately fragmented (45-55% forested) or unfragmented (>90% forested) landscapes, but abundance in moderate and unfragmented landscapes did not differ. Landscape-scale habitat patterns significantly influenced overall nest predation patterns and cowbird abundance. However, local effects of livestock grazing and horse corrals caused high variation between landscape units with similar percent forest characteristics. The specific types of non-forested habitats present may be important.

As a general rule, parasitism levels of 25 percent or less and daily nest predation rates of 4 percent or less should give most forest interior species "at least a chance" (Robinson 1995) of having self-sustaining local populations (also May and Robinson 1985; Donovan et al. 1995). Based on the work of Robinson et al. (1995), these parasitism rates are associated with a minimum of 70-80% forest cover at a landscape (75,000 acre) scale for a midwestern U.S. setting.

Duguay et al. (2001) found that in a forested setting in West Virginia (Monongahela National Forest, >88% forest cover), “fifteen years after harvest, cuts placed within otherwise extensively forested areas do not result in the type of edge effects (population sinks) observed in areas fragmented by agriculture in the midwestern U.S.” They also concluded that implementing relatively small cuts that create edge on a small proportion of the landscape may not result in increased nest failure, provided that other factors such as proximity to cowbird feeding sites are not prominent. The study involved tracking 556 nests of 46 species over a four-year period and calculation of daily nest survival rates.

Other habitat factors are known to influence productivity of this species group. Presence of young forest patches within a forested landscape is likely to have positive benefits for immature birds. Vega Rivera (1998) and Anders et al. (1998) found that after fledging, juvenile wood thrushes disperse from mature forest habitats and enter early-successional forests where they fed on invertebrates and fruit. Use of these habitats was very high relative to their availability. Later in the season, they shifted back into mature forest habitats. Fledglings preferred areas with dense understory and ground cover with species such as blackberry, sumac, and grape. Such areas may be provided by relatively small even-aged regeneration areas or by smaller dispersed canopy gaps. Scattered canopy gaps and associated dense understories likely were characteristic of old growth mesic deciduous forests. Open habitats such as pastures, old fields, and managed wildlife openings were rarely used.

The significance of National Forest lands to this species group was analyzed at both regional and forest scales in the Southern Appalachian Assessment (SAMAB 1996b: 69-

73). Only the Talladega Division of National Forests in Alabama was included in the original Southern Appalachian Assessment. This analysis of forest interior habitat focused primarily on patterns of land use (forested vs. non-forested) and measures of edge effects at a landscape scale. Based on this analysis, there are approximately 9 to 10.5 million acres of suitable habitat in the Southern Appalachian Assessment (SAA) Area with about 4.7 to 5.4 million acres (52%) located within tracts greater than 5,000 acres.

Approximately 70% of suitable habitat and 51% of the largest tracts are privately owned, while 23% of suitable habitat and 39% of the largest tracts are on national forest land. A notable difference is found within the Blue Ridge Mountains, where approximately 40% of suitable habitat and half of the largest tracts occur on national forest land. Within the SAA area, the majority of forest interior habitat occurs within the Blue Ridge Mountains, followed by the Northern Ridge and Valley/Cumberland Mountains. The Southern Ridge and Valley and Southern Cumberland Plateau have the smallest relative amount (SAMAB, 1996b:73).

To determine the landscape context of National Forests in Alabama, a shifting window analysis was conducted using 1990 National Land Cover Data (U.S. EPA 2002). Percent forest cover within a surrounding landscape of 75,000 acres (per Donovan et al. 1997) was calculated for each 90-meter grid cell located on the national forest and nearby private land. For this analysis, Deciduous, Evergreen, and Mixed Forest, and Woody Wetlands were classified as forested lands. All other land cover types, including recent clearcuts (transitional cover type), were classed as non-forest cover.

This analysis indicates that the great majority of National Forests in Alabama occur within a landscape that is more than 70 to 80 percent forested. An examination of this analysis by management unit of the National Forests in Alabama reveals the following conclusions.

Ninety-five percent (95%) of the Bankhead National Forest management unit falls within landscape units which are 70-100% forested, and secure from the potential effects of fragmentation. The remaining 5% of the forest which may be influenced by the effects of forest fragmentation are along the northern borders of the forest, at the upper edge of the Tennessee Valley's agricultural interface. The majority of Bankhead's northern rim is allocated to low management intensity prescriptions with recreational emphases, under the selected alternative. All of the Conecuh National Forest management unit, the Oakmulgee Division management unit, the Talladega National Forest management unit, and the Tuskegee National Forest management unit fall within landscape units which are 70-100% forested, making all of these entire management units secure from the potential effects of fragmentation.

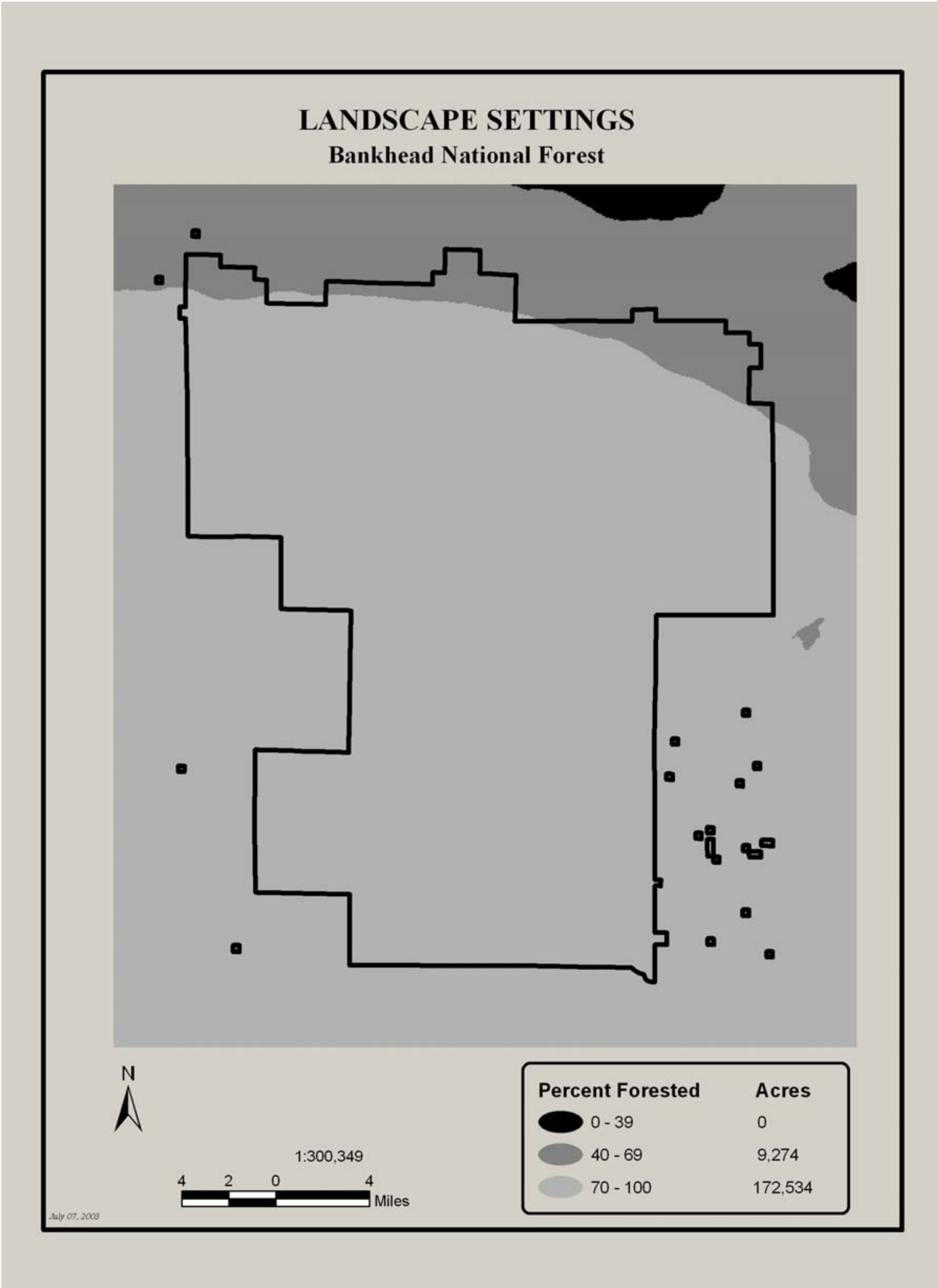


Figure 3B-6. Composite map of percent forested land cover within 75,000-acre circles surrounding each 90-meter square grid cell on and near the Bankhead National Forest, based on 1990 National Land Cover Data (US EPA 2002).

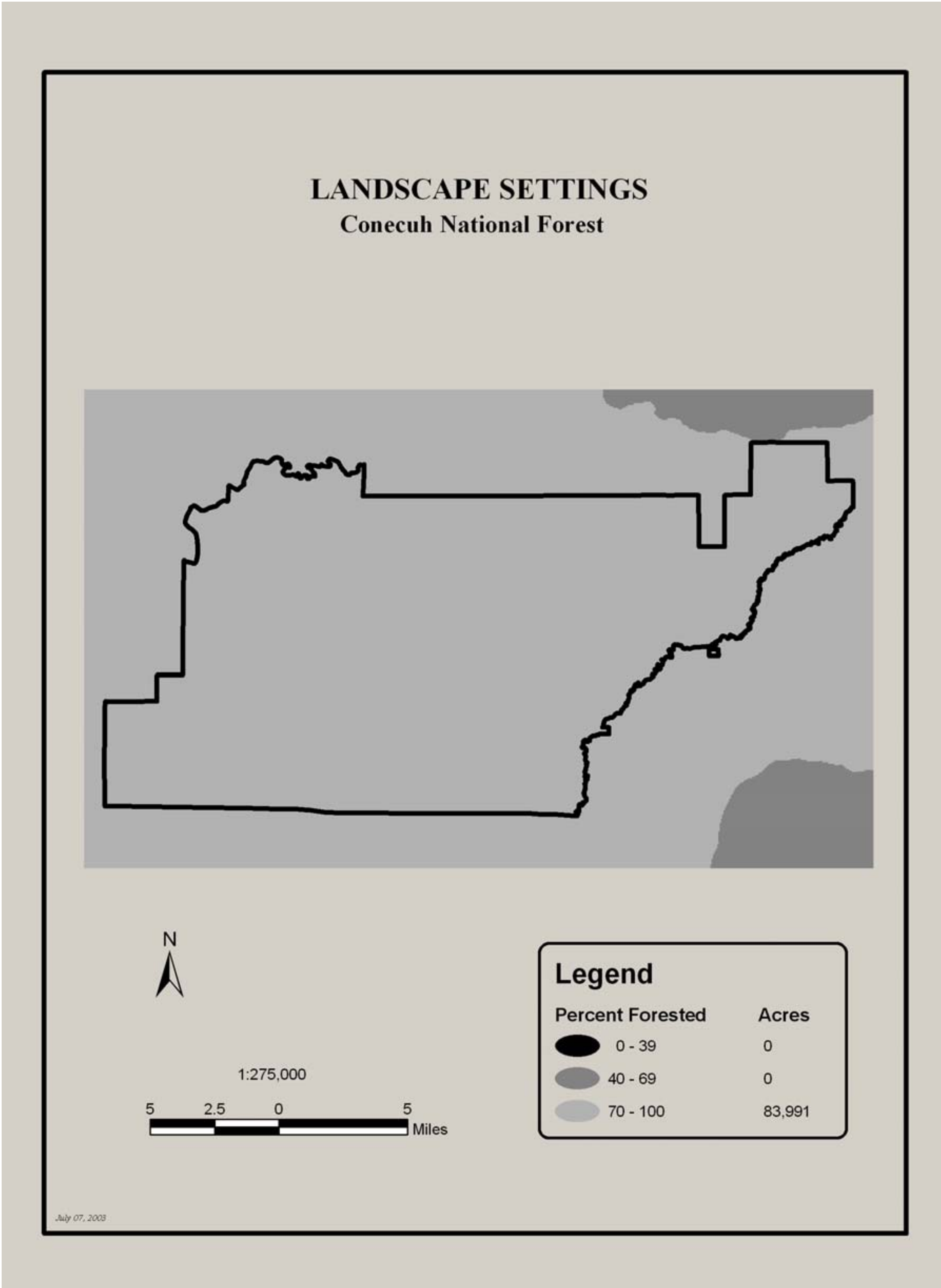


Figure 3B-7. Composite map of percent forested land cover within 75,000-acre circles surrounding each 90-meter square grid cell on and near the Conecuh National Forest, based on 1990 National Land Cover Data (US EPA 2002).

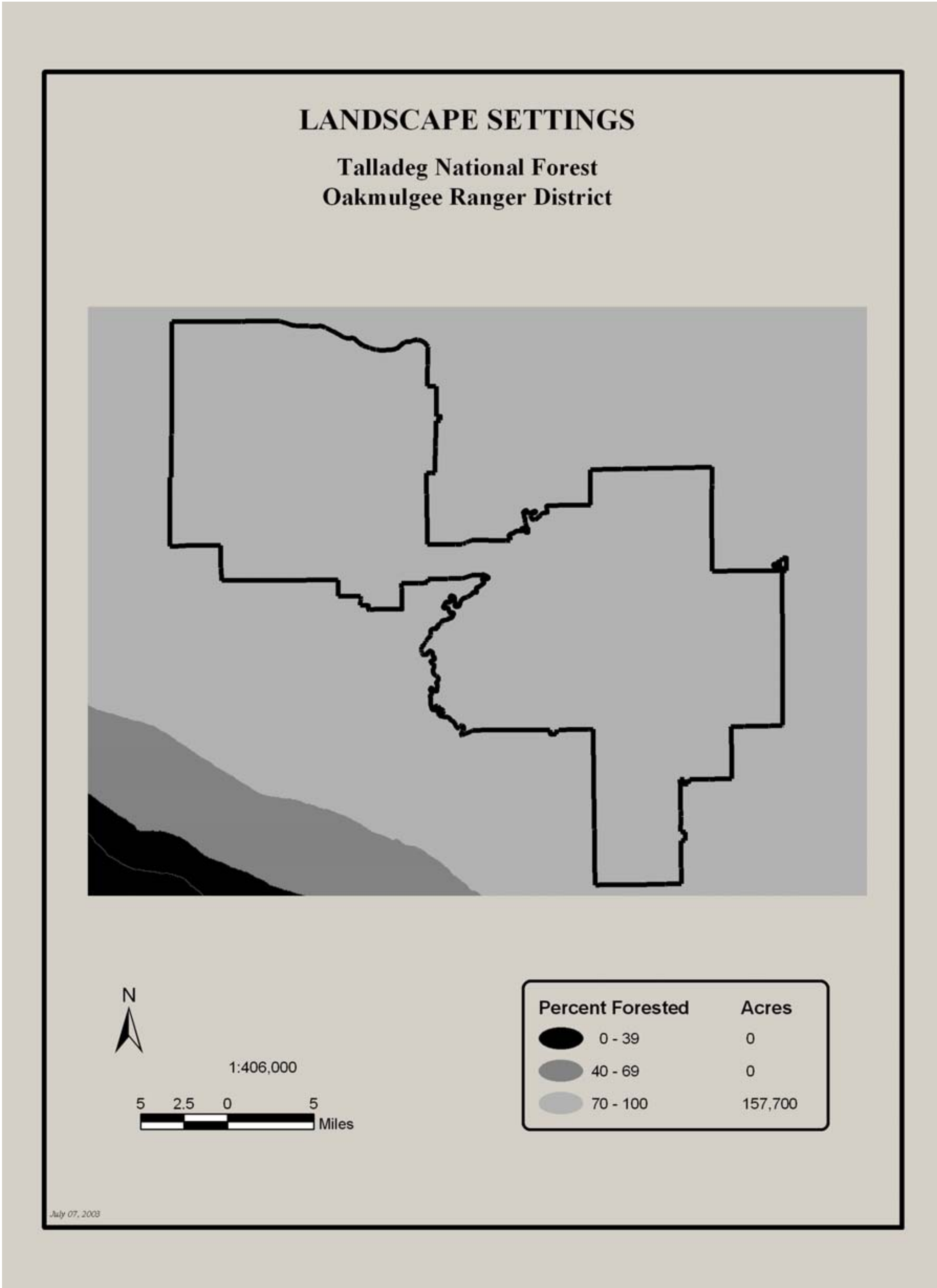


Figure 3B-8. Composite map of percent forested land cover within 75,000-acre circles surrounding each 90-meter square grid cell on and near the Oakmulgee Division of Talladega National Forest, based on 1990 National Land Cover Data (US EPA 2002).

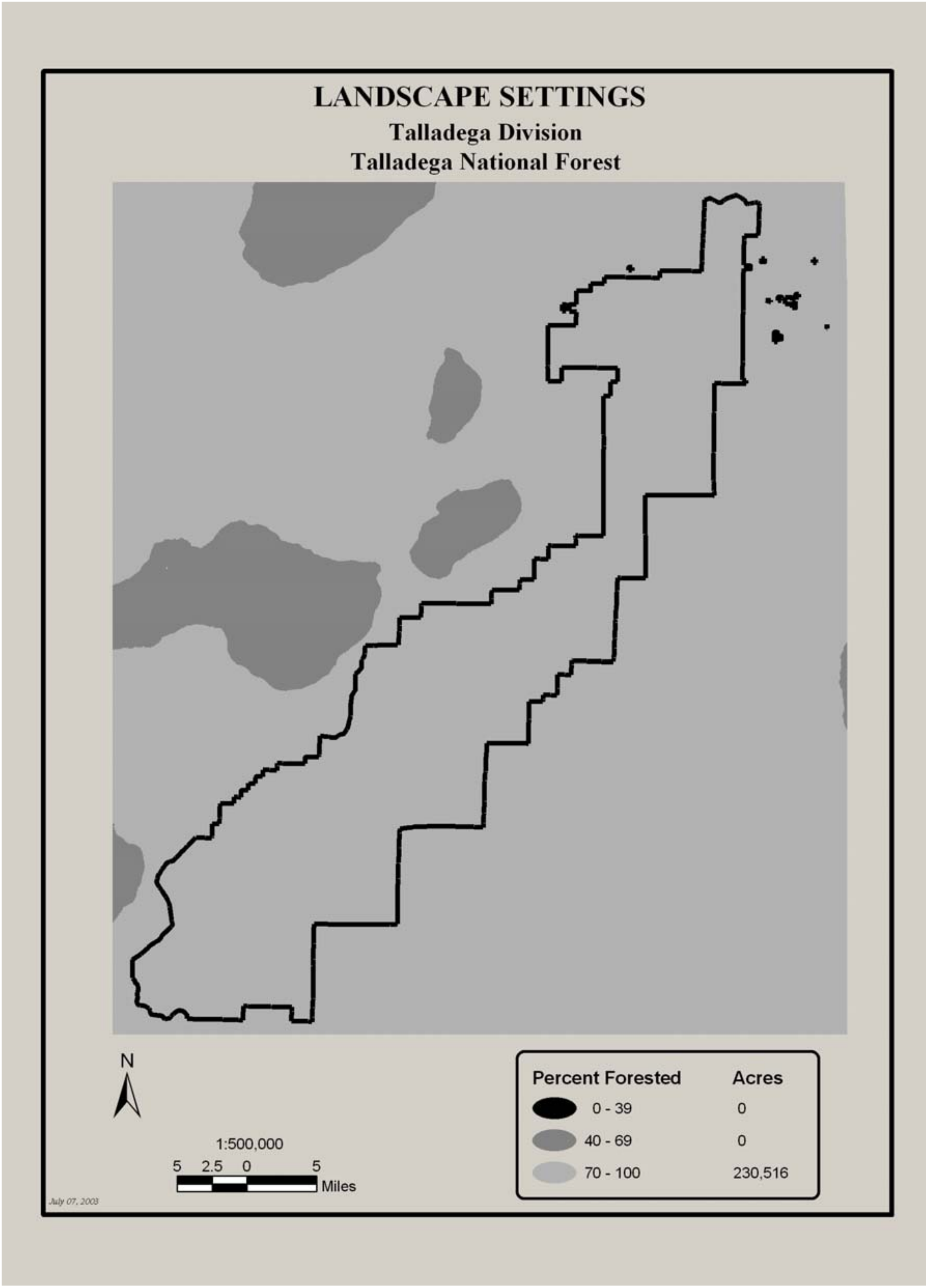


Figure 3B-9. Composite map of percent forested land cover within 75,000-acre circles surrounding each 90-meter square grid cell on and near the Talladega Division of Talladega National Forest, based on 1990 National Land Cover Data (US EPA 2002).

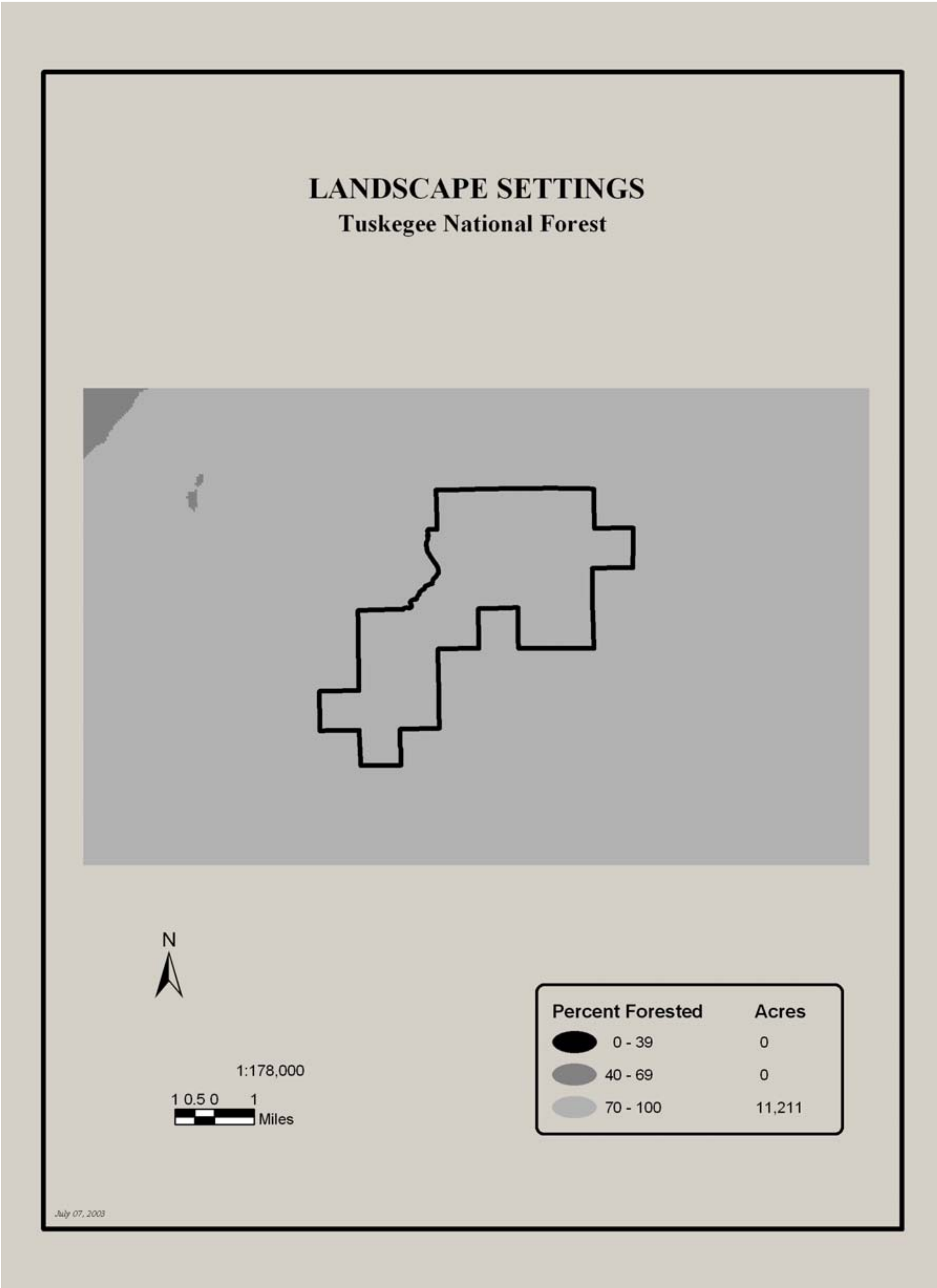


Figure 3B-10. Composite map of percent forested land cover within 75,000-acre circles surrounding each 90-meter square grid cell on and near the Tuskegee National Forest, based on 1990 National Land Cover Data (US EPA 2002).

The preceeding landscape analysis includes all forest types; however, forest interior specialist bird species are mainly associated with mature mesic deciduous forest habitats. Currently, the National Forests in Alabama provide approximately 60,000 acres of mesic deciduous forest, comprising 12% of total forest acres. Approximately 65% of these acres are in mid- and late- successional conditions.

9.1.2 Direct and Indirect Effects

Implementation of forest plan alternatives would create edge in mesic deciduous forest interior habitats during creation of early-successional forest habitats, road construction, some types of recreation development, and routine maintenance and permitting of small clearings including easements and rights-of-way. These edges could cause adverse effects to productivity of forest interior species in some settings.

Amount of edge generated would vary by alternative, particularly as caused by creation of early-successional forest habitats in or near mid- and late-successional mesic deciduous forests. Alternatives A and D have the greatest potential of creating interior edges.

Table 3B-115. Percentage of mid- and late-successional mesic deciduous forest acreage allocated to prescription objectives for early-successional forest by alternative and Management Unit on National Forests in Alabama, 2002.

Bankhead	Alternative						
Prescription objective for % early- successional forest	A	B	D	E	F	G	I
None	34	34	42	38		34	43
Low (0-4%)	0	0	0	0		50	0
Medium (4-10%)	36	1	1	59		11	32
High (10-17%)	30	65	57	3		5	25
Conecuh	**Alternative**						
Prescription objective for % early- successional forest	A	B	D	E	F	G	I
None	30	29	8	29		8	15
Low (0-4%)	0	0	0	0		0	0
Medium (4-10%)	61	70	21	71		92	85
High (10-17%)	9	1	71	0		0	0
Oakmulgee	**Alternative**						
Prescription objective for % early- successional forest	A	B	D	E	F	G	I
None	1	1	1	1		1	1
Low (0-4%)	0	0	0	0		0	0
Medium (4-10%)	40	99	60	99		99	99
High (10-17%)	59	0	39	0		0	0
Talladega	**Alternative**						
Prescription objective for % early- successional forest	A	B	D	E	F	G	I
None	5	4	4	9		4	4
Low (0-4%)	0	0	0	0		0	0
Medium (4-10%)	25	92	15	91		96	96
High (10-17%)	70	4	80	0		0	0
Tuskegee	**Alternative**						
Prescription objective for %	A	B	D	E	F	G	I

early- successional forest						
None	9	9	9	9	9	9
Low (0-4%)	0	0	0	0	0	0
Medium (4-10%)	1	91	46	91	91	91
High (10-17%)	90	0	45	0	0	0

In the short-term, adverse effects of edge are most likely to occur in the areas shown by analysis to be within landscapes less than 70 percent forested. Regardless of varying levels of edge created under plan alternatives, edge created on the rest of the forest is not expected to have significant short-term effects due to the current landscape context. High levels of forest regeneration on national forests could negatively shift percent of forest cover as calculated for this analysis; however, such effects would require simultaneous implementation of relatively high levels of regeneration over large landscapes. This situation is unlikely however, because much of the mesic deciduous community types are in or adjacent to riparian areas. Regeneration will only take place in riparian areas in order to improve the character of those areas for riparian dependant species. Although Option 3 allows creation of up to 10% early successional forest conditions, it will only be done when site-specific analysis determines that riparian character will be improved. Alternative A, due to its abundant allocation of acreage to high early-successional forest objectives, is most likely to result in simultaneous implementation of relatively high levels of regeneration over large landscapes. No alternative includes high levels of forest conversion to other land use types, and therefore no meaningful long-term change in landscape cover type is expected due to direct or indirect effects of national forest management. In the long-term, effects of forest edge on the national forest will largely depend on the cumulative effects of land-use changes on private lands surrounding the national forest.

Alternatives that shift age-class distribution of mesic deciduous forests to younger age classes would have negative effects on interior birds through reduction in acreage of suitable habitat. Alternative D, which includes the highest rates of forest regeneration would most limit abundance of suitable habitat for these species.

Some positive effects may be expected where alternatives permit low to moderate levels of vegetation management for creation of young mesic hardwood forest patches, due to use of these habitats by fledgling birds for food and cover (Vega Rivera 1998, Anders et al. 1998). The relative balance of these positive effects and potential negative edge effects is dependent on the landscape context and the relative abundance of mature and young forests. On balance, effects are expected to be positive where mid- and late-successional forests are common, and forest cover on surrounding landscapes predominate. The balance shifts to negative as landscapes go below 70 percent forest cover and young forests or forest openings become common.

Concern over forest interior habitats is primarily focused on effects to migratory birds. Several bird species are associated with forest interior. The wood thrush (*Hylocichla mustelina*) is deemed the most appropriate of these as an MIS for National Forests in Alabama. It is strongly associated with mature forest interior habitats (Hamel 1992, Crawford et al. 1981), and it is also common enough to be feasibly monitored for trends. Long-term monitoring of this species has resulted in some of the most robust data sets of any of the interior bird species surveyed on the forest. This species is selected to help indicate the effects of management on the availability of suitable mature forest interior habitats. Other elements, such as landscape analysis of forest fragmentation using remote sensing data, would supplement information received from monitoring this species.

Table 3B-116. Expected population trends[1] of MIS for Mature Forest Interior Habitats by alternative, National Forests in Alabama. Population trends are based on expected trends in habitat quantity and quality.

	A	B	D	E	F	G	I
WOOD THRUSH							
+10 YEARS	-	=	-	=	=	=	+
+50 YEARS	-	=	-	=	=	+	=

1 Population trend expressed as change from current levels: "++" = relatively large increase, "+" = increase, "=" = little to no change, "-" = decrease, "—" relatively large decrease.

Management indicator species may provide additional discerning information for evaluating the relative effects of management alternatives. MIS population trends are expected to be directly proportional to trends in habitat quantity and quality. The wood thrush is an MIS for mature forest interior habitats on all of National Forests in Alabama's management units. The expected population trends for MIS of Mature Forest Interior habitats after 10, and 50 years of revised forest plan implementation are shown in Table 3B-116. Alternatives I and G project the most beneficial population trends for the wood thrush. The landscape analysis revealed that only the Bankhead National Forest management unit displayed areas with potential risk to the effects of fragmentation. Table 3B-115 shows the alternatives with the greatest and least potential for creating interior edges. For the Bankhead management unit, Alternative I places the largest proportion of mesic deciduous forest acreage in prescription allocations with no early successional habitat objective, thus protecting the areas most important for wood thrush, and other forest interior specialist bird species. Alternative I is clearly the best treatment of mature forest interior habitats on the Bankhead National Forest management unit; the National Forests in Alabama management unit with the greatest risk from external land use conversion influences.

9.1.3 Cumulative Effects

Although the current supply of forest interior habitat on national forests within the analysis area is good to excellent (a range of 68% to 96% forest interior habitat; SAMAB 1996b), the context of land use trends is relevant, because conditions on surrounding private lands can adversely affect habitat suitability for forest interior bird on national forest land by increasing densities of cowbirds and nest predators. Currently, about 75% of the Southern Appalachian area is rural and privately owned. Forested private land within the region has declined by about 220,000 acres since 1982. Similarly, pasture and cropland have also decreased by about 300,000 acres. In contrast, developed acreage has increased by more than 600,000 acres, most prominently in the Blue Ridge and the Southern Mountain and Piedmont Sections (SAMAB 1996a).

Like agriculture and pasture land uses, developed acreage has a negative influence on forest interior species by encouraging nest predation (by crows and jays, mid-sized mammals including domestic cats) (Wilcove 1985; Crooks and Soule 1999; Hawkins 1998) and brood parasitism by cowbirds.

Rapid population growth, economic growth and diversification, better employment and wages, declining farming, and better housing translate into rising pressures on the natural resources of the Southern Appalachian region for the foreseeable future (SAMAB 1996a). New transportation corridors connecting communities will have direct and cumulative influences on development and subsequent loss of forested land.

Forested private lands adjacent to national forests reduce the influence of developed land on core areas of forest interior habitat on national forest. However, the continued forested condition is tenuous, and acreage will most certainly decrease. Future land use trends over the next 15 years will likely include a decrease in suitable forest interior habitat acreage found in large tract sizes, primarily due to development and increasing urbanization. The severity of edge effects and fragmentation will be most prominent in the currently agriculture-dominated landscapes (SAMAB 1996b: 72) especially in locations where national forest ownership occurs in small to medium patch sizes.

Alabama Landscape Setting

Bird productivity is likely most secure from landscape-level edge effects in Winston, Lawrence, and Cleburne Counties, Alabama, which have high proportions of land in public ownership (> 20%). Bird productivity is least secure in Franklin, Cherokee, Chilton and Hale Counties, Alabama, which are characterized by more rapid predicted growth and smaller acreage in public ownership (Table 3B-117). In these counties, critical social trends coincide with possible existing fragmented landscape conditions.

Table 3B-117. Projected percentage population increases from 2000-2025 in counties of National Forests in Alabama.

Projected Growth	County (and Percent of County Currently Forested)
None or Negative	Dallas (67%), Perry (78%), Macon (79%)
Low (0-10% growth)	Calhoun (64%), Covington (76%)
Medium (10-20% growth)	Talladega (69%), Tuscaloosa (78%), Escambia (76%)
High (>20% growth)	Franklin (73%), Cherokee (66%), Chilton (73%), Hale (64%)

For counties <10% publicly owned.

All alternatives would include monitoring of bird populations within these habitats, as well as changes in landscape context through re-evaluation of percent forest cover as new land cover data become available. Validation of forest interior bird productivity on national forests is a research need.

10. Forest Health

Affected environment

A healthy forest has the capacity to vigorously renew itself and to recover from a wide range of disturbances. The National Forests in Alabama have identified forest health as an important issue both internally and with the public. The most common forest health concerns for the national forests in Alabama are: off-site species, non-native invasive plants, southern pine beetle, ips engraver beetles, annosum root disease, littleleaf disease, fusiform rust, brownspot needle blight, oak decline, loblolly pine decline, weather events and catastrophic wildfire.

Of particular concern are loblolly pine, shortleaf pine, and slash pine occupying sites that would be better suited to longleaf pine or other species. Off-site species are stressed, have reduced vigor, are more susceptible to insects and disease, are prone to damage from weather events or wildfire, and have higher mortality rates.

Many of the forest communities of the National Forest in Alabama have long association with fire. However, for many years fire has been excluded or reduced. The risk of catastrophic wild fire has increased because of fire suppression.

Insects and disease are important timber management concerns in Alabama. Several insects, diseases and pests have the potential to adversely affect vegetative, recreational, or aesthetic resources on the National Forests in Alabama. The best approach to managing insect and disease problems is to combine prevention and control strategies to meet natural resource management objectives (USDA Forest Service, 2001). This approach is called Integrated Pest Management (IPM) and involves techniques of pest prevention and suppression in an ecological context to hold pest population levels below those causing economic injury or adversely impacting other values (USDA Forest Service, 1985). Three primary groups of strategies used to manipulate the health of forests are prevention, conversion and, sanitation/risk reduction. Prevention uses proactive management to reduce the risk of forest pest problem occurrence. Conversion is a strategy in which high risk stands are replaced with stands having lower risk of adverse pest activity. Sanitation/risk reduction uses management strategies to reduce the risk of pests in a stand that will be retained or replaced later.

Though cyclical in population levels, the **southern pine beetle**, *Dendroctonous frontalis*, has caused significant losses in timber volume and value, and will continue to be a major cause of mortality in pine stands throughout the National Forests in Alabama. Loblolly, Virginia, and shortleaf pines are more susceptible to this beetle than longleaf pine. All forests except the Conecuh NF have been through recent periods with epidemic levels of southern pine beetle infestation. Weather, predators, and insect parasites help to suppress southern pine beetle populations. IPM control measures usually include rapid cutting and removal of infested trees, piling and burning of infested trees, cutting and leaving trees, or cutting with chemical control in high value areas. Control options can be found in the *Final Environmental Impact Statement for the Suppression of the Southern Pine Beetle* (1987).

Ips engraver beetles, *Ips* spp., and black turpentine beetles, *Dendroctonus terebrans*, cause losses to timber but are less serious than the southern pine beetle. Ips beetles often kill clumps of trees where lightning damage occurs. Attacks are usually limited to small areas of less than one acre. Black turpentine beetles attack trees weakened from injuries to roots or trunks, usually from logging equipment. Both beetles are frequently associated with root disease. Control measures involve prompt removal of infested trees, and associated logging damage to roots and trunks should be minimized (USDA Forest Service, June 1989).

Annosum root disease, caused by *Heterobasidion annosum*, attacks the root system of live trees, causing growth loss and early mortality. Loblolly, shortleaf, and slash pines are particularly affected. Longleaf pine is less susceptible. This disease is most often associated with thinned pine stands. It has not been a major problem on the Forest but has been evident on the Bankhead NF and Conecuh NF where plantations of loblolly and slash occur on high-risk sites (deep sandy soils). Control methods include thinning in warm weather when daily temperatures exceed 80 degrees, and stump surface application of borax (USDA Forest Service, June 1989).

Littleleaf disease, caused by *Phytophthora cinnamomi*, occurs but is not a significant problem in older loblolly and shortleaf stands on the Bankhead NF and Talladega NF. This is a root disease associated with eroded clay soils with poor internal drainage. Littleleaf disease may become more significant as rotation ages are extended. Conversion of susceptible stands to a different species or younger pine stands would reduce the occurrence.

Fusiform rust, caused by *Cronartium fusiforme*, causes galls and cankers in loblolly and slash pine. These girdle young trees and increase breakage in older trees. Fusiform rust has not caused significant damage on the national forests in Alabama.

Brownspot needle blight, caused by *Scirrhia acicola*, infects needles of longleaf pine seedlings, causing delayed height growth and some mortality. Control is accomplished by prescribed burning infected stands to reduce inoculum on infected needles.

Oak decline is a complex resulting from an interaction of climate, site quality, and tree age, occurs in many older hardwood stands in the Southern Appalachians. Oak decline is stress induced, with the most frequent stress factors being drought, frost injury, and insect defoliation (USDA Forest Service, 1980). This affliction often results in crown dieback, which reduces tree vigor and makes oaks more vulnerable to insects and disease. Stressed trees lack carbohydrate resources to resist root infection or replace lost leaves, and repeated episodes result in crown dieback and eventual death. Oak decline will likely become a more significant problem in the future as rotation ages are increased for hardwood stands.

Loblolly pine decline, indicated by sparse crowns, chlorotic needles, reduced radial growth at age 40-50, root damage, and heavy cone crops prior to mortality, occurs in loblolly pine stands on the Talladega National Forest particularly on the Oakmulgee division. The disease is associated with *P. cinnamomi* and with *Leptographium* spp. It is prevalent on sites with historic littleleaf disease, as well as on soils other than the heavy clay piedmont soils. Conversion of susceptible stands to a different species would reduce the occurrence.

Non-native invasive plant species (NIS) replace native species and reduce native plant biodiversity with indirect effects on wildlife habitat. A multitude of invasive, non-native plants threatens the integrity of native ecosystems in Alabama. The Southern Appalachian Assessment (SAMAB 1996) provides a summary of the major threats from invasive plant species.

The following table lists the non-native invasive plant species for Alabama. Inclusion in this list is a certification that the species is known to occur on National Forest lands, although not on every unit, and is an alert to Forest Service personnel to stay informed about, and to be on the lookout for, these species. To date, there have been over 150 non-native plant species documented. A more complete list that includes non-invasive species is on file at the Forest Supervisor's office.

Table 3B-118. Non-native Invasive Plant Species

Common Name	Scientific Name
Silktree	*Albizia julibrissin*
Alligatorweed	*Alternanthera philoxeroides*
Giantreed	*Arundo donax*
Common water hyacinth	*Eichhornia crassipes*
Cogongrass	*Imperata cylindrical*
Japanese clover	*Kummerowia striata (=Lespedeza striata)*
Sericea lespedeza	*Lespedeza cuneata*
Japanese privet	*Ligustrum japonicum*
Chinese privet	*Ligustrum sinense*
European privet	*Ligustrum vulgare*
Tall fescue	*Lolium arundinaceum (=Festuca elatior* var. *arundinacea)*
Japanese honeysuckle	*Lonicera japonica*
Japanese climbing fern	*Lygodium japonicum*
Royal Paulownia	*Paulownia tomentosa*
Nepalese browntop	*Microstegium vimineum*
Dallasgrass	*Paspalum dilatatum*
Vasey's grass	*Paspalum urvillei*
Kudzu	*Pueraria lobata*
Multiflora rose	*Rosa multiflora*
Tallowtree	*Sapium sebiferum*
Johnsongrass	*Sorghum halepense*
Chinese wisteria	*Wisteria sinensis*
Brazilian vervain	*Verbena brasiliensis*
Meadow fescue	*Festuca elatior*

Direct and indirect effects

Integrated Pest Management (IPM) includes those activities that prevent, suppress, or lessen damage to forest stands from outbreaks of pest and disease organisms and will be utilized under all alternatives. The strategies commonly used under all alternatives are restoration and thinning. Restoration and maintenance projects respond to the forest health issue by restoring site specific suitable species composition, thinning to reduce crowding and prolong stand health until the stand composition and species can be restored, and the increased frequency of prescribed fire and in some cases the reintroduction of prescribed fire. As with all timber harvest activities, restoration and thinning will depend on management objectives. Restoration activities occur primarily on suitable acres, within management prescriptions 7E2, 8A1, 8A2, 8B1, 8D1, 9C1, 9C3, 9D1, 9G1, 10A1 and 10B1. Stands are prioritized for treatment based on existing conditions. Those currently exhibiting signs and symptoms indicating insects, disease, mortality, or other forest health issues are priority for restoration. Because forest health affects other resources, addressing forest health issues also addresses wildlife habitat and recreation concerns. Recreation areas require periodic hazard tree analysis to detect and remove diseased stems in all alternatives.

The following table shows an estimate of acres restored by alternative through period 5.

Table 3B-119. Acres Restored by Alternative

Community	Thousands of Acres Restored – Periods 1-5						
	A	B	D	E	F	G	I
Dry Mesic Oak	7.7	8.5	8.4	9.3	6.7	6.1	9.7
Mountain Longleaf	10.8	12.1	8.9	8.7	11.9	13.1	19.4
Upland Longleaf	24.5	27.5	33.9	29.8	27.6	31.8	29.9
Xeric Pine	9.4	10.3	10.2	11.3	8.2	7.4	11.8
Total	52.4	58.4	61.4	59.1	54.4	58.4	70.8

All alternatives provide for thinning over-stocked stands, with the amount per period dependent upon the number of suitable acres, rotation age, and management objectives. Thinning reduces stand density, removes infected or unhealthy individuals, and generally prolongs the health of a stand. The following table displays the average numbers of acres thinned per period during the first 5 planning periods (50 years), by alternative.

Table 3B-120. Average Acres Thinned

Alternative	Average Thinning per period Thousands of acres
A	40.8
B	35.8
D	47.7
E	40.5
F	50.6
G	43.2
I	26.9

Looking at a combination of restoration and thinning, Alternative D proposes the most and is the only alternative that proposes more than current management. Alternatives E, G and I propose relatively the same amount, while Alternatives A and B propose the least. However, Alternative I proposes the most restoration.

All alternatives propose somewhat longer rotations and/or fewer acres suitable for timber management than the current forest plan, resulting in older forests over time. This could lead to increased occurrence of diseases and insects that favor older forests, such as bark beetles, root diseases, and stem decay. Afflictions more common to young forests, such as brownspot needle blight and fusiform rust, may show a decrease in occurrence. All alternatives also include more prescribed burning than the current forest plan, with emphasis on more growing season burning. This would likely decrease the incidence of brownspot needle blight in longleaf pine seedlings since fire reduces the inoculum by destroying infected needles.

The amount of thinning and restoration in each alternative is related to the amount of suitable acres and the constraints on the amount of regeneration by management prescription. However, the difference in the amount of suitable acres between alternatives is small, ranging from 59% in Alternative I, to 70% in Alternative D. Alternatives F and D have significantly more suitable lands identified for timber management, and provide for more intensive management than the other alternatives, so these alternatives will likely have reduced effects from insects and diseases that are related to older and/or unmanaged stands. There would be a lower risk of loss from southern pine beetles, other bark beetles, littleleaf disease, and stem decay, but possible increased occurrence of annosum root disease and fusiform rust.

For the short term, prescribed burning could increase southern pine beetles and Ips beetles, especially in loblolly and slash pine, due to increased stress, which makes them more susceptible to attack. However, all alternatives propose replacing off-site loblolly and slash with the appropriate species, typically hardwoods, mixed pine and hardwood, or longleaf pine which is less susceptible to these pests, so their effects would be reduced in the long run. Longleaf pine is the most resistant southern pine to SPB attack. It also resists annosum root disease and fusiform rust.

In response to a specific insect or pest incident all alternative would use IPM strategies as appropriate. However, because Alternatives D and F have more suitable acres, there would be more flexibility to respond than in the other alternatives.

Non-native Invasive Species

In 1999 the Southern Region released a Noxious Weed Management Strategy that outlined five emphasis areas: 1) Prevention and Education; 2) Control; 3) Inventory, Mapping, and Monitoring; 4) Research; and, 5) Administration and Planning. Negative effects from invasive species will be minimized under all Plan alternatives through adherence to Regional policy and the implementation of Plan Goals, Objectives, and Standards.

Most non-native, invasive species have rapid growth response to openings and sunlight. Equipment used for management activities has the potential to introduce new NIS or spread those already occurring. Therefore, those alternatives will have a greater potential to increase risk of introduction and spread of NIS. In all alternatives, non-native invasive species will be inventoried, evaluated, and, where feasible and necessary, treated to protect resources. Priority for treatment will be on those areas where TES species habitat is being invaded; on those species that are most invasive, such as kudzu, cogongrass, and tallowtree; and where treatment is likely to be successful for the long term. The amount of treatment is not likely to differ significantly between alternatives.

Alternatives F and D have more suitable land than the other alternatives and would likely have more activities. Alternative I has the fewest suitable acres and would likely have reduced potential risk of introduction and spread. The other alternatives fall somewhere in the middle in terms of potential risk.

Cumulative effects

National forest lands will be managed using IPM techniques for all alternatives. All alternatives use the same suppression guidelines to control insect and disease infestations. Control method effectiveness would not be expected to differ by alternative. Longer rotation will sift vegetation to a more mature condition and will likely increase risk of insects and disease over time. Those alternatives will less suitable acres that current (Alternative F) will have increased risks as well as less flexibility to respond to threats. Effects of insects and disease on adjacent private lands would be similar for all alternatives with management actions taken to prevent the spread of insects and disease from national forest lands. Control of SPB infestations typically occurs on private lands in a similar manner to control operations on national forest land (removal or cut and leave).

Effects of harvesting activities for control of insects or disease, and for restoration of native ecosystems are similar to normal harvesting operations for forest management, which are discussed in other sections of this chapter (Soils, Water, and Major Forest Communities). Loss of stands or individual trees to insects or disease will reduce growing stock inventory and result in future economic loss.

With an increased emphasis on the management of NIS in the southern Appalachian area, particularly plant species, it is expected that impacts from these species will be reduced from current levels across federal lands.

3.C Other Elements

1.0 RECREATION PROGRAMS

1.1 Developed and Dispersed Recreation

1.1.1 Affected Environment

National forests provide over 191 million acres of public land within the United States. National forests in the Southern Appalachian region contribute approximately 4 million acres to the national total and provide unique settings for a variety of outdoor recreation activities such as primitive and developed camping, hunting, fishing, hiking, backpacking, horseback riding and OHV driving, canoeing/kayaking and whitewater rafting, as well as picnicking, sightseeing, nature watching, walking for pleasure and driving for pleasure.

Market Area

Market areas have been established for different national forests to better evaluate public demand for recreation opportunities. Past research has demonstrated that most national forest visits originate from within a 75-mile (1-½ hour driving time) radius. (*Apalachicola and Conecuh National Forests Recreation Realignment Report* Overdevest and Cordell, 2001 and *Bankhead, Talladega, and Tuskegee National Forests Recreation Realignment Report* Overdevest and Cordell, 2001). Therefore, for this analysis, the market area has been defined as all counties that fall within a 75-mile straight-line radius from a forest border.

The National Forests in Alabama were divided into two separate market areas. The Conecuh National Forest in Alabama is combined with the Apalachicola National Forest in Florida. The largest cities within this market area include Dothan, AL; Mobile, AL; Montgomery, AL; and Pensacola, FL. The Bankhead, Talladega, and Tuskegee National Forests make up the other market area. The largest cities within this market area include Birmingham, AL; Huntsville, AL; Montgomery, AL; Tuscaloosa, AL; Atlanta, GA; and Columbus, GA.

Opportunities for outdoor recreation are not limited to the national forests within the market areas. However, the National Forests in Alabama provide most of the public land.

Within the states of Alabama and Florida, several state parks are located within a 75-mile radius of the National Forests in Alabama's borders. These state parks, such as Cheaha State Park, often provide higher levels of development and accommodate overnight lodging. The United States Corps of Engineers also provides many of the water-based recreation opportunities within the National Forests in Alabama and surrounding market area.

The National Forests in Alabama provide approximately 666,000 acres of public land scattered in five blocks throughout the state. The National Forests in Alabama comprise a highly scarce resource – islands of undeveloped public lands in the midst of agricultural and urban development. The Forests are exceptional because they are scattered across the state in four distinct physiographic regions, resulting in unusual ecological diversity and landscapes. They are repositories of numerous rare species and will become even more ecologically significant with the restoration of native forest communities. The National Forests in Alabama will be increasingly important as urban escapes and at the same time, they will continue to be backyard playgrounds for nearby rural residents. Outdoor recreation opportunities on National Forests in Alabama are many and varied. Camping experiences range from highly developed campgrounds with full hookups to spots in the forest utilized by backpackers. Developed day use facilities include picnic sites, playgrounds, constructed swimming beaches, boat ramps, paved bicycle trails, and shooting ranges. Existing trails accommodate long distance hiking, short loop walking, horse, wagon, mountain biking, and OHV use. The Bartrum and Pinhoti are National Recreation Trails. The National Forests in Alabama provide opportunities for sightseeing, boating, hunting, and fishing. The Talladega Scenic Drive is a national scenic byway. Sightseeing opportunities include enjoying vistas such as those on the scenic drive as well as viewing the complex and varied forestwide flora and fauna. Primitive, semi-primitive non-motorized, semi-primitive motorized, roaded natural, and rural recreational opportunities are all present. The Cheaha, Dugger, and Sipsey Wildernesses are all managed for a primitive recreation experience

Recreation Demand & Trends

Recreation demand is a complex relationship mix of people's desires and preferences, availability of time, price, and availability of facilities. The evaluation of current and future demand for recreation on the National Forests in Alabama is based on recent surveys that identify and quantify:

- Estimated number of current recreation visits to the National Forests in Alabama
- Participation rates for recreation activities within the forest market area
- Future activity demand based on projected population growth
- Activity demand by demographic strata.

The recent National Visitor Use Monitoring (NVUM) effort by the Forest Service has provided baselines for estimating current use of recreation sites on the National Forests in Alabama. These numbers only account for people visiting developed or dispersed sites for the purpose of engaging in a recreation activity. They do not include the millions of people that drive through the national forest.

Table 3C-1 Baselines for Recreation Use on National Forests in Alabama

Type of Recreation Sites	Current Percentage of Total Estimated National Forest Recreation Visits*
Day-Use Developed Sites	20%
Overnight-Use Developed Sites	6%
Wilderness (Dispersed Sites)	9%
General Forest Areas (Dispersed Sites)	65%
Total	100% (687,850 estimated visits)

*Refer to process record in Appendix B.

Based on this NVUM data, "developed recreation" areas on the National Forests in Alabama accommodate approximately 26% of the estimated recreation visits. The remaining 74% of recreation visits can be defined as "dispersed recreation" that occurs away from developed sites in general forest areas and designated Wilderness.

People within the defined market area for the National Forests in Alabama engage in a variety of recreation activities. The following table lists the types of activities that can be enjoyed on the National Forests in Alabama. They have been ranked in order from highest to lowest participation rates based on the National Survey on Recreation and the Environment (NRSE), an on-going national telephone survey sponsored by the US Forest Service.

Table 3C-2 identifies trends in public demand. Data reflects participation in an activity within the defined market area and not necessarily on the National Forests in Alabama.

Table 3C-2 Number of People (in millions) over 16 years old Participating in Recreation Activities in National Forests in Alabama Market Areas and Percentage Increase over next 50 years (*Apalachicola and Conecuh National Forests Recreation Realignment Report,* Overdevest and Cordell, August 2001, *Bankhead, Talladega, and Tuskegee National Forests Recreation Realignment Report,* Overdevest and Cordell, August 2001 and from *Outdoor Recreation in American Life, A National Assessment of Demand and Supply Trends,* H.Ken Cordell, Principal Investigator, 1999). Table 3C-2A is for the Conecuh National Forest, and Table 3C-2B is for the other National Forests in Alabama.

Table 3C-2A Conecuh National Forest Recreation Activities

Recreation Activity	2001 Participation Rate	2000 # Of People	2010 increase *	2020 increase *	2030 increase *	2040 increase *	2050 increase *
View/photograph nature or scenery	48%	1.15	15% 1.32	31% 1.51	48% 1.70	66% 1.91`	86% 2.14
Driving for pleasure	47%	1.13	15% 1.30	31% 1.48	48% 1.67	66% 1.88	86% 2.10
Picnicking	48%	1.15	11% 1.28	23% 1.41	37% 1.58	53% 1.76	71% 1.97
Visit historic site	39%	0.94	22% 1.15	47% 1.38	77% 1.66	113% 2.00	155% 2.40
Swimming in streams, lakes, e	41%	0.98	6% 1.04	13% 1.11	20% 1.18	29% 1.26	41% 1.38
View wildlife	39%	0.92	15% 1.06	31% 1.21	48% 1.36	66% 1.53	86% 1.71
View natural vegetation, trees	39%	0.94	15% 1.08	31% 1.23	48% 1.39	66% 1.56	86% 1.75
View birds	25%	0.59	15% 0.68	31% 0.77	48% 0.87	66% 0.98	86% 1.10
Visit wilderness or primitive area	24%	0.56	25% 0.70	57% 0.88	96% 1.10	108% 1.16	171% 1.52
Day hiking	18%	0.44	19% 0.52	38% 0.61	59% 0.70	78% 0.78	94% 0.85
Warm water fishing	32%	0.76	9% 0.83	17% 0.89	24% 0.94	26% 0.96	26% 0.96

Recreation Activity	2001 Participation Rate	2000 # Of People	2010 increase *	2020 increase *	2030 increase *	2040 increase *	2050 increase *
Motor boating	28%	0.66	1% 0.67	3% 0.68	6% 0.70	11% 0.73	17% 0.77
View/photograph fish	31%	0.73	15% 0.84	31% 0.96	48% 1.08	66% 1.21	86% 1.36
Developed Camping	17%	0.41	27% 0.52	60% 0.66	98% 0.81	144% 1.00	201% 1.23
Drive off-road	18%	0.43	5% 0.45	10% 0.47	16% 0.50	23% 0.53	34% 0.58
Mountain biking	12%	0.30	12% 0.34	26% 0.38	42% 0.43	61% 0.48	83% 0.55
Primitive camping	12%	0.28	-2% 0.27	0% 0.28	0% 0.28	5% 0.29	0% 0.28
Coldwater fishing	9%	0.20	9% 0.22	17% 0.23	24% 0.25	26% 0.25	26% 0.25
Rafting	8%	0.18	5% 0.19	9% 0.20	16% 0.21	30% 0.23	51% 0.27
Backpacking	7%	0.16	23% 0.20	57% 0.25	96% 0.31	108% 0.33	171% 0.43
Big Game Hunting	16%	0.38	97% 0.75	93% 0.73	89% 0.72	83% 0.70	76% 0.67
Small-game Hunting	14%	0.34	97% 0.67	93% 0.66	89% 0.64	83% 0.62	76% 0.60
Horseback riding on trails	9%	0.22	9% 0.24	19% 0.26	27% 0.28	30% 0.29	31% 0.29
Canoeing	10%	0.24	5% 0.25	9% 0.26	16% 0.28	30% 0.31	31% 0.31
Kayaking	3%	0.06	5% 0.06	9% 0.07	16% 0.07	30% 0.08	31% 0.08
Migratory bird hunting	4%	0.09	97% 0.18	93% 0.17	89% 0.17	83% 0.16	76% 0.16

*Data increase show change from 2001

Table 3C-2B Bankhead, Talladega, and Tuskegee National Forest Recreation Activities

Recreation Activity	2001 Participation Rate	2000 # Of People	2010 increase *	2020 increase *	2030 increase *	2040 increase *	2050 increase *
View/photograph nature or scenery	57%	3.69	15% 4.24	31% 4.83	48% 5.46	66% 6.13	86% 6.86
Driving for pleasure	57%	3.71	15% 4.27	31% 4.86	48% 5.49	66% 6.16	86% 6.90
Picnicking	52%	3.36	11% 3.73	23% 4.13	37% 4.60	53% 5.04	71% 5.75
Visit historic site	51%	3.30	22% 4.03	47% 4.85	77% 5.84	113% 7.03	155% 8.42
Swimming in streams, lakes, e	42%	2.74	6% 2.90	13% 3.10	20% 3.29	29% 3.53	41% 3.86
View wildlife	44%	2.85	15% 3.28	31% 3.73	48% 4.22	66% 4.73	86% 5.30
View natural vegetation, trees	45%	2.93	15% 3.37	31% 3.84	48% 4.34	66% 4.86	86% 5.45
View birds	30%	1.94	15% 2.23	31% 2.54	48% 2.87	66% 3.22	86% 3.61
Visit wilderness or primitive area	31%	1.99	25% 2.49	57% 3.12	96% 3.90	108% 4.14	171% 5.39
Day hiking	29%	1.89	19%	38%	59%	78%	94%

Recreation Activity	2001 Participation Rate	2000 # Of People	2010 increase *	2020 increase *	2030 increase *	2040 increase *	2050 increase *
			2.25	2.61	3.01	3.36	3.67
Warm water fishing	31%	1.98	9% 2.16	17% 2.32	24% 2.46	26% 2.49	26% 2.49
Motor boating	26%	1.68	1% 1.70	3% 1.73	6% 1.78	11% 1.86	17% 1.97
View/photograph fish	26%	1.66	15% 1.91	31% 2.17	48% 2.46	66% 2.76	86% 3.09
Developed Camping	24%	1.53	27% 1.94	60% 2.45	98% 3.03	144% 3.73	201% 4.61
Drive off-road	21%	1.36	5% 1.43	10% 1.50	16% 1.58	23% 1.67	34% 1.82
Mountain biking	18%	1.14	12% 3.10	26% 1.44	42% 1.62	61% 1.84	83% 2.09
Primitive camping	13%	0.85	-2% 0.83	0% 0.85	0% 0.85	5% 0.89	0% 0.85
Coldwater fishing	11%	0.70	9% 0.76	17% 0.82	24% 0.87	26% 0.88	26% 0.88
Rafting	11%	0.74	5% 0.78	9% 0.81	16% 0. 86	30% 0.96	51% 1.12
Backpacking	10%	0.63	23% 0.77	57% 0.99	96% 1.23	108% 1.31	171% 1.71
Big Game Hunting	11%	0.69	97% 1.36	93% 1.33	89% 1.30	83% 1.26	76% 1.21
Small-game Hunting	9%	0.55	97% 1.08	93% 1.06	89% 1.04	83% 1.01	76% 0.97
Horseback riding on trails	9%	0.57	9% 0.62	19% 0.68	27% 0.72	30% 0.74	31% 0.75
Canoeing	8%	0.51	5% 0.54	9% 0.56	16% 0.59	30% 0.66	31% 0.67
Kayaking	3%	0.17	5% 0.18	9% 0.19	16% 0.20	30% 0.22	31% 0.22
Migratory bird hunting	2%	0.11	97% 0.22	93% 0.21	89% 0.28	83% 0.20	76% 0.19

Note: Table projections are based on *Outdoor Recreation in American Life, 1999*, with projections converted to a base year of 2001 instead of their original base year of 1995.

RECREATION OPPORTUNITY SPECTRUM (ROS)

Recreation Supply

For planning purposes, recreation supply is defined as the opportunity to participate in a desired recreation activity in a preferred setting to realize desired and expected experiences. Recreationists choose a setting and activity to create a desired experience.

Three components of supply are settings, activities and facilities. (SAA, p.140)

The US Forest Service manages a supply of settings and facilities.

The Recreation Opportunity Spectrum (ROS) is a planning tool used to identify and evaluate the supply of recreation settings on national forests. Five ROS classes have been inventoried or used as a management goal on the National Forests in Alabama.

These settings include Primitive (P), Semi-Primitive Non-Motorized (SPNM), Semi-Primitive Motorized (SPM), Roaded Natural (RN), and Rural (R).

Primitive (P) is the most remote, undeveloped recreation setting on the forest. These settings are generally located at least three miles from any open road and are 5,000 acres in size or larger. The National Forests in Alabama does not have any actual Primitive ROS class areas. All the wilderness areas are assigned Primitive management objective even though they do not meet size requirement for Primitive.

Designated wilderness areas currently range in size from 7,425 to 25,852 acres and do not contain any open roads. With few exceptions, the Wilderness Act prohibits the use of mechanized equipment and motorized transport for recreational use, search and rescue, resource protection, trail construction, and maintenance. Groups of visitors are often limited to a specific size to retain a sense of isolation and solitude.

Semi-Primitive Non-Motorized areas are less remote and can be as small as 2,500 acres in size and only a half-mile or greater from any open road. These settings accommodate dispersed, non-motorized recreation.

Semi-Primitive Motorized areas are less remote and can be as small as 2,500 acres in size and only a half-mile or greater from any open road, but may have primitive roads in the area. These settings accommodate dispersed, motorized recreation.

Roaded Natural (RN) settings are located within a half mile of a road and usually provide development in area such as campgrounds, picnic areas and river access points using rustic, native materials. Remoteness is of little relevance.

Rural settings represent the most developed sites and modified natural settings on the forest such as Clear Creek and Corinth Recreation Areas.

Table 3C-3 Current Distributions of ROS Classes on the National Forests in Alabama

Recreation Opportunity Spectrum (ROS) Class	Current Percentage Of National Forest	Current Inventoried Acres
Primitive (P)	6%	42989
Semi-Primitive Non-Motorized (SPNM)	2%	16590
Semi-Primitive Motorized (SPM)	3%	18903
Roaded Natural (RN)	87%	580802
Rural (R)	1%	5970
Total	100%	665,226 Acres

Note: This table represents current management objectives. Significant amounts of the Primitive, Semi-primitive Non-motorized, and Semi-primitive motorized areas do not provide a true experience due to lack of sufficient contiguous acres.

The Southern Appalachian Assessment Social, Cultural, Economic Technical Report (SAA) states that in the Southern Appalachian region approximately 45% of region is in Rural Setting, 24% in Roaded Natural Setting, 18% in Urban, Suburban, or Transitional Setting, 8% is considered Primitive or Semi-Primitive Setting. This indicates that Primitive and Semi-Primitive are in short supply.

DEVELOPED RECREATION

A developed site is a discrete place containing a concentration of facilities and services used to provide recreation opportunities to the public and evidencing a significant investment in facilities and management under the direction of an administration unit in the National Forest System. Recreation sites are developed within different outdoor settings to facilitate desired recreational use. Developed recreation sites include such facilities as campgrounds, picnic areas, shooting ranges, swimming beaches, visitor centers and historic sites. Developed recreation sites provide different levels of user comfort and convenience based on the assigned ROS setting. Development Levels range from 1 to 5, with Level 1 representing the most primitive, natural settings with minimal or no site amenities. Level 5 represents the highest level of development with fully accessible facilities.

Clear Creek and Corinth Recreation Areas are Level 5 developments. Corinth has water, electric, and sewer at each campsite. The day use section of Corinth has showers at the bath house for the swimming beach and flush toilets for all areas except the boat ramp. Clear Creek has water and electric at each campsite and day use facilities equal to Corinth. Coleman Lake and Open Pond Recreation Areas are examples of Level 4 campgrounds offering paved campsites, electric and water hook-ups and bathhouses.

Campgrounds such as Brushy Lake and Turnipseed with vault toilets, designated campsites and a developed water source are considered to be Level 3. Different levels of development may be present within large campgrounds, however the designated development level represents at least 70% of the facilities of the particular recreation area.

Supply of Developed Recreation Sites

The Forest Service defines the capacity of developed recreation sites in terms of "people at one time" a site can support (PAOTs). Currently, there are 30 developed sites managed by the National Forests in Alabama to accommodate different recreation activities. Tables 3C–4 and 3C-5 illustrate the different types of facilities provided across the forest and their current capacity in PAOTs. See Appendix B for a description of the NVUM process and discussion of recreation visits by Alternatives over time.

Table 3C-4 Current Capacities of Day-Use Developed Areas on NFs in Alabama

Type of Day Use Developed Areas	Total Number of Areas	Total Capacity (PAOT)
Picnic Areas	13	1500
Beaches & Swimming Areas	6	938

Shooting Ranges	7	280
Wildlife Viewing	1	52
Shelters	9	301*
Total Day-Use Capacity	36	3071

*Some shelter PAOTs are shown in Beaches & Swimming Areas, not under shelters.

Table 3C-5 Current Capacities of Overnight-Use Developed Sites on NF in Alabama

Level of Campground	Total Number of Campgrounds	Total Capacity (PAOTs)
Level 3 Campgrounds	8 (2 horse camps)	1277
Level 4 Campgrounds	2	810
Level 5 Campgrounds	2	1212
Total Overnight Capacity	12	3299

Note: Hunter Camps on the Oakmulgee, Shoal Creek (except Big Oak), Talladega, and Tuskegee Ranger Districts are not considered developed sites.

Site rehabilitation is necessary at almost all the Hunter Camps. Problems include soil exposure and substandard visual settings. Interior roads need to be surfaced and parking spots need to be designated. Drainage needs to be accommodated and in some cases vault toilets need to be added.

The public demand for campsites with a development level of 4 or 5 currently exceeds supply on the National Forests in Alabama according to reports presented by Auburn University. As older campgrounds are being reconstructed, electric and water hook-ups are being provided in response to this demand. Consequently, use has increased in updated and upgraded existing campgrounds. Overall PAOTs have not increased, but PAOTS for Level 4 and 5 campground loops have increased while Level 3 sites have decreased.

DISPERSED RECREATION

Dispersed recreation is defined as those activities that occur outside of developed recreation sites such as boating, hunting, fishing, hiking and biking. Every developed recreation site facilitates dispersed use of the forest, but some sites such as trailheads and boat ramps are constructed strictly to provide access for dispersed recreation use.

Table 3C-6 Developed Access Points for Dispersed Recreation on NF in Alabama

Type of Developed Site	Total Number of Sites	Total Capacity (PAOT)
Trailheads	4	130

River Access Points	1	32
Lake Boat Ramps	8	588
Fishing Sites	5	50
Hunter Camps	27	540
Total	45	1340

Table 3C-7 Miles of Non-Motorized Trails on NF in Alabama

Type(s) of Non-Motorized Use Allowed	Existing Miles of Designated Trails
Hike only	167.0
Hike and Bike only	23.4
Hike and Horse only	45.9
Hike, Horse and Wagon only	15.3
Hike, Bike and Horse only	24.9
Total	276.5

Table 3C-8 Miles of Motorized Multiple Use Trails on NF in Alabama

Type(s) of Motorized Use Allowed	Existing Miles of Designated Trails
Motorcycle and ATV*	39.6
Total	39.6

*Mountain Bikes and Hikers are permitted on the 23.3 miles of the Kentuck System and Mountain Bikes, Horses, and Hikers are permitted on the 16.3 miles of the Flint Creek System.

Table 3C-9 Acres of Current Fish and Wildlife Habitat Emphasis Areas

Type of Fish & Wildlife Habitat Emphasis	Unit of Measure
Wildlife Management Areas	241,820 Acres
Stocked (Put & Take) Reservoirs (less Lake Smith)	768 Acres
Lake Lewis Smith	2,838
Total	245,426 Acres

Does not include Lake Lewis Smith, which is managed by others.

Demand exists for additional hiking, horse, and OHV trails. Demand probably exists or will exist for additional mountain bike trails. Funding to extend the Pinhoti Hiking Trail for approximately 21 miles on it's south end is fairly certain. The primary limitation to adding miles to the existing, or building new, horse, mountain bike, and OHV trail systems is the adequacy of the trails and associated facilities maintenance and construction budgets. Maintenance budgets must be adequate to annually maintain trails to standard. Environmental conditions also affect trail construction and maintenance, and environmental consequences must be mitigated before opening any new trails. There are scattered pockets of illegal off-trail OHV and horse use throughout the Forest.

ENVIRONMENTAL CONSEQUENCES

Existing recreation demand is expected to grow for a variety of activities including dispersed and developed recreation (See Table 3C-2). Existing use on National Forest will increase as recreation demand and population grows over the next ten years.

General themes were developed for Alternatives A, B, D, E, G and I that emphasize different resource management objectives. Alternative F is the current management alternative and will provide the baseline for evaluating other alternatives. Each alternative theme and its allocation of prescription areas provide the parameters for redefining the current distribution of the Recreation Opportunity Spectrum. Road management direction and the emphasis placed on recreational use, either dispersed or developed, were major factors in determining the effects of each alternative to recreation.

National Forest management could affect recreation by constructing or removing recreation facilities and improvements; changing their development level; restricting, prohibiting or encouraging use; altering the land to make it suitable or unsuitable for use; and changing the landscape setting. Evaluation of potential recreation effects requires that these elements be considered: activities, setting, and experiences.

Refer to other sections of the DEIS for additional recreation environmental consequences related Scenery, Wild & Scenic Rivers, Wilderness, Roadless Areas, Special Areas and Heritage resources. Estimates of recreation visits can be found in Appendix B.

ROS

Table 3C-10 Estimated Distributions of ROS Classes by Alternative

ROS Class	ALT A	ALT B	ALT D	ALT E	ALT F* (ACRES)	ALT G	ALT I
P (1A&1B)	54,508 8%	48,387 7%	43,943 7%	54,907 8%	42,989 6%	56,531 8%	43,529 7%
SPNM	0	0	0	4801 1%	16590 2%	0	4801 1%
SPM	19834 3%	19834 3%	19834 3%	30430 5%	18903 3%	19834 3%	36908 6%
RN	584714 88%	591036 89%	595480 90%	569146 86%	580802 87%	582891 88%	572444 86%
R	6170	5969	5969	5942	5942	5970	7544

	1%	1%	1%	1%	1%	1%	1%
Total	665,226	665,226	665,226	665,226	665,226	665,226	665,226

* Baseline = Alternative F, Existing ROS Inventory (Table 3C-3)

Table 3C-10 displays Estimated Distribution of acres and corresponding percentages of ROS Classes by Alternative. These acres and percentages represent management objectives, not a true inventory of ROS available. For example, primitive ROS does not exist in Alabama because no single area is large enough to meet all the criteria. Some of the primitive areas do meet semi-primitive non-motorized, but areas proposed or being managed for semi-primitive experiences do not always provide semi-primitive experiences. All the Alternatives contain a variety of recreation opportunity spectrum objectives from the most primitive to the more developed. However, several alternatives do not have any areas, which will be managed for a semi-primitive non-motorized setting. The alternatives that have the most P, SPNM, and SPM acres provide slightly better settings for those seeking a more remote experience and slightly less positive for those seeking a more developed experience.

Any road closures or decommissioning would most likely occur in the remote backcountry management prescriptions. This would help increase the remote settings desired by some visitors. Road closure often reduces wildlife poaching and litter.

The modest increase in the primitive ROS class across all the active alternatives is due to various levels of proposed increases to the national wilderness system.

Developed Recreation

Table 3C-11 Estimated Increase in Capacity of Developed Recreation Areas by Alternative

Type of Development	ALT A	ALT B	ALT D	ALT E	ALT F* (PAOT)	ALT G	ALT I
Day-Use Areas	low	low	low	low	3071	low	low
Level 3 Campground	low	low	low	low	1277	low	low
Level 4 Campground	low	low	low	low	810	low	low
Level 4 Campground	low	low	low	low	1212	low	low
Total	low	low	low	low	6370	low	low

*Baseline = Alternative F, Existing Developed Recreation PAOTs (Table 3C-4 & 3C-5)
Low Increase = < 5% increase in existing PAOTs
Moderate Increase = 6-25% increase in existing PAOTs
High Increase = > 26% increase in existing PAOTs
Decrease = any net loss of existing PAOTs

Table 3C-11 displays allocation of capacity in terms of People At One Time (PAOT) by alternative to existing Developed capacity. All of the alternatives anticipate little change in the amount and capacity of developed recreation sites on the forest, but every alternative emphasizes changes to upgrade the accessibility of existing sites, which are considered high priority improvements. Development levels may be improved on some sites but these changes will be driven by demand and budget, not the selected alternative. Alternative A includes an additional campground to serve the Kentuck ORV Area, otherwise no new concentrated recreation zones (developed sites) are proposed. The increase of PAOT's would be minimal. There will be a greater satisfaction in every alternative for users of all abilities as more sites become accessible. However, with limited capacity increase, some sites that will be increasing overused and crowded at peak times such as holidays and weekends and may lower visitor satisfaction for some visitors. Use will reach capacity more often over time and some visitors will have unmet expectations. Alternative I increases the size of the Brook Hines Lake Developed Recreation Area which will improve the setting and allow for expansion at this facility.

Some activities/actions will effect developed recreation and effects will depend on the proximity and magnitude of the activity. These activities include construction, reconstruction and maintenance of roads and trails, vegetation management (including thinning, conversion, regeneration, insect and disease contrail, prescribed burning and pesticide use) and mineral exploration. Some activities have short term effects such as prescribed burning or pesticide use that decrease the satisfaction of the visitors in the area for a short time. Other activities such as road construction or insect and disease control may influence satisfaction on a long-term basis. Other natural causes such as wildfires or tornadoes can greatly affect developed recreation areas long-term or permanently.

The Allocation of lands to Wilderness will affect all mechanical and motorized transport forms of recreation, such as mountain bike riding according to Wilderness Act of 1964.. Table 17,in Wilderness and Roadless Areas section, displays the current allocation of acres to Wilderness. Table 20, same section, points out the roadless areas recommended for wilderness by alternative.

The designation of eligible is not expected to significantly increase public use of Five Runs or Cahaba River. However, if either river was added to the Wild and Scenic Rivers System, increased public interest would result in more river use for canoeing, camping, and fishing. Overuse could harm fragile aspects of their ecosysetm. Table 46, in the National Wild and Scenic Rivers section, displays allocation of acres by alternative to Wild and Scenic prescriptions.

Open Pond Campground, Warden Station Horse Camp, and Owl Creek Horse Camp are regularly over their design capacity on certain weekends and holidays. Hotspots of use for developed recreation will continue to be more and more crowded over time as use continues at these popular places.

Dispersed Recreation

Table 3C-12: Estimated Percent Increase in Non-Motorized Trails by Alternative

Type of Trail	ALT A	ALT B	ALT D	ALT E	ALT F*	ALT G	ALT I

Hike only	mod	mod	mod	mod	167.0	mod	mod
Hike and Bike only	low	low	low	low	23.4	low	low
Hike and Horse only	low	low	low	low	45.9	low	low
Hike, Horse and Wagon only	low	low	low	low	15.3	low	low
Hike, Bike and Horse only	low	low	low	low	24.9	low	low
Total	low	low	low	low	276.5	low	low

*Baseline = Alternative F, Existing Miles of Trail
Low increase = < 5% increase of existing miles of trail (less than 35 miles of new trail)
Moderate increase = 6-25% increase of existing miles of trail
High increase = > 50% increase of existing miles of trail
Highest increase = alternative with the highest increase in existing miles of trail
Decrease = any net loss of existing trail

Table 3C-13: Percent Increase of Designated OHV Areas by Alternative

Type of Motorized Use	ALT A	ALT B	ALT D	ALT E	ALT F	ALT G	ALT I
7C Designated OHV Area	low	low	low	low	39.6	low	low

Table 3C-14: Percent of Estimated Change in Motorized Trails by Alternative

Type(s) of Motorized Use Allowed	ALT A	ALT B	ALT D	ALT E	ALT F	ALT G	ALT I
Motorcycle and ATV only	low	low	low	low	39.6	low	low
Total	low	low	low	low	39.6	low	low

Table. 3C-15: Acres of Off-Highway Vehicle Use Areas (7.C. Prescription) by Alternative

Type of Motorized Use	ALT A	ALT B	ALT D	ALT E	ALT F	ALT G	ALT I
ATV and Motorcycles	4,685	4,685	4,685	4,685	4,121	4,685	4,685

Kentuck OHV and Flint Creek OHV systems both contain some opportunities for additional trails. Significant amounts of acres have been allocated to prescriptions in every alternative that allows construction of new trails to be considered. Budget and resource protection are the key limiting factors to growth. Additional OHV trail riding opportunity will increase noise disturbance and may lessen the recreation experience of other recreation participants such as hikers, hunters, fishermen, campers, and those seeking solitude.

None of the Alternatives necessarily increases trail systems, including hiking, mountain biking, horseback riding, OHV and interpretive trails. Variation among the alternatives occurs from how management prescriptions are applied. This creates variation because different prescriptions create different settings. Alternative E provides the best collection of all-round recreation settings. Different visitors tend to prefer different settings for their particular type of recreation. Alternative G provides more quality settings for those seeking primitive experiences, while alternatives such as A, B, and D provide larger amounts of quality hunting habitat. Alternative I provides a good compromise between general recreation and restoration values. Access points (trailheads, parking lots for GFA users , boat ramps) are similar to trails in that budgets and demand, not alternatives, will govern their number. Since demand exists, and budget increases are theoretically possible, increases in forest access points and trails need to be considered. Increases in dispersed recreation access points may include greater user satisfaction for some users, higher use for trails and easer access to different parts of the forest for some users. Some users may experience user conflicts on increased trails. Increases in the trail system will also have effects of more litter, safety concerns, law enforcement needs. Interpretive trails and locations enhance experiences for most visitors. Also, by sharing information about ecosystems, history and resource management through interpretation, better informed visitors often result in good partners in management. Tables 3C-12, 3C-13, and 3C-14 displays the allocation by alternative to the various types of trails.

Table 3C-16 Estimated Total Acres of Big & Small Game Emphasis Areas by Alternative

TYPE OF GAME Habitat	ALTERNATIVES A	B	D	E	F	G	I
FAVORABLE Habitat	547,749 82%	559,017 84%	598,829 90%	524,391 79%	569,390 86%	406,671 61%	545059 82%
EARLY SUCCESSION Habitat*	0	0	0	188,180 28%	0	55,142 8%	0
LESS MANAGED HABITAT	117,477 18%	106,209 16%	66,397 10%	140,835 21%	95,836 14%	258,555 39%	120,167 18%
TOTAL	665,226	665,226	665,226	665,226	665,226	665,226	665,226

*Subset of favorable habitat. Percentages represent percent of entire National Forest land.

Note: Favorable Habitat includes management prescriptions: 7E2, 8B, 8D, 9s, and 10s.

Early Successional Habitat includes management prescription 8B. Early successional habitat emphasis does not mean every acre is providing early successional habitat. Less Managed Habitat includes the remainder of the prescriptions.

Alternatives that allocate additional acres to Big & Small Game Emphasis Areas will increase the hunting and wildlife viewing experiences. Table 3C-16 displays the allocation by acres by alternative to Big & Small Game Emphasis Areas. The quantity of stocked (put and take) reservoirs is not expected to change over alternatives.

Alternative E provides the most early succession emphasis areas and Alternative D provides the most acres of favorable habitat. This type of management will favor wildlife and will tend to increase hunting opportunities and non-consumptive wildlife viewing. All the alternative provide significant amounts of favorable wildlife habitat as demonstrated in Table 3C-16. Some specific areas on the forest will not be managed for game species that were in the past; this will affect hunters more negatively by decreasing the places or the success ratio. Some areas will be managed differently than in the past and hunter satisfaction may increase in those areas. Maximizing potential hunting or wildlife viewing decreases the satisfaction of some visitors, especially some trail users. Hunting brings on safety concerns for some while the vegetative management necessary for maximizing wildlife is aesthetically objectable to others.

1.2 WILDERNESS AND ROADLESS AREAS

1.2.1 AFFECTED ENVIRONMENT

Wilderness

Congressionally designated wilderness areas are protected by law and valued for their ecological, historical, scientific and experiential resources.

National Forests in Alabama currently have 3 designated wilderness areas containing a total of 42,211 acres or 6 percent of the total forest area. The National Forests in Alabama do not contain any wilderness study areas or recommended wilderness study areas that have not been acted upon by Congress. The existing wilderness areas will be managed to maintain the areas' natural characteristics. Natural occurrences such as outbreaks of insects or disease are allowed as part of the natural cycle. Man caused intrusions are not allowed. Under emergency conditions, mechanical equipment and motorized transport may be approved for use to control fire which threatens life, property, or the wilderness resource. The wilderness act, with few exceptions, prohibits the use of mechanized equipment and motorized transport for recreational use, search and rescue, resource protection, trail construction, and maintenance.

Table 3C-17 Existing Designated Wilderness Areas

Wilderness Area	Ranger District	Acres
CHEAHA	Talladega	7,425
DUGGER	Shoal Creek	8,934
SIPSEY	Bankhead	25,852
Total		42,211

Roadless

The first step in the evaluation of potential wilderness is to identify and inventory all roadless, undeveloped areas that satisfy the definition of wilderness found in Section 2 (c) of the 1964 Wilderness Act (FSH 1909.12, Chpt. 7, item 7.1). Roadless areas are places that have retained or are regaining a natural, untrammeled appearance; any signs of prior human activity are disappearing or being muted by natural forces. Criteria provide for an individual roadless area to include no more than one half mile of improved road for each 1,000 acres.

In the forest planning process, National Forests are required to assess roadless areas on a forest (Chapter 7 of FSH 1909.12). A new roadless inventory was conducted as a part of the Southern Appalachian Assessment with additional guidelines developed by the SAA team and the Southern Regional Office of the Forest Service to facilitate consistent application of the process.

All the RARE II areas deemed suitable for further wilderness study in the 1983 Reevaluation were analyzed in the 1986 Plan. The areas were classified into Management Area 2, Wilderness Study; Management Area 3, Wild and Scenic River; Management Area 4, Research Natural Area; Management Area 6, Semi-primitive; and Management Area 16, General Forest Area. Disposition of the RARE II areas is shown in Table 3C-18. Areas in wilderness and the wild sections of the Sipsey Fork, West Fork River are managed as a primitive ROS class although the areas are generally not large enough to provide a true primitive setting. Areas in the semi-primitive management areas are managed as semi-primitive non-motorized settings. The research natural area is managed for semi-primitive motorized, however due to its limited area roaded natural is the actual setting. The GFA provides roaded natural settings. Oakey Mountain was added for roadless analysis after being recommended by the public. Cheaha B was added for roadless analysis after acquisition.

All of the listed areas were considered for inventoried roadless status, even those deemed unsuitable for further wilderness study in the 1983 reevaluation. The areas labeled "No" in the Current Inventoried Roadless Area column are no longer being considered for roadless status. None of these areas met the roadless criteria.

Table 3C-18 RARE II Area Disposition

Area	RARE II 1979 FEIS Status	RARE II 1983 Reevaluation	1986 PLAN and REVISIONS	Current Inventoried Roadless Area (SAA)
Bankhead Ranger District, Bankhead National Forest				
Sipsey Addition	W	Suitable	WS>Sipsey Wilderness	Wilderness
Thompson Creek*	FP	Suitable	WS> Sipsey Wilderness & wild river	Wilderness
			Semi-primitive	No
Hagood Creek*	FP	Suitable	WS> Sipsey Wilderness & wild river	Wilderness
			Semi-primitive	No
Borden Creek	W	Suitable	WS>Sipsey Wilderness	Wilderness
Montgomery-Borden Creek	FP	Suitable	Semi-primitive & scenic river	No
Brushy Fork	FP	Suitable	GFA	No
Rabbittown Addion	FP	Suitable	GFA	No
Conecuh Ranger District, Conecuh National Forest				
Big Bay	NW	Unsuitable	GFA	No
Oakmulgee Ranger District, Talladega National Forest				
Reed Brake	W	Suitable	Research Natural Area	YES
West Elliots Creek	FP	Suitable	GFA	No

Area	RARE II 1979 FEIS Status	RARE II 1983 Reevaluation	1986 PLAN and REVISIONS	Current Inventoried Roadless Area (SAA)
Big Sandy	FP	Suitable	GFA	No
Perry Mountain	NW	Unsuitable	GFA	No
Talladega Division, Talladega National Forest				
Dugger Mountain	NW	Suitable	WS>Dugger Mountain Wilderness	Wilderness
Blue Mountain	NW	Suitable	Semi-primitive	YES
Shinebone Creek	FP	Cheaha Designation	Cheaha Wilderness	Wilderness
Shinebone Creek (Cheaha B)*	FP	Suitable	GFA	YES
Adams Gap	FP	Cheaha Designation	Cheaha Wilderness	Wilderness
Oakey Mountain	n.a.	n.a.	GFA	YES
Cheaha A	n.a.	n.a.	n.a.	YES
Tuskegee Ranger District, Tuskegee National Forest				
Choctafaula	NW	Unsuitable	GFA	No

*Thompson Creek and Hagood Creek areas were allocated to wilderness, wild segments of wild and scenic rivers, and semi-primitive management.
*Cheaha B is the section of the Shinebone Creek RARE II Area not previously allocated to the Cheaha Wilderness.

Table Legend:
W= Proposed Wilderness.
NW= Non-wilderness
FP= Further Planning
n.a.= not applicable at the time
Oakey was not in the RARE II inventory and Cheaha A was acquired after 1986.
Suitable= areas suitable for further wilderness study
Unsuitable= areas unsuitable for further wilderness study
WS= Wilderness study
GFA= General Forest Area
YES= Included in roadless inventory
No= Not included in roadless inventory

For each roadless area labeled “YES”, a report was prepared that evaluates its wilderness potential. These reports are found in Appendix C and are in accord with 36 CFR 219.17. The evaluation reports consider wilderness potential in three main categories: 1) capability - the qualities that make a roadless area suitable or not suitable for wilderness; 2) availability - an assessment of the non-wilderness resources and demand of the area; and, 3) need - a consideration of the amount of wilderness already in the area and region.

The National Forests in Alabama currently has 5 inventoried roadless areas, totaling approximately 12,437 acres that could be recommended for wilderness study.

Outdoor recreation is one of the benefactors of wilderness and is one of the drivers of wilderness demand and wilderness management. According to trend data collected from

1965 to 1994, the trend in recreation visits to National Forest Wilderness has paralleled designations and increased over time. In the Southeast, participation rates and trends in wilderness indicate a continued increase in visitation to wilderness with an estimated 7,860,000 visits to wilderness by the year 2050 (see Table 3C-2 in Developed and Dispersed Recreation discussion).

In addition to outdoor recreation in wilderness, there is a non-user component that values American wilderness and is important to understand when analyzing wilderness and roadless allocations. Wilderness is valued for preserving representative natural ecosystems and local landscapes. The very existence of wilderness is valued by the American public as part of the natural heritage of the country. The National Survey on Recreation and the Environment, 2000, found that 69.8% of those surveyed agreed or strongly agreed to the question, "How do you feel about designating more federal lands in your state as wilderness?" Over 96 percent agreed or strongly agreed with the statement, " I enjoy knowing that future generations will be able to visit and experience wilderness areas."

Monitoring shows certain areas of the Sipsey and Cheaha Wildernesses are overused. The result is small pockets of trampled, compacted sites that do not exhibit an untrammeled appearance. NVUM data indicate a 171% increase in use between 2000 and 2050; therefore, it will be necessary to disperse wilderness use if wilderness objectives are to be meet. Dugger Mountain Wilderness is too new for use trends to be evident.

A list of the roadless areas and approximate acreages is displayed in Table 3C-19.

Table 3C-19

Roadless Area	Ranger District	Acres
REED BRAKE	Oakmulgee	602
OAKEY MOUNTAIN	Shoal Creek	6,080
BLUE MOUNTAIN	Shoal Creek	3,558
BLUE MOUNTAIN	Talladega	1,243
CHEAHA A	Talladega	236
CHEAHA B	Talladega	718
Total		12,437

ENVIRONMENTAL CONSEQUENCES

Wilderness

Wilderness has many positive effects. As stated above, wilderness preserves natural systems and provides places of solitude for visitors. However, there are environmental effects within wilderness from many sources. Recreational use can have negative impacts to the quality, character and integrity of the wilderness resource due to overuse. Some of these negative impacts include soil compaction; vegetation loss, disturbance and/or replacement by non-native species such as noxious weeds on trails and campsites caused by heavy recreation use; crowding and loss of solitude; deterioration of water quality from improper disposal of human waste and waste water; and loss of or threats to biological/ecological processes and biodiversity, through human disturbance.

Other environmental effects which impact the integrity of the natural systems in wilderness include air pollution from outside sources, interruption of natural functioning ecosystems by fire suppression, and threats to native plant species from the spread of noxious weeds from sources outside wilderness.

No significant new management direction is being proposed for any of the existing designated wilderness areas on the forest under any of the alternatives so there are no significant direct, indirect, or cumulative effects to the existing wilderness resource. Expansion to the Cheaha Wilderness is proposed by allocating adjacent lands to wilderness study areas. Under direction of all alternatives naturally ignited fire could be allowed to burn in wilderness provided the wildfire is in accordance with a previously approved fire plan.

Roadless

Both the decision to designate wilderness study areas and the decision not to designate wilderness study areas have environmental consequences. The magnitude of the effects varies by alternative depending upon the number of roadless areas assigned.

Three categories are used to summarize how each roadless area is allocated in the alternatives. These categories are Recommended Wilderness Study, Roadless Areas Maintaining Roadless Characteristics, and Roadless Areas Not Maintaining Roadless Characteristics. Table 3C-20 summarizes all roadless area allocations by category across the alternatives.

Table 3C-20 Prescriptions Applied by Alternative

Roadless Area	District	A	B	D	E	F	G	I
REED BRAKE	Oakmulgee	**4.B.1**	**4.B.1**	**4.B.1**	**4.B.1**	**4.B.1**	**4.B.1**	**4.B.1**
OAKEY MOUNTAIN	Shoal Creek	**1.B**	**7.B**	10.A	**12.A**	10.A	**1.B**	**12.A**
BLUE MOUNTAIN	Shoal Creek/Talladega	**1.B**	**1.B**	10.B	**12.B**	**12.B**	**1.B**	**12.B**
CHEAHA A	Talladega	**1.B**	**1.B**	**1.B**	**1.B**	10.A	**1.B**	**1.B**
CHEAHA B West Section 42%	Talladega	**1.B**	**1.B**	**1.B**	**1.B**	10.A	**1.B**	**1.B**
CHEAHA B East Section 58%	Talladega	**1.B**	**1.B**	**1.B**	**1.B**	10.A	**1.B**	**7.E.2**

Prescriptions retaining roadless characteristics are in bold.
Blue Mountain 12.B prescriptions will be encroached by the Talladega Scenic Drive Corridor (7.A).
1.B is recommended wilderness study areas.

Recommended Wilderness Study (1.B): Designation as wilderness study areas would preserve additional areas which would be managed to allow natural processes to occur, provide areas for solitude and primitive recreation, and minimize the impacts of man and his activities on the land. These areas would be islands within the forest where the naturalness, uniqueness, and representative ecosystems of the designated areas will be maintained. The highest priority for management would be to manage for the naturalness of the area.

Roadless areas recommended for wilderness study are set aside for future designation as wilderness and are not available for activities such as vegetative management or road construction. These areas are managed much the same as designated wilderness until a final determination is made by Congress as to whether they will be added to the National Wilderness Preservation system. Roadless areas recommended for wilderness study are displayed in Table 3C-20. Table 3C-22 displays the ecosystems represented currently by designated wilderness on the forest as well as those which would potentially be added after wilderness studies are completed.

The Thompson Creek area of the Bankhead Ranger District and the Rebecca (Horn) Mountain area of the Talladega Ranger District are two places recommended by citizens to be considered for wilderness study but do not meet the roadless criteria. Both these areas were allocated to recommended wilderness study in Alternative E.

Table 3C-21 Numbers of Areas & Acres Allocated to Recommended Wilderness Study (1.B) by Alternative

	A	B	D	E	F	G	I
Number of Areas	4	3	2	4*	0	5**	2
Acres	11,519	5,398	954	11,918*	0	13,542**	540

* Includes non-roadless area properties: the proposed Rebecca Mountain Wilderness (Talladega Ranger District) and Thompson Creek addition to Sipsey Wilderness (Bankhead Ranger District).

** Includes non-roadless area properties: the proposed Dugger Mt. expansion (Shoal Creek Ranger District).

Table 3C-22 Ecosystems represented by Wilderness or Wilderness Study areas by Alternative

	Alternatives (by number of areas)													
	A		B		D		E		F		G		I	
Section; Subsection names	w	ws	w	ws	w	ws	w	ws	w	ws	w	ws	w	ws
Southern Cumberland Plateau Section; Sandstone Mountain Subsection	1	0	1	0	1	0	1	1	1	0	1	0	1	0
Southern Ridge and Valley Section; Quartzite and Talladega Slate Ridge Subsection	1	2	1	2	1	1	1	1	1	0	1	2	1	1

	Alternatives (by number of areas)													
	A		B		D		E		F		G		I	
Section; Subsection names	W	WS	W	WS	W	WS	W	WS	W	WS	W	WS	W	WS
Southern Ridge and Valley Section; Sandstone, Shale, and Chert Ridge Subsection	1	2	1	1	1	1	1	2	1	0	1	2	1	1
Total	3	4	3	3	3	2	3	2	3	0	3	3	3	2

W=Wilderness
WS=Wilderness Study Areas

Direct effects of managing wilderness study areas include maintaining soil, hydrologic and atmospheric conditions prevailing within the areas. Roads will be closed and rehabilitated or allowed to return to natural state. Water quality and air quality should remain high and the imprint of man's influence will not increase or will diminish over time.

Opportunities for solitude and remoteness will increase as will the opportunity for primitive and unconfined recreation due to road closures and prohibiting motorized use. Non-motorized dispersed recreation activities such as hiking, horseback riding, camping, fishing, and hunting would continue and use levels would be expected to remain about the same as currently takes place. Visual and experiential contrasts between roadless areas and other timbered lands will increase. Additional acreage for wilderness study will increase the carrying capacity and allow for user impacts to be dispersed across a larger area providing an increase in wilderness visitor satisfaction. However, road closures will result in decreased access for some activities. A decrease in opportunities for bicycling and other forms of recreation requiring motorized transport or mechanized equipment will result (Table 3C-23). Bicycle and motorized use would be displaced to other areas.

A wilderness study designation would require maintenance of the Pinhoti National Recreation Trail would be done using hand tools only and access would be made using non- mechanized/non-motorized means. Trail blazes, under current policy, would not be maintained. The minor amount of developed recreation use and other use associated with motor vehicles currently taking place in these areas would cease. Approximately 3 miles of the Cheaha Oxford Road would be closed to potential bicycle use under alternatives A, B, and G. The Blue Mountain Shelter would need to be relocated under those alternatives as well.

Table 3C-23: Miles of trails to be closed to bicycles and OHVs by alternative under prescription 1.B.

	Alternatives						
	A	B	D	E	F	G	I
Bicycles	3	3	0	0	0	3	0
OHVs	0	0	0	0	0	0	0
Total	3	3	0	0	0	3	0

Research indicates there will be an increase in visitation and an increase in economic benefits resulting from tourism in the surrounding local communities. However, there will also be a reduction in economic benefits associated with the management, harvesting, manufacturing and retail sale of timber products from the roadless areas since timber management activities would not be allowed in these areas. There will be reduced opportunities to recover commercial minerals and mineral exploration and development will be hindered. Little or no mineral development or its associated impacts would be expected under this alternative.

Inventory data indicates privately owned, outstanding or reserved mineral rights underlying Federal surface ownership occur on portions of Blue Mountain Roadless Area, Oakey Mountain Roadless Area, Thompson Creek, and Rebecca Mountain which have been allocated to recommended wilderness study in some alternatives. Thus a request for access to that interest would be recognized and reasonable access granted. However, these areas were not recommended for wilderness study in Alternative I. There is no known existing Federal oil or gas leases or other Federal mineral leases in effect in either Cheaha A or Cheaha B Roadless Areas. All of Cheaha A and part of Cheaha B have been allocated to recommended wilderness study in Alternative I.

Educational opportunities for the scientific study of natural ecological processes will increase.

The naturalness, uniqueness, and representative ecosystems of the designated areas will be maintained. Natural ecological processes will continue including plant succession. Larger blocks of undeveloped land and reduction in open road density in areas recommended for wilderness study will favor area sensitive and disturbance sensitive species. Existing old fields, wildlife openings and other habitat improvements for fish and wildlife would not be maintained in prescriptions areas recommended for wilderness study. These early successional habitat areas will succeed to forest. New permanent wildlife openings are not created. These factors will reduce habitat for early successional species. Fish stocking in areas recommended for wilderness study would be restricted to reestablishment or maintenance of indigenous, threatened, endangered, or sensitive species with Forest Supervisor authorization. Rare communities and threatened and endangered species would be managed within the limitation of activities allowed within wilderness study areas.

Fire management may be effected by designation of additional wilderness areas. Fire suppression of all human-caused wildfires would minimize the potential effects on wilderness values, however fires in these areas would likely become larger than they would under current management because of the restrictions on motorized equipment such as dozers. Under emergency situations, mechanized equipment and motorized transport, use of helicopters, air tankers, and other aircraft may be approved by Forest Supervisors and/or Regional Forester. These actions would impact wilderness character and visitor experiences and leave evidence of man, although rehabilitation could help to reduce those impacts afterward.

Lightning ignited fires, if allowed to burn, enhance the natural systems that are fire dependent. It would benefit recreation by opening up the forest, reducing fuel loading to acceptable levels, and maintaining the vegetation. There would be a short-term negative impact to air quality, visual aesthetics and possibly water quality.

Management ignited fires to reduce hazardous fuels can have negative results in wilderness through changes in vegetation types, impacts to wilderness visitors and experiences, water quality and habitat within wilderness. It can however benefit the wilderness by reducing fuel loadings to acceptable levels such that naturally ignited fires may be returned to the wilderness or wilderness study area. Fire prevention strategies applied in the urban interface area on private land can reduce the need for management-ignited fires.

Additional effects to wilderness study areas are similar to those found in wilderness such as soil compaction; vegetation loss or disturbance, non-native species, crowding and loss of solitude, deterioration of water quality from improper disposal of human waste and waste water; and loss of or threats to biological/ecological processes and biodiversity, through human disturbance.

Roadless Areas Maintaining Roadless Character

Areas identified as Roadless Areas Maintaining Roadless character will be assigned to prescriptions, which would manage in ways very similar to and have an overall effect similar to those in Wilderness or Wilderness Study. The management of these areas will strive to protect the natural process and minimize the impact of humans. No active timber management or permanent road construction is prescribed in any of the alternatives for these areas. However, sights and sounds of man's activities would increase under these prescriptions and some opportunity for solitude would be diminished due to a broader range of activities under the various prescriptions. Some recreation facilities may be constructed to enhance the visitor's experience. Recreation may include motorized trails and bicycle trails and be at a higher density than wilderness study areas. Management ignited fire would be used to maintain fuel loadings and mechanized equipment and motorized vehicles would be used. Prescriptions assigned for these areas in various alternatives that prohibit permanent road construction, timber harvest, or surface occupancy for minerals development are 4.B.1, Research Natural Area; 7.B, Sensitive Viewshed; 12A, Remote Backcountry Recreation – Few Open Roads; and 12B, Remote Backcountry Recreation – Nonmotorized. These prescriptions will preserve roadless values.

Roadless Areas Not Maintaining Roadless Character: In this category, areas are made available for management allocations involving road construction and/or timber harvest. This means that changes are allowed that can make an area no longer suitable for wilderness designation or may no longer provide primitive or semi-primitive settings. Prescription allocations in this category do not necessarily commit an area to development. Before a decision is made to build road or harvest timber in a roadless area, a site-specific analysis must be conducted.

The roadless character in many of these areas may be diminished over time. The naturalness of these undesignated areas will be reduced by the interruption of natural ecological processes. Vegetation composition and structure will be manipulated resulting in a greater diversity of age-classes among forest types. Opportunities for solitude and remoteness would decrease. Sights and sounds of man's activities will be more obvious. Additional roads and trails may be constructed. Noise levels and soil erosion will increase and air and water quality may decrease but water quality will meet State and Federal standards.

Roadless Area Conservation Rule

On January 12, 2001, the Forest Service issued the Final Rule for Roadless Area Conservation in the Federal Register. Since that time, numerous legal challenges have been made to this decision, including a ruling on July 14, 2003 from the United States District Court, Wyoming District, where Judge Clarence Brimmer found the Roadless Area Conservation Rule to be in violation of the National Environmental Policy Act (NEPA) and the Wilderness Act, and enjoined its implementation. However, this issue is from settled. Appeals of the Wyoming District Court decision, other litigation, new rulemaking, or new FSM directives could result in a change in direction for inventoried roadless areas.

The Roadless Area Conservation Rule (Roadless Rule) would place restrictions on the road construction and reconstruction activities, and the timber cutting, sale, or removal activities that could occur in inventoried roadless areas. 36 CFR 294.12 and 294.13 identify the exceptions where road construction/reconstruction activities and timber cutting/removal activities would be allowed.

In this EIS, the inventoried roadless areas were evaluated for possible wilderness study area recommendations. If areas were not recommended for wilderness study designation, other land allocations were considered for these areas, depending upon the overall emphasis of each plan alternative. In some alternatives, a particular roadless area's characteristics would be maintained, while in other alternatives, the area's roadless characteristics could be altered. The following describes by alternative, what would happen to these land allocations should the Roadless Area Conservation Rule restrictions go into effect.

Alternative A

Under this alternative, 100% of the acres in the inventoried roadless areas are either recommended for wilderness study designation or are allocated to management prescriptions that would maintain the area's roadless characteristics. Any activities within these areas would be consistent with the Roadless Rule. Five percent of the acres in the inventoried roadless areas are allocated to management prescriptions Research Natural Area (4.B.1). Within this allocation, a minimum level of and timber harvesting activities would be conducted for the purposes of RCW habitat management These activities would still be consistent with the Roadless Rule exceptions.

Alternative B

Under this alternative, 100% of the acres in the inventoried roadless areas are either recommended for wilderness study designation or are allocated to management prescriptions that would maintain the area's roadless characteristics. Any activities within these areas would be consistent with the Roadless Rule. Fifty-four percent of the acres in the inventoried roadless areas are allocated to management prescriptions Research Natural Area (4.B.1) and Scenic Corridor (7.B). Within these allocations, a minimum level of road building and timber harvesting activities would be conducted for the purposes of RCW habitat management, forest health and viewshed management. These activities would still be consistent with the Roadless Rule exceptions.

Alternative D

Under this alternative, 13% of the acres in the inventoried roadless areas are either recommended for wilderness study designation or are allocated to management prescriptions that would maintain the area's roadless characteristics. Any activities within these areas would be consistent with the Roadless Rule. Five percent of the acres in the inventoried roadless areas are allocated to management prescriptions Research Natural Area (4.B.1). Within these allocations, a minimum level of road building and timber harvesting activities would be conducted for the purposes of RCW habitat management. These activities would still be consistent with the Roadless Rule exceptions. Of the remaining acres in the inventoried roadless areas, 82% are allocated to management prescriptions substained yield timber management (10.A) and high quality forest products (10.B). Within these allocations, road building and timber harvesting activities would be conducted for the purposes of timber production and forest health. These activities would not be consistent with the Roadless Rule exceptions and would therefore be foregone with the Roadless Rule in effect.

Alternative E

Under this alternative, 100% of the acres in the inventoried roadless areas are either recommended for wilderness study designation or are allocated to management prescriptions that would maintain the area's roadless characteristics. Any activities within these areas would be consistent with the Roadless Rule. Five percent of the acres in the inventoried roadless areas are allocated to management prescriptions Research Natural Area (4.B.1). Within these allocations, a minimum level of road building and timber harvesting activities would be conducted for the purposes of RCW habitat improvement. These activities would still be consistent with the Roadless Rule exceptions.

Alternative F

Under this alternative, 43% of the acres in the inventoried roadless areas are either recommended for wilderness study designation or are allocated to management prescriptions that would maintain the area's roadless characteristics. Any activities within these areas would be consistent with the Roadless Rule. Forty-three percent of the acres in the inventoried roadless areas are allocated to management prescriptions Research Natural Area (4.B.1). Within these allocations, a minimum level of road building and timber harvesting activities would be conducted for the purposes of RCW habitat management. These activities would still be consistent with the Roadless Rule exceptions. Of the remaining acres in the inventoried roadless areas, 57% are allocated to management prescriptions sustained yield timber management (10.A). Within these allocations, road building and timber harvesting activities would be conducted for the purposes of timber production and forest health. These activities would not be consistent with the Roadless Rule exceptions and would therefore be foregone with the Roadless Rule in effect.

Alternative G

Under this alternative, 100% of the acres in the inventoried roadless areas are either recommended for wilderness study designation or are allocated to management prescriptions that would maintain the area's roadless characteristics. Any activities within these areas would be consistent with the Roadless Rule. Five percent of the acres in the inventoried roadless areas are allocated to management prescriptions Research Natural Area (4.B.1). Within these allocations, a minimum level of road building and timber harvesting activities would be conducted for the purposes of RCW habitat management. These activities would still be consistent with the Roadless Rule exceptions.

Alternative I

Under this alternative, 97% of the acres in the inventoried roadless areas are either recommended for wilderness study designation or are allocated to management prescriptions that would maintain the area's roadless characteristics. Any activities within these areas would be consistent with the Roadless Rule. Five percent of the acres in the inventoried roadless areas are allocated to management prescriptions Research Natural Area (4.B.1). Within these allocations, a minimum level of timber harvesting activities would be conducted for the purposes of RCW habitat management. These activities would still be consistent with the Roadless Rule exceptions. Of the remaining acres in the inventoried roadless areas, 3% (or 416 acres) are allocated to management prescriptions dispersed recreation (7.E.2). Within these allocations, road building and timber harvesting activities would be conducted for the purposes of forest health and fuels reduction. These activities would not be consistent with the Roadless Rule exceptions and would therefore be foregone with the Roadless Rule in effect.

1.3 SCENERY MANAGEMENT SYSTEM (SMS)

1.3.1 Affected Environment

Large portions of the National Forests in Alabama can be seen from adjacent or interior roads, trails or waterways largely due to the density of the various travel routes. Twenty-five percent of National Forest land is classified as foreground. The more scenic landscapes (those in Retention and Partial Retention VMS or in High or Moderate SMS) are generally associated with or occur adjacent to important roads, lakes, rivers and streams, or highly developed recreation areas and National Trails. Elevations on the National Forest in Alabama range from a high point at Odum Point (2342') just off Talladega Mountain to lower elevations of less than 150 feet in the Conecuh and Yellow River valleys of the Conecuh Ranger District. Views beyond the immediate foreground are influenced by vegetation type, vegetation density, and terrain. Topography ranges from steep ridges, to relatively flat coastal plains, to deeply disected dendretic drained landforms. The forest is covered with an almost-continuous canopy of soft- to medium-textured rounded tree forms, creating a natural-appearing landscape character. Since the late 1990s, as a result of the Southern Pine Beetle infestation that killed large numbers of introduced and native pines, part of the canopy has opened. Groups of tall, gray, defoliated stems, generally varying in size from less than an acre to more than 25 acres. A few spots are considerably larger with one being nearly 1000 acres. The openings eventually give way to an emerging deciduous and evergreen understory. This process is speeded by active salvage operations.

National Forests in Alabama landscapes may be described by referring to descriptions of its phsiographic sections. National Forests in Alabama include land in the: 1) Outer Coastal Plain Mixed Forest Province, Coastal Plain and Flatwoods Lower Section; 2) Southeastern Mixed Forest Province, Coastal Plain Middle Section; 3) Southeastern Mixed Forest Province, Southern Ridge and Valley Section; and 4) Southeastern Mixed Forest Province, Southern Cumberland Plateau Section as described by Bailey and others (1994). These lands provide distinctive, common, and undistinguished examples of these physiographic provinces and sections.

Landscape character is described as the particular attributes, qualities, and traits of a landscape that give it an image and make it identifiable or unique. Landscape themes refer to the general focus or subject of variations on landscape character settings. They may be thought of as detailed description of desired landscape character. Themes range from a natural to an urban landscape. Of the seven Land Use Themes described in the Southern Appalachian Assessment, National Forest in Alabama landscapes can be grouped predominantly into three: Natural Evolving, Natural Appearing, and Rural-Forested.

The vast majority of the Forest is characterized as Natural Appearing. Designated Wilderness (42211 acres or 6%), lands where ecological processes predominate, are characteristically Natural Evolving landscapes. Rural-Forested is a very small category that includes the Forest's most highly developed recreation areas.

Cultural features are present, often obvious, and represent the varied peoples who have lived and used the land now known as the National Forests in Alabama. Fire towers, cemeteries, old house sites, stills, and bluff shelters are all found on the National Forests in Alabama. Often cultural features become special places requiring appropriate visual settings.

Existing Visual Quality

For planning purposes, Scenic Integrity Objectives (SIOs) were established for each prescription. These range from Very High (VH unaltered) to Low (L moderately altered). Very Low is not a scenery management objective in this analysis, however Maximum Modification was in the VMS and in the previous Forest Plan. The SIOs define the different levels of alteration affecting the visual resource that is acceptable.

The scenic resources of the National Forests in Alabama are currently managed in accordance with the 1986 Forest Plan. The scenic resource management direction in the

Forest Plan is the Visual Quality Objective (VQO), which were determined by the Visual Management System (VMS). The scenic resource has been re-inventoried to comply with the Scenery Management System (SMS), which replaced the VMS in 1995.

See *Landscape Aesthetics, A Handbook for Scenery Management, Agricultural Handbook Number 701* for description of the SMS system and cross-walk between the SMS-SIOs and the VMS-VQOs. National Forests lands have been inventoried to identify Scenic Classes from 1 (highest level) to 6.

The crosswalk between Visual Quality Objectives (Visual Management System) and Scenic Integrity Objectives (the updated Scenery Management System) is as follows:

Table 3C-24 VQO, SIO Crosswalk

Visual Quality Objective (VQO)	Scenic Integrity Objective (SIO)
Preservation (P)	Very High (VH)
Retention (R)	High (H)
Partial Retention (PR)	Moderate (M)
Modification (M)	Low (L)
Maximum Modification (MM)	Very Low (VL)

Table 3C-25 below shows allocation of land under current management direction. It compares the management direction at the time the current (old) plan was implemented with current conditions using cross walked SIO terminology. Current conditions were mapped by applying the management prescriptions from the menu for the revised plan in a manner that represents current direction.

Table 3C-25 Current Direction

	Acreage	% of Landbase
Very High	61,127	9%
High	52,229	8%
Moderate	72,892	11%
Low	478,270	72%
Very Low	0	0%
Total	664,518	100%

Special places

Special Places are those specific locations and expanses in outdoor settings that have attractions and features that are identified as unique, different, distinctive, and extraordinary to people. Special Places are not part of the Special Areas. Special places may range form a small area, such as a particular fallen tree, to large areas, such as a landscape unit.

These areas may be cultural, natural, or a combination of the two. What is special to one individual or group may not be special to another. An area may become special due to the evolving values of the citizens. Conversely an area may cease to be special for the same reason. A comprehensive inventory of constituents' special places has not been conducted, and the special places of the National Forests in Alabama are likely not all known by forest staff.

Some examples of special places are:

Forest-Wide Special Places
Any favorite camping site
Any favorite picnic site
Any favorite hunting site
Any favorite fishing site
Any favorite trail
Any cultural resource site
Any fire tower

Bankhead Ranger District
Sipsey Wilderness
Sipsey Wild and Scenic River
Indian Tomb Hollow
High Town Path
Kinlock Bluff Shelter
Various Bluff Shelters
Various Canyon Corridors
The Big Tree in the Sipsey Wilderness

Conecuh Ranger District
Various pitcher plant bogs
All the natural ponds
Blue Springs
Conecuh Trail

Oakmulgee Ranger District
Old growth tree stands
Some beaver ponds
Reed Break Research Natural Area

Shoal Creek Ranger District
Shoal Creek Church
Favorite Redeye fishing spot

Talladega Ranger District
Sherman Cliffs
Forest Road 600
Salt Creek Falls

Tuskegee Ranger District
The swimming hole
The Botanical Area
Swamp on Uphapee Creek tributary

Environmental Consequences

The scenic resource is affected by management activities altering the appearance of what is seen in the landscape. Short-term scenic effects are usually considered in terms of degree of visual contrast with existing or adjacent conditions that result from management activity. The scenic landscape can be changed over the long term or cumulatively by the alteration of the visual character. Management activities, which result in visual alterations inconsistent with the assigned SIO, even with mitigation, affect scenery. Management activities that have the greatest potential of affecting scenery are road construction, vegetation management, insect and disease control, special use utility rights-of-ways, and mineral extraction. Other management activities that also can effect the scenic resource at a lesser degree are threatened and endangered (T&E) species habitat management, prescribed burning, fire suppression, land exchange, old growth forest management, recreation, and administrative site facility construction, and wildlife management. See Tables for SIO allocation by alternative.

The Cheaha, Dugger Mountain, and Sipsey wilderness areas are assigned the Very High SIO in every alternative. Wild sections of the Sipsey Fork, West Fork River and Reed Brake Research Natural Area, and the recommended addition to the Cheaha Wilderness are also assigned Very High SIO in every alternative. Scenic Sections of the Sipsey Fork, West Fork River, Five Runs, and Cahaba River are assigned the High SIO in every alternative. Finally the Talladega Scenic Drive is assigned an SIO of High in every alternative. Several prescriptions will have an SIO of low for areas with a scenic class of 3 or higher. Areas that have a scenic class 3 or higher and assigned one the following prescriptions in every alternative: OHV Use Area, Early Successional Habitat, Red-cocked Woodpecker Management Area, Southern Cumberland Plateau Native Ecosystem, Restoration of Coastal Plain Longleaf Pine Forests, Southern Ridge and Valley Native Ecosystems, or Grazing Emphasis Area will have an SIO of low in every alternative.

Table 3C-26 SIO Acres – National Forests in Alabama

	Alternatives						
SIO	A	B	D	E	F	G	I
Very High	56,217	49,605	45,043	60,569	61,127	57,749	50,639
High	62,355	63,534	56,470	70,402	52,229	75,409	74,779
Moderate	123,670	91181	86,524	202,402	72,892	138,808	178,064
Low	420,817	460,198	476,481	331,145	478,270	392,552	361,036
Very Low	1,459	0	0	0	0	0	0
Total	664,518	664,518	664,518	664,518	664,518	664,518	664,518

Table 3C-27 Percentages – National Forests in Alabama

	Alternatives						
SIO	A	B		E	F	G	I
Very High	8%	7%	7%	9%	9%	9%	8%
High	9%	10%	8%	11%	8%	11%	11%
Moderate	19%	14%	13%	31%	11%	21%	27%
Low	63%	69%	72%	50%	72%	59%	54%
Very Low	0%	0%	0%	0%	0%	0%	0%
Total	100%	100%	100%	100%	100%	100%	100%

Table 3C-28 Acres – Bankhead Ranger District

	Alternatives						
SIO	A	B	D		F	G	I
Very High	27,262	26,770	26,652	31,895	38,292	26,770	28,177
High	22,121	22,121	22,121	21,897	20,455	42,320	31479
Moderate	59,563	30,350	30,431	69,751	20,519	75,912	66,527
Low	72,844	102,549	102,586	58,247	102,524	36788	55,607
Very Low	0	0	0	0	0	0	0
Total	181,790	181,790	181,790	181,790	181,790	181,790	181,790

Table 3C-29 Percentages – Bankhead Ranger District

	Alternatives						
	A	B	D	E	F	G	I
Very High	15%	15%	15%	18%	21%	15%	15%
High	12%	12%	12%	12%	11%	23%	17%
Moderate	33%	17%	17%	38%	11%	42%	37%
Low	40%	56%	56%	32%	56%	20%	31%
Very Low	0%	0%	0%	0%	0%	0%	0%
total	100%	100%	100%	100%	100%	100%	100%

Table 3C-30 Acres – Conecuh Ranger District

	alternatives						
SIO	A	B	D		F	G	I
Very High	0	0	0	0	0	0	41
High	13,050	13,050	6,298	13050	5,442	6,298	6,268
Moderate	8,664	8,664	9,295	11,488	10,033	9,295	14,424
Low	62274	62,274	68,395	59450	68,513	68,395	64,255
Very Low	0	0	0	0	0	0	0
Total	83,988	83,988	83,988	83,988	83,988	83,988	83,988

Table 3C-31 Percentages – Conecuh Ranger District

	Alternatives						
SIO	A	B	D	E	F	G	I
Very High	0%	0%	0%	0%	0%	0%	0%
High	16%	16%	8%	16%	6%	8%	7%
Moderate	10%	10%	11%	14%	12%	11%	16%
Low	74%	74%	81%	71%	82%	81%	77%
Very Low	0%	0%	0%	0%	0%	0%	0%
Total	100%	100%	100%	100%	100%	100%	100%

Table 3C-32 Acres – Oakmulgee Ranger District

	Alternatives						
SIO	A	B	D	E	F	G	I
Very High	602	602	602	602	602	602	602
High	1,100	1,100	1100	1,100	1,033	1,100	1,100
Moderate	5,018	4981	5018	36,717	2,832	5,018	33,147
Low	150,360	150397	150360	118661	152613	150,360	122,231
Very Low	0	0	0	0	0	0	0
Total	157,080	157,080	157080	157,080	157,080	157,080	157,080

Table 3C-33 Percentages – Oakmulgee Ranger District

	Alternatives						
SIO	A	B	D	E	F	G	I
Very High	1%	1%	1%	1%	1%	1%	1%
High	1%	1%	1%	1%	1%	1%	1%
Moderate	3%	3%	3%	23%	2%	3%	21%
Low	95%	95%	95%	76%	96%	95%	77%
Very Low	0%	0%	0%	0%	0%	0%	0%
Total	100%	100%	100%	100%	100%	100%	100%

Table 3C-34 Acres – Shoal Creek Ranger District

	Alternatives						
SIO	A	B	D	E	F	G	I
Very High	19,111	12,990	9,432	12,990	12,990	21,134	12,990
High	15,145	16,323	15,526	22,906	14,360	14,751	24,704
Moderate	20,495	25,417	19,620	29,847	17,743	18,855	28,937
Low	62,227	62,248	72400	51235	71,885	62,238	50,347
Very Low	0	0	0	0	0	0	0
Total	116,978	116,978	116,978	116,978	116,978	116,978	116,978

Table 3C-35 Percentages – Shoal Creek Ranger District

	Alternatives						
SIO	A	B	D	E	F	G	I
Very High	16%	11%	8%	11%	11%	18%	11%
High	13%	14%	13%	20%	12%	13%	21%
Moderate	18%	22%	17%	26%	16%	16%	25%
Low	53%	53%	62%	43%	61%	53%	43%
Very Low	0%	0%	0%	0%	0%	0%	0%
Total	100%	100%	100%	100%	100%	100%	100%

C-36 Acres – Talladega Ranger District

	Alternatives						
SIO	A	B	D	E	F	G	I
Very High	9243	9243	8357	15082	8289	9243	8829
High	10,036	10,036	10,522	10,546	10,036	10,036	10,325
Moderate	26,830	18669	19,060	44,305	19623	26,628	32,404
Low	67,376	75,537	75,546	43,552	75,537	67,578	61,927
Very Low	0	0	0	0	0	0	0
Total	113,485	113,485	113,485	113,485	113,485	113,485	113,485

Table 3C-37 Percentages – Talladega Ranger District

	Alternatives						
SIO	A	B	D	E	F	G	I
Very High	8%	8%	7%	13%	7%	8%	8%
High	9%	9%	9%	9%	9%	9%	9%
Moderate	24%	16%	17%	39%	17%	23%	29%
Low	59%	67%	67%	38%	67%	60%	55%
Very Low	0%	0%	0%	0%	0%	0%	0%
Total	100%	100%	100%	100%	100%	100%	100%

Table 3C-38 Acres – Tuskegee Ranger District

	Alternatives						
SIO	A	B	D	E	F	G	I
Very High	0	0	0	0	0	0	0
High	904	904	904	904	904	904	904
Moderate	3,100	3,100	3,100	10,293	3,096	3,100	3,625
Low	5,734	7,193	7,193	0	7,197	7,193	6,668
Very Low	1,459	0	0	0	0	0	0
Total	11,197	11,197	11197	11,197	11,197	11,197	11,197

Table 3C-39 Percentages – Tuskegee Ranger District

	Alternatives						
SIO	A	B	D	E	F	G	I
Very High	0%	0%	0%	0%	0%	0%	0%
High	8%	8%	8%	8%	8%	8%	8%
Moderate	28%	28%	28%	92%	28%	28%	32%
Low	51%	64%	64%	0%	64%	64%	60%
Very Low	13%	0%	0%	0%	0%	0%	0%
Total	100%	100%	100%	100%	100%	100%	100%

All the action alternative have increases in lands assigned High and Moderate SIO in contrast with the no action alternative. There are fewer acres assigned to Very High in all the action alternatives than assigned in the no action alternative. This is due to the need for restoration to occur on some Bankhead Ranger District acres that are currently being managed as remote backcountry non-motorized recreation and thus were assigned a Very High SIO. All the other districts have the same or more Very High SIO assigned in comparison with the no action alternative. Alternatives E and I receive the highest acreage in High and Medium SIO. This would result in more protection and enhancement to the scenic resources than alternatives having fewer acres assigned to the higher SIOs. Alternatives E and I also have the least acres assigned to Low SIO. This indicates Alternatives E and I are most favorable to enhancing the scenic resource. Alternative F has the most and Alternatives D and B the next largest assigned to Low SIO which indicates these alternatives are least favorable to the scenic resource.

Negative impacts to scenery from road construction, insect and disease control, special use utility rights-of-ways, and mineral extraction would be essentially flat across all alternatives. Alternatives with the most acres in very high, high, and moderate SIOs will require greater mitigation efforts. Negative impacts to scenery from vegetation management would be the greatest in Alternatives D and F and lowest in Alternatives B and I. This is according to projected final harvest numbers. Many of these impacts would be avoided by implementing mitigation measures.

There would be a modest increase in Natural Evolving Landscape Character in all the action alternatives. These increases would come from recommended wilderness study areas, Non-motorized remote backcountry recreation, and a natural area. Alternatives B and D would have the least additions to Natural Evolving Landscape. There would be no lost of Natural Appearing Landscape except that which moves to Natural Evolving.

All alternatives propose prescribed burning on a cycle that varies with community type and age. Drifting smoke and blackened vegetation and charred tree trunks would be the main negative visual effect. Visual contrast from fireline construction would also be evident. The contrast levels and duration vary with fire intensity. Blackened vegetation usually last a short time but charring of trees may be evident for many years. Repetitive burning reduces overall visual diversity. It often results in loss of valued mid- and understory species such as flowering dogwood, but tends to promote herbaceous flowering species. Prescribed fire repeated over time produces stands with open understories allowing views farther into the landscape. There are no significant differences expected among the alternatives in the prescribed burning program.

Insect infestations and diseases can cause strong, unattractive 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 appear as clearcutting to forest visitors. These impacts can occur in areas of high scenic value. Management will be consistent across all alternatives. In the long term the negative effects from insects and diseases are expected to be less with alternatives I (Rolling) and B (Restoration).

Utility rights-of-way (ROW) have a high potential of affecting the scenic resource for a long duration. Cleared ROW, utility structures contrast and may be incongruent with existing landscape. Cleared ROW contrast in form, line, color, and texture when compared to the natural appearing landscape. Alternatives with the most acres in very high, high, and moderate SIOs will require greater mitigation efforts, but all effects to scenery is expected to be consistent across all alternative

Mineral management and development activities can involve major landform alteration, as well as form, line, color, and texture contrasts, causing substantially adverse scenic impacts. Natural Gas extraction occurs on the Conecuh National Forest. Well sites are currently not common enough to negatively affect the landscape on a district wide scale. The alternatives that most protect scenery (E and I) offer the most insurance to scenic values if demand for gas drilling increases. Overall, Alternatives E and I are least favorable to mineral development and Alternatives B and D are the most favorable.

Road maintenance, especially rights-of-way maintenance, affects scenery. Mowing frequency and timing alters the appearance of the landscape. Road construction introduces unnatural visual elements into the landscape and causes form, line, color, and texture contrasts. Road management controls how much of the landscape is seen by having roads open or closed. New road construction is expected to be minimal across all the alternatives. The alternatives requiring the most vegetative management are expected to have the most road reconstruction. Therefore, Alternatives D and F would have the most road activity while Alternatives B and I would have the least.

Vegetation management has the great potential to alter the landscape and impact the scenic resource. Timber harvest practices can cause long-term effects on scenery by altering landscape character through species conversion, reduction in species diversity, manipulation of the prominent age class, and 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. The restoration prescriptions are expected to have positive visual effects in the long term. Correctly matching species with their habitat is expected to result in less devastating disease and insect catastrophes.

Of the management applications, even-aged management may be the most impacting. Among the even-aged regenerations methods clearcutting and seed-tree harvest produces the highest visual contrasts 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 repeat the size and general character of surrounding natural openings and the landscape character would impact scenery the least. Single-tree selection and group selection harvest are normally less evident because they do not cause large openings in the canopy. Uneven-aged regeneration methods can affect scenery, causing contrasts in form, line, color, and texture from slash production. All impacts as a result of timber harvest are short-term because of rapid vegetation growth.

Site preparation activities affect scenery by exposing soil and killing other vegetation. These effects are generally short-term. Site preparation usually improves the appearance of the harvest area by removing the unmerchantable trees and most of the broken stems. Stand improvement work can affect scenery by browning the vegetation, reducing visual variety through elimination of target species. Alternatives D and F will have the most timber harvesting and site preparation, while Alternatives B and I will have the least.

Forest-wide prescribed burning and midstory manipulation in Red-cockaded Woodpecker cluster sites are common wildlife management practices. Midstory removal and prescribed burning reduce overstory diversity, often resulting in the loss of valued scenic resources such as flowering dogwoods. Midstory removal and prescribed burning in time produces stands with open understories allowing desirable views into the landscape. The quantity of woodpecker recovery work is expected to be essentially consistent across all alternatives, but the project locations are likely to be affected by management prescription location.

Recreation facilities are deviations to the natural landscape. Forest Service recreation facilities are designed to blend into the landscape without major visual disruption. A new campground to serve the Kentuck ORV Trail System is proposed in Alternatives A, B, D, E, and G. Due to anticipated flat budgets no additional recreation facilities are anticipated.

Designation of wilderness will generally cause positive effects to the scenery. Old-growth forest character will be created over time.

For the most part, Special Places are not affected across Alternatives. However, the inventory list is not exhaustive, and will change over time as more sites are inventoried. Buffers needed to protect the character of each individual special place will vary by site.

1.4 SPECIAL AREAS

1.4.1 AFFECTED ENVIRONMENT

Special interests areas are designated to protect and, where appropriate, foster public use and enjoyment of areas with scenic, historical, geological, botanical, zoological, paleontological, archeological or other characteristics. Special interest areas may be designated administratively or may receive designation by law. Other uses are permitted in these areas to the extent that these uses are in harmony with the designation.

This section concentrates on Scenic Byways and Geological / Paleontological areas. Other sections of the EIS also deal with special areas. For example, special botanical areas are discussed under rare community types, historic districts under the heritage section and outstandingly remarkable streams under the Wild & Scenic Rivers section.

The special areas on the National Forest in Alabama are:

1. <u>Scenic Byway - Talladega Scenic Drive</u>

Talladega Scenic Drive is a two-lane paved road that generally follows the ridge top of Horseblock Mountain, crosses Cheaha Mountain, and travels along the side of Talladega Mountain. It features panoramic views from both sides of Horseblock Mountain and impressive views to the west from Talladega Mountain. Cheaha Mountain is the highest point in Alabama at 2,407 feet above sea level. The 29 miles of road terminate on the north end just west of Heflin and Adams Gap on the south end. The roadbed is in good condition and serves a design speed of 35 miles per hour for most of the route. Talladega Scenic Drive's value lays primarily with its vistas and as an access route for Cheaha State Park and Lodge. The drive also serves as the entry point to various recreation sites and activities, a travel way for general forest management, and for general transportation. The Talladega Scenic Drive is an outgrowth of the Sky Way Motor Way constructed in the 1930s by the Civilian Conservation Corps.

Table 3C-40 Special Areas: Scenic Byway

NATIONAL SCENIC BYWAY	ACRES in 7A	MILES	DISTRICT
Talladega Scenic Drive	2,670	23	Shoal Creek
Talladega Scenic Drive	808	6	Talladega
Total	3,478	29	

2. <u>Geologic Site - Conecuh Cave</u>

The Conecuh cave near the east bank of yellow river on east end of the district is a result of a small area of karst topography, which is what makes the area unique. The easily explorable area of the sinkhole fed cave is quite shallow. The cave is home to bats, but the area does not provide habitat for known threatened or endangered flora or fauna.

Table 3C-41 Special Areas: Geologic Sites

GEOLOGIC SITES	ACRES	DISTRICT
Conecuh Cave	74	Conecuh

ENVIRONMENTAL CONSEQUENCES

Management for the Talladega Scenic Drive corridor is consistent for every alternative.

Management for the lands adjacent to the scenic drive corridor does vary by alternative. Table 3C-42 illustrates those various management options. Alternative I supports the scenic drive's scenic values well. However, the longleaf restoration work under this alternative will diminish scenery in the short run. Alternatives A, E, and G generally supports the scenic drive's scenery resources. There are extensive areas of sustained yield timber management in alternative A. Alternative E uses the potentially incongruent land allocation of 8.B (early successional habitat) to enhance the hunting and wildlife viewing experience. Alternative G uses the mid to late-successional forest habitat prescription in some places which results in some low SIOs. Alternatives B, D, and F (current management) do not well support the goals and objectives of the scenic drive due to large areas of low SIO.

Table 3C-42 Adjacent Management - Talladega Scenic Drive

Adjacent Land Allocation	Alternatives						
	A	B	D	E	F	G	I
Cheaha State Park	*	*	*	*	*	*	*
Private Land	*	*	*	*	*	*	*
1.A Cheaha Wilderness	*	*	*	*	*	*	*
7.D Concentrated Recreation Zone – Turnipseed Camp	*	*	*	*	*	*	*
1.B Recommended Wilderness Blue Mt.)	*					*	
12.B Remote Backcountry Recreation-nonmotorized, Blue Mt				*	*		*
6.C Old Growth						*	
7.B Sensitive Viewshed							*
7.E.2 Dispersed Recreation	*			*		*	*
8.A.1 Mid to Late-successional Forest Habitats						*	
8.B Early Successional Habitat				*			
8.D.1 Red-cockaded Woodpecker Sub-habitat Mngmnt Area		*					
9.D.1 Restoration of Longleaf Pine Forests		*					*
10.A Sustained Yield Timber Management	*	*	*		*		
10.B High Quality Forest Products			*				

Note: The shaded area of the table represents the unchanging land allocations.
Management for the Conecuh Caves area is consistent for every alternative.

1.5 NATIONAL WILD AND SCENIC RIVERS

1.5.1 AFFECTED ENVIRONMENT

The Wild and 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, protects water quality and protects their immediate environments for the benefit and enjoyment of present and future generations.

Most rivers are added to the National Wild and Scenic Rivers System (National System) through federal legislation, after a study of the river's eligibility and suitability for designation. The Forest Service is required to consider and evaluate rivers on lands they manage for potential designation while preparing their broader land and resource management plans under Section 5(d)(1) of the Act.

According to the Southern Appalachian Assessment (SAA), the national forests in the Southern Appalachians were established early in the 20th century primarily to protect the headwaters of major rivers from land uses that encouraged flooding, erosion, and stream sedimentation. Some would argue that clean water for the surrounding cities is the region's most important product. The Southern Appalachians contain parts of 73 major watersheds; 29 are wholly within the SAA region, 18 have more than one-half within the region. Nine major rivers that rise in the Southern Appalachians provide drinking water to the major cities in the Southeast.

Rivers and stream corridors accommodate a lot of different uses such as picnicking, fishing, day hiking and walking for pleasure, primitive camping, boating (canoeing, kayaking, rafting, tubing), swimming and nature study. The National Survey on Recreation and the Environment 2000 interviewed over 15,000 people to determine participation in a variety of activities. According to the results, 76.1 reported participating in boating (including rafting, kayaking and canoeing) and 20 million participated in rafting, tubing or any other type of floating on flowing waters. According to the SAA Social, Cultural, and Economic Technical Report, trends in the percentage of participation in all of these activities increased from 1972 to 1992. The largest increases in participation over the 20 years occurred in pleasure walking (34.3%), nature study (25.3%) and day hiking (16.9%). All of these activities would be compatible and possibly enhanced through designation. One exception is whitewater boating since neither eligible river has a gradient conducive to a whitewater experience.

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 resources 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.

The Southern Appalachians currently have 5 Wild and Scenic Rivers totaling 191.1 miles. All but 45.3 miles are managed by the national forests. Of the 145.8 miles of designated river managed by the forest service, 80.8 miles are classified as wild, 34 miles as scenic and 31 miles as recreational.

The National Forests in Alabama has one designated WSR, the Sipsey Fork, West Fork River and selected tributaries. Congress amended the National Wild and Scenic River Act in 1975 to include a study of Sipsey Fork, West Fork, and the Sipsey was designated October 28, 1988. Most of the river and its tributaries are located within the Sipsey Wilderness Area. Its 61.4 designated miles, all on the Bankhead National Forest, include approximately 25 miles that are not bounded by wilderness.

Table 3C-43 Sipsey Fork, West Fork River

#	Segment	Description	Miles	Classification
1	Sipsey Fork	From mouth of Sandy Creek upstream to County Rt. 60.	13.1	scenic
2	Sipsey Fork	From County Rt. 60 upstream to confluence of Hubbard Creek and Thompson Creek .	7.4	wild
3	Hubbard Creek	From mouth of Hubbard Creek upstream to Forest Road 210.	3.4	wild
4	Thompson Creek	From mouth of Thompson Creek upstream to origin in Section 4, T8S, R9W.	7.3	wild
5	Tedford Creek	From confluence with Thompson Creek upstream to Section 17, T8S, R9W	2.1	wild
6	Mattox Creek	From confluence with Thompson Creek upstream to Section 36, T7S, R9W	1.8	wild
7	Borden Creek	From confluence with Sipsey Fork upstream to Forest Road 208.	4.9	wild
8	Borden Creek	From Forest Road 208 upstream to confluence with Montgomery Creek	6.4	scenic
9	Montgomery Creek	From confluence with Borden Creek upstream to SW quarter of SW quarter of Section 36, T7S, R8W.	1.5	scenic
10	Flannigan Creek	From confluence with Borden Creek upstream to Forest Road 208.	1.8	wild
11	Flannigan Creek	From Forest Road 208 upstream to Section 4, T8S, R8W.	4.0	scenic
12	Braziel Creek	From confluence with Borden Creek upstream to Section 12, T8S, R9W.	4.9	wild
13	Hagood Creek	From confluence with Braziel Creek upstream to confluence with unnamed tributary in Section 7, T8S, R8W	2.8	wild

Three rivers were studied in the current Forest Plan. The Sipsey Fork, West Fork was studied as per direction in the amended National Wild and Scenic River Act of 1975. Segments of Sipsey Fork, West Fork and selected tributaries were designated as shown. The Blackwater River and the Yellow River were also studied. Both these rivers were included in an inventory prepared by the National Park Service of significant free flowing rivers. Neither river was determined to be eligible for designation into the national wild and scenic system.

The area of study or bounds of analysis includes all land found inside the proclamation boundaries of the National Forests in Alabama. The analysis team reviewed every watershed found on National Forest land to determine which, if any, rivers might contain outstandingly remarkable values and therefore deserves further analysis. The analysis team also reviewed rivers previously studied.

For this Forest Plan revision, 38 streams on the National Forests in Alabama were suggested and reviewed for potential WSR eligibility. Of the 38, 2 were found to be eligible based on their outstandingly remarkable values. These streams were classified according to Section 2 of the WSR act (PL 90-542)(see Appendix D for more information). Table 3C-44 shows the sections and their recommended classifications.

Table C-44 Rivers Studied for Inclusion as National Wild and Scenic Rivers

River	Segment Length in Miles	FS Ownership In Miles	Potential classification
Bankhead Ranger District			
Brown Creek	4.2	4.2	Not eligible
Brushy Creek (segment A)	14.2	10.0 L.B. 0.3 R.B.	Not eligible
Brushy Creek (segment B)	4.9	4.8	Not eligible
Caney Creek	4.5	4.0 0.1 L.B.	Not eligible
North Fork Caney Creek	6.0	6.0	Not eligible
South Fork Caney Creek	3.4	2.4	Not eligible
Capsey Creek	10.0	9.2	Not eligible
Clear Creek	11.8	1.1 0.9 L.B.	Not eligible
Collier Creek	3.4	3.4	Not eligible
Freeman Hollow Creek	1.7	1.7	Not eligible
Key Mill Branch	1.9	1.9	Not eligible
Owl Creek	4.6	4.6	Not eligible
Turkey Creek	2.3	1.7	Not eligible
Rush Creek	7.6	7.2 0.4 R.B.	Not eligible
West Flint Creek	4.6	2.5	Not eligible
Conecuh Ranger District			
Blackwater River	2.5	0.9	Not eligible
Conecuh River	14.2	0.0	Not eligible
Five Runs Creek	8.3	7.9	Scenic
Yellow River	13.4	0.1 7.6 R.B.	Not eligible
Oakmulgee Ranger District			
Beaver Swamp Creek	3.8	3.8	Not eligible
Cahaba River	27.2	0.4 L.B.	Scenic
Elliots Creek	6.4	4.5	Not eligible
Little Oakmulgee Creek	14.2	2.7 2.4 R.B.	Not eligible
Oakmulgee Creek	13.4	1.9 0.4 R.B.	Not eligible

River	Segment Length in Miles	FS Ownership In Miles	Potential classification
South Sandy Creek	9.7	8.7 0.1 R.B.	Not eligible
Shoal Creek Ranger District			
Beaver Dam Creek	3.0	3.0	Not eligible
Choccolocco Creek	5.7	3.8	Not eligible
Greenleaf Creek	3.4	3.4	Not eligible
Hillabee Creek	9.2	7.2	Not eligible
Jones Branch	2.3	2.3	Not eligible
North Fork Greenleaf Creek	1.5	1.5	Not eligible
Shoal Creek (segment A)	3.2	2.4	Not eligible
Shoal Creek (segment B)	5.7	5.7	Not eligible
Shoal Creek (segment C)	4.4	4.4	Not eligible
South Fork Terrapin Creek	7.8	6.8	Not eligible
Talladega Ranger District			
Cheaha Creek (segment A)	3.0	3.0	Not eligible
Cheaha Creek (segment B)	1.7	1.7	Not eligible
Mill Shoal Creek	1.5	1.4	Not eligible
Talladega Creek	12.0	4.0	Not eligible
Tallaseehatchet Creek	6.4	6.0	Not eligible
Tuskegee Ranger District			
Choclafaula Creek	4.0	3.9	Not eligible
Uphapee Creek	3.4	1.7	Not eligible

L.B.: Forest ownership left descending bank only.
R.B.: Forest ownership right descending bank only.

ENVIRONMENTAL CONSEQUENCES

Eligible Rivers

The identification of a river for study through the forest planning process does not trigger any protection under the Act until designation by Congress. Importantly, identifying rivers as eligible, or eligible and suitable, does not create any new agency authority; rather, it focuses the management actions within the discretion of the Forest Service on protecting identified river values. For agency-identified study rivers, the preliminary (inventoried) classification is to be maintained absent a suitability determination. The recommended classification is to be maintained throughout the duration of the forest plan. Table 3C-45 describes the eligible river segments.

The lack of Forest Service ownership along the Cahaba River make management problematic; therefore, it does not seem to be prudent to do suitability analysis. The 67 acres will be managed as an Eligible Wild and Scenic River (2.C) in all alternatives except Alternative F (Current Management). The Cahaba River is expected to remain under 2.C management throughout the life of the planning period unless another agency completes suitability analysis and thus elevates its status or the current management alternative is selected.

Five Runs will be managed as an Eligible Wild and Scenic River (2.C) in all alternatives except Alternative F (Current Management). If suitability analysis did not fine Five Runs suitable to be recommended into the wild and scenic river system, then the 864 acres would assigned as shown in Table 3C-45.

Table 3C-45 Status of Eligible Rivers

River	Segment Length	Potential classification	Acres In 2.C	status
Cahaba River, Oakmulgee Ranger District	27.2	scenic	67	On hold
Five Runs, Conecuh Ranger District	8.3	scenic	864	Suitability Analysis Required

Management emphasis for the eligible rivers and their corridors is 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 length, diversity, and uniqueness of the flora and fauna are the establishment values include ecological diversity and uniqueness of the flora and fauna.

Table 3C-46 Number of Acres of Eligible Rivers by Classification Across Alternatives

	Alternatives						
	A	B	D	E	F	G	I
Wild	0	0	0	0	0	0	0
Scenic	931	931	931	931	0	931	931
Recreational	0	0	0	0	0	0	0

Increasing human population density and the resulting intensive human uses of the landscape put high stresses on aquatic systems in many areas through nonpoint source pollution and habitat degradation. Population density in the Southern Appalachians increased from 80 people per square mile in 1970 to 102 people per square mile in 1990, and the area’s population is expected to grow an additional 12.3 percent by the year 2010. The SAA was not able to adequately estimate the impacts of increasing population on aquatic resources. However, they did report that land covers, which represent human activity, occupied over 50 percent of the land area at the time of publication (1996) on many large watersheds. Historically, riparian zones were largely forested, but human activities have reduced forest land cover to less than 60 percent in many large watersheds. Development along rivers and streams is not only reducing water quality and habitat on many rivers, but limiting public access for fishing and other river related activities. Protection of rivers and streams through the forest planning process helps to assure high quality, free flowing rivers and streams, as well as river related recreation opportunities.

Sections of rivers classified as wild, will have the highest level of protection. Most impacts to wild rivers will come from upland activities outside of the river corridor. Vegetation management, road construction, and construction or removal of recreation facilities could cause erosion along the river, sedimentation from soil runoff, visual intrusions or noise from nearby activities. Fire management within the corridor, prescribed fire and fire suppression actions, may result in smoke impacts, noise from aircraft, chainsaws and engines, or lasting visual effects from charred vegetation. Search and rescue operations may cause some impact from the use of equipment in the river corridor but these are predicted to be minimal. Increased public interest and use may result in development of additional trailheads, and trails and access points to the river to accommodate additional public interest and use of the river. However, increased recreation use due to designation may also result in more river related activities (boating, fishing, etc.) and cause localized increases in soil compaction and erosion of streambanks, and the need for limited public access.

River sections classified as scenic or recreational are managed with a wider variety of activities allowed within the river corridor. However forest management would be subordinate to recreational and the river's outstandingly remarkable scenic values. Classification as scenic or recreational would therefore be expected to have a wider range of effects from activities outside and within the river corridor. Visual quality, while preserved at a higher level of visual quality objectives than in those alternatives where rivers are not eligible for WSR designation, would be less than the wild rivers. Sights and sounds of man's activities would be more apparent. Management activities that have the greatest potential of affecting rivers and their potential suitability for WSR designation are road construction, vegetation management, insect and disease control, special use utility right-of-ways, and mineral extraction. Other management activities that also can affect the river resources to a lesser degree are threatened and endangered (T&E) species habitat management, military use, range management, recreation, and administrative site facility construction, and wildlife and fisheries management.

Table 3C-47 Five Runs Management Prescriptions if Determined not Suitable

River	Alternatives						
	A	B	D	E	F	G	I
Five Runs Before suitability Analysis	2.C 11	2.C 11	2.C 11	2.C 11	10.A	2.C 11	2.C 11
Five Runs If suitable	2.B.2 11	2.B.2 11	2.B.2 11	2.B.2 11	10.A	2.B.2 11	2.B.2 11
Five Runs If not suitable	10.A 9.D.1 11	9.G 11	10.A 11	8.B 11	10.A	8.B 8.D.1 11	9.D.1 11

Table Legend

2.B.2	Recommended Scenic River
2.C	Eligible River
8.B	Early Successional Habitat Emphasis
8.D.1	Red-Cockaded Woodpecker Management
9.D.1	Longleaf Pine Restoration
9.G	Maintenance and Restoration of Bottomland Hardwood
10.A	Sustained Yield Timber Management
11	Riparian

Non-eligible Rivers

Management direction for non-eligible rivers is determined by the management prescription decided in the forest land management plans. Only rivers determined to have at least one outstandingly remarkable value were judged eligible to be studied for inclusion into the wild and scenic river system. Rivers possessing merely remarkable values were not accepted. Rivers possessing only outstanding values did not make it. The River needed to meet the higher standard of outstandingly remarkable. A wild and scenic river already representing a physiographic region may preclude another river being added in that same region. All rivers flowing through the National Forests in Alabama, including those suggested, but determined not eligible for wild and scenic river status, will be managed under direction of the riparian prescription.

1.6 CUMULATIVE EFFECTS

A discussion on cumulative effects of the alternatives presented in this EIS examines the how social and land use trends on public and private lands in the Southern Appalachians together influence the healthy and sound management of National Forest lands.

As discussed in the DEIS sections dealing with recreation and scenery, overall demand for outdoor recreation opportunities, and the settings that provide them, is increasing and it is increasing at a rate greater than population growth.

The demand for a particular type of recreation activity remains either stable with population growth, or increases more rapidly, depending on the activity. Generally, due to the aging population, the demand for less physically challenging activities, and therefore the demands for developed or improved settings, are likely to rise faster than demands for remote and primitive settings. *Southern Appalachian Assessment, Summary report, p. 37.*

Trends on private lands are relevant to Forest Service lands. Currently, public holdings represent one-third of the roaded-natural appearing settings and two thirds of remote settings in the Southern Appalachians. These are the preferred settings for outdoor recreation experiences. Due to continuing development of roads and buildings, these settings on privately owned lands are being converted to rural forested settings. *Southern Appalachian Assessment, Social Cultural Economic Technical Report p.140, 157, 173.* The ability for the public to recreate on private lands is changing. About ¼ of private landholders in the Southern Appalachians provide access for the recreating public for certain compatible activities. However, overtime, less private land is predicted to be available. *Southern Forest Resource Assessment, draft, Chapter Socio-6, pp. 2 and 12.*

Streams, rivers, and lakes draw people because of water's importance in high quality scenery and the recreation opportunities offered. Today, National Forests are seeing congestion and overuse on many of its waterways. Use is exceeding capacity and public access provided by private lands for water for recreation diminishing.

Therefore, a general trend on private lands surrounding the National Forests in Alabama is the gradual loss of preferred settings for nature based recreation as well the potential to access private lands. Private lands are not expected to increase the supply for the settings preferred by outdoor recreationists for their activities. As a result, public lands will face most of increasing recreation demand. *Southern Forest Resource Assessment, draft Chapter SOCIO-6.*

Related to recreation demand are tourism and its importance to gateway communities and regional economies. Many communities are encouraging tourism which centers around using the attractions of National Forest to stimulate their local economy. The Sipsey Wilderness, the Sipsey Wild and Scenic River, and Lewis Smith Lake are key National Forest locations on the Bankhead Ranger District that north Alabama tourist groups use to market outdoor recreation. The mountain scenery, Talladega Scenic Drive, and the Pinhoti National Recreation trail are focal points for tourist advocates in the Talladega Mountains section of the state. Another potential tourism connection is the Tuskegee Ranger District which is adjacent to Moton Field, the new National Park Service Facility, and historic Tuskegee Institute. Tuskegee is also home to the Bartram National Recreation Trail. The potential for additional eco-tourism is present on every ranger district.

Finally, nature-based settings are key ingredients for enhancing a sense of place in the Southern Appalachian communities. Rapid development of private lands in the South appears to be taking away the sense of place of long-term residents. Local communities identify with landscape features or have cultural practices related to natural settings. Also, traditional uses of the land by residents for hunting, fishing and gathering of natural forest products have transferred in part to Forest Service lands as private lands become unavailable. Some conflicts may exist or may arise between long time residents and new development related to tourism and outdoor recreation. *Southern Appalachian Assessment, Summary Report, pg. 38.* The potential for conflict is present on every district. However, for now, user flexibility (willingness to modify recreation use patterns), public education, and management decisions have effectively mitigated problems.

The primary challenge for recreation managers is how to maintain the integrity of the ecosystems and high quality natural settings as more and more people, who bring more impact to the natural setting and want more and more conveniences. Alternatives E and I emphasize recreation opportunities. Alternatives A, B, D, and G emphasize other values on National Forest land and therefore provide less recreation opportunities.

Regardless of the alternative selected, recreation demand is increasing and effects will occur. Effects, such as user conflict and resource impacts to riparian corridors, will simply show up sooner in alternatives that do not emphasize recreation opportunities. User controls will be needed, in varying degrees, to protect the health of the natural systems and to maintain an acceptable recreation experience. These controls will begin in current problem areas.

Regardless of alternative selected, it is unknown if future Forest Service budgets will be able to support the recreation staff, law enforcement and facilities (whether for developed or dispersed settings) called for by recreation demand. This is particularly important for high maintenance and operational cost facilities or trail systems such as OHV areas where on-going maintenance and on-the-ground personnel are needed.

For those alternatives which generally emphasize recreation management, there will be a better opportunity to maintain scarce settings, provide high quality recreation experiences and manage impacts on the land. Also there will be a better opportunity to develop tourism linkages and partnerships to support local economies and sound recreation management programs. However, when considering issues such as an available campsite, a trail that is not crowded, or a place to park at a trailhead, meeting demand will be budget driven, not alternative driven. It is assumed existing demand will not be meet no matter which alternative is selected. It is also assumed the agency will attempt to meet the demand for additional outdoor recreation experiences no matter which alternative is selected. If budgets to build and maintain new facilities do allow expansion, then the carrying capacity or ecological condition of the land will become the limiting factor. These ecological decisions will be on a site-specific basis, and the actual limiting point won't be known until the decisions are made.

The public demands quality as well as quantity. The alternatives that tend to favor recreational settings will tend to accommodate the user's demand for quality. Even then, conflict will remain, as the definition of a quality landscape is likely to be different for different users. Those preferring natural evolving landscapes may not consider vegetative management that optimizes game to be a high quality landscape. The alternatives that favor natural evolving landscapes may accommodate the hunter who prefers hunting in that type of setting, but be totally un-acceptable to the hunter wanting to maximize potential success. In the end, even the alternatives that favor recreation will only be acceptable with adequate budgets and site-specific decisions that capture an informed consent of compromise.

2.0 Heritage Resources

2.1 Affected Environments

Bankhead Management Area

Current Situation - The Bankhead Management Area has a rich and wide variety of heritage resources. The archeological sites range from prehistoric sites, approximately 9,000 to 10,000 years old, to early 20th historic sites, which include pre- national forest settlement and early national forest sites. The bluff shelters on the forest have been occupied from the earliest periods of prehistory, and occupied again during the Civil War. The bluff shelters contain some of the most fragile of heritage resources, particularly the petroglyphs and other rock art. The bluff shelters have been the targets of illegal digging for artifacts and other vandalism since long before the creation of the national forest. Upland lithic scatters occur along the narrow ridges, particularly on ridge saddles. Prehistoric travel routes, later used historically, are known to have remnants on the forest. Early historic house sites from the early 19th century occur on terraces, close to water sources. Later, the house sites move higher on the ridges and wells were dug to provide water. Historic sites from the first half of the 20th century include bridges, fire towers, and other elements of the infrastructure and are associated with the Civilian Conservation Corps and the early national forest history. There are three study areas on the Bankhead that fall under Prescription 4.E. They are Indian Tomb Hollow, Kinlock, and Hightown Path. These areas contain a high density of archeological sites as well as being the locations of traditional cultural activities for local people of Native-American descent.

Trends - Archeological surveys will be conducted prior to land management activities. More research will be conducted on the historic transportation routes, traditional cultural use of the forest, and early forest area history. In addition to law enforcement personnel patrolling the areas of the bluff shelters, public education in the schools will continue to reduce the occurrence of illegal digging and vandalism of the bluff shelters.

Conecuh Management Area

Current Situation - The Conecuh Management Area has a relatively light scattering of heritage resources. The prehistoric sites, dating back to 8,000 to 10,000 years ago, represent the short-term occupations of small groups of people traveling from the Gulf Coast to the Tallahatta quartzite lithic sources that outcrop north of Andalusia. These sites occur along the first and second terraces overlooking streams and creeks, and on the higher ridges overlooking the larger sinkholes. Historic sites, the earliest being from the mid-19th century, represent the settlement of the area and the logging industry prior to the creation of the national forest. Historic sites from the first half of the 20th century include fire towers, recreational facilities, and other elements of the infrastructure and are associated with the Civilian Conservation Corps and the early national forest history.

Trends - Archeological surveys will be conducted prior to land management activities. Research will be conducted on early forest history, pre- national forest logging and turpentine industries, and the Civilian Conservation Corps.

Oakmulgee Management Area

Current Situation - The Oakmulgee Management Area has a moderately dense distribution of heritage resources. Prehistoric sites, dating back to 8,000 or more years ago, occur on almost any level landform near water. Sites situated on ridge lines tend to have a higher degree of disturbance due to the severe erosion that occurred across the forest historically, but sites on the first and second terraces tend to be intact if they were not later subjected to farming. Historic sites, representing the 19th century settlement of the area and the logging industry, are scattered over the forest. Sites from the early 20th century include fire towers and other sites associated with the early forest development. The western portion of the Oakmulgee, west of the Cahaba River, was initially acquired into federal ownership through the West Alabama Resettlement Administration program, a New Deal program. Payne Lake, originally called Lake Margaret, and other infrastructure and administrative sites associated with this program exist.

Trends - Archeological surveys will be conducted prior to land management activities. Research will be conducted on early forest history, pre- national forest logging industry, and the West Alabama Resettlement Administration.

Talladega Management Area

Current Situation - The Talladega Management Area has a density of heritage resources similar to that of the Oakmulgee. Small prehistoric sites can be located on most level landforms near water sources. Past erosion on the steeper slopes has disturbed most of the upland sites, but some small intact lithic scatters are found on the lower terraces near water sources. Historic sites, representing the 19^{th} century settlement of the area and the logging industry, are scattered over the forest. Sites from the early 20^{th} century include fire towers, recreational areas, and other infrastructure elements associated with the early forest development and the Civilian Conservation Corps. Two known historic transportation routes are of interest on the management area. The McIntosh Trail runs east/west across the management area south of Interstate-20. This early historic trade route connected the Creek Nation to South Carolina Colony. The Oxford-Cheaha CCC Road is an early 20^{th} century road, built by the Civilian Conservation Corps that provided the route from the CCC camp at Oxford to the top of Cheaha Mountain.

Trends - Archeological surveys will be conducted prior to land management activities. Research will be conducted on early forest history, the early transportation routes, and the Civilian Conservation Corps.

Tuskegee Management Area

Current Situation - The Tuskegee Management Area has a relatively high density of heritage resources. Small lithic scatters, representing various periods of prehistory, can be found on level landforms in the uplands. However, most of the upland settings have been severely disturbed from past erosion and subsequent land management activities. Historic Creek Indian sites, including small villages or extended hamlets, have been located along Choctafaula Creek. Some of these sites may date to the early 19^{th} century, just prior and during the Creek Civil War. Site 1Mc110, is a Creek Indian village site listed on the National Register of Historic Places, and placed in Prescription 4.E. The Tuskegee Management Area was initially acquired into federal ownership through the East Alabama Land Resettlement Administration. Early 20^{th} century infrastructure elements, fire towers, recreational facilities associated with the resettlement administration can be found on the management area.

Trends - Archeological surveys will be conducted prior to land management activities. Research will be conducted on the early historic Creek Indian period and the East Alabama Resettlement Administration.

General Effects

Introduction

Prior to decision making for planned land management undertakings on the National Forests in Alabama, heritage resource inventories of the proposed area of potential effect (APE) are conducted, and consultation with the Alabama State Historic Preservation Office (SHPO) are conducted. If any heritage resources are identified as being eligible for the National Register of Historic Places, protective or mitigative measures are developed through consultation with the Alabama SHPO. The Forest includes these protective or mitigative measures in their project plan.

The discussion of direct, indirect, or cumulative effect is based on the assumption that although the required inventories have been conducted, including field survey, some smaller heritage sites or light artifact density sites may have been missed, and may be revealed during or subsequent to the project implementation. The amount of cumulative effects to known heritage sites considered eligible for the National Register of Historic Places from all management activities should be slight as inventory, assessment, protection and mitigation measures would be implemented prior to the initiation of the land management activities.

In addition to potential effect from land management activities, there is also potential effect from natural activities such as erosion, natural weathering, and wildfire. These natural occurrences could contribute to heritage resource deterioration through time. Cumulative effects from illegal artifact hunting and archeological vandalism occur on certain types of sites, primarily bluff shelters. Law enforcement may stem some of the activity if the perpetrators are apprehended and prosecuted. Public education as to the intrinsic values of heritage resources is also needed.

Prior to 1975, no heritage resource inventories existed. No records pertinent to the potential resource database were maintained. Therefore, the cumulative effects of Forest-related projects occurring on that resource base prior to the mid 1970's must be added to current measured effects. When compared to private lands, cumulative effects on national forest lands are comparatively fewer. This is due to little or no resource base inventory is systematically conducted on private lands, and because currently, protective or mitigative measures are rare unless federally funded projects are being planned on these private lands.

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 setting (example- intrusive visual or auditory components)
- Diminished jurisdiction, as in the case of land exchange out of federal ownership

Indirect effects may include vandalism due to increase access, or erosion or siltation from an off-site project.

Effects of fire management on heritage resources

High-temperature wildfire, and in some cases, high-temperature prescribed burns, could damage surface or shallow archeological sites, standing structures, or cemetery markers. Sites of the historic period are most subject to damage because historic sites have a higher frequency of surface features and artifacts. Historic wooden structure, wooden cemetery markers and wooden fence lines are susceptible to damage by fire. Ceramic and glass artifacts from historic sites may be affected. Glazed ceramics may crack or craze making identification difficult. Glass may melt and fuse into indistinguishable clumps. Artifacts made of bone; shell and other perishable organic materials may be damaged or destroyed due to fire.

Prehistoric pottery was made by firing clays in intense heat. If refired, some chemical and physical changes can occur making identification difficult. Fire can also ruin the potential for acquiring dates of prehistoric pottery through thermo luminescence dating. As early as 12,000 years ago, Indians in the Southeast found that heating chert made the stone much easier to shape into tools. Experiments conducted to replicate this intentional thermal alteration by Barbara Purdy and H.K. Brooks in 1971 indicate that some cherts which contain iron oxides will change color when heated to a temperature of 240-260 degrees Celsius (464-500 F). Cherts with no iron inclusions become waxy or glassy in appearance if heated to temperatures of 350-400 Celsius (662-752 F) for sustained periods of time. Crazing or spalling of chert will also occur in temperatures exceeding 600 degrees Celsius (1112 F). As with pottery, thermally altered chert can be used in thermo luminescence dating, if not contaminated. Chert artifacts that have been altered by modern fire may be confused with those altered prehistorically. This could skew laboratory analysis, distorting percentages of prehistorically heat-treated versus non-heat treated materials, thus reducing their value as indicators of measurable prehistoric activities represented at specific locales.

Shallow archeological sites may also be affected by fire. Studies conducted by Carol Wells in 1977 and reported in Effects of Fire on Soil: A State of Knowledge Review, showed that the temperature of the soil below one inch from the surface is not usually raised unless extremely intense 700 degree Celsius (1292 F) fires are at the surface. Studies conducted in the southeastern United States showed that temperatures in the top .12 to .25 inches of the soil layer usually do not exceed 135 degrees Celsius (275 F). In most cases, deeper buried sites will not be affected by fire.

The fuel type most likely to effect subsurface cultural remains are slash piles. Temperatures from a burning slash pile could alter artifacts within the top .25 inch. However, the heavy equipment used to make the slash pile would in most cases create a greater effect to the cultural resource.

The plowing of the firebreaks can cause detrimental effects to heritage resources, however, the dozer operator is attempting to only remove the forest litter and organic layer of soil. Firebreaks laid in using dozer blades may physically displace artifacts down to 10 centimeters below surface. The heavy equipment may break artifacts, but also cause displacement of artifacts as well as shallow subsurface features such as fire hearths, trash pits and postholes. The nature of the displacement is primarily lateral, as the blade pushes soil and artifacts to each side of the firebreak over a swath about three meters wide. When several firebreaks are used to control wildfire, it would be possible to have a wider area of disturbance. Normally, heritage surveys are not conducted prior to construction of emergency firebreaks, so the possibility of damage to unknown heritage resources during wildfire suppression is higher.

Indirect effects may include erosion losses due to burned vegetation cover, or further deterioration of artifact or feature condition following damage by high temperatures. Increased ground surface visibility may facilitate illegal collecting of artifacts from surface exposures. 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 due to the fact that protection under federal law would no longer apply to the heritage resources contained within an exchanged tract.

Land Use

Special Use Permits most often involve small acres and therefore the potential for impact is low.

Effects of minerals management on heritage resources

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.

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 may be severe, it is usually localized.

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.

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 due to the fact that 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 represent 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 centimeters below surface) properties, and disturbance may occur over most of the stand or area being harvested. An uneven-aged harvest would similarly disturb the upper 20 centimeters or so 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. The disturbance may sometimes exceed 20 centimeters.

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 to 20 centimeters, 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 due to the fact that pushing stumps and slash into windrows for subsequent treatment displaces a substantial amount of soil, often exceeding 30 to 40 centimeters 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 materials 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 were accomplished manually rather than using heavy equipment. The construction of wildlife food plots may produce minimal impacts, similar to firebreak discing. This would apply for the general plowing that takes place in an established plow zone, usually within the top 30 centimeters. Wildlife food plots are periodically plowed deeper than the plow zone. This chisel plowing will produce deeper impacts. Unauthorized collection of surface artifacts from wildlife food plots may occur as an indirect effect resulting from increased ground visibility.

To some degree, areas protected for wildlife or sensitive species are also areas of high probability for containing significant heritage resources. Therefore, protective management for wildlife purposes may benefit or compliment protection of heritage resources.

Effects By Management Area

Fire Management - The effects of fire management will be common forest-wide. On the Conecuh National Forest, some of the firebreaks are constructed by disc plowing. Most of the firebreaks are pushed with blade. On the other districts, firebreaks are constructed by pushing with blade. On all districts, areas of high site probability are the first and second terraces overlooking streams and creeks. Proposed firebreaks along these landforms have a higher potential of effecting heritage resources. Standing historic structures are located on the Bankhead District and Talladega Division. Cemeteries with wooden markers may be present on all districts.

Land Adjustment - Land adjustment activity will be highest on the Bankhead District, with much of the activities involving tracts of land going out of federal ownership. The Bankhead District has high potential for heritage sites on terraces and in the bluff line areas. Land adjustment activities will also be high on the Talladega Division; however, most of these activities will be in the acquisition of tracts. Land adjustment activities on the Oakmulgee and Conecuh Districts will be moderate, with the activities involving both acquisition of tracts and tracts being exchanged out of federal ownership. The Talladega Division and the Oakmulgee District have moderate to high potential for heritage sites, especially along the first and second terraces. The Conecuh District had a low site density, with approximately three-fifths of the district having been surveyed. Land adjustment activities on the Tuskegee will be relatively low, with the activities involving primarily acquisition. Approximately four-fifths of the Tuskegee District has been surveyed.

Land Use

Special Use permits will be considered Forest-wide.

Minerals Management - The effects for sand and gravel exploration will be forest-wide, however, this activity will be low. Oil and gas exploration will be highest on the Conecuh. Clay exploration and gas exploration will be moderate on the Oakmulgee District. Recreational gold panning will be low on the Talladega.

Recreation Management - Recreation management will be forest-wide. Trails and increased access into the bluff areas of the Bankhead District may increase vandalism and illegal artifact collecting of artifacts.

Structure Management - Structure management will be forest-wide.

Transportation Management - Transportation management will be forest-wide.

Timber Harvest - Timber harvest will be forest wide.

Site Preparation - Site preparation will be forest wide.

Pine Straw Collection - Pine straw collection will be a moderate to low activity on the Conecuh District, the Oakmulgee District and the Tuskegee District.

Wildlife Management - Red-cockaded woodpecker midstory removal will be a moderate to low activity on the Talladega Division, the Oakmulgee District, and the Conecuh District. Maintenance of existing wildlife food plots will be forest-wide. Construction of new wildlife food plots will be done in coordination with timber sales.

Effects By Alternative

As discussed earlier in this chapter, compliance inventories are conducted in consultation with the Alabama 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.

Five direct effects caused by forest management were noted above. 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.

Although there is not a formal predictive model for the National Forests in Alabama, examination of the archeological survey status atlases for the different management areas reveal higher and lower potential areas for heritage resources. Most of the heritage sites occur on first and second terraces, on level, well-drained landforms, overlooking streams and creeks. Therefore a high percentage of the heritage resources will be located in the streamside or riparian area zones. The riparian zone prescription (Prescription 11.B) will be applied to all alternatives.

Two other prescriptions will give either greater emphasis on heritage resources or indirect protection to heritage resources. These prescriptions will be applied to all alternatives:

Prescription 4.E Cultural / Heritage Areas
Prescription 9.F Rare Communities

In Alternative I, Prescription 4.L Canyon Corridor will give indirect protection to heritage resources on the Bankhead Management Area.

Alternatives D and F will have the greatest potential to effect unknown heritage resources through timber harvesting, thinning and road construction.

Alternatives B, G and I would have the least potential to effect unknown heritage resources through timber harvesting, thinning and road construction. These alternatives would also give the most protection to heritage resources through streamside and riparian area protection.

Alternatives A and E would fall into the midrange of protection for heritage resources. Alternative A would vary somewhat with management area, with more cutting occurring in areas where timber plays a greater factor in local economies.

3.0 Forest Products

3.1 Affected Environment

The Multiple-Use Sustained Yield Act of 1960 recognizes timber as one of the five major resources for which national forests are to be managed. National forest timber resources are managed to provide timber for the use and necessities of the citizens of the United States, provide an even flow of timber to stabilize communities, provide for regeneration of tree stands, and maintain diversity of forest vegetation.

Management of the timber resource on the National Forests in Alabama involves a variety of forest types occurring in the different physiographic regions represented by the four national forests. The Conecuh National Forest adjacent to the Florida state line is in the Lower Gulf Coastal Plain with wet “bays” supporting mostly low value redbay, sweetbay, and blackgum. Sand ridges support longleaf pine. Slash pine and some commercial hardwood types occur in areas between the wet bays and dry ridges.

The Tuskegee National Forest and the Oakmulgee Division of the Talladega National Forest are in the Upper Gulf Coastal Plain. Longleaf and loblolly pines are the predominant types, along with minor amounts of shortleaf pine. Bottomland and upland hardwoods are much more prevalent than on the Conecuh.

The Talladega Division of the Talladega National Forest is located in the northeast part of the state on the southern end of the Appalachian Mountains. Upland hardwoods and a mix of southern yellow pines (shortleaf, loblolly, longleaf, Virginia) are predominant. Mountain longleaf pine, a variety unique to Alabama, occurs only on this Division.

The Bankhead National Forest includes the lower reaches of the Cumberland Plateau within the Tennessee River drainage in the northwest portion of the state. All southern yellow pine types except slash occur on this forest, along with a wide variety of upland and cove hardwoods. Hemlock is unique to the Bankhead among Alabama’s national forests, and the state champion yellow poplar is also found here.

Recent Timber Production

Although the national forests in Alabama contain a wide variety of tree species, timber products are grouped and sold as either pine or hardwood. Pine sawtimber and small roundwood products include all pine species found on the forest, including loblolly, shortleaf, slash, Virginia, and longleaf pines. Hardwood sawtimber and small roundwood include all the various hardwood species, such as oak, hickory, yellow poplar, sweetgum, blackgum, etc.

Pine sawtimber is all pine species 9.6 inches and larger in diameter. Pine small roundwood is all pine species from 5 inches to 9.5 inches in diameter. Hardwood sawtimber is all hardwood species 12.0 inches and larger in diameter. Hardwood small roundwood is all hardwood species between 6 inches and 11.9 inches in diameter.

Average stumpage prices received for pine and hardwood sawtimber (per CCF) and pine and hardwood small roundwood (per CCF) are presented in Table 3C-46. These prices are an average for the period of 1991 to 2000 (adjusted to 1996 dollars) and are shown by planning unit, which may include more than one district or forest, and also an average for the forest. No hardwood prices are shown for the Conecuh NF since only pine products have typically been sold on the forest. Salvage sale stumpage prices are not included in the averages.

Table 3C-47 Average Stumpage Prices

Planning Unit	Sawtimber ($/CCF)		Small Roundwood ($/CCF)	
	Pine	Hardwood	Pine	Hardwood
Bankhead and Talladega Division	99.72	22.44	19.36	7.84
Conecuh	140.84		23.60	
Tuskegee and Oakmulgee Division	113.73	50.05	21.24	14.45
NFs in Alabama (weighted average)	113.57	28.24	20.44	7.88

MBF – thousand board feet CCF – hundred cubic feet

Table 3C-48 displays the volume of timber sold by product and species group on the National Forests in Alabama from 1986 to 2001. Volume sold fluctuates annually due to market conditions and other factors, including meeting requirements of the various environmental regulations and the NEPA process. Pine sawtimber accounted for close to 90 percent of the total sawtimber volume. Salvage sales are excluded since they are not considered a part of the normal timber program. Since 1986, there has been a decreasing trend in timber volume sold across all product groups. Sawtimber volume in 2001 was down approximately 99 percent from 1986 levels. Small roundwood volume decreased even more (94 percent) during the same period.

Table 3C-48 Timber Volume Sold by Product, 1986-2001.

	Sawtimber (MCF)			Small Roundwood (MCF)		
Year	Softwood	Hardwood	Total	Softwood	Hardwood	Total
1986	10,559	881	11,440	4,469	1,564	6,033
1987	8,588	1,056	9,644	3,454	1,432	4,886
1988	8,072	869	8,941	3,104	1,285	4,389
1989	7,287	615	7,902	3,057	997	4,054
1990	6,494	839	7,332	3,088	1,258	4,346
1991	6,087	771	6,858	4,288	1,087	5,375
1992	7,892	1,030	8,922	5,353	1,667	7,020
1993	4,986	603	5,589	4,086	1,055	5,141
1994	3,757	324	4,081	3,194	773	3,967
1995	4,185	167	4,352	4,137	499	4,636
1996	1,587	223	1809	1,922	297	2,219
1997	2,309	280	2,589	2,455	543	2,998
1998	1,745	157	1,902	1,232	289	1,522
1999	691	54	745	877	83	960
2000	1,219	20	1,239	358	24	382
2001	99	0	99	371	0	371

MCF – thousand cubic feet
Note: 5.5 MBF = 1 MCF

Table 3C-49 shows the total harvest volumes from 1986 to 2001 and illustrates the overall trend in volume reduction for the period. Annual total volume sold declined just over 97 percent from 1986 to 2001. Sawtimber volume sold decreased approximately 99 percent. Small roundwood volume fluctuated during the period with no overall trend until 1995, when volumes declined significantly toward the end of the period.

Table 3C-49Total Timber Volume Sold, 1986-2001. (Million Cubic Feet)

Year	Sawtimber	Pulpwood	Total
1986	11.44	6.03	17.47
1987	9.64	4.89	14.53
1988	8.94	4.39	13.33
1989	7.91	4.05	11.96
1990	7.33	4.35	11.68
1991	6.86	5.37	12.23
1992	8.92	7.02	15.94
1993	5.59	5.14	10.73
1994	4.08	3.97	8.05
1995	4.35	4.64	8.99
1996	1.81	2.22	4.03
1997	2.59	3.00	5.59
1998	1.90	1.52	3.42
1999	0.75	0.96	1.71
2000	1.24	0.38	1.62
2001	0.10	0.37	0.47

Table 3C-50 below shows the acres harvested from 1986 to 2001 by type of treatment or cutting method. The significant decrease in volume harvested over the period, as shown above, is very noticeable in the sharp decline of harvest acres for all cutting methods.

Table 3C-50 Acres harvested by cutting method, 1986-2001.

Year	Clearcut	Seed Tree	Removal	Selection	Thinning	Sanitation
1986	*	*	*	*	*	*
1987	*	*	*	*	*	*
1988	6,334	847			8,969	
1989	6,451	24			8,446	
1990	5,474	541	481	31	5,991	
1991	1,223	118	279		3,454	157
1992	4,190	669	201	10	9,124	266
1993	2,887	639	330	135	4,079	328
1994	1,724	826	579	178	7,275	1,255
1995	1,209	511	504	42	5,909	2,345
1996	882	235	476	52	3,974	18,028
1997	1,250	111	224	125	3,161	135
1998	1,035	46	163		3,168	425

Year	Clearcut	Seed Tree	Removal	Selection	Thinning	Sanitation
1999	778	42	38	35	1948	55
2000	253	62			3,512	320
2001	70				618	462

* Data not available

Table 3C-51 shows the estimated net annual growth of timber on the national forests in Alabama. The net annual growth is the gross annual growth less the annual mortality. This reflects re-measurement of permanent FIA plots on the forests between 1990 and the latest survey (1997 to 2000). The total average net annual growth of all species on the forests was 43.0 MMCF and the average annual volume sold was 8.2 MMCF for the same period.

Table 3C-51 Average Net Annual Growth

	Yellow Pine	Other Softwood	Hardwood	All Species
Sawtimber	128.1 MMBF	2.2 MMBF	70.7 MMBF	201.0 MMBF
Growing Stock	23.9 MMCF	0.5 MMCF	18.6 MMCF	43.0 MMCF

MMBF – million board feet MMCF – million cubic feet
Source: Forest Statistics for Alabama, 2000; Resource Bulletin SRS-67, Southern Research Station, Asheville, NC, 2002.

National Timber Supply and Demand

Highlights of the 2000 RPA Timber Assessment include:

- Consumption of forest products will continue to increase over the next 50 years, but the rate of increase will be slower than over the last 50 years. Rising consumption will be accompanied by increases in U.S. timber harvest; rising log, chip and product imports; and greater use of recovered paper.

- The composition of both production and consumption will change. Pulp and paper products will account for a larger share, the relative importance of composite products will remain steady, and the importance of lumber will decline.

- The projected prices of sawtimber in the South are a notable exception to the overall projection of moderate price increases: prices are projected to rise as a result of limited availability.

- Over the next 50 years, most of the increase in the Nation's timber harvest will occur in the East and especially on nonindustrial lands in the South.

- United States timber harvest is expected to increase 24 percent by 2050; harvest of softwoods will increase 30 percent and harvest of hardwoods will increase by 17 percent. Most of the increase will be used for manufacturing paper, paperboard, and composite products.

- Plantations for softwood species will play an important role in future domestic harvest expansion. By 2050, 54 percent of total U.S. softwood growing stock removals will come from plantations in private ownership.

- Timber inventories will increase over the next 50 years. Softwood timber inventories will rise on all ownerships in all regions by 53 percent for the U.S. as a whole; softwood inventories on public lands alone will rise by more than 70 percent. Hardwood inventories will increase by 27 percent.

- Over the next 50 years, the species composition of U.S. forests will shift toward softwoods in the South and toward hardwoods in the North, but remain largely unchanged in other regions.

- By 2050, the age structure of forests managed on an even-aged basis will be similar to current conditions on private lands but shift toward older age classes on public lands.

- Harvests on national forests decreased from 2.0 billion cubic feet in 1991 to 0.8 billion cubic feet in 1997 and are projected to remain near the 1997 harvest level over the next 50 years.

- Although domestic production will continue to account for most of the U.S. consumption, the share of total consumption met by imports will rise from 20 percent today to 26 percent by 2050.

Local Timber Supply and Demand

Although national forest lands are only a small portion (3 percent) of the total forestlands in Alabama, they account for a large percentage of forestlands in some counties. Timber supply is the relationship between the quantity of timber landowners will offer and price. Timber demand is the relationship between the quantity demanded by wood product manufacturers and price. This interaction of supply and demand defines timber markets. Timber is exchanged in several markets in Alabama. Softwood sawtimber is used in the manufacture of structural lumber and poles. Hardwood sawtimber is used for both aesthetic (furniture, cabinets, flooring) and industrial (shipping pallets) products. Low quality timber is used to make paper and packaging material.

A market area for timber from the National Forests in Alabama was defined to fall within a competitive zone representing the area of timber procurement for the mills that utilize national forest timber. This area encompasses 49 counties in Alabama, 15 counties in Georgia, and 14 counties in Florida, and includes 23.2 million acres of timberland. Distribution of commercial timberland within the market area by ownership is listed in Table 3C-52.

Table 3C-52 Commercial Timberland Distribution

Ownership	Million Acres	Percent
National Forest (NFsAL)	1.0 (0.6)	4.4 (2.6)
Other Public	1.4	6.0
Forest Industry	6.5	28.1
Farmer	4.0	17.4
Corporate	1.9	8.4
Individual	8.3	35.7
Total	23.2	100.0

National forest lands are 4.4 percent of the timberland within the market area and contain 6 percent of the growing stock and 7 percent of the sawtimber. With less than 3 percent of the timberland in the market area, the National Forests in Alabama provided over 10 percent of the market area sawtimber harvest in 1986. This figure dropped to less than 4 percent in 1993, and currently less than 1 percent of the market area sawtimber harvest is from national forest.

Southern softwood sawtimber stumpage prices, as projected by the RPA Timber Assessment, are expected to increase due to limited supply on private lands and reduced harvesting on national forests. The market share of timber (primarily sawtimber) supplied by the national forests has sharply decreased as total timber production in the market area has steadily increased in recent years.

Since national forest lands are concentrated in a few counties with the market area, smaller mills located in these areas have been more dependent on national forest timber than larger mills, which are typically further away but have much larger procurement areas. The Analysis of the Management Situation for the National Forests in Alabama Land and Resource Management Plan (1985) determined that 13 mills were dependent on the national forests for 25 percent or more of their timber volume. Seven of these mills acquired 50 percent or more of their volume from national forest lands. Decreased timber availability from federal lands has a greater impact on these small mills since their procurement areas are limited as compared to the larger mills. The long-term viability of local solid wood producers will be affected by the limited availability of sawtimber from both federal and private lands. The closing of one mill in a rural county can have significant impacts to the local economy.

3.2 Direct and Indirect Effects

Land suitable for timber production, long-term sustained yield capacity (LTSYC), and estimated timber yields or allowable sale quantity (ASQ) were considered in evaluating the effects of implementing the alternatives on the forest product resource. Land suitable for timber production is determined by both appropriateness and capability of the land for growing regulated crops of trees for consumer or industrial use. Table 3C-53 shows a comparison of acres and percentage of total forest land (665,226 acres) classified as suitable for timber production by alternative. The documentation for timber suitability determination is found in Appendix B, “Analysis Process”.

Table 3C-53.
Acres and Percent of Forest Classified as Suitable for Timber Production by Alternative

Alternative	Suitable Acres	Percent Suitable
A	402,071	60
B	398,812	60
D	465,523	70
E	392,414	59
F	459,152	69
G	406.883	61
I	389,480	59

Long-term sustained yield capacity is the highest uniform wood yield from lands managed for timber production that may be sustained under a specified management intensity consistent with multiple-use objectives. Table 3C-54 compares the long-term sustained yield capacity by alternative. The LTSYC for all of the alternatives is significantly lower than for the current forest plan, due to generally longer management rotations and less land classified being as suitable for timber production. The maximum timber benchmark is used for comparison purposes. This shows the maximum total volume that may be produced during the planning horizon. The benchmark includes constraints for minimum legal requirements. The objective for this benchmark is to maximize volume and not present net worth (PNW) as in the alternatives.

Table 3C-54
Long-Term Sustained Yield Capacity by Alternative
(Million Cubic Feet/Year)

Alternative	LTSYC
A	20.3
B	17.6
D	22.7
E	18.1
F	22.2
G	17.8
I	17.1
Maximum Timber	24.9
1985 Forest Plan	33.5

SPECTRUM, a linear program-based forest planning model used to optimize land allocation and activity and output scheduling over a specified planning horizon, was used to calculate the period by period outcomes, including changes in vegetation growth stage, acres treated, and timber harvest volumes. Data provided to the model included the allocation of acres of land to a management prescription category; identification of suitable lands for timber management; current vegetation conditions from GIS; and the identification of vegetative treatments and associated management objectives for each alternative. The LTSYC estimates above and ASQ volumes by period for each alternative were derived from SPECTRUM.

The allowable sale quantity is the maximum quantity of timber that may be sold from the land suitable for timber production for a period specified by the Forest Plan. The estimated allowable sale quantity by ten-year period for each alternative is displayed in Table 3C-55.

Table 3C-55
Estimated Allowable Sale Quantity by Period
(Million Cubic Feet)

Alternative	Period				
	1	2	3	4	5
A	136.9	192.1	203.2	190.6	203.2
B	102.9	165.7	171.0	172.8	174.0
D	226.9	226.9	226.9	226.9	226.9
E	147.8	163.5	181.0	163.6	174.0
F	222.0	222.0	222.0	222.0	222.0
G	126.1	155.0	178.2	177.5	178.2
I	85.3	155.8	157.5	160.0	166.0

Volume harvested from land classified as unsuitable for timber management is not included in the ASQ figures shown above. This volume results from vegetation management practices such as restoration activities to attain desired future conditions, wildlife habitat improvement, recreation projects, and other management activities on unsuitable lands. The estimated sale quantity from unsuitable lands by ten-year period for each alternative is displayed in Table 3C-56. These estimates were also obtained from SPECTRUM and are primarily harvests from riparian areas. All alternatives may also have additional volume removed due to unplanned management activities, such as salvage for SPB control, on both suitable and unsuitable lands.

Table 3C-56
Estimated Sale Quantity from Unsuitable Lands by Period
(Million Cubic Feet)

Alternative	Period				
	1	2	3	4	5
A		11.1		12.6	
B		11.1	5.7	3.9	2.7
D					
E		17.5		17.4	7.0
F					
G		23.2		0.7	
I	5.9	16.2	14.5	12.0	6.1

Estimated final harvest and thinning acres for each alternative are shown below for suitable lands (Tables 3C-57 and 3C-58). Estimated total harvest acres for each alternative are shown below for unsuitable lands (Table 3C-59). All alternatives may also have additional harvest acres due to unplanned management activities, such as salvage for SPB control, on both suitable and unsuitable lands. Tables in the "Major Forest Communities" section (or "Forest Health" section) show the estimated harvest acres by community type, alternative, and period.

Table 3C-57

Estimated Final Harvest Acres on Suitable Lands by Period (Acres)

Alternative	Period				
	1	2	3	4	5
A	21,101	38,781	38,338	36,754	40,094
B	13,016	31,578	29,125	35,293	36,392
D	47,032	46,918	43,984	48,155	44,246
E	23,632	32,194	31,794	35,008	40,191
F	39,924	48,034	43,962	45,374	44,837
G	22,279	29,722	30,483	37,198	36,543
I	13,093	31,775	28,018	30,711	32,070

Table 3C-58

Estimated Thinning Acres on Suitable Lands by Period (Acres)

Alternative	Period				
	1	2	3	4	5
A	35,741	31,565	40,180	49,804	48,676
B	38,920	33,960	35,575	39,742	30,627
D	30,397	36,853	52,198	55,467	63,495
E	36,241	35,036	44,500	43,981	40,911
F	30,986	36,480	50,511	66,332	68,730
G	34,927	35,170	47,658	45,589	43,236
I	27,842	18,425	23,554	32,018	32,650

Table 3C-59

Estimated Harvest Acres on Unsuitable Lands by Period (Acres)

Alternative	Period				
	1	2	3	4	5
A		3,534		3,221	
B		3,518	1,436	1,027	711
D					
E		5,224		3,824	1,798
F					
G		6,867		203	
I	1,679	4,625	3,378	2,333	1,458

The following table shows the estimated annual revenues, costs, and net revenues of the timber program for each alternative by period. The costs shown are the direct costs associated with the timber sale program (sale preparation, administration, and stand establishment with associated treatments). The net revenue is the difference between revenues and costs.

Table 3C-60

Projected Average Annual Timber Program Revenues, Costs, and Net Revenues by Period (Million $)

		Period				
Alternative	Measure	1	2	3	4	5
	Revenue	10.91	13.01	10.30	9.89	12.41
A	Cost	2.19	2.87	3.03	2.75	3.01
	Net	8.73	10.13	11.27	7.14	9.40
	Revenue	6.19	9.16	9.84	9.59	10.94
B	Cost	1.27	2.37	2.16	2.38	2.59
	Net	4.92	6.79	7.67	7.21	8.35
	Revenue	15.26	13.05	17.27	10.67	13.90
D	Cost	3.04	2.94	2.84	3.42	3.31
	Net	12.22	10.11	14.43	7.24	10.59
	Revenue	9.40	9.33	11.73	7.15	9.35
E	Cost	1.88	2.36	2.38	2.55	2.83
	Net	7.52	6.97	9.34	4.60	6.52
	Revenue	12.92	13.58	17.33	11.14	14.37
F	Cost	2.70	3.01	3.17	3.03	3.18
	Net	10.22	10.57	14.17	8.11	11.19
	Revenue	8.59	9.00	11.24	8.39	10.99
G	Cost	1.76	2.22	2.31	2.65	2.57
	Net	6.83	6.78	8.93	5.74	8.42
	Revenue	6.19	8.75	9.48	8.18	10.66
I	Cost	1.43	2.44	2.24	2.43	2.49
	Net	4.76	6.31	7.24	5.75	8.18

All of the alternatives have positive net revenues for all periods. The alternatives rank the same for net revenue as they do for ASQ in the discussions below by alternative.

Alternative A.

Alternative A emphasizes production of a mix of goods and services beneficial to local economies and communities. This alternative ranks fourth in the amount of land classified as suitable for timber production, third in LTSYC at 20.3 MMCF per year, fourth in first period ASQ with an estimated harvest of 136.9 MMCF, and fifth in total number of acres receiving some type of harvest activity in the first period.

Alternative B.

Alternative B emphasizes restoration of vegetation to natural community types and plant associations. This alternative ranks fifth in the amount of land classified as suitable for timber production, next to last in LTSYC at 17.6 MMCF per year, next to last in first period ASQ with an estimated harvest of 102.9 MMCF, and next to last in total number of acres receiving some type of harvest activity in the first period.

Alternative D.

Alternative D emphasizes balanced age classes, resulting in shorter rotation ages for most community types with an equal number of acres in each ten-year age class. This alternative ranks first in the amount of land classified as suitable for timber production, first in LTSYC at 22.7 MMCF per year, first in first period ASQ with an estimated harvest of 226.9 MMCF, and first in total number of acres receiving some type of harvest activity in the first period.

Alternative E.

Alternative E emphasizes recreational activities. This alternative ranks next to last in the amount of land classified as suitable for timber production, fourth in LTSYC at 18.1 MMCF per year, third in first period ASQ with an estimated harvest of 147.8 MMCF, and third in total number of acres receiving some type of harvest activity in the first period.

Alternative F.

Alternative F provides direction from the current Forest Plan with adjustments for the new suitability determination. Suitable acres dropped from 494,187 in the 1985 National Forests in Alabama Forest Plan to 459,152 in Alternative F, resulting in a reduction of LTSYC from 33.5 MMCF to 22.2 MMCF. This alternative ranks second in the amount of land classified as suitable for timber production, second in LTSYC, second in first period ASQ with an estimated harvest of 222 MMCF, and second in total number of acres receiving some type of harvest activity in the first period.

Alternative G.

Alternative G emphasizes late successional habitats with large undisturbed areas linked by wildlife movement corridors. This alternative ranks third in the amount of land classified as suitable for timber production, fifth in LTSYC at 17.8 MMCF per year, fifth in first period ASQ with an estimated harvest of 126.1 MMCF, and fourth in total number of acres receiving some type of harvest activity in the first period.

Alternative I.

Alternative I is the selected action. This alternative ranks last (fewest acres) in the amount of land classified as suitable for timber production, last in LTSYC at 17.1 MMCF per year, last in first period ASQ with an estimated harvest of 85.3 MMCF, and last in total number of acres receiving some type of harvest activity in the first period.

3.3 Cumulative Effects

The first period annual ASQ and LTSYC for all of the alternatives is well below the average net annual growth on national forest lands of 43 MMCF (determined from Forest Inventory Analysis measurements as discussed above under the section on "Recent Timber Production"). National Forest in Alabama forest lands are a minor component (approximately 3%) of total forest lands within the forest products market area discussed previously in this section. There are no identifiable cumulative effects in relation to forest products specifically. Potential adverse effects from a timber sale program are from vegetation manipulation, such as harvesting and related silvicultural activities, and road reconstruction or maintenance, which are discussed in the appropriate sections of this chapter (see the Soils, Water, Roads and Access, and Forest Health sections). Private lands within and adjacent to the national forests are not affected by the forest products program since timber harvesting is a means to reach other management objectives, which would likely occur whether or not forest products are sold.

4.0 Roads and Access

Introduction

Transportation facilities are essential in providing access to and through the Forest. Access is provided for Forest administration, visitor recreation and for transporting forest products where applicable. Most of the transportation system is in place and generally appears to be serving the Forest well. The Forest Plan will provide a framework for an efficient and environmentally sensitive system for future Forest needs.

This topic addresses the general conditions of roads and current access to the Forest. It is closely related to Topic 1 – Developed Recreation. Further information about recreation-related travel can be found there.

4.1 Affected Environment

Most roads on the Forest were constructed for commodity needs such as timber production; mining and special use access, and range management. Although access is still needed for these purposes, access for recreational purposes are now the highest use of roads.

National Forest managers consistently face road and access issues which directly or indirectly affect the existing natural resources. The road and access issues listed below are encountered sometimes on a reoccurring basis due to a constantly changing environment.

- Recreation uses and impacts
- Legal public access to Forest lands
- Legal public access to private inholdings
- Closed versus open policy
- Economics of transporting commodities
- Law enforcement

- Public health and safety
- Road maintenance costs
- Effects and impacts on other Forest resources

Recreation-related travel stands out as a significant issue. Recreational conflicts occur on the Forest because of the increased use on the Forest and different needs of users. Areas that were once used by only a few users of one type, now face crowded conditions with several different types of users present. A key concern is the perceived incompatibility of various modes of travel. Non-motorized recreationists view their experience to be degraded by the presence of motor vehicles. They are finding it more difficult to find areas outside of wilderness that are free of motorized use.

Evident resource damage attests to unauthorized off-road travel by motorized vehicles in some areas. These violations occur yearlong, but peak during the fall hunting season. Resource damage is especially critical if it occurs in watersheds, highly erosive soil or areas containing threatened or endangered communities of plants and animals. Vandalism and destruction of signs and barricades is also a problem in some areas of the Forest.

Road Management

National Forest System roads are authorized primarily for the administration, protection, and utilization of National Forest lands. A road is a motor vehicle route more than 50 inches wide, unless designated and managed as a trail. There has been a steady increase in road miles in the Forest Service since the 1940's. Some of that increase is due to better inventorying and classifying of existing roads.

Roads can have both beneficial and negative effects. Roads provide access for multiple uses, access to private lands, firebreaks, and if properly constructed can mitigate negative effects of past roading. They can have undesired effects on hydrology, sedimentation, source of human-caused fires, habitat fragmentation, predation, road kill, invasion by exotic species, dispersal of pathogen, some recreational experiences, water quality and chemical contamination, soil productivity and biodiversity (Forest Service Roadless Area Conservation FEIS, 2000).

Roads management is an important aspect of Forest management on the National Forests in Alabama. Most of the administrative, commercial and public travel on the Forest occurs on roads. The transportation system contains about 2,000 miles of National Forest roads under Forest Service jurisdiction that provide access to and through National Forest System lands. Roads providing all levels of service are included here from paved surfaced types to high clearance 4WD types. Roads that provide access and complete the transportation network for the Forest are under municipal, county, state, other federal and private landowner jurisdictions.

A road might be classified, unclassified, or temporary. Classified roads are National Forest System roads under Forest Service jurisdiction, which are intended for long-term use. See Table 3C-61 below for a comparison of existing road miles located on the forest by jurisdiction.

Table 3C-61. Ranger Districts with associated road miles listed by jurisdiction. All data listed in this table was taken from the INFRA Database in November of 2002.

Ranger District	National Forest System Road (miles)	County Road (miles)	State Road (miles)	Federal Road (miles)
Bankhead	577	244	43	20
Conecuh	201	174	17	14
Oakmulgee	522	253	94	42
Shoal Creek	389	130	72	42
Talladega	230	212	12	0
Tuskegee	40	30	4	15
Forest-wide	1959	1043	242	133

Unclassified roads are unplanned roads, abandoned travel ways including off-road vehicle tracks that have not been designated and managed as a road or trail. In the past, these unclassified roads were termed “temporary”, “pioneer”, “ghost”, “ways”, and “two-track” roads. Several of these roads have been decommissioned to mitigate resource damage.

Temporary roads are authorized by contract, permit, lease or emergency operation. They are not intended to be part of the NFS transportation system and not necessary for long-term resource management.

Road Management Objectives

Road Management Objectives (RMO) are established for all classified roads and provide criteria for design, operation and management of the road. Design standards such as number of lanes, lane width, surface type, vehicle types, expected traffic volumes dictate management standards including functional class, traffic service levels and maintenance level. Access needs environmental constraints, and economics are considered when determining the appropriate standards to be applied.

Functional Class. The road system is composed of a branching system of arterial, collector, and local roads. Arterials provide access to large land areas, typically by linking to county roads, state highways, or communities. They have the highest standards for construction and maintenance, because of the higher design speeds assigned to them and the larger volumes of traffic they carry. Collector roads disperse traffic from arterials to large forest areas, such as watersheds. Local roads provide access to specific project areas or sites and are usually short roads of a lower standard of construction.

Table 3C-62. Miles of Road by Function Class
All data listed in this table was taken from the INFRA Database in November of 2002.

Functional Class	National Forest System Road (miles)	County, State and Other Federal Road (miles)
Arterial	0	359
Collector	226	402
Local	1750	730

Traffic Service Levels. Traffic service levels represent the significant traffic characteristics and operating conditions for a road: Level A (most efficient and free-flowing) through D (single purpose, low volume).

Table 3C-63. Miles of Road by Traffic Service Level
All data listed in this table was taken from the INFRA Database in November of 2002.

Traffic Service Level	National Forest Road Miles
A	40
B	153
C	559
D	1222

Maintenance Levels. Road maintenance levels prescribe the upkeep and restoration work necessary to retain a desired service level. Maintenance level describes the existing condition of the road in terms of current maintenance activities. Maintenance level 1 is the lowest standard and is used where roads are closed to motor vehicle traffic, while preserving the investment in the road structure. Roads assigned maintenance levels 2 through 5 are open to vehicle traffic year long or seasonally. Maintenance level 2 is also assigned to roads that require high-clearance vehicles, such as trucks and four-wheel drive vehicles. User comfort improves as the maintenance level increases up to level 5, which designates a road with a paved smooth surface.

Table 3C-64. Miles of Road by Maintenance Level
All data listed in this table was taken from the INFRA Database in November of 2002.

Maintenance Level	National Forest Road Miles
1	463
2	838
3	495
4	135
5	31

Road Maintenance

As a result of decreased and inadequate funding, the condition of many roads on the Forest has fallen below the levels necessary for safety, for resource protection and to efficiently support the traffic volumes being carried. Because of fewer commercial activities like timber sales, maintenance funding has also decreased from user contributions. Many of the county roads that provide access to the forest are substandard. County governments continue to provide maintenance on some forest roads, but at reduced levels. Trends indicate that volumes will continue to increase in the future, especially from recreation-oriented traffic.

Maintenance on roads is expensive costing on average, approximately $1,500 per mile annually. In FY2000, the Forest Service received about 30% of the estimated funding needed to maintain its existing road infrastructure. Annual accomplishment reporting indicates that the N.F. in Alabama road maintenance program has achieved maintenance on approximately 30% of the transportation system. This means that a large number of miles of road are in a deteriorating condition and are causing resource damage, especially because of erosion control problems. Many are rutted and rough and barely usable. Maintenance activities have mainly been focused on stabilizing and removing public safety hazards on National Forest System roads. To address the declining ability of the Forest in providing adequate maintenance and restoration work, physical closures to motor vehicles (Maintenance Level 1) and road decommissioning have been employed to an increasing degree on some ranger districts.

Some local roads are primitive, poorly located and difficult or impossible to maintain. They are continuing to deteriorate, causing resource damage and becoming safety hazards and would need to be reconstructed if left open for public travel. Unclassified roads (non-system travel ways) are usually not necessary for administration of NFS lands or to provide access. Most of these routes are old timber sale roads that may or may not have been closed to eliminate vehicular traffic. Others have been created by unapproved recreational use. Because many of these ways appear on the landscape as a road and in many cases cause significant resource damage, there is a critical need to monitor their use and condition and close them as soon as funding allows. There has not been adequate funding for decommissioning classified and unclassified roads.

Public scoping has shown that many of these unclassified travel ways are of interest and value to some Forest users. Some of the public wants them kept open (or re-opened) for motorized access, while others want them closed to protect roadless, wildlife and watershed values. As these routes are located and inventoried, management objectives need to be developed for them. In many cases, the objective will be to eliminate the route by decommissioning.

Road Construction and Reconstruction

The current plan listed miles of new road construction and reconstruction planned on the Forest. In the past decade, reductions in the timber sale program and lower than expected appropriations for capital investments have caused many of these roads to never be constructed or reconstructed. In the period from 1997 to 2002 there has only been 1 mile of road constructed. In the same period of time 43 miles of road was reconstructed. Of the 43 miles, 29 miles were reconstructed in 1997. This trend is expected to continue unless funding is increased.

Where roads are poorly located, road reconstruction and realignment is intended to improve water quality, provide wildlife security areas, and create a safe and efficient maintainable transportation system.

Road Density

Roads can have both beneficial and negative effects. Roads provide access for multiple uses, access to private lands, and firebreaks, and if properly constructed can mitigate negative effects of past roading. They can have undesired effects on hydrology, sedimentation, source of human-caused fires, habitat fragmentation, predation, road kill, invasion of exotic species, dispersal of pathogens, some recreational experiences, water quality and chemical contamination, soil productivity and biodiversity (Forest Service Roadless Area Conservation FEIS, 2000).

Table 3C-65. Road density from area of Ranger District and miles of road.
All data listed in this table was taken from the INFRA Database in November of 2002.

Ranger District	Size (acres)	NFS Road Density (acres/total NFS Road Miles)	Total Road Density 1/ (acres/total Public Road Miles)
Bankhead	181,156	314	205
Conecuh	83,898	417	207
Oakmulgee	157,549	302	173
Shoal Creek/ Talladega	231,846	375	213
Tuskegee	11,252	281	126
Forest-wide	665,701	340	197

1/ Includes all Road Miles.

Many of the undesirable effects associated with roads may be controlled or minimized by decreasing the open road density. Many local roads are not needed to provide public access, but may be needed for Forest administration purposes. Approximately 60 miles of classified and unclassified roads on the forest have been decommissioned since 1998.

A watershed scale road analysis should be completed for all management areas to provide the following road recommendations:

- remain open
- close seasonally (i.e. open for some part of the year for recreation purposes).
- close year-long and plant grasses in the road template to stabilize soils, or
- identify unclassified roads and the need to classify or decommission.

The National Forests in Alabama can use the above described management options to adjust the existing road density to meet recreation demands, Forest administration needs, approved commercial activities and private land access while minimizing any associated undesirable effects. The watershed scale road analysis process is time consuming and expensive, but provides detailed information for making sound managerial decisions. Road analysis will be completed at the watershed scale, as funding is available.

General Effects

Road construction and reconstruction are usually associated with development related to timber harvest, utility lines, mineral and energy development, recreation facilities, and public safety. Most of the Forest road needs for the current level of use are in place. Reconstruction, maintenance, and decommissioning of existing facilities are expected in all alternatives. Projections for new construction are much lower than was predicted for the previous planning period. Commercial use of the transportation system declined in the 1990s. This trend is expected to continue except in areas where commercial timber sales are used to accomplish restoration activities. On the other hand, recreation traffic has increased substantially. This shift in traffic composition and user types is a driving force for development of new strategies for road management.

Maintenance effects are the same for all alternatives based on previous budget levels. Roads are usually maintained on a priority basis with items like user safety, resource protections, and user comfort needs used to prioritize roads for maintenance. Road maintenance will probably remain below full capacity based on expected budgets. It is hoped that road maintenance funding will improve over current levels, due to the emphasis nationally on environmental effects caused by roads and the needed maintenance to reduce those effects.

The final decision for plan revision could have some effects on road management changes, based on new management prescriptions, implementation of the Recreational Opportunities Spectrum designation and Scenery Management System application. The Forest plan provides directions for watershed scale and project level roads analysis planning. Future site-specific issues to be address could include seasonal road closures, wildlife and fisheries habitat needs, dispersed recreation site access, resolution of user conflicts, designated OHV routes, and/or mountain biking routes.

Open road densities are expected to decrease in most areas upon completion of Watershed and Project Scale road analysis processes. The decreased need for commercial road use, lack of adequate road maintenance funding and potential for resource damage will be the driving forces to accomplish reduced road densities. Nationally, the trend in the 1990's has been to redirect maintenance funding to decommission unneeded roads and improve the maintenance conditions of those remaining. A smaller and more efficient transportation system is the expected outcome.

4.2 Direct and Indirect Effects

Effects on Production of Goods and Services Beneficial to Local Economies and Communities - Alternative A

In most areas the existing road system will be adequate. Very few new roads will need to be constructed. The need for road reconstruction will accelerate where existing roads are not adequately maintained, due to insufficient funding.

The construction and use of temporary roads would increase as the commercial use of the Forest increased. Road density would be expected to decline on all districts due to an increase of roads identified for decommissioning from completed Roads Analysis Process's.

Effects on Roads/Access Management from Restoration of Natural Resources and Wildlife Habitats - Alternative B

In most areas, the existing road system will be adequate. Very few new roads will need to be constructed. The need for road reconstruction will accelerate where existing roads are not adequately maintained, due to insufficient funding.

The construction and use of temporary roads would increase if commercial timber sales were used as a tool to achieve restoration of correct forest types. Road density would be expected to decline on all districts at a greater rate due to increasing needs identified for road decommissioning. Completed Roads Analysis at Watershed and Project Scales would identify roads where resource damage was occurring and where road densities are too high for proper methods of wildlife management.

Effects on Roads/Access Management from Balanced Age Class or Timber Commodity Alternative - Alternative D

In most areas, the existing road system will be adequate. Very few new roads will need to be constructed. The need for road reconstruction will accelerate where existing roads are not adequately maintained, due to insufficient funding.

The construction and use of temporary roads would increase as the commercial use of the Forest increased. Road density would be expected to decline on all districts due to an increase of roads identified for decommissioning from completed Roads Analysis Process's.

Effects on Roads/Access Management from Recreation and Inventoried Roadless Area Management – Alternative E

Because recommended wilderness does not allow mechanized or motorized use, access for these uses on currently open roads and trails within areas recommended for wilderness would be eliminated.

A minimum transportation system would be available that improves access for Forest road users while protecting Forest resources. In most situations, access will be limited to areas that can be accessed by maintaining or reconstructing existing system roads, or through the construction of temporary roads. New permanent roads would only be constructed in a few situations. The pace of decommissioning unneeded roads (both classified and unclassified) would be accelerated as funding becomes available. The Forest road density would decrease where roads are decommissioned due to closure of areas to motorized use and where resource damage was identified on existing roads.

New road construction for recreation purposes is expected to be very low and not vary much by alternative. It is anticipated that some reconstruction will occur, but it will be minimal, since most of the infrastructure is in place. Road operation and maintenance activities will continue to be essential to providing safe and convenient transportation facilities.

An adequate budget to support road maintenance will continue to be a challenge. Paved roads provide access to many campgrounds and cost $10,000 to $15,000 per mile to maintain. For most roads in the Forest, road damage occurs in the spring from recreational driving and in the fall from hunting activities, when wet weather conditions often saturate road surfaces.

Effects on Roads/Access Management from No Action Alternative, Current Management - Alternative F

A minimum transportation system would be available that improves access for Forest road users while protecting Forest resources. Generally, access will be limited to those areas that can be accessed by maintaining or reconstructing existing system roads, or through the construction of temporary roads. New permanent roads would only be constructed in a few situations. The pace of decommissioning unneeded roads (both classified and unclassified) would be accelerated as funding becomes available. The Forest road density would continue to decrease as roads are decommissioned.

Effects on Roads/Access Management from Linking Together Corridors and Large Undisturbed Areas - Alternative G

A minimum transportation system would be available that improves access for Forest road users while protecting Forest resources. Generally, access will be limited to those areas that can be accessed by maintaining or reconstructing existing system roads, or through the construction of temporary roads. New permanent roads would only be constructed in a few situations. The pace of decommissioning unneeded roads (both classified and unclassified) would be accelerated. The Forest road density would continue to decrease as roads are decommissioned. The Forest road density would be further reduced if most roadless areas were recommended for wilderness.

Affects on Roads and Access Management from Implementation of the "Rolling Alternative" - Alternative I.

In most areas, the existing road system will be adequate. Very few new roads will need to be constructed. The need for road reconstruction will accelerate where existing roads are not adequately maintained, due to insufficient funding. The construction and use of temporary roads would increase due to commercial timber sales being used as a tool to achieve restoration of correct forest types.

Road operation and maintenance activities will continue to be essential to providing safe and convenient transportation facilities. An adequate budget to support road maintenance will continue to be a challenge. Paved roads provide access to many campgrounds and cost $10,000 to $15,000 per mile to maintain. For most roads in the Forest, road damage occurs in the spring from recreational driving and in the fall from hunting activities, when wet weather conditions often saturate road surfaces.

Roads existing inside areas recommended for wilderness would be closed. Open road and road density would be further reduced overall in the general forest area by road management and decommissioning. Priority would be assigned to decommission roads that are causing damage to the ecosystem. Road and road sections not causing damage to the ecosystem may be closed and left in an undisturbed state to heal naturally.

Completed Roads Analyses at Watershed and Project Scales will identify roads where resource damage is occurring and where road densities are too high for proper wildlife management. Roads recognized in the analysis as not needed, will be decommissioned, as funding is available. By the same analysis process(s), some roads will be recommended for retention but managed as closed for all or part of the year. Cumulative road miles would be decreased due to less acreage available for commercial activities.

4.3 Cumulative Effects

Analysis Area and Area of Influence

Reasonably Foreseeable Actions

The use of National Forest System roads will increase as populations grow and urban development expands near the Forest. Arterial and major collector roads that connect to the Forest are expected to experience the most increased day-use traffic, particularly on weekends. As the population demand for public land use increases, the use of forest collector and local roads is expected to increase, particularly in the fall and spring seasons of the year. This additional traffic during the wet and freeze/thaw portions of the year will require additional road maintenance work to provide a safe and useable road system. Road use for non-recreational purposes is not expected to increase in most areas.

The Forest Service is required by law to provide reasonable access to private inholdings. As ownership of these lands changes, routes previously open to public access are now frequently gated and locked. Current funding levels for activities to obtain right of ways are inadequate to meet the Forest needs. The availability of public access across private inholdings is decreasing.

5.0 Range

5.1 Affected Environment

The only range allotments still existing are located on the Conecuh Ranger District. These are the Camp Creek and Open Pond allotments. The Open Pond allotment has a single pasture, Spicer Field, which has been traditionally used for range purposes.

In addition, three (3) additional allotments have not been grazed since the late 1970s or early 1980s. These are Yellow River Allotment, Stockade Allotment, and Pleasant Home Allotment, which contained the Poss D pasture. No interest has been directed toward these allotments since before the current Forest Plan. These allotments have been slowly de-commissioned over the past years, restoring the native vegetation and removing fences and corrals. These allotments will remain closed.

Historic vegetation on the uplands consisted of a park-like forest of longleaf pine with wiregrass and other fine-leaved herbs in the herbaceous layer. Fires frequently swept the area and kept the uplands free of shrubs and vines. Estimates indicate that the historic forest consisted of 75% evergreen trees, most of these longleaf pine, and oaks, which comprised about 7% of the forest. On the sandiest sterile ridges where there were not enough grassy fuels to carry a fire, scrub oaks such as turkey and bluejack occurred with stunted longleaf interspersed among the oaks and with blueberry and huckleberry as understory shrubs. Historic vegetation in the bottomlands along streams consisted of swamp chestnut oak, sweetgum, green ash, water hickory, elm, and sugarberry. Slash pine occurred around ponds and bays. As railroad lines were laid throughout the area by timber companies in the late 1800s, virgin stands of longleaf pine were cut.

The area that comprises the Camp Creek Range Allotment was purchased by the federal government from Horseshoe Lumber Company, Inc., by deed dated August 20, 1936, as part of tract Number 22. Review of aerial photographs taken in March of 1937 shows the entire area cut over with only scattered trees left. The low wet areas next to the streams show trees still remaining.

The current vegetation overstory of the allotment consists of approximately 264 acres of hardwood stands consisting of dominant species of white oak, red oak, hickory, post oak, black oak, laurel oak, and willow oak. Approximately 156 acres of bay-like areas consist of dominant species of sweet bay, swamp tupelo, red maple, and sweet gum. These areas are considered unsuitable for range due to the lack of forage in the understory. The transition area between the bottomland and sanddhill longleaf stands is generally occupied by mature slash pine. This transition zone totals approximately 253 acres. Mature longleaf pine stands comprise 373 acres. Young poletimber stands consisting of slash pine comprise 339 acres. There are 77 acres of young slash pine, and young longleaf seedlings comprise 143 acres. These areas are of sufficient age that no enclosure fences to protect the pines are needed. There are 10 acres of sand pine. Additionally, 5 acres are managed as wildlife openings.

The following categorizes acres within the Camp Creek Allotment (Camp Creek Allotment Analysis, 1998):

Range Allotment Total Acres	=	1,681
Excluded Area in Acres	=	30 (Nellie Pond)
Available Acres for Range	=	1,651
Unsuitable Range Acres	=	451
Suitable Range Acres	=	1,200

The understory vegetation, which provides the majority for forage, consists of a diversity of grasses, forbs, vines, shrubs, and trees. The most commonly found understory plants are flowering dogwood, titi, red maple, yaupon, muscadines, blueberry, huckleberry, gallberry, poison ivy, poison oak, poison sumac, sassafras, red chokeberry, persimmon, blackberry, trumpet creepers, wax myrtle, bluestem, paspalum, pinewoods dropseeds, panicum, wiregrass, Indian grass, partridge pea, blackeyed susan, and common lespedeza (see Camp Creek Range Allotment Analysis).

The forage condition was found to be good to fair. Grazing capacity was calculated to be 333 AUMs (Animal Unit Months). A cow/calf rate of 900 lb/AUM was used because the permittee on the Camp Creek Allotment typically runs with calves.

Spicer Field occupies approximately 80 acres. Overstory vegetation consists of immature sawtimber size slash pine on what is considered a longleaf pine site. Site index is 80. The understory vegetation consists of Pensacola bahiagrass.

This area was a private farm field used for agricultural purposes prior to acquisition by the Forest Service in 1968. All native vegetation was removed from this area when farmed. Since the establishment of this study area in 1970, the understory vegetation has primarily consisted of bahiagrass. Spicer Field has been a demonstration area for how the South's marginal cropland can be used to produce a return over several years by the integration of cattle and timber (Byrd and Lewis 1983). Bahia provides a high quality and quantity of grass for forage.

The current range rating is in the excellent category. The understory vegetation consists of Pensacola bahiagrass, which has a high nutritive value for grazing. Grazing capacity was calculated to be 276 AUMs. A cow rate of 681 lb/AUM was used because the permittee on SF typically runs cows without calves. If the permittee begins using cow/calves, the allowable AUM will be adjusted for the annual permit.

The dominant vegetation of Spicer Field, as remarked previously, is Pensacola bahiagrass. Bahiagrass is not native to this area. It is considered "naturalized", meaning bahiagrass has become established over a large enough area and/or long enough period of time. It is important to note that "desirable naturalized plant and animal species" are included in diversity under 36 CFR 219.27 Management Requirements (g). Because this area was farmed for agricultural products prior to Forest Service acquisition, all native vegetation had been removed. Upon acquisition by the Forest Service, bahiagrass and slash pine were planted. There is little or no diversity in Spicer Field where the plant community consists of primarily bahiagrass and off-site slash pine. When this field was acquired, it essentially mitigated the option of grazing the entire allotment. There is currently a longleaf restoration effort continuing on the Conecuh unit, which will replace the off-site slash pine with native, on-site longleaf pine.

The Camp Creek Allotment contains habitat for game species, songbirds, reptiles and amphibians, and many small mammals. The entire Camp Creek Allotment is located within the boundaries of the Blue Springs Wildlife Management Area. The primary game species on the Conecuh are the white-tailed deer, Eastern wild turkey, gray and fox squirrel, and bobwhite quail. Most hunting in this area consists of deer and turkey hunting. Many resident and migrant birds use this. Spicer Field has been beneficial to white-tailed deer and eastern wild turkey by providing an additional source of food for the deer, and bugging habitat for turkey hens and their poults.

There are no active red-cockaded woodpecker (RCW) cluster sites in the project area. The nearest inactive cluster, site 7-1, is approximately 0.25 mile north of the allotment boundary (see Appendix A); the ¾-mile zone extends into the allotment. The nearest active cluster site is approximately 11 miles to the South. The population objectives (based on 200 ac pine, pine-hardwood stand acres by management type per cluster) for compartments 6, 7, 8, and 23 are approximately 6, 4, 5, and 4 cluster sites, respectively.

The Camp Creek Allotment, within these parts of these 4 compartments, contains approximately 1,266 acres of pine and pine-hardwood sites, or potential habitat for about 6 cluster sites. Spicer Field supplies 82 acres of potential RCW habitat (currently potential foraging, but once reforested in longleaf pine and through time it would eventually provide potential nesting habitat). Habitat conditions preferred by the RCW also benefit the Bachman's sparrow. The Bachman's sparrow breeds in open pine where there is thick cover of grasses or saw palmetto (Hamel 1992). Winter habitat is similar to breeding habitat (thick grassy cover). Dr. Geoff Hill reported higher bird species richness in fire-maintained longleaf woodlands than in fire suppressed areas or planted stands of slash pine. Hill (1996) found Bachman's sparrow at 60% of his point counts in burned longleaf pine. This offers habitat for the Bachman's sparrow, but, as with the RCW, more growing season burning will have to take place to control brush and encourage more open, grassy conditions.

The gopher tortoise is the key associated species for the xeric sandhill communities located in the Camp Creek Allotment because of the dependence of other species on its burrows for food and shelter. Gopher tortoise habitat is characterized by, but not limited to, Troup, Bonifay, Fuquay, and Dothan soils, and is particularly associated with the longleaf pine community. The availability of herbaceous forage vegetation required by the gopher tortoise is related to canopy openness/closure and prescribed burning.

Sandhills habitat is suitable for the Eastern diamondback rattlesnake, the Florida pine snake, and the Eastern indigo snake. Although some indigo snakes were relocated to the Conecuh during the 1980s, this effort was apparently unsuccessful because no indigo snakes have been found on the Forest. The last valid report of the indigo snake in Covington County was 1954 (Mount 1980). The Eastern diamondback rattlesnake and the Florida pine snake are found throughout.

The dusky gopher frog also utilizes gopher tortoise burrows for shelter. However, this species also requires semi-permanent ponds, which hold water for at least 4-6 months of the year for use as breeding sites. There are 4 known breeding ponds on the Conecuh National Forest. These are located in compartments 7, 8, 22, and 30 (Bailey 1989, 1995). The Camp Creek Allotment contains Nellie Pond and Salt Pond, which are known breeding ponds for the dusky gopher frog. Salt Pond has continuously had the highest production of dusky gopher frogs of any of the known ponds on the Conecuh. Reasons for this have been noted that this pond dries frequently and has never had fish present, or fish were not present for long periods of time (Jensen 1995).

Nellie Pond has received special management attention to increase the dusky gopher frog population. Through the years, unauthorized fish stocking has been conducted by local residents. In 1992-93, these fish were removed (reference EA for Fish Removal to Improve Breeding Habitat for the Dusky Gopher Frog, 1992), a Forest Supervisor's order was made to prohibit stocking and fishing, the uplands were thinned and burned to promote gopher tortoise habitat, and cattle were fenced out of the pond area. The following spring, the University of Montevallo began research in raising dusky gopher frogs to get them past the critical tadpole stage (Braid 1993-96) because some fish remained. The number of egg masses has been increasing since this work was initiated; unfortunately, monitoring has revealed that large fish are once again present in Nellie Pond. On the positive side, the winter and summer of 2002 again dried up the pond to the point that the only portion harboring water was the small cypress pond to the northeast.

The sandhills community is also suitable habitat for the pineland hoary pea. Pineland hoary pea is recognized as a distinct species from *Tephrosia virginiana* by some (Clewel 1985), but not by others. Isley (1990) does not recognize that some populations in the Florida panhandle with reduced foliose inflorescences with solitary flowers, or flowers with clustered in axils of leaves, may deserve taxonomic rank. Kral (1983) recognizes *T. mohrii* as a distinct species and states that it will increase in abundance following logging and site preparation and readily cultivates road rights-of-way.

Sensitive plants on the Conecuh found in or associated with shallow ponds and lakes include: black-fruited spikerush, hatpin, bogbutton, Small's bogbutton, Carolina lilaeopsis, water milfoil, meadow beauty, beakrush, Florida bladderwort, purple bladderwort, quillwort yellow-eyed grass, and Kral's yellow-eyed grass. Say's dragonfly is associated with ponds, but has not been found in the project area (Krotzer and Krotzer 1994). These are also present on the Camp Creek Allotment.

Water milfoil and purple bladderwort have been found in Gum Pond, which is adjacent to the Camp Creek Allotment. Cattle are excluded from Nellie Pond. Although the bald eagle is an infrequent migrant in the Conecuh, there have been confirmed sightings at large lakes or ponds.

Soils associated with streamsides, swamps and riparian communities include, but are not limited to, Bibb, Muckalee, and Osier soil series'.

Sensitive plants found in association with streamsides, swamps, and floodplains include: green-fly orchid, loblolly bay (gordonia), white arum, climbing heath, and Florida azalea. Other sensitive species associated with this habitat include Say's dragon fly, southern kidneyshell and Choctaw bean freshwater mussels, and the Florida black bear. Rafinesque's big-eared bat and southern myotis have the potential to occur in the cave adjacent to a stream in compartment 27. The last time a Florida black bear was seen or reported was in March 1994 near Bear Bay in compartment 34.

Freshwater mussels have been found associated with the Yellow River drainage, with most found in Five Runs Creek (Vittor 1994). No sensitive mussels were found within the Camp Creek Allotment or near the Spicer Field. Southern kidneyshell and Choctaw bean mussels were collected downstream in Hogfoot Creek. Other non-sensitive mussels found in or near the Camp Creek Allotment were *Villosa vibex*, *Ellipto icterina,* and *Campeloma limum.* Warren and Burr (1993) stress the importance of stream habitats to fish, and state that diversity of fish is concentrated in the southeastern U.S.

The Camp Creek Allotment and Spicer Field pastures are currently under permit, but are in their second year of optional non-use. This is due in part to the lack of maintenance funds to repair the fences. However, it is also due in part to the lack of interest from the public or permittees to actually graze cattle on National Forest lands. To date, a scoping letter sent out by the Conecuh National Forest proposing to close the range allotments has elicited nothing but positive responses from the public.

5.2 Direct and Indirect Effects

Over the years, there has been a decrease in requests for grazing opportunities on the National Forests in Alabama. Added to that, the Camp Creek Allotment contains numerous federally listed or sensitive species, and several rare community occurrences, some requiring the erection of fences to protect the resources, and a continuing need for fence replacement. The fence replacement issues are many times the result of a positive management action aimed at longleaf restoration – namely an increase in prescribed burning. While these actions are also beneficial to the restoration of native grasses within the Camp Creek Allotment, short-term side effects include damages to some fence portions – especially those that still contain wooden fence posts.

The Camp Creek Allotment contains a Gopher Tortoise Study Area for research being conducted by Auburn University (Guyer 1993, 1996). The study has been conducted concurrently with grazing, prescribed burning, and timber management. Preliminary results show benefits to the gopher tortoise from thinning and burning. No adverse impacts from grazing have been found.

Nellie Pond was fenced to exclude cattle in 1992. No sensitive species have been found at the other pond, and there has been no cattle disturbance to vegetation. Conditions favorable for RCW and Bachman's sparrow would be dependent on habitat management (prescribed burning, thinning, longleaf restoration, etc.), rather than livestock grazing. Without grazing, the RCW would not be affected. There would be some increase in ground vegetation for nesting use by Bachman's sparrow; however, supply of ground vegetation will depend primarily on the amount of growing season burning.

In general, Alternatives A and F would continue to favor the grazing program, Alternatives D & E would have some neutral to negative impacts, and Alternatives B & G would propose to limit or close down the range program. Alternative I has the proposal to close the range program as well, based on public and agency responses to date.

Because of the continuing lack of interest in grazing, the preponderance of rare communities and rare species in the Camp Creek Allotment, and the decrease in maintenance budgets for range, all but one of the allotments are proposed to be closed for this forest planning period. Only Spicer Field may be retained for any grazing opportunities since it contains non-native grasses on a set, easily accessible acreage. In addition, if any acquired lands contain what is termed "improved pasture" (i.e. naturalized non-native grasses) with adequate fencing and holding facilities, these may be considered on a case-by-case basis for grazing.

5.3 Cumulative Effects

The cumulative effects of the alternatives with their attendant management actions will not have any long-term affect on the range allotments. Due to the proposed closures and continued lack of interest in grazing opportunities, all range allotments, excluding Spicer Field, will potentially be closed by the end of this forest planning period. Based on this, there are projected to be few range opportunities over a 50-year time period.

6.0 Lands and Special Uses

The lands program includes:

- Acquiring, exchanging, and transferring forest land;
- Acquiring, granting and exchanging rights-of-way;
- Locating and maintaining property boundaries;
- Resolving land claims and trespass;
- Processing and administering special use applications and authorizations, and determining suitability of available lands for national forests purposes.
- A land ownership adjustment program which consists of a planned, coordinated program for acquiring and adjusting necessary interests in land to optimize public benefits and administrative effectiveness of the National Forests in Alabama, consistent with Congressional direction and budget authorizations.
- Land acquisition including acquisition by purchase, exchange, donation, and/or interchange. Most of the Forests have landownership patterns that diminish the optimum effectiveness and benefits that can be derived from the National Forests in Alabama.

Laws, Policy and Direction

The Transfer Act (1905) - Transferred the Forest Reserves to the Department of Agriculture.

The Weeks Law (1911) - Provides for land acquisition, exchange, condemnation and rights-of-way easements. Lands acquired by the United States under this act are reserved and not subject to appropriation under mineral law except as provided by the Secretary of Agriculture.

The General Exchange Act (1922) - Authorizes land adjustments within National Forest boundaries.

The Land Acquisition Declaration of Taking Act (1931) - Provides condemnation authority to the United States.

The Department of Agriculture Organic Act of 1956 - Provides additional land purchase authority.

The Land and Water Conservation Fund Act (1965) - Provides for funds for the acquisition of lands and interests in lands.

The Sisk Act (1967) - Provides for the exchange of lands with states and local governments.

The Federal Land Policy and Management Act of 1976 - Provides additional direction for land acquisition and exchange.

The Small Tracts Act (1983) - Provides for the sale, exchange, or interchange of certain parcels of minimal size.

6.1 Affected environment

The National Forests in Alabama encompasses 1,276,376 gross acres within the boundary of the four proclaimed National Forests. 666,081 acres are in National Forest ownership. The majority of national forest land in Alabama was acquired under the authority of the Weeks Law of 1911.

The National Forests in Alabama, primarily through land purchase and the land exchange programs, increased the total acquired U. S. lands to 666,081 acres as of October 10, 2002. Most of the lands have been acquired on the Talladega Division, Talladega National Forest.

The land ownership pattern confirms there is still work to be done. Because of the lack of land purchase funds, land exchange is the most secure vehicle for meeting the land ownership program objective.

Additional acres within the National Forest Proclamation Boundary are needed to meet expected resource outputs (water, wildlife, threatened and endangered species, timber, recreation wilderness and range). Consolidation is a desired end product for improving overall efficiency. Priority for acquisition or exchange for the National Forest is decided on a case-by-case basis. The best opportunity to improve landownership patterns has been to acquire high priority lands within or adjacent to existing National Forest lands, using scattered and/or less efficiently managed forestlands for exchange. Since the implementation of the current Forest Land and Resource Management Plan (4/86), the forest has acquired 21,658 acres by land exchange; 11,209 acres by purchase; and 242 acres by donation. Land exchange is done on a value-for-value basis. Net gain to the National Forest system through these programs has been 17,494 acres since Plan implementation.

Table 3C-66. Land Status as of October 11, 2002

National Forests	Gross Acres	Forest Acres
William B. Bankhead		
Franklin County	6,141	1,227
Lawrence County	111,763	90,332
Winston County	230,854	89,438
Forest Total	348,758	180,997
Conecuh		
Coffee County	40	40
Covington County	113,118	54,614
Escambia County	58,059	29,244
Forest Total	171,217	83,898
Talladega		
Bibb County	89,389	60,700
Calhoun County	38,338	23,703
Cherokee County	5,004	2,269
Chilton	40,212	23,031
Clay County	146,936	64,149
Cleburne County	135,586	96,421
Dallas County	8,510	2,215
Hale County	43,139	28,397
Perry County	112,175	32,661
Talladega County	98,701	45,743
Tuscaloosa County	22,783	10,645
Forest Total	740,773	389,934
Tuskegee		
Macon County	15,628	11,252
Total Alabama	1,276,376	666,081

Landlines

Ownership boundaries must be located and identified in order to allow the National forest lands to be managed by the Forest Service and used by the public, while preventing the inadvertent expenditure of appropriated funds on private lands.

As of September 30, 1995, there were 2,267 miles of property boundary on the Forests, of which approximately 2,222 miles, or 98%, have been established and monumental to standard. Except for incidental landline location associated with landownership adjustment, the Forest boundary is expected to require only maintenance after FY 2008, provided funding is available to complete the establishment work.

Claims and Trespass

The forest has a backlog of approximately 300 land claims by private citizens against the Forest Service. As our landlines are brought to standard, more claims and trespasses are discovered. Most claims are a result of erroneous landline surveys and adverse possession prior to government ownership.

Rights-of-Way Acquisition

An aggressive right-of-way acquisition program was implemented in 1971. The purpose of this program is to acquire, across private ownership, rights-of-way that are adequate for the protection administration and utilization of the National Forests. From 1971 through 1985, 263 rights-of-way had been acquired. During the past ten years (fiscal years (1986-1995) for which the current Forest Land and Resource Management Plan has been in implementation, 201 rights-of-ways have been acquired. The Forest Plan projected a need for 210 rights-of-way for that period of time. From 1996 to 1999, the average number of right-of-way acquired was 9. Currently, the Forest is averaging 1 per year, a significant reduction from the early period of the current Plan where the average was 30 right-of-way easements per year.

Table 3C-67. Right-of-Way Accomplishments

	Accomplished	Planned
FY 87	32	30
FY 88	34	30
FY 89	25	30
FY 90	21	30
FY 91	21	30
FY 92	11	12
FY 93	13	12
FY 94	12	12
FY 95	12	16
FY 96	10	19
FY 97	10	12
FY 98	9	6
FY 99	8	12
FY 00	1	6
FY 01	1	7
FY 02	0	8

Special Uses

Special use activities include outfitter-guides, campground concessions, communication sites, linear rights-of-way, and recreation special events. These activities are authorized by special use permits, easement deeds, or leases, and are issued to individuals, corporations, business entities, local, State, or Federal agencies for commercial, recreational or various other purposes, after ascertaining that the proposed use is compatible with the agency's mission.

The National Forests in Alabama has numerous utility rights-of-way, and the demand is increasing as communities expand in and adjacent to the National Forest land. Fort Earl, Bankhead and Horn Mountain were designated communication sites by the Land and Resource Management Plan Amendment #16 on September 2, 1997.

Table 3C-68. Types of Special Uses on the National Forests in Alabama

Use	Number	Acres
Recreation	10	1,802.83
Agriculture	4	7.48
Community	10	5.37
Research Study	33	12,577.16
Industry	6	12.95
Energy Generation	66	1,022.40
Transportation	176	2,621.69
Communications	55	143.93
Water	48	1,892.68

6.2 Direct and indirect effects

6.2.1 Direct and indirect effects

Minor changes to the National Forest land base may continue to occur as a result of the ongoing conveyances processes, or from future land exchanges. The future addition of electronic sites by private industry could help improve electronic signal coverage Forest-wide. Transportation and utility systems can reduce scenic quality, while at the same time increasing recreational access. They may also affect other resources. Any special use requiring land disturbance could result in compaction of soil and localized increase in soil loss due to erosion. Loss of forested habitat would be unfavorable for some plant and animals species; however, the increase in grass-forbs or brushy habitats is favored by other plants and animals.

Improved services such as access, electrical power, natural gas, and telephone communications systems to rural areas could occur. Corridor creation would reduce land available for the production of commodities such as timber products.

Special uses may increase chances of damaging cultural resources with increased soil disturbing activities. They may expose cultural resource sites to public observation and vandalism. The finding of a significant site could halt or delay special uses which involve ground disturbing activities such as pipelines, road rights-of-way, gravel pits, electronic sites, power lines, etc.

Corridor creation and electronic tower construction will reduce visual quality in varying degrees and for varying periods of time. Temporary increases in sediment delivery to aquatic systems could occur.

Land acquisition provides opportunities to improve the productivity of any degraded lands, once acquired. Water quality will also be improved as a result of watershed improvements made on these lands. Lands acquired through exchange are also often in need of watershed improvements. This is particularly true on lands that are cut over before acquisition.

Where exchange results in a net gain for public ownership, more land becomes available for management of vegetation and animal habitats. Where management improves the productivity of acquired lands, quantities of wood products and the carrying capacity of animal habitats can be increased.

Land exchange and purchase will consolidate National Forest lands and reduce management cost for property lines, rights-of-way acquisition, and trespass claim cases. Consolidation can reduce user conflicts in sensitive areas such as wilderness, wild and scenic rivers, recreation areas, trails, or other recreation facilities. Where present ownership patterns restrict public use of National Forest lands, exchange and purchase provide for better access and utilization.

Acquisition of land will increase capacity for hunting, fishing, and other forms of dispersed recreation. Increased acreage will, in most cases, increase the Forest's capability to produce timber products for industries. Jobs in these related industries would increase in proportion.

Acquisition may bring more cultural sites under protection. Chances of losing significant cultural sites on lands traded away are minimal since all National Forest lands proposed for exchange are first surveyed for the presence of significant cultural resource sites. The finding of a significant cultural site may delay or halt a land exchange.

Exchange can negatively affect local communities when exchange results in a loss of National Forest lands from a particular locale.

7.0 Wildland and Prescribed Fire

7.1 Affected Environment

Fire is a natural ecological process, but unlike many other natural events (tornadoes, floods, hurricanes), man has the capability to use fire as a tool and, as recent history has shown, to suppress the natural processes of fire. The presence of fire begins long before humans arrived in North America. Evidence of lightning fires exists as fusain in coal layers and as lightning scars on petrified trees (Pyne, 1982). Even today, lightning and thunderstorms are abundant, and Pyne surmised, "a phenomenon of such magnitude and longevity has unquestionably kindled profound evolutionary consequences". This great and persistent selecting force has influenced ecosystem traits and characteristics since fuels and lightning first interacted. The result is a forest with diversity and flexibility that is well adapted to fire occurrence. Fire has no doubt been a major selection force in our forest ecosystems, both lightning and human-caused. Many of the communities and species require fire to sustain populations. Oak and southern yellow pine communities have been major components of these forests for thousands of years. These communities promote and require fire. Recurring fire has been a part of the ecosystem for thousands of years. Burning is the oldest sustained land management force on these forests. No other practice can be said to have such a track record with known results.

A clearer picture of change over time is gained when we focus on the period since the last ice age. Dramatic changes in plant and animal communities have occurred during this post-glacial period. Importantly, humans made their way onto the North American scene during this period. The ecosystems developed within the influences of both climatic and human forces. The question often debated is whether human ignition, for those thousands of years, should be considered when determining the “natural” state of ecosystems. Several points seem clear. The forests have been continually changing. The diversity and flexibility of these natural systems are necessary to react to change. Fire is an important mechanism to retain that diversity and flexibility.

The National Forests in Alabama were established in the first half of the twentieth century. During this time, the national direction of the Forest Service was quite clear (Pyne, 1982). "Forest fires have no place in any forest but as a result of ignorance, carelessness, and indifference (Anonymous, 1936)". The practitioners of "controlled burning" battled against an enormous campaign set at the national level to stop all fire. With that new direction of suppressing all fires, that major force of selection that had been present since the ice age was suddenly altered. The consequences of that well-intentioned but misguided policy would not be obvious for several decades. The selection process that influenced plant and animal communities now changed with the absence of fire.

Perhaps, though, in defense of the dedicated firefighters during these times, this is the way it had to happen. Fire fighting equipment, intelligence, weather forecasts, budgets, and fire behavior prediction has only recently enabled prescribed burning on a substantial level. Recent scientific literature regarding plant and animal reactions and effects are now better known. We have better data on pre-settlement conditions. We are now beginning to understand some of the more dramatic long-term impacts of fire exclusion as plant and animal populations and conditions of forest ecosystems are altered.

Wildland Fire Suppression

Fires generally fall into one of two categories: wildland fires or prescribed burns. A wildland fire is a fire resulting from an unplanned ignition; it requires an appropriate management response to control its spread. A prescribed fire is any fire ignited by management actions to meet specific objectives. Escaped fires are a third category. An escaped fire is a prescribed fire that exceeds its prescription or a wildland fire that exceeds the initial level of control actions and requires re-evaluation through a Wildland Fire Situation Analysis (Routt National Forest Revised Land and Resource Management Plan 1997).

Fire is a random event and is therefore unpredictable as to its occurrence. During spring and fall fire seasons, arson is the leading cause of our wildland fire starts. Though we may know the area an arsonist is working, the next start is always an unknown. Law enforcement officials on the National Forests in Alabama have been very successful in recent years in apprehending and prosecuting a number of arson cases on the Forests. We may be able to reduce human-caused fires through active fire prevention, education, and enforcement programs.

The second leading cause of wildland fire starts is lightning. Lightning is an extremely random event that is dependent upon the weather systems that occur. Those two causes together account for 100 percent of the wildland fire occurrence during the period from 1989 to 2001.

Table 3C-69 shows the fire history for 1989 – 2001 for the National Forests in Alabama. The largest lightning fire during that time period was 200 acres and occurred on the Talladega Ranger District in June of 1996. The largest human-caused fire during that same time period was 3,321 acres and occurred on the Shoal Creek Ranger District in April of 1995. The average number of fires per year during the time period was 92 and the average acres burned were 1,963.

Generally, southern aspects had higher occurrences. Human-caused fires began largely on the lower slopes (following road and settlement patterns) and lightning was distributed on the higher slopes.

Table 3C-69. Wildland Fire History for the National Forests in Alabama

Year	No. of Fires by Cause		Total	
	Lightning	Human	No. of Fires	Acres Burned
1989	24	23	47	401
1990	26	98	124	1,614
1991	5	79	84	648
1992	2	85	87	1,386
1993	7	114	121	1,991
1994	5	62	67	1,250
1995	22	84	106	4,564
1996	9	81	90	3,374
1997	2	37	39	609
1998	6	108	114	4,288
1999	6	116	122	1,955
2000	23	73	96	2,294
2001	11	73	84	1,150
Total	**148**	**1033**	**1181**	**25,524**
Average			**92**	**1,963**

Volunteer Fire Departments (VFDs) gradually assumed the role of the local, less formal warden crews. VFDs are well distributed through the valleys, and they are trained, equipped and quick to respond. Their rapid response has kept most roadside fires to minimal acres. Not all areas of the Appalachians have this committed response. VFDs have likely prevented many wildfires from involving homes and structures.

The firefighting organization continues to evolve as interagency and intra-agency cooperation multiplies available resources, communication improves, and aircraft are utilized. All national forest units in Alabama are evaluated together for National Fire Management Analysis System (NFMAS) initial attack modeling for the planning and developing of the forest fire suppression and prevention program. The result of this latest analysis has provided the Forest with additional personnel and fire-funded equipment.

Firefighter and public safety is always the primary consideration for all suppression strategies and tactics. The full range of appropriate suppression strategies, running the gamut from direct attack to minimize acreage burned and resource value loss to indirect attack to monitoring a fire, are available to the fire manager and line officer. Strategies and tactics for the fire should be commensurate with resource values at risk. Natural barriers such as riparian areas, roads, rock slides, etc., are used whenever possible to construct firelines to mitigate impacts to soil, vegetation and water; reduce costs of line construction; and to provide for additional safety considerations. Once the Forest has an updated Fire Management Plan and Wilderness Fire Plan, or fire plans for other areas that have been identified as suitable within this Land Management Plan, wildland fire use will become an option for the management of natural (lightning) ignitions. While wildfires may not be managed to meet resource objectives, Wildland Fire Use fires may be managed to meet resource objectives once a Wildland Fire Implementation Plan (WFIP) is written for the fire.

The National Forests in Alabama are relatively fragmented with much private land within proclamation boundaries. There is increasing pressure as additional growth occurs in these areas. More people desire to live in wooded surroundings and typically work at maintaining a natural vegetative state surrounding their property to provide a more isolated setting that will block the view of any adjacent structures. While this is aesthetically pleasing, the increased vegetation can quickly become hazardous fuel in the event of a wildfire. From a suppression standpoint, anytime there is a wildfire in the wildland urban interface, more resources respond with a threat of structure involvement. These fires are much more expensive to suppress and are almost always multi-jurisdictional.

Wildfires occurring in the wilderness use MIST (Minimum Impact Suppression Techniques) techniques for fire suppression operations. While safety is still the primary consideration when selecting strategies and tactics, resources, and equipment, we utilize those that will have the least impact on the environment. Strategies that allow the fire to burn to natural barriers are favored and if fireline must be constructed, it should be of a minimum width and depth to check fire spread. Limbing, bucking, and felling of trees or snags are minimized and normally not done unless considered a safety hazard or threat to security of the fireline.

Fuels Management

For fiscal years 1986 through 2002, the National Forests in Alabama prescribe burned an average of 62,000 acres per year, ranging from a low of 44,600 acres in 1987 to a high of 80,000 acres in 2001. The average over the last few years has been approximately 70,000 acres annually.

Prescribed fire, despite concerns about its use, remains an important and ecologically appropriate management tool. Natural fuels must be managed over time to meet long-term resource management objectives. 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 as stating that fire should function as nearly as possible in its natural role in maintaining healthy wildland ecosystems and protecting human health and welfare by mitigating the impacts of air pollutant emissions on air quality and visibility.

Prescribed fire and mechanical fuels treatments are designed to reduce the risk of catastrophic wildfires by decreasing the amount of available fuel that the fire is able to consume and thus carry the fire. Both methods are utilized to restore fire regimes within or near the historical range. Condition classes are a function of the departure from historical fire regimes, resulting in alterations of key ecosystem components such as species composition, stand structure, successional stage, stand age, and canopy closure. One or more of the following activities may have caused this departure: fire exclusion, timber harvesting, grazing, introduction and establishment of exotic plant species, insects and disease (introduced or native), or other past management activities. Fire Condition Class is a measure of general wildland fire risk and ecosystem condition defined as follows:

Condition Class 1:

- Fire regimes are within or near an historical range.
- The risk of losing key ecosystem components is low.
- Fire frequencies have departed from historical frequencies by no more than one return interval.
- Vegetation attributes (species composition and structure) are intact and functioning within an historical range.

Condition Class 2:

- Fire regimes have been moderately altered from their historical range.
- The risk of losing key ecosystem components has increased to moderate.
- Fire frequencies have departed (either increased or decreased) from historical frequencies by more than one return interval. This results in moderate changes to one or more of the following: fire size, frequency, intensity, severity, or landscape patterns.

- Vegetation attributes have been moderately altered from their historical range.

Condition Class 3:

- Fire regimes have been significantly altered from their historical range.
- The risk of losing key ecosystem components is high.
- Fire frequencies have departed from historical frequencies by multiple return intervals. This results in dramatic changes to one or more of the following: fire size, frequency, intensity, severity, or landscape patterns.
- Vegetation attributes have been significantly altered from their historical range.

The National Forests in Alabama use both prescribed fire and mechanical treatments to reduce fuel loading and to break-up fuel continuity, both vertically and horizontally, to reduce rates of spread and therefore, fire size, intensity, and severity. Nationally, the direction is to increase hazardous fuels treatment in the wildland urban interface areas. Those areas are the most expensive areas to suppress wildland fires and pose the greatest threat to public and firefighter safety. Though there is not a one-to-one correlation between acres treated and suppression dollars saved, or fewer acres burned, there is sufficient evidence to show that areas that have been treated typically exhibit lower rates of spread, less intensity, less severity, and a smaller final fire size under normal conditions.

Prescribed fire is also a valuable tool to provide wildlife habitat; for managing rare communities that require periodic fire to maintain plant viability; for reducing brown-spot needle blight in young Longleaf pine stands; silviculturally as a site preparation tool; to increase forage; and, as a tool to regenerate oak stands on highly productive sites. Table 3C-70 displays the acres of prescribed fire by alternative and by type of burn in an average year over the next decade.

Table 3C-70. Acres of Prescribed Fire by Alternative

	Acres of Prescribed Fire by Type of Burn in Average Year of First Period	
Alternative	Fuel Reduction	Site Preparation
A	64,800	5,050
B	90,000	5,650
D	64,800	5,950
E	86,800	4,880
F	64,800	5,750

	Acres of Prescribed Fire by Type of Burn in Average Year of First Period	
Alternative	Fuel Reduction	Site Preparation
G	86,800	5,150
I	90,000	4,440

Wildland Fire Use is being able to utilize lightning ignitions, both in and outside of wilderness, utilizing various parameters such as weather, fuel conditions and expected fire behavior to determine if the prescribe fire is within prescription parameters.

Management ignited prescribed fires in wilderness may only be ignited for threatened and endangered species and to reduce unnatural buildups of fuel only if necessary to meet at least one of the wilderness fire management objectives set forth in FSM 2324.21 (1. Permit fire to play, as nearly as possible, their natural ecological role within wilderness; or, 2. Reduce, to an acceptable level, the risks and consequences of wildfire within wilderness or escaping from wilderness.), providing that all of the following conditions are met: (a) The use of prescribed fire or other fuel treatment measures outside of wilderness is not sufficient to achieve fire management objectives within wilderness; (b) An interdisciplinary team of resource specialists has evaluated and recommended the proposed use of prescribed fire; (c) The interested public has been involved appropriately in the decision; and (d) Lightning-caused fires cannot be allowed to burn because they will pose serious threats to life and/or property within wilderness or to life, property, or natural resources outside of wilderness.

Prescribed fire can have short-term negative effects on air quality. Many effects may be mitigated by burning at certain times of the year, at certain moisture thresholds, and through parameters that are outlined in the prescribed burn plan.

Fuels management considers both the dead and live fuel components within the fuel complex that vary widely across the forest, being dependent on the specific ecosystem, insect and disease outbreaks, moisture or drought conditions, and the natural processes that occur without active vegetative management.

The dead fuel components are snags, dead pine needles and leaf litter, dead trees on the forest floor, and shrubs, forbs and graminoids that have a fuel moisture low enough to be consumed in the flaming front of a fire. These comprise the available fuels and will vary seasonally. Snags are becoming more of a hazard on the Forest with the increasing incidence of southern pine beetle and other insects and diseases. Snags are creating a significant safety hazard that we are dealing with more frequently in wildfire suppression due to the insect and disease outbreaks.

Besides providing firebrand receptors and sources, snags create safety problems for firefighters. Snags may fall with little or no warning. Nationally, falling snags and green trees have killed 19 people, 15 of those since 1985. As the time since mortality of snags increases, so does the possibility of the snag falling. Snags are also less predictable when felling, due to decay and breakout of branches. Fallen snags will slow line-building rates for fire control.

Snags are an important habitat site for many birds and mammal species. Snags are important to bark-gleaning insectivorous birds and cavity nesters. The number and species richness of birds have been found to increase with snag retention.

In prescribed burns, snags are typically felled near control lines prior to ignition (or raked around to prevent ignition). An estimate of 5 – 10% of the burn area may receive some snag treatment. With snag recruitment from the prescribed burn (mortality), the number of snags within these burn areas can increase over the short run.

7.2 Direct and Indirect Effects

Fire hazard can be related to stand age, stand structure, stand composition, and stand density. Fire hazards are greatest in stands where an accumulation of ground fuels and vertical ladder fuels have occurred. Table 3C-71 displays the successional stages for forested lands on the National Forests in Alabama.

Table 3C-71. Successional Stages of the National Forests in Alabama

Successional Stage	Years	Percent of Forested Land
Early	0 - 10	
Saplings/Pole	11 - 30	16.8
Young	31 - 60	22.7
Mature	61 - 99	45.1
Old	100 +	9.4

As can be seen in the table above, almost 55% of the forest is in a mature to decadent state (over 60 years of age).

The timber and prescribed fire programs on the Forest will have the most significant impact on the fire program in the future. Since the fire hazard is greatest in those stands that have greater accumulations of ground fuels and vertical fuels, the more timber that is removed from those stands should result in lower fire intensity and final fire size, should a fire occur under normal circumstances. The alternatives with more prescribed burning should also result in lower fire intensity and smaller average fire size since fuels are reduced significantly. The timber alternatives in order of preference from a fire management perspective (acres treated in the first period) would be: Alternative D, Alternative F, Alternative E, Alternative G, Alternative A, Alternative B; and lastly, Alternative I. The alternatives in order of preference based on the prescribed fire program (acres of fuel reduction annually for the first period) would be Alternatives B and I, Alternatives E and G, and lastly Alternatives A, D, and F.

With approximately 87% of our fires being human caused, recreation is a very important aspect. Alternative E focuses on attracting a variety of recreational users and, with increasing recreational pressure, it would appear inevitable that fire occurrence would also increase. In Alternative A, with its focus on economic growth, we would predict the next largest increase in human-caused fire occurrence, followed by Alternatives I and F. Alternatives D and G, which are non-motorized oriented, would have the least effect on human-caused fire occurrence due to the public's access being more restricted.

High value areas on the forest to be protected that are key in the fuel/fire situation are urban interface areas, unique habitats or features, municipal watersheds, high value timber, and scenic corridors, as a few examples.

The road management program has been declining over the past several years, and while any road reconstruction that provides access to the public might increase the possibility of human-caused ignitions, it also provides our firefighting resources with access as well. There is no one alternative that is superior over the others for road management.

7.3 Cumulative Effects

The prescribed fire program on the Forest over the last few years has been closer to the low end of the range shown above for estimated acres of burning annually by alternative. With the prescribed fire program staying close to the current situation or increasing above current levels for most alternatives, fuel loads should not increase, but should tend to stabilize or decrease over time, resulting in a reduced risk of large fires. This also reduces the probability of fires originating on federal lands spreading onto private lands before being controlled.

The risk of ignition from lightning fires will remain constant under all alternatives, while the risk of human-caused fires is expected to increase, especially in Alternative E, due to the increased pressure by recreationists.

In alternatives with less motorized access to the forest, the risk of large fires increases due to the increase in travel time of firefighting resources, as well as longer initial reporting time. More development in the urban interface adjacent to the forest boundary will require an increased emphasis being placed on reducing hazardous fuels in those areas.

3.D Social and Economic Environment

1.0 Affected Environment

The four National Forests that make up the National Forests in Alabama are scattered across the State in five main physiographic regions. The Talladega Division of the Talladega National Forest is located at the very end of the southern Appalachian Mountains, in the southern ridge and valley physiographic region and the southern piedmont region. The Bankhead National Forest is located in the Southern Cumberland Plateau. The Oakmulgee Division of the Talladega National Forest, and the Tuskegee National Forest, are located in the coastal plain, and the Conecuh National Forest is in the lower coastal plain.

The USDA Forest Service, along with many other federal areas, completed a broad assessment of the Southern Appalachian region in 1996, known as the Southern Appalachian Assessment (SAA). One of the components of this analysis is the "Social, Cultural, and Economic Technical Report", where a social and economic assessment of the southern Appalachian lands was performed. The following assessment of the National Forests in Alabama is tied to some of the more significant SAA findings. An attempt is made to contrast the Forest's environment with similar findings from the southern Appalachian lands. The following SAA topics will be presented in this assessment:

I. Demographic (social) Changes
II. Economy Trends
III. Demographic Changes Effect on Natural Resource Management
IV. Impact of Natural Resource Management on the Economic and Social Status of Local Communities
V. Values and Attitudes of Southern Appalachia Residents Toward Natural Resources and Ecosystem Management
VI. Priorities for Management of Private Land by Non-industrial Owners

Social attitudes, values and beliefs are elements used to describe and understand the human dimension of resource management. This information is used to predict possible effects on local communities, and may include acceptance of or resistance to the decisions made in the revised forest plan. Social analysis coupled with economic demographic information forms the human dimension of ecosystem management. Social and economic information is used with the biological and physical analysis to best understand potential effects on the land as well as the human environment. Summary information is provided here, but detailed are available in the process record for this analysis.

I. Demographic Changes:

One characteristic of an area used to determine how dynamic and subject to change it may be, is the growth of population and its various racial and ethnic components within the counties which comprise a national forest. A static area implies few possible issues affecting change. Conversely, a dynamic growing population may produce many conflicting issues for land managers to consider. Certain areas of the National Forest and surrounding lands, which are attractive to urban dwellers for recreation and second or retirement home residence, may produce issues which conflict with traditional residents of the area.

Demographic changes for the Southern Appalachian Assessment are listed first in the analysis followed by that of the National Forest in Alabama's; then a contrast is made between the SAA region, the forest, and the State of Alabama. Many of the time frames used in the Assessment were not available for the Forest, and more current data than for 1990 were not available in the Assessment. Therefore, direct comparisons between the two are not possible at times. There is some limited Census data from the 2000 Census from the SF 1 count (mostly population, households and housing data from the "short form most families completed).

Population increased by 7.3 percent from 1980 to 1990 in the southern Appalachia region. This compared with a decrease of 1.3 percent for the counties with the National Forests in Alabama, and an increase of 3.8 percent for the State of Alabama. More currently, the change from 1990 to 2000 was an increase of 7.8 and 10.1 percent, respectively. The table below shows a summary of the population changes from 1980 to 1990, and 1990 to 2000 values on all the counties within the forest boundary.

Table 3D-1 - Minority and Percent Population Change

	1990 % Minority	Population % Change '80-'90	2000 % Minority	Population % Change '90-00
Forest Counties	28.4	1.3	28.0	7.8
Alabama	26.8	3.8	26.4	10.1
SAA	8.1	7.3	*	*

* No SAA number for 2000
Source: U.S. Census Bureau

Minority population decreased only slightly between 1990 and 2000 within the counties in the forest boundaries. The minority population within Alabama in 2000 represented 26.8 percent of the entire population, a slight decrease from 1990. Meanwhile, the SAA had minority population of 8.1 percent in 1990—significantly less than that within the Forest, or the State at that time.

Table 3D-2 - Population Density

	1980 Population Density Person/ Square Mile	1990 Population Density Person/ Square Mile	2000 Population Density Persons/Square Mile
Forest Counties	55	55	57
Alabama	77	80	88
SAA	94	102	*

*** No SAA number for 2000**
Source: U.S. Census Bureau

Population density, meanwhile, was 102 people per square mile in the SAA in 1990, while the population density for the forest was 55 people per square mile, and 80 people per square mile for the State of Alabama. Population density in 2000 increased to 88 persons per square mile in the State while the forest counties increased to 57. These rates of change in density are the same as the population rates of change over the decade. While population density changed from about 94 persons per square mile during 1980 in the SAA, it had increased from 55 persons per square mile in the forest area of analysis and from 77 for the State.

The significance of these population changes is that the forest counties population remained static and the State of Alabama grew at a slower rate for the 1980 to 1990 decade than that of the SAA area. However, population in the forest counties grew rapidly from 1990 to2000 (7.8 percent) for the Forest counties, only 2 percent less than the rate of growth for Alabama.

Minority population's share of the total for the SAA area is substantially less than that of the forest counties and the State of Alabama. However, the rate of growth between 1990 and 2000 was less in the forest counties than in the State.

The rural nature of the area is contrasted with the State and SAA below.

Table 3D-3 - Percentage Rural

	1980 % Rural	1990 % Rural
Forest Counties	46.6	46.8
Alabama	40.0	39.6
SAA	*	53.0

*** No SAA number for 1980**
Source: U.S. Census Bureau

The rural characteristic of the National Forests in Alabama analysis area has remained relatively unchanged since 1980. The percentage of persons living in rural areas for the aggregated counties making up this area has increased from 46.6 percent in 1980 to 46.8 percent in 1990. The forest counties at 46.8 percent are somewhat less rural than the SAA area at 53 percent. However, the State of Alabama had a less rural character (39.6 percent) during 1990 than either the forest counties or the SAA area. The forest area remained virtually unchanged in rural character between 1980 and 1990.

Population growth in the National Forests in Alabama analysis area for the 1990 decade appears to have increased substantially over the slight increase noted during the 1980's. This population increase appears to be moving both to urban areas within these counties and to rural areas.

Per capita income is a relative measure of the wealth of an area. It constitutes the personal income from all sources divided by the population of that area. For the SAA the per capita income average was $10,950 in 1990; for the forest analysis area it averaged $12,441 and for the State of Alabama it was $15,213.

Table 3D-4 - Per capita Income

	1980 Per Cap. Income	1990 Per Cap. Income	Real Avg. Annual % Change '80-'90 Per Capita Income
Alabama	$5,892	$15,213	2.1
Forest Counties Avg.	$4,919	$12,441	1.8
SAA	$6,377	$10,950	0.8

Source: U.S. Census Bureau

Income for both the forest area and Alabama's income grew faster on a real basis (inflation adjusted) than the SAA during the 1980's. The forest counties area grew at a 1.8 percent rate; Alabama grew at a 2.1 percent rate, while the SAA grew only by 0.8 percent. Thus, person's financial well being increased at a greater rate in the forest analysis area than that of the SAA for the 1980's. The growth in earning power increased almost at the same rate as the State.

The process record contains income data for the Forest and State based on Bureau of Economic Analysis (BEA) measurements. This data is per capita personal income, which is not directly comparable with the Bureau of the Census per capita income data shown above. The two data sets are not the same because census data is obtained directly from households, whereas the BEA income series is estimated largely on the basis of data from administrative records of business and governmental sources. Also the definitions on income are different. Caution also must be used in comparing growth rates from BEA with Census data because growth in Census data is based on real or inflation adjusted dollars while growth in BEA data is based on nominal dollars (unadjusted for inflation).

Thus from the table above, it is evident that the National Forest in Alabama analysis area is still relatively poorer than the State, but has surpassed that of the SAA.

Another indicator or relative economic prosperity is the percent of the workforce out of work. Unemployment rates change dramatically over time, depending in large part on the national economy. Some areas, however, have protracted unemployment problems because of educational attainment and lack of skills.

In 1990 the forest counties had the highest unemployment rate (7.3%) of either the State (5.6%) or the SAA area (6.5%).

Table 3D-5 - Unemployment Rate

	1990 Unemployment Rate	1997 Unemployment Rate
Alabama	5.6	5.1
Forest Counties Avg.	7.3	5.7
SAA	6.5	*

***No SAA data for 1997**
Source: U.S. Census Bureau

Unemployment rate has decreased by 1.6 percentage points for the forest analysis area while the rate has decreased by 0.5 percent for the State. However, the unemployment rate within the forest analysis area in 1997 was only 0.6 percent higher than that of the State. The unemployment rate of the Forest boundary counties has decreased almost two percent since 1990.

People in poverty is represented in the following table:

Table 3D-6 - Poverty Rate

	1989–Percent of People of All Ages in Poverty	1995–Percent of People of All Ages in Poverty
Alabama	18.3	17.6
Forest Counties Avg.	23.6	21.6
SAA	11.0	*

*** No SAA number for 1995**
Source: U.S. Census Bureau

Many of the counties in the forest analysis area had very high rates of poverty in 1989. The average was much higher for the forest than either the State or the SAA. In 1995 it is estimated that the State of Alabama had a one percent lower poverty rate, and the forest had a two percent lower rate than that found in 1989. The SAA was based on data through 1990 therefore more current data is not shown for this area.

Another factor indicating relative poverty and social disunity for an area is the percent of households headed by a female member. The greater this percentage is, the more likely that these households may be on some form of government assistance. The table below contrasts the experience for our three areas of comparison:

Table 3D-7 - Female Head of Households

	1980 Female Head of Households	1990 Female Head of Households
Alabama	6.5	7.1
Forest Counties Avg.	6.4	7.0
SAA	*	10.5

*** No SAA number for 1980**
Source: U.S. Census Bureau

The increase in female-headed households rose slightly from 1980 to 1990 for the Forest and the State. Both, however, were lower than the SAA average (10.5%) for 1990. A lower female head of household for the Forest may indicate greater social cohesion from the extended family in the State and within in the forest area than exists in some areas of the SAA region.

The number of persons per household also indicates economic status in a region. The greater the average number of persons per household, the less prosperous an area tends to be.

More specific information about individual Forest's county information on households can be found in Appendix B.

Table 3D-8 - Density of Households

	1980 Persons Per Household	1990 Persons Per Household	2000 Persons Per Household
Alabama	2.8	2.6	2.3
Forest Counties Avg.	2.9	2.7	2.2
SAA	*	2.6	*

*** No SAA number for 1980 or 2000**
Source: U.S. Census Bureau

The change in household size from 1980 to 1990 and from 1990 to 2000 decreased slightly for the forest counties and the State. The magnitude of size for both of the former areas compares favorably with that of the larger SAA area. Enormously large households do not seem to be a characteristic of the forest analysis area.

The decade of the 1970's appears to be a decade of more rapid growth than the decade of the 1980's. Housing unit growth from 1970 to 1980 was 32.2 percent for the Forest area, while Alabama showed a slightly smaller growth rate of 31.0 percent. Growth between 1990 and 2000 showed a smaller increase than the 1970's but larger than the 1980's of 22.4 for the forest counties and 17.5 for the State. During the 1970's decade and the 1990's decade, housing growth was slightly higher for the forest analysis area. During the 1980's, the State slightly outgrew the forest counties. Housing unit change was not measure in the SAA.

Table 3D-9 - Housing Units

	Housing Units percent change 1970-1980	Housing Units percent change 1980-1990	Housing Units percent change 1990-2000
Alabama	31.0	13.8	17.5
Forest Counties Avg.	32.2	11.5	22.4

Source: U.S. Census Bureau

Median housing value is contrasted in the table below. Housing values within the forest analysis area tend to be substantially below that of Alabama and the SAA. Housing values are determined principally by the extent of demand. The greater the demand the higher prices are bid up. Population and job increases play a factor in the extent of demand for housing. Population has only begun to increase at a significant rate in the 1990's. The prior decade population grew at a small pace. Housing stock increased at a significant rate in the decade of the 1970's and 1980's. However, value is still low compared with the State, which has the influence of urban areas that can support higher priced housing. At any rate, it appears that the forest analysis area is fairly dynamic as far as new home additions. Population and wage growth will have to increase significantly to warrant significant increases in housing values.

Table 3D-10 - Housing Value

	Housing Units Median Value 1980	Housing Units Median Value 1990
Alabama	$33,900	$53,700
Forest Counties Avg.	$27,095	$43,400
SAA	*	$59,700

*** No SAA number for 1980**
Source: U.S. Census Bureau

II. Economic Trends

Analyzing the major sectors of an economy allows insight into how diverse and what industries may be driving its growth. Table 3D-11 of the appendix shows the entire economy broken out by major Standard Industrial Code (SIC) and by important industry sub-sectors for wood products and for an estimate of the contribution of certain industries to tourism.

The chart below shows the Manufacturing sector, the sub-sectors for wood based industries, and an estimate of the tourism industry for percentage of industry output and employment for 1985 and 1996. Tourism is not a sector of an economy but comprises several of the services and retail industries. The percentage of each of these industries attributed to tourism was taken from the work of Gordon McClung at West Virginia University.

Table 3D-11 - Economic Diversity

Sector	Industry Output % Total 1985	Industry Output % Total 1996	Employment % Total 1985	Employment % Total 1996
Manufacturing	37.5%	41.9%	26.0%	20.0%
Mfg. Lumber & Wood Prods.	3.2%	5.7%	3.1%	3.6%
Wood Furniture. & fix.	0.7%	0.8%	0.9%	0.6%
Paper & Pulp Products	5.4%	6.0%	2.0%	1.6%
Tourism	1.1%	1.0%	1.8%	2.1%
Total Economy	$17,919.4	$30,544.3	299,348	403,653

*** In Millions of dollars**
Source: IMPLAN 1985 and 1996 Data

From the chart above it is evident that the forest analysis area economy is becoming more reliant on the manufacturing sector. Its importance increased by 4.4 percent of the total output from 1985 to 1996, even though employment decreased by 6 percent between those dates. And increase in output with a concomitment decrease in employment implies productivity increases in this sector – that is capital equipment is replacing labor in the production process.

Meanwhile, the SAA's economy in 1991 showed a 42 percent share of the economy for manufacturing - higher than the National Forests in Alabama local economy. The SAA area shows a concentration in manufacturing that is much higher than that of the forest analysis area or the U.S economy whose share is around 20 percent.

Of the manufacturing sector, wood products maintain a 5.7 percent share of the local economy's total output in 1996. This is an increase from the 3.2 percent share it had in 1985. Employment share grew slightly from a 3.1 percent share in 1985 to 3.6 percent share in 1996. Employment in the wood products industries resulted in a 3.4 percent share of the SAA economy in 1991. Industrial output for the SAA represented 5.2 percent of total output. The wood products industries were relatively more important in the forest analysis area's economy than that of the SAA.

Tourism is defined as any non-business related travel of 100 miles or more from home. Recreation would be a subset of the tourism estimate, therefore its share of the economy would be something less than the tourism numbers.

The estimate of tourism's share of the economy was about the same for output between 1985 and 1996. Employment, on the other hand, increased from a 1.8 percent to a 2.1 percent share of the local economy's total.

For the purpose of economic analysis in the Southern Appalachian Assessment the years of contrast and data usedin the IMPLAN input-output model were 1977 and 1991. The Forest meanwhile used more current data, contrasting the 1985 regional economy with the one found in 1996. Because these years are dissimilar, many of the percentage changes are not directly comparable. Placing the comparison on an average annual rate of change does allow for a comparison measure. The following chart compares the rate of change between the SAA's economy and that of the forest analysis area:

Table 3D-12 - Economy Dynamics

	Employment Avg. Annual Change	Industrial Output Avg. Annual Change
Forest Area*	2.3%	3.7%
SAA**	1.9%	2.6%

*** Change from 1985 to 1996**
**** Change from 1977 to 1991**
Source: IMPLAN 1985 and 1996 Data

Clearly, output has grown much faster for the National Forests in Alabama local economy (3.7 percent) than the SAA (2.6 percent per year). Meanwhile growth in employment has been even greater in the forest counties than that of the SAA (2.3% versus 1.9%). This disparity would seem to suggest that the industries within the Forest boundary counties have invested in capital equipment that have produced productivity increases, allowing the area to achieve a higher level of output growth relative to employee growth.

A principle way an economy grows is by export of goods and services. Most typically, manufacturing activity is thought of as providing most of this export related activity. However, services and retail trade can be considered "export" industries if significant visitors come in from outside in travel related activities to bring in new dollars. Tourism is classified as an export driven activity. A manufacturing industry can be a net importer if it imports more of a commodity that it exports.

The chart below compares the exporting characteristics of the forest analysis area for 1985 and 1996.

Table 3D-13 - Exporting Industries

Commodity	Net Exports – Export less Imports		Net Exporting Industries as a Percentage of Total Positive Exporting Industries	
	1985	1996	1985	1996
Mfg.Lumber & Wood Products	$262.4	$513.3	10.3%	30.0%
Mfg.Wood Furniture & Fixtures	$53.9	$71.8	2.1%	4.2%
Mfg.Paper & Pulp Products	$502.4	$1000.4	19.7%	58.4%
Total Mfg	-$24.3	$1445.0	0.0%	84.3%
Estimate of Trade	-$38.4	-$64.4	0.0%	0.0%
Total Net Trade (exports)	-$2580.6	-$5081.3	100%	100%
Total Positive Export Industries	$2545.9	$1713.8	—	—

Source: IMPLAN 1985 and 1996 Data

The chart shows that this local economy was a net importing county in both 1985 and 1996. Large changes occurred in the wood products industries whereby those industries increased their net exports. Total manufacturing also changed from an importing sector in 1985 to that of an exporting sector in 1996, changing from importing $24.3 million to exporting $1,445 million.

"Total positive export industries" dollars provide the basis for expressing the percentage of an industry, which is a net exporter, to determine its share of total exports. Thus, manufacturing in 1985 was a net importer ($24.3 million), and had no share of the export market.

The local economy became a net importer of $2580.6 million in 1985, and remained a net importer in 1996 ($5081.3 million). While manufacturing turned into a net exporting industry, services and trade remained net importing industries in 1985 and 1996. The largest contributor to this was the finance, insurance, and real estate sector, services-non-tourism sector, and commodities. Tourism is estimated to be an importer of $38.4 million in 1985 and an importer in 1996 ($64.4 million). Thus, travelers were not coming from outside the analysis area at a greater rate in 1996 to spend money in the local economy than in 1985. More detailed information by county can be found in Appendix B.

This is contrasted with the SAA area, which was a net exporter in 1991 of goods and services of $15.8 billion. Manufacturing was the largest net exporting sector, representing $24.6 billion. Manufacturing represented 156 percent of the net exporting sectors. Construction ($6.7 billion) and services ($4.3 billion) were the largest net importers and contributed to a drain of money from the economy. More detailed information by county can be found in Appendix B.

Thus, the forest analysis area economy remained an importing economy in 1995, meaning the economy did not bring in “new” money to grow. The Manufacturing sector however did become a net exporter by 1996, with the wood product manufacturing increasing its share of the export business substantially between 1985 and 1996. Importance as a net exporter declined from 1985 to 1996, meanwhile the estimated trade effect of tourism has kept the analysis area a net importer more people leaving the region for travel.

Another way to indicate diversity of an economy is with the Shannon-Weaver Entropy Indices of diversity. This process allows a relative measure of how diverse a county is with a single number. The entropy method measures diversity of a region against a uniform distribution of employment where the norm is equi-proportional employment in all industries. All indices range between 0 (no diversity) and 1.0 (perfect diversity). These two extremes would occur when there is only one industry in the economy (no diversity) and when all industries contribute equally to the region’s employment (perfect diversity). In most cases diversity would be registered somewhere between 0 and 1.0. Another factor affecting the magnitude of the index is the number of industries in a local economy; the greater number of industries, the larger the index.

The following table contrasts the change in diversity from 1977 to 1993 at the four digit SIC, or at the industry level. For a point of reference, Alabama and the United States serve as comparison guides.

Table 3D-14 Shannon-Weaver Entropy Diversity Indices

Forest Boundary Counties	1977 Five Digit SIC	1993 Five Digit SIC
Bibb AL	0.46028	0.58143
Calhoun AL	0.30485	0.64371
Cherokee AL	0.48240	0.60011
Chilton AL	0.53889	0.63296
Cleburne AL	0.41015	0.54091
Clay AL	0.41583	0.52260
Covington AL	0.48452	0.61118
Dallas AL	0.53175	0.64781
Escambia AL	0.53727	0.62759
Franklin AL	0.51461	0.60722
Hale AL	0.49468	0.56240
Lawrence AL	0.47439	0.55965
Lee AL	0.54638	0.60311
Macon AL	0.27423	0.49794
Perry AL	0.50877	0.56986
Talladega AL	0.55777	0.63163
Tuscaloosa AL	0.56365	0.63447
Winston AL	0.51385	0.59049
Alabama	0.58649	0.72608
United States	0.66483	0.73973

Source: USDA Forest Service, IMI

In 1977, Macon County, followed by Calhoun County, were the least diversified counties within the forest analysis area. Macon County was 53 percent less diversified than Alabama. The most diversified county in 1977 was Tuscaloosa County, which was only four percent less diversified than Alabama and 15 percent less diversified than the United States.

Between 1977 and 1993, all forest counties became much more diversified. Macon County remained the least diversified county in 1993, at 31 percent less diversified than the State. Clay County was next to the last in diversity for 1993. The most diverse county was Dallas County, which was about 14 percent less diversified than that of the State. Lee County showed the least improvement in its diversity standing between these two years, increasing only 10 percent. Calhoun County had the greatest increase at 111 percent. Bibb, Calhoun, Cherokee, Cleburne, Clay, Covington, and Macon Counties were Forest counties that increased diversity by a higher percentage than the State, but remain less diverse than the State or the United States.

In summary, the forest area economy is less diverse than the regional Alabama economy, but these rural counties have become more diversified over the 16 years of analysis data presented above. Calhoun and Macon Counties have especially made great strides to improve its economic infrastructure in that they have added additional industries to their mix. In aggregate the total economy has improved its diversity only marginally over this time span.

Payments in Lieu of Taxes (PILT) are funds that the federal government transfers to counties to help offset the non-tax status of federal lands within their boundaries. PILT is a payment from the Bureau of Land Management that covers shortfalls from natural resource consumption on the national forest. That is, if the Forest Service's Twenty Five Percent funds (25 % Funds) from timber harvesting, mining and recreation do not cover at least $1.75 per acre, PILT will make up the shortfall.

Trends in 25% Funds and PILT is important to show a possible erosion of an area's tax base. The chart below shows forest counties in the aggregate changes from various years for data that was common between the two sources.

Table 3D-15 - Payments In Lieu of Taxes Funds (Forest Counties)

	1990	1997	% Change 1990-1997
PILT	$67,172	$133,031	98%
25% Funds	$1,553,275	$964,419	-38%
Total	$1,620,447	$1,097,450	-32%

Source: U.S. Dept. of Interior

County revenues from the federal government have been variable since 1986, the first year of available data for 25 percent funds. The trend has been down, however, because of a reduction in timber harvesting. At the same time, PILT funds have trended up as a replacement of lost revenues from timber harvesting. Taking the two payments together, there was a 32 percent decrease for the forest analysis area from 1990 to 1997.

Land use and its change over time is an indicator of the dynamism of an area. Areas converting from rural uses to urban uses have implications of changes that affect residents. The chart below shows the land use of weighted average acres for the counties in forest analysis area during the period from 1982- 1992, for all uses except urban. Urban comprises a small share and can be found along with characteristics of all counties in the analysis area in the process record.

Table 3D-16 - Land Use

	Forest '82 % Share	Forest '92 % Share	Farm '82 % Share	Farm '92 % Share	Residual '82 % Share	Residual '92 % Share
Weighted Average Acres for Forest Counties	22.7	18.0	62.0	62.2	12.9	16.7

Source: USDA, Natural Resources Conservation Service

This data set is from the Natural Resources Conservation Service, and includes federal land within their residual category. Residual also includes highways and powerline access rights-of-way. The residual category has increased 3.8% in the last ten years. The forest category contains lands of private timber owners. Approximately 85 percent of this private area was either in farm or forest cover in 1982. By 1992 this percentage had decreased slightly to about 80 percent. Approximately 23% was forested in 1982, and 18 percent were forested in 1992. The urban share of the land had increased from 14 percent in 1982 to 17 percent in 1992. This land use has lost about one percent of its acreage in the last ten years.

The SAA found that little forest land was lost between 1970 and 1990 in that region. However, urban, road and housing development growth caused by increased population in the area took farmland, pastures and open space. Retirees and commuters from nearby urban centers were responsible for part of that demand for development.

Summary of Demographic and Economy Changes

Population and economic dynamics are changing at a moderate rate within the counties that contain the National Forests in Alabama (forest analysis area). While population grew very slowly from 1980 to 1990, growth has seemed to increase substantially during 1990's. The rate of increase has been 7.8 percent over this period, but is still just over two percentage points behind the growth rate of Alabama. Increased population suggests the area may have new residents from outside the area who will present non-traditional ideas from those of long-standing residents—possibly those that are non-commodity based.

Minority population has changed slightly within the analysis area from 1990 to 2000. Minority share has decreased about one quarter of a percent over this time, indicating stable conditions. These numbers are slightly higher than the share found in the State in 2000 (26.8 percent), which indicates that minority population is not leaving the area, and there are increased opportunities for minority participation in local recreation endeavors.

The analysis area has become slightly more rural from 1980 to 1990. The rural character is still in place in the forest analysis area. Impingement upon "backdoor" urban encroachment does not appear to be a problem.

The area's economic health as measured by per capita income grew at a robust rate during the 1980's—0.2 percent per year, greater than that of Alabama's rate. Still, per capita income in 1990 was about $2,700 less than that of the State. The area's unemployment rate has decreased by over one percent from 1990 to 1997; however, it was still one-half percent greater than Alabama's, which was at 5.1 percent in 1997. Income growth rate in this area has progressed steadily, indicating that the area is economically strong. People with strong incomes and jobs are more likely to have free time and need an outlet for recreation. The national forest is a prime outlet for these people.

The area's poverty rate has declined by two percent from 1989 to 1995, a rate faster than Alabama's decline of less than one percent. Percentage of female head of households was low and only slightly increasing; persons per household were basically the same as the State's average—all good signs of an area without protracted economic problems.

Housing unit growth was less than the State for the decade of the 1980's and greater than the stare in the 1990's, a sign of increasing prosperity for the area. Median housing value, however, is still about $10,000 less than the State average of $53,700, a condition that can be expected with a larger urban component.

The forest analysis area's economy has become more diverse and less concentrated in the manufacturing sector. As measured by total output, manufacturing is about 42 percent of the economy as of 1996 - still a high share, but services and retail activity have gained increasing shares since 1985. Wood products manufacturing in 1996 held about a 12.5 percent share of the total Alabama National Forest area economy—an increase of 3.2 percent share from 1985. Tourism, meanwhile, maintained about a 1.0 percent share in both measurement periods.

Since 1985, the area has remained a net importing regional economy where money flows to other areas. However, wood products have remained a net exporting economy from these industries. Economies that export more than they import are able to grow faster than those that are net importers.

Land use has changed slightly since 1982. In 1992 the analysis area lost about 4.2 percent of its forest share since 1982. It is assumed that public lands forest cover has remained constant.

Population has grown vigorously during the 1990's, much more than the slow rate of growth during the 1980's. Poverty has declined somewhat since the late 1980's, but it still trails the rate for the State. Housing construction grew at a rapid pace in the 1990's to accommodate the large increase in population; it grew at a rate in excess of the growth rate for Alabama. The economy continues to become more diversified, however it is still heavily reliant on the cyclicality of the manufacturing sector. The counties that comprise the NF in Alabama are still net importers of goods and services needed to satisfy peoples' needs in the area. Per capita income grew at a rate slightly less than the State from 1990 to 1997; but income remained almost $3,000 below the average for the State. The fast pace of population and housing growth suggest that there is possibly more increasing demand for leisure time activities. The economy on balance, however, is improving but still below average in most economic and demographic measures.

III. Demographic Changes Effect on Natural Resource Management

The Southern Appalachian Assessment found that while little forest land has been lost since 1970 in the region, urban, road and housing development growth, caused by increased population, has taken farmland, pastures and open space. Retirees and commuters from nearby urban centers are responsible for part of this demand for development.

Newcomers to the region feel differently than long-time residents about natural resource preservation. Often, the long-time residents' livelihood depended upon manufacturing from natural resources. Managers of natural resources have had to respond to new sets of values and preferences, particularly increased demand from land and water resources for scenery, recreation and tourism.

Population in the Southern Appalachian region is projected to grow by 12.3 percent by 2010, slightly less than the growth rate expected for the nation (13.1 percent). Most of the growth is expected to be in northern Georgia, western North Carolina, and portions of eastern Tennessee and northwestern Virginia. Alabama is projected to show only a 4 percent increase by 2005, but a 21 percent increase by 2025.

The increase in population density across all counties in the southern Appalachian region and across the State of Alabama has impacted farms, forests, and pastures and has removed habitat for most species of wildlife and fish. More people entering the area has resulted in greater amounts of land conversion and impacts to water quantities, quality, and use. At higher elevations, development has impacted visual qualities.

As development occurs across certain areas of the southern Appalachians and across Alabama, more urban pressures impact the land. Private lands are posted as "off limits", causing public lands to become more crowded. This greater private land restriction, occurring in this area, has put more pressures on public land to accommodate increased demand for tourism and recreation.

The following analysis details the National Forests in Alabama's market area and presents estimates of the percentages of persons 16 or older fitting various personal and household profiles who live in the forest impact area. The results are from the "Public Survey Report, Public Use and Preferred Objectives for Southern Appalachian National Forests", Forest Service, Southern Research Station, p.12.(see Table 3D-17 The forest market area includes all counties within a 75-mile radius of the boundary of the forests. A sub regional market area includes all the counties within the combined 75-mile radii of the forests covered by this report.

As with the National Forests in Alabama, other forests in the SA region show little difference in characteristics from those found in the National Forests in Alabama forest market areas.

Most people age 16 and over live in the forest market areas year-round (96% to 97%), leaving only 3 to 4 percent being seasonal residents. For the Bankhead and Talladega National Forests of central and northern Alabama, almost 50 percent of respondents lived in Alabama, about 44 percent lived in nearby Georgia, and about 4 percent lived in Mississippi. For the Conecuh and Tuskegee National Forests in eastern central and southern Alabama, well over 62 percent of respondents were from Alabama, 23 percent from Georgia, and almost 15 percent were from Florida.

Between 36 and 40 percent of residents surveyed had lived in the areas within the Southern Appalachian Region their entire lives, and between 49 and 53 percent had lived in those areas more than 20 years (percentages which include those who have lived there all their lives). Just over 30 percent had lived there less than 10 years, however, indicating a fairly sizeable portion of the population that has been mobile and a large contingent of recent immigrants. For people living in the Alabama market areas, a majority, over 55 percent, remains in the sub-region because of family ties. Very few, around 6 percent, remain for their job, and only between 10 and 12 percent remain because of attachment to the area itself.

Around 11 percent of responding residents are owners of 5 or more acres of rural land. About 30 percent are under age 30, and about 26 percent are over age 55. Most of the surveyed population is between the ages of 30 and 55. About two-thirds are non-Hispanic White, 30 percent are Black, and around 4 percent are Hispanic. Between 1 and 2 percent are foreign born. Around 7 percent have less than a high school education, and around 20 percent have a college degree. Well over 70 percent of persons 16 or older, therefore, have a high school diploma or a diploma and some college experience. About 60 percent work a job, while over one-third are retired. Increasingly, the national forests with their natural and scenic amenities are popular retirement locations.

Table 3D-17 – Percentage of local residents 16 or older by personal or household characteristic by forest, sub-region, and region-wide in the Southern Appalachians, 2002.

Personal and Household Characteristics	Forest Market Areas		Combined Sub-region Market Areas	Southern Appalachian Region Market Area
	Bankhead & Talladega (N=1,781)	Conecuh & Tuskegee (N=1,006)		
Year-round resident	97.0	95.7	96.8	97.2
Part-time resident	3.0	4.3	3.2	2.8
Percentage of residents in market area by state	AL 48.6 GA 43.8 MS 4.0	AL 62.6 GA 22.6 FL 14.7	AL 49.0 GA 37.6 FL 7.1	GA 24.2 AL 21.4 TN 14.3
Lived in SA entire life	35.9	40.9	35.8	38.1
Lived in SA 20+ years	48.6	52.5	48.8	51.7
Lived in SA 10-19 years	18.6	19.5	19.4	19.0
Lived in SA <10 years	32.9	27.9	31.8	29.3
Remain in the SAs for job	6.6	5.9	6.5	7.4
Remain for family in the SAs	58.8	56.4	55.4	54.8
Remain for the SA area itself	9.7	12.4	12.4	14.6
Remain for other reasons	24.9	25.3	25.8	23.2
Own 5+ acres of rural land	10.9	11.1	10.8	13.1
Age under 30	29.6	30.9	29.6	27.2
Age over 55	25.7	28.3	26.1	27.3
White, non-Hispanic	63.7	63.9	65.0	74.5
Black, non-Hispanic	30.0	31.3	29.0	19.7
Hispanic	4.6	3.2	4.2	3.6
Foreign born	1.7	1.0	1.5	1.8
Education - 8th grade or less	7.4	7.2	7.5	7.3
Education - Bachelor's degree/more	22.9	18.0	22.0	21.0
Work a job	60.6	58.1	60.3	59.9
Retired	35.2	38.8	36.7	39.5

[1] **Source: National Survey on Recreation and the Environment, Version 12, 11/2001 to 4/2002.**

IV. Management of Natural Resources' Impact on Economic and Social Status of Local Communities

The Southern Appalachian Assessment found that residents of communities near public land are sensitive to land management choices. Further, it found the region's communities are still in a lower economic status than surrounding state populations. Likewise, their economy is more heavily dependent on natural resources than those of the states that comprise the southern Appalachians. Of particular concern to residents in the area is the need to balance local interests with those of retirees, logging industry, and tourism.

For the forest market area, the local economy is heavily dependent on manufacturing, and residents are in a lower economic status than the State as a whole.

Findings of the Public Survey Report for the National Forests in Alabama include the values to market area residents for the protection of sources of clean water; the legacy of passing along natural forests to future generations; the protection for wildlife and habitat, maintenance of places that are natural in appearance, and for protection of rare or endangered species.

Outdoor recreation and timber, as values of national forests, are in the second or lower one-half of the list of values. The following Table illustrates the values of local area residents by showing the percentage of local and regional residents 16 or older indicating the stated value is important (the number to the left of the "/") and percentage indicating it is extremely important (number to the right of the "/").

Table 3D-18. – Values of Local Residents (Percentages Important/Extremely Important)

Forest Value	Forest Market Areas		Combined Sub region Market Area	SA Region Market Area	National
	Bankhead & Talladega	Conecuh & Tuskegee			
Protect sources of clean water	93.1/84.8	93/83.9	93/84.6	94/86.3	94.1/82.7
Maintain in good condition for future generations	91.2/81.6	92.9/82.2	91.8/81.9	92.7/83.7	92.5/80.4
Provide protection for wildlife	86.8/69.7	88.3/68.9	87.4/70	88.8/72.4	88/69.4
Emphasize healthy forests	86.4/69.3	88.4/69.9	86.7/69.3	87.7/70.5	N/A
Leave them natural in appearance	82.9/65.9	82.2/63.8	83.7/66.2	85.9/68.6	85.6/64.3
Protect rare or endangered species	81.3/67.8	82.9/67.8	81.7/68.1	83.1/69.7	84.7/67.1
Provide information and educational services	79.6/54.8	79.8/55.7	79.6/55.1	80.1/55.9	79.1/52.5

Forest Value	Forest Market Areas		Combined Sub region Market Area	SA Region Market Area	National
	Bankhead & Talladega	Conecuh & Tuskegee			
Provide outdoor recreation	73.9/47.7	76/48.9	73.9/47.3	74.1/47.8	73.4/44.8
Provide abundant timber supply	73/56.1	75.8/56.7	73.8/56.6	72.3/54.8	77.7/57.6
Provide natural places for personal renewal	72.6/51.3	73/51.9	73.1/51.7	75.8/54.2	73.9/49.1
Help local tourism businesses	59.9/37.8	63.8/41	60.1/38.4	57.3/36	56/31.1
Permit grazing of livestock	45.5/28.2	48.1/29.9	46.3/28.4	45.2/26.5	49.8/28
Provide raw materials and products for local industries	39.2/22.5	42.1/23.4	40.1/23	38.7/22.3	45.1/24.9

Source: National Survey on Recreation and the Environment, Version 12, November 2001 to April 2002. National percentages are from NSRE Version 6 and 7, September 2000 to March 2001.

V. Values and Attitudes of Southern Appalachian Residents Toward Natural Resources and Ecosystem Management

Natural resource management attitudes and values that residents of the SAA hold are extremely important for land managers to understand. Research done during the SAA analysis showed that most people felt that environmental protection and economic growth could be compatible. However, when people had to choose between the two, their first choice was the environment. Most people felt that environment protection has not gone far enough. SAA residents indicated a willingness to put more personal funds toward collective environmental protection.

Furthermore, the SAA found that as retirees, urban transfers, and other new residents move into the SAA region, concerns for the health and aesthetic appearance of the region's ecosystems were likely to strengthen.

"The magnitude of upward trends in population, changes in demographic makeup, and rising demand for recreation suggest there likely are other significant social changes in the South. Among such possible changes are the values and attitudes people hold toward the natural environment in general and forests in particular. In rapidly urbanizing areas of the South, there have been dramatic decreases in the amount of and access to forested or other natural lands. A changing population and decreasing forest resources have led to changes in the values and attitudes Southerners hold toward forests. Below is a discussion of values, attitudes, and demographics found in the Southern Forest Resource Assessment (SFRA).

"Values–Published literature and survey results from the SFRA both indicate that private forest owners and the public as well rank "conservation" higher now than in past decades. Recently there is growing concern in the public's view that environmental quality is more important than commodity benefits from forests and other natural lands. In a survey designed specifically for the SFRA, Southerners confirmed that environmental benefits from forests are valued higher than commodity benefits. Wood as a commodity was rated as least important of four listed values (wood products, clean air, scenic beauty, and heritage) associated with forests (Tarrant et al. In Press). Clean air was listed as most important. When survey respondents were asked about values of public forests as distinct from private forests, some differences were noted. Producing wood products was valued higher if it were to come from private forests while clean air was valued higher if coming from public forests. These results indicate that Southerners hold measurably stronger environmental values and more restrictive commodity values about public forests than they hold for private forests.

Respondents to the SFRA survey were asked if they or their spouse owned 10 or more acres of rural land. A comparison between individuals who reported owning land and those who did not, showed little or no significant differences regarding forest values were evident. The single exception was that landowners rated wood products as a more important use for private forests than did non-landowners. Furthermore, there were no significant differences between the two groups in attitudes toward the environment. Overall, results suggest that land ownership has relatively little bearing on southern residents' values of forests or attitudes toward the environment.

Attitudes– While values indicate the relative good or worth of forests, attitudes represent levels of agreement with particular forest conditions or environmental issues, such as regulatory laws and policies. Based on results from the survey done for the SFRA, a majority of Southerners felt that "too little" was being spent on protecting the environment (62.5 percent). Only 9.2 percent reported they felt "too much" was being spent. Similarly regarding environmental laws, 45.5 percent-indicated environmental laws had "not gone far enough", while only 13.1 percent thought environmental laws had gone "too far." An overall mean score of 23.8 on the modified New Ecological Paradigm used in the SFRA survey (midpoint of 30 with a range of 10 , highly favorable, to 50, highly unfavorable) suggests a moderately strong pro-environmental attitude among people of the South.

Demographic Differences in Values and Attitudes–A number of comparisons of values were made between different social groups in the South. They included urban-rural, age, length of residency, and gender. These comparisons revealed that where people live in the South (urban or rural) is not related to their values or attitudes toward forests and the environment. However, age did influence public values toward forests and environmental attitudes. For private forests, younger people placed significantly less importance on wood products and significantly more on heritage than did the older generation. For public forests, the younger generation valued scenic beauty significantly higher than did the older generation. Younger people were significantly more likely than older people to believe we are spending too little to protect the environment, and that environmental laws have not gone far enough. Generally, younger people tend to have more bio-centric values of forests than older people. There were no significant correlations between length of residency in the South and values of public or private forests or environmental attitudes. Females exhibited significantly stronger pro-environmental attitudes than males, and were more likely than males to believe that we have spent too little on the environment; and to believe that environmental laws and regulations have not gone far enough."

(From: "Changing Demographics, Values, and Attitudes", H. Ken Cordell and Michael Tarrant, Journal of Forestry, October/November 2002, pp. 31-32.)

Priorities for Management of Private Land by Non-industrial Owners

The Assessment found that approximately 75 percent of the 37 million acres of the SAA region are privately owned. Of these 37 million acres approximately 19 million are forested acres. Three-fourths of the forestland in the region is privately owned.

Agriculture and timber harvesting are the overwhelming primary commodity uses of private undeveloped land. Recreation is the dominant non-commodity use. Raising livestock, recreation, enjoyment of a rural lifestyle, and having green space are listed as important reasons for owning land in the Southern Appalachians.

"Private Properties–Privately owned land dominates in the South. Corporate private owners typically provide recreation access by leasing land to clubs, counties, or others. Individual owners usually have little to none of their land open, either through lease or other means (Teasley et al. 1999). Persistently, the number of southern owners allowing the public to recreate on their land has been decreasing (Cordell et al. 1999). Among individual owners approximately 59 percent indicate that an emphasis in managing their land is maintaining and improving the land's natural components. For 37 percent of owners, improving the natural components is the primary thing they emphasize with their land. Accordingly, only about 14 percent of owners in the South permit the outside public to use their lands, even though the greatest growth in demand is for nature appreciation and photography. It appears that even less land may be open to public recreation in the future (Table 1). Unless conditions become more favorable for landowners, the percentage of them permitting public access is likely to continue to decrease, as it has been for several years. Increasingly individuals and families are purchasing land for their own personal recreational pursuits and these owners are even less likely to permit others use of their land.

Potential Conflicts. A highly significant and growing issue nationally and in the South is that of conflict. Conflicts limit supply and increase the costs of management. Conflicts addressed in the SFRA included those between similar uses because of crowding; conflicts between non-similar uses because of incompatible norms, values and goals; and conflicts between users and providers.

Perhaps the most worrisome type of recreation conflict is that between users and owners of private tracts. These conflicts can and often do lead to posting and other ways of denying access, which act to limit supply. Because most of the forest-land in the South is privately owned, conflicts between recreational users and private forest land owners is especially significant. Results from the 1995 National Private Landowner Survey, NPLOS 95 (Teasley et al. 1999), suggest a number of possibilities for owner-user conflict. For example, about 59 percent of individual southern landowners indicate that improving wildlife, water, aesthetics and other natural components of their land is an important emphasis in their land management. Because landowners sometimes encounter use problems they may perceive to be incompatible with their conservation goals, land closure can result. The more prominent of such problems include dumping garbage, littering, illegal hunting and fishing, damage to fences and gates, damage to roads, disturbance of wildlife, and careless shooting.

Not all, maybe not even most, of these problems are the result of recreation use, although owners perceive them to be. As of 1995, about 41 percent of owners in the South posted their land. Among owners who already post some or all of their land, 16 percent anticipate posting more in the future. Very few anticipate posting less. Increasing demands for off-road vehicle use, hunting, fishing, and other of the more consumptive recreational activities are likely to bring about more recreation participant-land owner conflicts. In part as a response, many of the higher-income residents of the South are purchasing their own land for personal recreational pursuits. Very often these purchased lands end up being posted."

Environmental Consequences

Economic Impacts

Economic impacts of each alternative are given in the tables below. Table 3D-19 illustrates how the various alternatives differ from the current management direction (Alternative F) by jobs. Due to substitution effects from competing non-government sources, these jobs are characterized as being associated with local economic activity initiated by Forest Service programs and activities, rather than caused by these activities. Alternatives A through I provide a range of human influence from very little to more emphasis on human intervention and provide a range of multiple-use levels of forest resources.

Recreation and Forest Service expenditures are the programs that are associated most with jobs in this economy; this relationship holds for all alternatives. Those alternatives with a timber emphasis contribute the third most to jobs of all Forest Service programs.

Table 3D-19 Employment by Program by Alternative (Average Annual, Decade 1)

	Total Number of Jobs Contributed						
Resource	**Current(Alt.F)**	**Alt. I**	**Alt. A**	**Alt. B**	**Alt. D**	**Alt. E**	**Alt. G**
Recreation	449	449	449	449	449	449	449
Wildlife and Fish	42	42	42	42	42	42	42
Grazing	0	0	0	0	0	0	0
Timber	4,134	762	2,850	2,251	4,563	2,989	2,748
Minerals	0	0	0	0	0	0	0
Payments to States/Counties	933	98	587	450	1,011	634	561
Forest Service Expenditures	280	275	271	270	278	270	271
Total Forest Management	5,839	1,627	4,200	3,463	6,344	4,386	4,071
Percent Change from Current	---	-72.1%	-28.1%	-40.7%	8.7%	-24.9%	-30.3%

Table 3D-19 above shows employment changes from the current situation as percent change from current. Alternative D has the only increase while Alternative I, the preferred alternative, has the greatest decrease.

Table 3D-20 Labor Income by Program by Alternative (Average Annual, Decade 1; $1,000,000)

	Millions of dollars						
Resource	**Current(Alt. F)**	**Alt. I**	**Alt. A**	**Alt. B**	**Alt. D**	**Alt. E**	**Alt. G**
Recreation	$8.1	$8.1	$8.1	$8.1	$8.1	$8.1	$8.1
Wildlife and Fish	$1.0	$1.0	$1.0	$1.0	$1.0	$1.0	$1.0
Grazing	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Timber	$130.6	$24.2	$90.1	$71.2	$144.2	$94.5	$86.9
Minerals	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Payments to States/Counties	$29.2	$3.1	$18.4	$14.1	$31.6	$19.9	$17.6
Forest Service Expenditures	$8.8	$8.3	$8.1	$7.9	$8.7	$8.0	$8.0
Total Forest Management	$177.7	$44.6	$125.6	$102.2	$193.6	$131.4	$121.5
Percent Change from Current	---	-74.9%	-29.3%	-42.5%	8.9%	-26.1%	-31.6%

Labor income by alternative is given in Table 3D-20 above. The current management alternative has $177.1 million of labor income associated with it. All alternatives, except Alternative D, show a large decrease from current level of income. Alternative D shows a small increase. Recreation and those alternatives with timber activity contribute most income to the forest total.

Employment and income found in the following tables are divided into the major sectors of the National Forests in Alabama economy. For all alternatives, Retail Trade, Services, and Government are the sectors most affected by Forest Service programs and expenditures. To the extent that an alternative has a commodity program, manufacturing is also affected to a significant degree. Labor income in the form of wages and proprietors' earnings, has a similar effect as employment on the Retail Trade, Services and Government sectors of this economy.

Table 3D-21 Employment by Major Industry by Alternative (Average Annual, Decade 1)

	Total Number of Jobs Contributed						
Industry	**Current(Alt. F)**	**Alt. I**	**Alt. A**	**Alt. B**	**Alt. D**	**Alt. E**	**Alt. G**
Agriculture	56	22	43	37	60	44	42
Mining	31	10	23	19	34	24	22
Construction	471	80	317	249	515	335	305
Manufacturing	1,944	370	1,341	1,062	2,141	1,407	1,293
Transportation, Communication, & Utilities	299	69	211	170	329	221	204
Wholesale trade	220	57	158	129	241	164	153
Retail trade	822	339	634	549	880	655	619
Finance, Insurance, & Real Estate	157	40	111	91	171	116	108
Services	1,059	366	790	667	1,144	819	768
Government (Federal, State, & Local)	738	264	543	465	784	569	529
Miscellaneous	42	11	30	24	45	31	29
Total Forest Management	5,839	1,627	4,200	3,463	6,344	4,386	4,071
Percent Change from Current	---	0.0%	-28.1%	-40.7%	8.7%	-24.9%	-30.3%

Table 3D-22 Labor Income by Major Industry by Alternative (Avg. Annual, Decade 1; $1,000,000)

	Millions of dollars						
Industry	**Current(Alt. F)**	**Alt. I**	**Alt. A**	**Alt. B**	**Alt. D**	**Alt. E**	**Alt. G**
Agriculture	$0.9	$0.3	$0.7	$0.6	$0.9	$0.7	$0.6
Mining	$1.6	$0.4	$1.2	$1.0	$1.8	$1.2	$1.1
Construction	$14.9	$2.5	$10.0	$7.9	$16.3	$10.6	$9.6
Manufacturing	$70.3	$13.4	$48.6	$38.5	$77.5	$51.0	$46.8
Transportation, Communication, & Utilities	$12.5	$2.9	$8.8	$7.1	$13.7	$9.2	$8.5
Wholesale trade	$8.0	$2.1	$5.7	$4.7	$8.8	$6.0	$5.6
Retail trade	$13.5	$5.4	$10.3	$8.9	$14.4	$10.7	$10.1
Finance, Insurance, & Real Estate	$4.5	$1.1	$3.2	$2.6	$4.9	$3.3	$3.1
Services	$25.1	$7.4	$18.2	$15.1	$27.3	$19.0	$17.7
Government (Federal, State, & Local)	$26.1	$8.9	$18.7	$15.7	$27.7	$19.5	$18.1
Miscellaneous	$0.3	$0.1	$0.2	$0.2	$0.4	$0.3	$0.2
Total Forest Management	$177.7	$44.6	$125.6	$102.2	$193.6	$131.4	$121.5
Percent Change from Current	---	-74.9%	-29.3%	-42.5%	8.9%	-26.1%	-31.6%

Forest Service revenues from program activities, which result in payments to States/counties, are expected to decrease from the current direction for all proposed alternatives, except Alternative D. The magnitude of payments to counties expected in the first decade is shown in Table 3D-23 below. From $39.2 million currently, Alternative I would be expected to show the lowest amount with only a $4.1 million payment; Alternative D would have the only increase with a $42.5 million payment to the counties within the National Forests in Alabama boundaries.

Table 3D-23 Forest Service Revenues and Payments to Counties (Annual Avg, Decade 1; $1,000,000)

Forest Service Program	**Current(Alt. F)**	**Alt. I**	**Alt. A**	**Alt. B**	**Alt. D**	**Alt. E**	**Alt. G**
Recreation	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Wildlife and Fish	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Grazing	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Timber	$156.6	$16.3	$98.4	$75.5	$169.6	$106.4	$94.2
Minerals	$0.2	$0.2	$0.2	$0.2	$0.2	$0.2	$0.2
Soil, Water & Air	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Protection	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Total Revenues	$156.8	$16.6	$98.7	$75.7	$169.8	$106.6	$94.4
Payment to States/Counties	$39.2	$4.1	$24.7	$18.9	$42.5	$26.7	$23.6

Table 3D-24 below illustrates the percentage contribution of the National Forests in Alabama's current management program (Alternative F) to the area's economy. The Forest is associated with 2.4 percent of the total local economy's jobs, and 2.7 percent of the labor income. Manufacturing, Retail Trade, Services, and Government are the sectors of the economy that show the most benefit from the Forest's activities.

Table 3D-24 Current Role of Forest Service-Related Contributions to the Area Economy

	Employment (jobs)		Labor Income ($ million)	
Industry	Area Totals	FS-Related	Area Totals	FS-Related
Agriculture	18,004	56	$241.8	$0.9
Mining	3,535	31	$203.5	$1.6
Construction	29,347	471	$797.4	$14.9
Manufacturing	83,952	1,944	$2,890.5	$70.3
Transportation, Communication, & Utilities	14,845	299	$527.5	$12.5
Wholesale trade	11,692	220	$376.1	$8.0
Retail trade	72,443	822	$1,119.6	$13.5
Finance, Insurance, & Real Estate	15,738	157	$385.3	$4.5
Services	84,358	1,059	$1,927.7	$25.1
Government (Federal, State, & Local)	87,724	738	$2,809.6	$26.1
Miscellaneous	4,794	42	$34.8	$0.3
Total	426,433	5,839	$11,313.5	$177.7
Percent of Total	100.0%	1.4%	100.0%	1.6%

Economically speaking, commodity-oriented alternatives have a greater role in producing impacts on the economy. However, substitutions may occur in certain sectors, such as those related to the timber program, where non-government owners could supply those products in this local economy. Therefore, there would likely be no loss of jobs or income from a reduced federal timber program. Recreation plays a significant part in the forest's contribution to the local economy

Table3D-25. Cumulative Economic Impacts in 2015

	2000		2015						
	Area	Forest	Area	Forest Portion					
Economic Indicator	Totals	Portion	Totals	Alt. F - NA	Alt. A	Alt. B	Alt. D	Alt. E	Alt. G
Employment									
Total (jobs)	352,660	5,839	429,323	5,839	4,200	3,463	6,344	4,386	4,071
% of Area Totals	100%	1.7%	100%	1.4%	1.0%	0.8%	1.5%	1.0%	0.9%
% Change from No Action	---	---	---	0.0%	-28.1%	-40.7%	8.7%	-24.9%	-30.3%
Labor Income									
Total ($ million)	$8,699.0	$177.7	$12,410.0	$177.7	$125.6	$102.2	$193.6	$131.4	$121.5
% of Base	100%	2.0%	100%	1.4%	1.0%	0.8%	1.6%	1.1%	1.0%
% Change from No Action	---	---	---	0.0%	-29.3%	-42.5%	8.9%	-26.1%	-31.6%

	2000		2015						
	Area	Forest	Area	Forest Portion					
Economic Indicator	Totals	Portion	Totals	Alt. I	--	--	--	--	--
Employment									
Total (jobs)	352,660	5,839	429,323	1,627	0	0	0	0	0
% of Area Totals	100%	1.7%	100%	0.4%	0.0%	0.0%	0.0%	0.0%	0.0%
% Change from No Action	---	---	---	-72.1%	-100.0%	-100.0%	-100.0%	-100.0%	-100.0%
Labor income									
Total ($ million)	$8,699.0	$177.7	$12,410.0	$44.6	$0.0	$0.0	$0.0	$0.0	$0.0
% of Area Totals	100%	2.0%	100%	0.4%	0.0%	0.0%	0.0%	0.0%	0.0%
% Change from No Action	---	---	---	-74.9%	-100.0%	-100.0%	-100.0%	-100.0%	-100.0%

Social Impacts

Since the beginning of this planning process, numerous public meetings were held to allow people an opportunity to express their wants, needs and demands for access to and use of national forest resources. Many of these views were used to develop the range of alternatives considered in this analysis. Public meetings, however, typically represent only a portion of the public's interests and seldom represent the so-called "silent majority" who do not or cannot attend meetings. Therefore, the Southern Region commissioned the Southern Research Station to undertake a telephone survey to randomly survey the public within a 75-mile radius of our national forests current revising their Land and Resource Management plans. This type of survey provides input from a broader public concerning what they would like to see emphasized in national forest management. For more information on how this survey was conducted, see the "Public Survey Report, Southern Appalachian National Forests, National Forests in Alabama."

General Attitudes – Survey Results

The public survey provided some information on the values residents have relating to natural resources. Well over 90 percent of the sample in the National Forests in Alabama market area thought protection of clean water was an important management goal for national forests. Next highest percentages (in the low 90's) were maintaining the forests in good condition for future generations, providing protection for wildlife and habitat (mid to high 80's), protection of trees for healthy forests (mid to high 80's), natural appearing forests (low to mid 80's), and protection of rare or endangered species (high 70's to low 80's).

The values favored least by survey participants included management of national forests to help local tourism industries, national forests as a source of grazing range for cattle, and national forests as sources of raw materials and products to support local industries and manufacturing.

People who reside in the areas near the Alabama National Forests put wildlife, ecosystems and naturalness above utilitarian objectives in the management of these national forests. Another way people relate to the National Forests is through recreational activities. For more information on the types of recreational activities provided on the National Forests, and how this may change by alternative, see the section in this EIS on Dispersed and Developed Recreation.

Possible management objectives of the forest were asked of respondents. The following analysis provides a comparison of the most favored management objectives versus the range of alternatives available to forest decision makers

Approximately 90 percent of local residents favored a management objective that would protect streams, lakes and watershed areas. Alternatives D and F protect water quality and riparian areas through implementation State BMP's and streamside management zones. All other alternatives protect water quality and riparian areas through the riparian corridor prescription.

"Naturalness" – Survey Results

The next most favored management issues address naturalness. About 90 percent of respondents wanted the forest to be managed for wildlife by protecting their habitats; approximately 83 percent wanted management direction to protect old growth forests;

approximately 83 percent want to see forests managed to provide habitat for wildlife and birds for people to see and photograph.

Alternatives D and F would have the least emphasis of all alternatives on "naturalness". Forests would likely appear managed with variable tree sizes and openings throughout the forests and the canopy openings could be seen from roadways and vista points. These alternatives would mainly provide old growth on unsuitable lands already withdrawn from the timber base. Alternative E provides high quality scenery in both natural and managed settings. Highways and roads in the forests would have forest stands with few, if any, broken views. Roadless areas and certain other areas adjacent to or in close proximity to wilderness areas would be recommended for wilderness designation, which would increase "naturalness". Alternative I provides for a healthy forest by managing ecosystems through restoration or maintenance to provide for natural species composition (species mix), structure (age class distribution), and function (as habitat, and healthy, vigorous overstory/understory components). Alternative I also provides for emphasis on variety of recreational uses and settings. In all alternatives, except D and F, a variety of large, medium and small old growth patches will be managed or created through restoration, protection, or maintenance activities to meet biological and social needs. Alternative B would emphasize the restoration activities that could produce both large and small openings. Alternative A supports visual quality and most areas would maintain a forested canopy. A substantial amount of the forest would be allocated to providing a mix of products and services, including recreation opportunities and natural settings. Alternative G would provide an emphasis on establishing large blocks of undisturbed areas and habitat linkages.

Commodity Uses – Survey Results

The management objectives favored least by percentage include: commercial leasing of oil and gas rights (18 percent), expand access for motorized off-highway vehicles (24 percent), allow recreational gold prospecting and dredging (28 percent), allow harvesting and mining to support local industries (37 percent), provide new paved roads for cars (40 percent).

Alternatives D and F emphasize balanced age classes. All lands considered suitable for sustained-yield timber management would be available for sustained-yield management. Each major forest group—pine, mixed, and hardwood—would have specific target rotation ages. Alternative A provides sustained yield of wood products with an emphasis on high quality sawtimber. Alternative I allows forest management activities where needed and appropriate to achieve the restoration of desired composition, structure, function of forest ecosystems with additional emphasis on providing for a wide variety of recreational activities. A result of the restoration activities could also be a sustainable supply of wood products. Alternative B emphasizes restoring natural ecosystems. Wood products would be managed in concert with restoration and creating wildlife habitats. Timber sales would be a by-product of restoration management. Alternative E provides for the widest range of recreation overall long-term timber product objective of large-diameter and high quality sawtimber species. Alternative G emphasizes large undisturbed areas. High quality timber would be produced in long rotations in areas outside sensitive species habitat.

Recreation Use – Survey Results

Recreation use as a forest management objective was thought of as important by about two thirds of our respondents. The management objective to allow a diversity of uses such as grazing, recreation and wildlife habitat had 66 percent positive response. Allowing recreation fees that go back to the forest were favored by about 60 percent.

Alternative D provides for developed and dispersed recreation opportunities in both natural and managed settings. Potential for roaded natural experiences would increase as access roads for timber harvests are built or improved. Wildlife habitat would be provided in this alternative as a mosaic of seral stages (age classes). Alternative A emphasizes developed and dispersed recreation opportunities achieved by commercial recreation and increased public access. It would be appropriate to increase public access in high-use areas in order to provide more recreation opportunities. Wildlife habitat is among the many emphases of this alternative, in terms of PETS species, and demand species. Alternative I provides a spectrum of high quality, nature-based recreation settings and opportunities that are not widely available on non-federal lands. Hiking, biking, equestrian trail systems are emphasized in non-motorized settings with high quality landscapes. OHV routes are designated in proper settings. Hunting, fishing, and non-consumptive wildlife opportunities are also emphasized. Backcountry recreation experiences are also provided. A variety of wildlife habitats are provided in this alternative via the restoration activities and prescribe burning. Alternative B provides a variety of recreating settings, and wildlife habitats in areas where they would be compatible with restoration activities. A wide variety of recreation activities would be provided. Alternative E emphasizes settings that would attract a variety of recreation users. Active resource management would be concentrated in certain locations that support recreation use and visual quality. Increases in dispersed and developed recreation areas and opportunities would be appropriate. A variety of recreation experiences including concentrated use of off-highway vehicle use is provided. Wildlife habitat protection and maintenance would likely be limited to PETS species in this alternative. Alternative G emphasizes backcountry and nature-oriented non-motorized recreation opportunities; semi primitive, wildlife, and nature-oriented recreation opportunities would be provided. Developed facilities would remain and new facilities would occur where they do not detract from ecosystem function and landscape connectivity.

Present Net Value of the Alternatives

The following table shows estimated benefits, costs, net benefits, and cumulative present net value (PNV) by alternative. All figures are in 2000 dollars. The benefits in this table include market values and non-market assigned values. Market values include those values where the Forest Service receives money such as for timber, range, special uses, etc. Non-market values are assigned values for amenities such as wildlife and recreation.

Table 3D-26 Cumulative Decadal Present Values of Costs and Benefits

	Alt. A	Alt. B	Alt. D	Alt. E	Alt. F	Alt. G	Alt. I
Present Value benefits by Program:							
Range:	$4	$4	$4	$4	$4	$4	$4
Timber:	$280,867	$199,999	$335,001	$231,128	$320,067	$223,586	$189,652
Minerals:	$4,317	$4,317	$4,317	$4,317	$4,317	$4,317	$4,317
Recreation	$343,696	$343,696	$343,696	$343,696	$343,696	$343,696	$343,696
Wildlife:	$495,436	$495,436	$495,436	$495,436	$495,436	$495,436	$495,436
PV of Benefits	$1,124,321	$1,043,453	$1,178,456	$1,074,582	$1,163,521	$1,067,040	$1,033,106
Present Value costs by Program:							
Range:	$2,395	$2,395	$2,395	$2,395	$2,395	$2,395	$2,395
Timber:	$66,477	$50,376	$77,774	$58,684	$76,150	$56,262	$53,800
Roads/Engineering	$97,327	$79,121	$133,529	$93,501	$126,883	$91,792	$75,395
Minerals:	$3,244	$3,244	$3,244	$3,244	$3,244	$3,244	$3,244
Recreation	$25,949	$21,639	$21,421	$27,255	$23,794	$21,639	$24,033
Wildlife:	$48,306	$53,139	$46,129	$43,473	$48,306	$53,139	$55,555
Soil, Water, Air..	$5,442	$5,442	$5,442	$5,442	$5,442	$5,442	$5,442
Protection/Forest Health	$26,101	$42,864	$28,278	$32,349	$30,455	$31,544	$39,446
Lands	$9,905	$8,120	$10,362	$9,905	$10,362	$9,905	$8,120
Planning, Inv., Monitoring	$23,445	$25,601	$21,269	$23,445	$23,445	$23,445	$27,016
Administration (Cost Pools)	$54,227	$54,227	$54,227	$54,227	$54,227	$54,227	$54,227
PV Costs	$362,818	$346,166	$404,070	$353,920	$404,703	$353,033	$348,672
Cumulative Present Net Value	$761,502	$697,287	$774,386	$720,662	$758,818	$714,007	$684,434

Following are conclusions that can be drawn from the PNV table:

Alternatives A, D, & F. These alternatives have the highest PNV due to the timber emphasis portion of the alternatives. The timber sale revenues are much higher here, and offset costs to a higher degree.

Alternatives E and G. These alternatives have the next highest PNV due to emphasis on wildlife and recreation objectives. The wildlife objective creates the need to provide early successional habitat on parts of the landscape, and timber sales are a tool to achieve the objective. Timber volume is a side benefit to achieving the objective.

Alternatives B, and I. These alternatives have the lowest PNV due to lower timber revenue in a restoration mode. Stands that get regenerated in a restoration emphasis are some of the lower quality, off site stands that do have a lower market value. Timber sales are a tool to achieve restoration, and timber volume is a side benefit, not the objective.

3.E Unavoidable Adverse Impacts

The application of management prescriptions, standards and guidelines, best management practices, monitoring, and adaptive management would limit the extent, severity, and duration of any adverse environmental effects. Mitigation measures are also reflected in the management prescriptions and discussed within each resource effects section of this document (Chapters 3 and 4). Nevertheless, some adverse effects are unavoidable under any of the alternatives.

Most unavoidable adverse effects are transitory. For example, air quality would diminish on a recurring but temporary basis due to the use of prescribed fire. Although standards and guides require burning during times of greatest smoke dispersion, the presence of smoke and haze could detract from visitor's expectations of clean air. Some impacts to the visual qualities of the Forest landscape may be inevitable. Mineral and energy developments can have varying magnitudes of impacts depending upon the location and type of activity. Most adverse impacts can be avoided or minimized through approved operating plans for locatable minerals and surface stipulations for leasable minerals. Other short-term unavoidable adverse effects could include sediment production and run-off from fires, silvicultural practices, or road and facility construction, reconstruction, and maintenance. Standards and guides, best management practices, and monitoring plans would minimize and mitigate adverse affects, however, it is currently not technically feasible to avoid all sediment mobilization. Unavoidable adverse affects could translate into a small, but never the less detectable, reduction in downstream water quality and aquatic habitat loss.

Likewise, disturbance, displacement, or loss of fish and wildlife habitat may occur as a consequence of habitat reduction or increased human activity. Human access and resulting adverse impacts on natural communities is generally increasing and yet unavoidable, regardless of the selected alternative. Development activities and silvicultural treatments could have an adverse effect on the potential for future management of un-roaded areas as wilderness, research, or natural areas. Disease, pests, and storm damage will occur at one time or another, creating changes in the appearance and function of the landscape. Such adverse affects may be localized and could be of either temporary or long-term duration.

For detailed disclosure of all effects, including unavoidable adverse effects, see the preceding Environmental Consequences discussions (Chapters 3) covering the various resource areas (air, water, biological, recreation, etc.).

3.F. Relationship between Short-term Uses and Long-term Productivity

Short-term uses are those expected to occur on the Forest over the next ten years. These uses include, but are not limited to, recreation activities, mineral development, timber harvest, and prescribed burning. Long-term productivity refers to the capability of the land to provide resource outputs for a period of time beyond the next ten years. Soil and water are the primary resource factors supporting long-term productivity of our National Forests.

Federal regulations (36 CFR 219.27) provide for the maintenance of long-term productivity of the land. By law, the Forest Service must ensure that land allocations and permitted activities do not significantly impair the long-term productivity of the land. All of the alternatives considered in detail incorporate the concept of sustained resource output yield while maintaining the productivity of natural resources. Specific direction and mitigation measures included in the Forest-wide management requirements would ensure that long-term productivity would not be impaired by the application of short-term management practices.

Although all of the alternatives were designed to maintain long-term productivity, there are differences among alternatives in the long-term availability or condition of resources. There may also be differences among alternatives in long-term expenditures necessary to maintain desired conditions. Alternatives A, D, and E have the highest inherent level of short-term uses as reflected by the acres of vegetation treatments and potential ground disturbance. These alternatives would therefore be expected to result in higher levels of short-term consequences such as visual impacts, alteration of fish and wildlife habitat, and increased sedimentation. Alternatives B, G, and I have the lowest level of short-term uses, and therefore the lowest level of short-term consequences. However, there is not necessarily an inverse relationship between the extent and intensity of short-term uses to long-term productivity. Some short-term uses may have substantial short-term adverse impacts but long-term benefits. For example, prescribed burning can be considered a short-term use and impact that will translate into an increase in long-term resource productivity. Other measures and means of increasing forest health would also be expected to have temporary adverse impacts on some resources but long-term benefits to overall forest and watershed health. These types of differences among the alternatives are further described in the preceding Environmental Consequences discussions (Chapters 3) covering the various resource areas (air, water, biological, recreation, etc.).

3.G. Irreversible/Irretrievable Commitment of Resources

Irreversible and irretrievable commitments of resources are not usually made at the programmatic level of a Forest Plan. Irreversible commitments are decisions affecting non-renewable resources such as soils, minerals and cultural resources. Such commitments of resources are considered irreversible because the resource has been destroyed, removed or has deteriorated to the point that renewal can occur only over a long period or at great expense. The actual commitment to develop, use or affect non-renewable resources is made at the project level.

Irretrievable commitments represent resource uses or opportunities that are foregone or cannot be realized during the planning period. These decisions are reversible, but the production opportunities foregone are irretrievable. An example is the allocation of management prescriptions that do not allow timber harvests where the trees could have been part of the suitable base. For the period these allocations are made, the opportunity to produce timber from these areas is foregone. Irreversible and irretrievable commitments are not specifically identified in the discussions in this chapter.

3.H. Incomplete or Unavailable Information

The National Forests in Alabama 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, where applicable, for each resource.

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.

3.I. Environmental Justice

A specific consideration of equity and fairness in resource decision-making is encompassed with the concerns of environmental justice. As required by Executive Order 12898, all federal actions must consider potentially disproportionate effects on minority or low-income communities. Principles for considering environmental justice are outlined in Environmental Justice Guidance under the National Environmental Policy "Act (Council on Environmental Quality 1997). Those principles were considered in this analysis.

The Socio-Economic portion of this chapter identified the demographics of the affected areas of Alabama in relation to the locations of the National Forests in Alabama, including minorities and low-income populations. There are standards in place in the Revised Plan that protect traditional cultural uses of the National Forests, and because the Revised Plan is strategic and programmatic in nature, there are no adverse environmental effects relating to an environmental justice issue. Also, during the extensive public involvement phases of this planning process, where we looked at land allocation (of management emphases) scenarios, environmental justice issues did not arise.

There is no evidence to believe that minority or low-income groups will be adversely or disproportionately affected by the alternatives that have been presented in this document. Results from a recent survey support this notion. The "*Public Survey Report, Southern Appalachian National Forests, Bankhead & Talladega and Tuskegee & Conecuh National*

Forests" (Cordell et al. July, 2002) provided the Forest Service with a profile of the individual attitudes and values toward management activities, including recreation, on the national forests in the Southern Appalachian Region. The survey (Table 9) revealed that attitudes toward various management issues on National Forest System lands are very similar between minority groups and Caucasians for most activities. Therefore, impacts resulting from changes in recreation opportunities, or other management activity, under any alternative would not be expected to have a disproportionate impact on any minority group, or income group.

CHAPTER 4

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Anthony Jay Edwards Acting Staff Officer/Hydrologist Supervisors Office	MS Physical Geography, A.B.D. Ph.D. Physical Geo, 8 years experience National Wetlands Research Center, 2 year experience with Forest Service	Watershed Health
Stanley Glover GIS Coordinator Supervisors Office	17 years of service with Forest Service—3 Ranger Districts and SO; 7 years GIS experience; 15 years forestry experience	GIS Analysis and Map Production
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CHAPTER 5

Final EIS Distribution List

The following agencies, organizations, and individuals are on the distribution list for the Final Environmental Impact Statement for the Revised Forest Land and Resource Management Plan for the National Forests in Alabama:

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MELINDA LEDBETTER
JIMMY LEE
LARRY LEE
C SPENCER LEFFEL
R MICHAEL LEONARD
MARGARET LITTLE
JAMES LOESEL, CTZNS TASK FRCE ON NATL FRST MGMT
KAY & JIM LOGAN
JON LONEY, TVA
FAYE LOWRY
WILLIAM LUMOR
WADE MAHLKE
LLOYD MALONE
WILLIAM MARBURG
KEVIN MAREK, MOBILE BAY SIERRA CLB
J THOMAS MARTIN
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LOUISE NICOL
BLANTON NOLAND
ROLAND NORTON
MEREDITH ODOM
GERALD OGBURN
LU PARBERY
JUDITH PATLA
MICHELLE PATTERSON
CAROL PATTERSON
DAVID PATTERSON
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J. PERRY
FREDRICH PERRY
CAROL PETERSON
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ANN & DONALD SWEENEY
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GEORGE & LINDA TAYLOR
LYLE TAYLOR
MARIA TCHAKERIAN, TEXAS A&M UNIVERSITY
JULIA THOMPSON
KATHLEEN TOKUDA
WILLIAM TRUEBLOOD
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CHAPTER 6

Glossary

Acronyms

AA - analysis area
ACP – Agriculture Conservation Program
AD - Administratively Determined
ADA - Americans with Disabilities Act
AMS - Analysis of the Management Situation
APHIS - Animal and Plant Health Inspection Service
ASQ - allowable sale quantity
AT - Appalachian Trail
ATV – all-terrain vehicle
AUM - animal unit month

BA - basal area
BF - board foot
BMP - best management practice
BIO – biological oxygen demand
BSS - base sale schedule

CAA - Clean Air Act
CCF - hundred cubic feet
CEQ - Council on Environmental Quality
CF - cubic foot
CFL - commercial forest land
CFR - Code of Federal Regulations
CFS - cubic feet per second
CIP - Capital Investment Program
CISC - Continuous Inventory of Stand Conditions
CMAI - culmination of mean annual increment
CompPATS - Computerized Project Analysis of Timber Sales
CVHW - cove hardwood.
CWA - Clean Water Act
CWD – coarse woody debris

DBH - diameter at breast height
DBRU - Drainage Basin Response Unit
DEIS - Draft Environmental Impact Statement
DFC - desired future condition

EA – Environmental Assessment
ECOMAP - Ecological Classification and Mapping Task Team
ECS - Ecological Classification System
EIS - Environmental Impact Statement
EMU - ecological management unit
EPA - Environmental Protection Agency
ESA - Endangered Species Act
EWPP- Emergency Watershed Protection Plan

FDR - forest development road
FRP - Forest Road Program
FEIS - Final Environmental Impact Statement
FH - Forest Highway
FIA - Forest Inventory and Analysis
FMAP - Fire Management Action Plan
FR - Forest Road
FSH - Forest Service Handbook
FSM - Forest Service Manual
FTE - full-time employee
FY - fiscal year

GAO - Government Accounting Office
GFA – General Forest Area
GIS - Geographic Information System
GDP - gross domestic product

HRP - Human Resource Program
HUC – Hydrologic Unit Code

IDT - Interdisciplinary Team
IPM - integrated pest management
IS - Interpretive Services

LAR - Land Area Report
LE - law enforcement
LOAP - Landownership Adjustment Plan
LTA - landtype association
LTP - landtype phase
LTSYC - long-term sustained-yield capacity
LUG - land-use group
L&WCF - Land and Water Conservation Fund

LWD – large woody debris

M - thousand
M$ - thousands of dollars
MA - management area
MAR - Management Attainment Report
MAUM - thousand animal unit month
MBF - thousand board feet
MCF - thousand cubic feet
MIL - management intensity level
MIS - management indicator species
MM - million
MM$ - millions of dollars
MMBF - million board feet
MMCF - million cubic feet
MMR - minimum management requirement
MMRVD - million recreation visitor-day
MOU - memorandum of understanding
MRVD - thousand recreation visitor-day
MWFUD - thousand wildlife and fish user-day

NAAQS - National Ambient Air Quality Standards
NAPAP – National Acid Precipitation Assessment Program
NEPA - National Environmental Policy Act
NF - National Forest
NFMA - National Forest Management Act
NFRS – National Forest Recreation Survey
NFS – National Forest System
NFSR – National Forest System Road
NLFCA – National Listing of Fish Consumption Advisories
NPL – National Priorities List
NPS – National Parks Service
NRCS - Natural Resources Conservation Service
NRI – Natural Resource Inventory
NTMB - neotropical migratory birds
NVUM – National Visitor Use Monitoring
NWPS - National Wilderness Preservation System

OHV - off-highway vehicle
OMP - operation maintenance and protection
ORV - off-road vehicle

PAOT - persons-at-one-time
PETS - proposed, endangered, threatened, or sensitive
PL - public law
PM - particulate matter
PNV - present net value
PNW - present net worth
PRODCL - productivity class
PSD - prevention of significant deterioration
PSI - pounds per square inch

RAP – Roads Analysis Process or Procedure
RARE - Roadless Area Review and Evaluation
RARE II - the second Roadless Area Review and Evaluation
RBP – Rapid Bioassessment Protocol
RCW - red-cockaded woodpecker
RCW EIS - Final Environmental Impact Statement for the management of the Red-cockaded Woodpecker and its habitat on National Forests in the Southern Region
RD - Ranger District
RMO – Road Management Objectives
RNA - research natural area
RNAT - roaded natural
ROD - record of decision
ROS - Recreation Opportunity Spectrum
ROW - right-of-way
RPA - Resources Planning Act
RVD - recreation visitor-day

SAA - Southern Appalachian Assessment
SCORP - State Comprehensive Outdoor Recreation Plan
S&G - standard and guideline
SH - state highway
SIO – Scenic Integrity Objective
SIP - State Implementation Plan
SMS – Scenery Management System
SPB - southern pine beetle
SPMO - semiprimitive motorized
SPNM - semiprimitive non-motorized
SMZ – Streamside Management Zone

T&E - threatened and endangered
TNC - The Nature Conservancy
TSI - timber stand improvement
TSPIRS - Timber Sale Program Information Reporting System
TVA - Tennessee Valley Authority

UPLD - upland hardwood/mixed
USC - United States Code
USDA - U.S. Department of Agriculture
USDI - U.S. Department of Interior
USFWS - U.S. Fish and Wildlife Service
USGS - U.S. Geological Survey

VIS - Visitor Information Services
VMS – Visual Management System
VQO - visual quality objective

WFUD - wildlife and fish user-day
WHI - wildlife habitat improvement
WIN - Watershed Improvement Inventory
WO - Washington Office
WPIN - white pine
WRD - Wildlife Resources Division
WRP – Wetlands Reserve Program
WSA - wilderness study area
WURR – Water Use Rights and Requirements

YPIN - yellow pine

Definitions

Definitions were taken from the following sources:

Code of Federal Regulations (CFR) Title 36, *Parks, Forests, and Public Property,* Chapter II, Forest Service, Department of Agriculture; Part 219, Planning, Section A—National Forest System Land and Resource Management Planning; Section 219.3, Definitions and Terminology, Revised July 1, 1998. (Referred to as 36 CFR 219.3)

Forest IDT is the Interdisciplinary Team on the National Forests in Alabama. (Referred to as Forest IDT)

Society of American Foresters. 1998. *The Dictionary of Forestry*. Edited by John A. Helms. 210 p. (Referred to as SAF)

Forest Service Handbook (FSH) 2090.11, *Ecological Classification and Inventory Handbook*, WO Amendment 2090.11-91-1, Effective 4/26/91, 05 - Definitions. (Referred to as FSH 2090.11-05)

FSH 2409.13, *Timber Resource Planning Handbook*, WO Amendment 2409.13-92-1, Effective 8/3/92, 05 - Definitions. (Referred to as FSH 2409.13-05)

FSH 2409.15, *Timber Sale Administration Handbook*, Amendment No. 2409.15-96-2, Effective Sept. 19, 1996, 05 - Definitions. (Referred to as FSH 2409.15-05)

FSH 2409.17, Silvicultural Practices Handbook, 1/85 WO, Chapter 9 - Timber Stocking Guides and Growth Predictions, 9.05 - Definitions. (Referred to as FSH 2409.17-9.05)

FSH 2609.13, *Wildlife and Fisheries Program Management Handbook*, WO Amendment 2609.13-92-1, Effective 8/3/92, Chapter 70 - Analysis of Economic Efficiency of Wildlife and Fisheries Projects, 70.5 - Definitions. (Referred to as FSH 2609.70.5)

FSH 2709.12, *Road Rights-of-Way Grants Handbook*, 9/85 WO, Zero Code, 05 - Definitions. (Referred to as FSH 2709.12-05)

Forest Service Manual (FSM) 1900 - Planning, Amendment No. 1900-91-3, Effective March 15, 1991, 1905 - Definitions. (FSM 1905)

FSM 2163, *Hazardous Waste Management*, Chapter 2163.05, Definitions. (Referred to as FSM 2163)

FSM 2200, *Range Management*, WO Amendment 2200-91-1 Effective 3/1/91, Chapter 2230, Grazing and Livestock Use Permit System, 2230.5 - Definitions. (Referred to as FSM 2230)

FSM 2300, *Recreation, Wilderness, and Related Resource Management*, Amendment No. 2300-91-3 Effective March 12, 1991. Chapter 2355, Off-Road Vehicle Use Management, Executive Order 116-44, as amended by Executive Order 11989, Use of

Off-Road Vehicles on the Public Lands 37 FR 2877 (Feb. 9, 1972), 42 FR 26959 (May 25, 1977). (Referred to as FSM 2355)

FSM 2300, *Recreation, Wilderness, and Related Resource Management*, WO AFSM 2300 - Recreation, Wilderness, and Related Resource Management, WO Amendment 2300-90-1, Effective 6/1/90, Chapter 2310 - Planning and Data Management - 2312 - Recreation Information Management (RIM). (Referred to as (FSM 2312)

FSM 2400, Timber Management, WO Amendment 2400-96-6 Effective 9/24/96. Chapter 2435 - Salvage Sales. 2435.05, Definitions. (FSM 2435)

FSM 2500, *Watershed and Air Management*, Amendment No. 2500-94-4, Effective Dec. 20, 1994. Chapter 2520, Watershed Protection and Management. 2521 - Watershed Condition Assessment. 2521.05 - Definitions. (Referred to as FSM 2521)

FSM 2500, *Watershed and Air Management*, Amendment No. 2500-94-4, Effective Dec. 20, 1994. Chapter 2520, Watershed Protection and Management. FSM 2526 - Riparian Area Management. 2526.05 - Definitions. (Referred to as FSM 2526)

FSM 2600, *Wildlife, Fish, and Sensitive Plant Habitat Management*, Amendment No. 2600-91-8 Effective Oct. 22, 1991, Chapter 2605, Definitions. (Referred to as FSM 2605)

FSM 2600,*Wildlife, Fish, and Sensitive Plant Habitat Management*, WO Amendment 2600-95-7, Effective 6/23/95, Chapter 2670, Threatened, Endangered, and Sensitive Plants and Animals, 2670.5 - Definitions. (Referred to as FSM 2670)

A User's Guide to Forest Information Retrieval (FIR), Southeastern Forest Experiment Station, Forest Inventory and Analysis Unit, Asheville, NC, 1988. (Referred to as FIR)

Interim Resource Inventory Glossary, File 1900, Washington, DC, 96 p., June 14, 1989. (Referred to IRIG)

A

accessibility – The relative ease or difficulty of getting from or to someplace, especially the ability of a site, facility or opportunity to be used by persons of varying physical and mental abilities.

accessible facility – A single or contiguous group of improvement that exists to shelter or support Forest Service programs that is in compliance with the highest standard of current Federal or Forest Service accessibility guidelines, at the time of construction.

acid deposition - Rain, snow, or dry particulate matter containing high concentrations of acid anions (e.g. nitrate and sulfate), usually produced by atmospheric transformation of the byproducts of fossil fuel combustion. Precipitation with a pH lower than 5.0 is generally considered to be acidic.

acid neutralizing capacity - The total capacity of a water sample to neutralize acids, as determined by titration with a strong acid. Acid neutralizing capacity includes alkalinity (e.g. carbonate) plus base cations.

acidification – To convert into an acid or become acid.

Agriculture Conservation Program – USDA cost-share program for steambank improvement.

acquisition of land - Obtaining full landownership rights by donation, purchase, exchange, or condemnation.

acre-equivalents - The number of acres of forest habitat improved or affected by the installation of various wildlife habitat improvements in an area. Determined by multiplying by various coefficients.

acre-foot - A measurement of water volume, equal to the amount of water that would cover an area of 1 acre to a depth of 1 foot (specifically 43,560 cubic feet or 325,851 gallons).

activity - A measure, course of action, or treatment that is undertaken to directly or indirectly produce, enhance, or maintain forest and rangeland outputs or achieve administrative or environmental quality objectives.

adaptive management – A dynamic approach to forest management in which the effects of treatments and decisions are continually monitored and used, along with research results, to modify management on a continuing basis to ensure objectives are being met.

administrative unit - All the National Forest System lands where one forest supervisor has responsibility. The basic geographic management area within a Forest Service Region, station, or area.

advance regeneration (reproduction) - Seedlings or saplings that develop, or are present, in the understory.

aerial logging – A yarding system employing aerial means, (e.g., helicopters, balloons), to lift logs.

afforestation - Establishment of a forest or stand in an area not recently forested.

age class - A grouping of living things based on their age.

age class (cohort) - A distinct aggregation of trees originating from a single natural disturbance or regeneration cutting.

age dependent relationships – Complex yield composite relationships between independent and dependent variables that vary by the age of the understory and/or the overstory.

agricultural land - Areas used primarily for production of food and/or fiber (excludes wood fiber). Examples include cropland, pasture, orchards, vineyards, nurseries, confined feeding areas, farmsteads, and ranch headquarters.

air pollution - Any substance or energy form (heat, light, noise, etc.) that alters the state of the air from what would naturally occur.

air quality (PSD) class – Three broad classifications established by the CAA to help prevent significant deterioration of air quality for all areas of the country that are known (or assumed) to be attaining NAAQS.

> **Class I –** Select wilderness areas and national parks where identified air quality related values might become (or currently are) adversely affected by even a small increment of additional air pollution. To date, there are 156 such areas nationwide.
>
> **Class II –** Areas the states may designate to receive such additional amount of air pollution (even up to 30 times the Class I area increment) that air quality may deteriorate from baseline to, (but not below) NAAQS. To date, there are no such areas nationwide.
>
> **Class III –** All other areas, by default, where a moderate level of additional air pollution is deemed acceptable. The bulk of the U.S. falls in this class.

air quality related values – Terminology used in the PSD portion of the CAA describing values associated with certain resources that may become impaired by air pollution. Typically, these include aquatic habitats, terrestrial habitats, and visibility.

all aged stand – A stand with trees of all, or almost all age classes, including those of exploitable age.

allocated fund - Funds transferred from one agency or bureau to another for carrying out the purpose of the parent appropriation and agency.

allocation - The assignment of management prescriptions or combination of management practices to a particular land area to achieve the goals and objectives of the alternative.

allopatric – Condition where one species lives in an area without other closely related species. The species have disjunct distributions. Opposite of sympatric.

allotment management plan - The basic land unit used to facilitate management of the range resource on National Forest System and associated lands administered by the Forest Service.

allowable sale quantity - The quantity of timber that may be sold from the area of suitable land covered by the Forest Plan for a time period specified by the Forest Plan. This quantity is usually expressed on an annual basis as the "average annual allowable sale quantity."

all-terrain vehicle (ATV) - Any motorized, off-highway vehicle 50 inches or less in width, having a dry weight of 600 pounds or less that travels straddled by the operator. Low-pressure tires are six inches or more 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.

alternative - In forest planning, a mix of resource outputs designed to achieve a desired management emphasis as expressed in goals and objectives, and in response to public issues or management concerns.

amendment - A formal alteration of the Forest Plan by modification, addition, or deletion. Forest Plan amendment requires an environmental analysis. Significant findings require an environmental impact statement and the amendment will follow the same procedure used for plan preparation. Insignificant findings allow the changes to be implemented following public notification. Amendments can take place at any time following plan approval.

amenity values - Features or qualities which are pleasurable or aesthetic, as contrasted with the utilitarian features of a plan, project, location, or resource.

analysis area - A collection of lands, not necessary contiguous, sufficiently similar in character, that they may be treated as if they were identical.

analysis area identifier - A resource characteristic used to stratify the land into capability areas and analysis areas.

Analysis of the Management Situation - A determination of the ability of the planning area to supply goods and services in response to society's demand. The AMS is contained in a 182-page report available from the Forest Supervisor. The Forest Plan includes a summary of the AMS. Information from it is contained throughout the EIS/Plan.

animal unit month (AUM) - The quantity of forage required by one mature cow and her calf (or the equivalent, in sheep or horses), for one month; 682 pounds of air-dry forage.

annual forest program - The summary or aggregation of all projects that make up an integrated (multifunctional) course of action for a given level of funding of a forest planning area that is consistent with the Forest Plan.

annual work planning process - Preparation of technical plans that serve to implement land and resource management, and program decisions contained in the integrated land, resource plans, and budget allocations.

appropriated fund - Funds available for obligation or outlay by Congress to a given agency.

appropriate management response – The response to a wildland fire based on an evaluation of risks to firefighter and public safety. Circumstances under which the fire occurs, including weather and fuel conditions, natural and cultural resource management objectives, protection priorities, and values to be protected. The evaluation must also include an analysis of the context of the specific fire within the overall logic, geographic area, or national wildland fire situation.

aquatic ecosystem - Components that include: the stream channel, lake and estuary beds, water, biotic community, and associated habitat features. Also included are streams and lakes with intermittently, semipermanently, and seasonally flooded channels or streambeds. In the absence of flowing water, intermittent streams may have pools or surface water.

aquatic habitat types - The classification of instream habitat based on location within channel, patterns of water flow, and nature of flow controlling structures. Habitat is classified into a number of types according to location within the channel, patterns of water flow, and nature of flow controlling structure. Riffles are divided into three habitat types: low gradient riffles, rapids, and cascades. Pools are divided into seven types: secondary channel pools, backward pools, trench pools, plunge pools, lateral scour pools, dammed pools, and beaver ponds. Glides, the third habitat type, are intermediate in many characteristics between riffles and pools. It is recognized that as aquatic habitat types occur in various parts of the country, additional habitat types may have to be described. If necessary, the regional fishery biologist will describe and define the additional habitat types.

arterial roads - Roads that provide service to large land areas and usually connect with public highways or other forest arterial roads to form an integrated network of primary travel routes. The location and standard are often determined by a demand for maximum mobility and travel efficiency rather than specific resource-management service. They are usually developed and operated for long-term land and resource management purposes and constant service. These roads generally serve areas more than 40,000 acres.

artificial regeneration (reproduction) - Creation of a new age class by renewal of a tree crop by direct seeding, or by planting seedlings or cuttings.

authorized use - Specific activity or occupancy, including a ski area, historical marker, or oil and gas lease, for which a special authorization is issued.

B

bald - An early successional opening generally above 4,000 feet, characterized by grassy or heath vegetation.

basal area - The area of the cross-section of a tree inclusive of bark at breast height (4.5 feet or 1.37 meters above the ground) most commonly expressed as square feet per acre or square meters per hectare. Used to measure the density of a stand of trees. For shrubs and herbs it is used to determine phytomass. Grasses, forbs, and shrubs usually measured at or less then 1 inch above soil level. Trees—the cross-section area of a tree stem in square feet commonly measured at breast height (4.5' above ground) and inclusive of bark, usually computed by using diameter at breast height (DBH), or tallied through the use of basal area factor angle gauge.

basal spray – The application of a pesticide, usually a herbicide for controlling brush or weed trees, directed at the base of the stem.

base sale schedule - A timber sale schedule formulated on the basis that the quantity of timber planned for sale and harvest for any future decade is equal to, or greater than, the planned sale and harvest for the preceding decade. The planned sale and harvest for any decade must not be greater than the long-term sustained yield capacity.

BEIG (Built Environment Image Guide) – guide for design of administrative and recreation buildings, landscape structures, site furnishings, wayside structures, and signs installed or operated by the Forest Service, its cooperators, and permittees.

best management practice (BMP) - A practice, or a combination of practices determined to be the most effective and practical means of preventing or reducing the amount of pollution generated by non-point sources to a level compatible with water quality goals.

biodiversity - The variety of life in an area, including the variety of gene pools, species, plant and animal communities, ecosystems, and the processes through which individual organisms interact with one another, and their environments.

biological assessment - A “biological evaluation” conducted for major federal construction projects requiring an environmental impact statement, in accordance with legal requirements under Section 7 of the Endangered Species Act (16 U.S.C. 1536(c)). The purpose of the assessment and resulting document is to determine whether the proposed action is likely to affect an endangered, threatened, or proposed species.

biological evaluation - A documented Forest Service review of its programs or activities in sufficient detail to determine how an action or proposed action may affect any proposed, endangered, threatened, or sensitive species.

biological growth potential - The average net growth attainable on a fully-stocked natural forest land.

biological oxygen demand - Dissolved oxygen required by organisms for the aerobic biochemical decomposition of organic matter present in water.

bladed skid road - A travel way through the woods formed by loggers to facilitate dragging (skidding) logs from the stump to a log landing. Skid roads are generally used in steep terrain and are cut into mountainsides with a bulldozer.

board foot - A unit of timber measurement equaling the amount of wood contained in an unfinished board 1 inch thick, 12 inches long, and 12 inches wide. Commonly, 1,000 board feet is written as 1 MBF, and 1,000,000 board feet is written as 1MMBF.

browse - Young twigs, leaves and tender shoots of plants, shrubs or trees that animals eat.

burning (prescribed) - The application of fire, usually under existing stands and under specified conditions of weather and fuel moisture, in order to attain silvicultural or other management objectives.

C

cable logging – A term for any system involving transport of logs along, or by means of steel cables with the load being lifted partly or wholly off the ground.

canopy cover - The percent of a fixed area covered by the crown of an individual plant species or delimited by the vertical projection of its outermost perimeter. Small openings in the crown are included. Used to express the relative importance of individual species within a vegetation community, or to express the canopy cover of woody species. Canopy cover may be used as a measure of land cover change or trend. Often used for wildlife habitat evaluations.

capability – The potential of a land area to produce resources, supply goods and services, and allow resource uses under an assumed set of management practices and a given level of management intensity. Note: capability depends upon the current condition and site conditions including climate, slope, land form, soil and geology, and the application of management practices and protection from fire, insects, and disease.

carrying capacity - The number of organisms of a given species and quality that can survive in, without causing deterioration of, a given ecosystem through the least favorable environmental conditions that occur within a stated interval of time.

channel ephemeral streams - Ephemeral streams that have a defined channel of flow where surface water converges with enough energy to remove soil, organic matter, and leaf litter. Ones that exhibit an ordinary high watermark and show signs of annual scour or sediment transport are considered navigable waters of the United States (USACE, Part 330- Nationwide Permit program, 2000).

channelization – Artificial change of a stream channel profile.

Clean Air Act of 1970 (CAA) – A congressional act, along with the amendments passed in 1977 and 1990, that provides authority for the Environmental Protection Agency to develop specific regulations controlling air pollution.

cleaning - A release treatment made in an age class, not past the sapling stage, in order to free the favored trees from less desirable individuals of the same age class which can overtop them.

clearcutting - The harvesting in one cut of all trees on an area for the purpose of creating a new, even-aged stand. The area harvested may be a patch, stand, or strip large enough to be mapped or recorded as a separate age class in planning for sustained yield under area regulation. A method of regenerating an even-aged 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). In the clearcutting system, the management unit or stand in which regeneration, growth, and yield are regulated consists of the individual clearcut stand.

clearcutting with reserves - A two-aged regeneration method in which varying numbers of reserve trees are not harvested to attain goals other than regeneration.

climax - The culminating stage in plant succession for a given environment with the vegetation having reached a highly stable condition.

closed road/trail – A road or trail that is closed for public use.

co-dominant trees - Trees or shrubs with crowns receiving full light from above, but comparatively little from the sides. Crowns usually form the general level of the canopy.

cohort – a group of trees developing after a single disturbance, commonly consisting of trees of similar age, although it can include a considerable range of tree ages of seeding or sprout origin and threes that predate the disturbance.

cold water fishery - Aquatic habitats that predominately support fish species that have temperature tolerances up to about 70^{o}F, and exhibit their greatest reproductive success at temperatures below 65^{o}F (18.3^{o}C).

collector road - Roads that serve smaller land areas and are usually connected to a forest arterial or public highway. They collect traffic from forest local roads or terminal facilities. The location and standard are influenced by long-term multi-resource service needs, and travel efficiency. Forest collector roads may be operated for constant or intermittent service, depending on land-use and resource management objectives for the area served by the facility. These roads generally have two or more local roads feeding into them and generally serve an area exceeding 10,000 acres.

commercial forest land - Forest land that can produce crops of industrial wood, and has not been withdrawn by Congress, the Secretary of Agriculture, or the Chief of the Forest Service. Existing technology and knowledge must be available to ensure timber production without irreversible damage to soils productivity, or watershed conditions. Adequate restocking can be attained within five years after final harvesting.

commercial thinning – Any type of thinning producing merchantable material at least equal to the value of the direct cost of harvesting.

commercial tree species – (1) Tree species suitable for industrial wood produces. (2) Conifer and hardwood species used to calculate the commercial forest land allowable sale quality.

commodity outputs - A resource output with commercial value. All resource products that are articles of commerce.

compartment – A portion of a forest under one ownership, usually contiguous and composed of a variety of forest stand types, defined for purposes of locational reference.

composition (stand) - The proportion of each tree species in a stand expressed as a percentage of the total number, basal area, or volume of all tree species in the stand.

concentrated use area (CUA) – An undeveloped site or area located within a general forest area, generally not in the infrastructure system but receiving investments of management time and/or dollars because recreation use leaves evident impacts, such as litter, vandalism, or soil compaction. Any amenities in a CUA are placed and managed for resource protection rather than user convenience.

concern level – A particular degree or measure of viewer interest in the scenic qualities of the landscape, rated level 1 (highest concern) to level 3 (lowest concern).

constraint - A restriction or limit that must be met.

Continuous Inventory of Stand Condition (CISC) - A system that continuously reflects an up-to-date description of timber stands. It tells what and when actions are planned for stands and gives some information about actions that have taken place. It is also the name of the data base management computer system used for the storage and retrieval of data.

conventional logging - A term used to identify methods commonly used in an area to move logs from stump to mill.

conversion (forest management) – A change from one forest type to another in a stand on land that has the capability of both forest types.

coppice - A method of regenerating a stand in which all trees in the previous stand are harvested and the majority of regeneration is from stump sprouts or root suckers.

coppice with reserve - A two-aged regeneration method in which reserve trees are retained to goals other than regeneration. This method normally creates a two-aged stand.

cord - A unit of gross volume measurement for stacked, round wood based on external dimensions, generally implies a stack of 4 x 4 feet vertical cross section and 8 feet long. Contains 128 stacked cubic feet.

corridor - A linear strip of land identified for the present or future location of transportation or utility rights-of-way within its boundaries. It can also be identified for wildlife habitat connecting, or protecting forest resources.

Council on Environmental Quality - An advisory council to the president established by the National Environmental Policy Act of 1969. It reviews federal programs for their effect on the environment, conducts environmental studies, and advises the president on environmental matters.

creel survey – A survey of anglers.

critical habitat – Habitat, determined by the Secretary of Interior, essential to the conservation of the endangered or threatened species.

crown class - A class of tree based on crown position relative to the crowns of adjacent trees.

> **dominant -** Trees with crowns extending above the general level of the main canopy of even-aged groups of trees. They receive full light from above, and partly from the sides.
>
> **co-dominant -** Trees with crowns forming the general level of the main canopy in even-aged groups of trees. They receive full light from above, and comparatively little from the sides.
>
> **intermediate -** Trees with crowns extending into the lower portion of the main canopy of even-aged groups of trees, but shorter in height than the co-dominants. They receive little direct light from above, and none from the sides.
>
> **overtopped (suppressed) -** Trees of varying levels of vigor that have their crowns completely covered by the crowns of one or more neighboring trees.

cubic foot - A unit of measure reflecting a piece of wood 12 inches long, 12 inches wide, and 12 inches thick.

culmination of mean annual increment - Age at which average rate of annual tree growth stops increasing and begins to decline. Mean annual increment is expressed in cubic feet measure and is based on expected growth, according to the management intensities and utilization standards assumed in accordance with 36 CFR 219.16(a)(2)(i) and (ii). Culmination of mean annual increment includes regeneration harvest yields, and any additional yields from planned intermediate harvests.

cultural resources - Physical remains of districts, sites, structures, buildings, networks or objects that were used by humans. They may be historic, prehistoric, archaeological or architectural in nature. Cultural resources are non-renewable.

cunit - Equivalent to 100 cubic feet of solid wood. Commonly, 100 cubic feet is expressed as 1 CCF.

cut-offs - Analysis constraints that prevent the valuation of non-timber outputs produced in excess of demand plus x percent. It ensures that the assumptions of a horizontal demand curve are not violated.

cutting cycle – The planned interval between partial harvest in a stand being managed with an uneven-aged regeneration method.

D

daylighting - The practices of cutting back edges of roads or trails by removing shrub and tree growth.

decision criteria - Rules or standards used to evaluate and rank alternatives.

demand – The amount of an output that users are willing to take at specified price, time period, and condition of sale.

den trees - Trees having rainproof, weather- tight cavities used by wildlife.

desired future condition - An expression of resource goals that have been set for a unit of land. It is written as a narrative description of the landscape as it will appear when the goals have been achieved. The condition also includes a description of physical and biological processes, the environmental setting, and the human experience.

desired landscape character - Appearance of the landscape character to be retained or created over time, recognizing that a landscape is a dynamic and constantly changing community of plants and animals. It includes the combination of landscape design attributes and opportunities, and biological opportunities and constraints.

developed recreation - Recreation use or opportunities occurring at developed sites.

developed recreation site – A discrete place containing a concentration of facilities and services used to provide recreation opportunities to the public and evidencing a significant investment in facilities and management under the direction of an administrative unit in the National Forest System.

development level (scale) – An indication of site modification based on classes in the Recreation Opportunity Spectrum. Development Level 1 equates to Primitive, with minimum site modification; 2 equates to Semi-Primitive Motorized/Nonmotorized, with little site modification; 3 equates to Roaded, with moderate modification; 4 equates to Rural, with heavy site modification; and 5 relates to Urban, with a high degree of site modification.

diameter at breast height – A tree's diameter measured at about 4.5 feet (1.37m) above the forest floor on the uphill side of the tree. For the purposes of determining breast height, the forest floor includes the duff layer that may be present, but does not include unincorporated woody debris that may rise above the ground line.

diameter class – Any of the intervals into which a range of diameters of tree stems may be divided for classification and use, (e.g., 10-inch class includes diameters from 9.5 inches to 10.49 inches.

dispersed recreation – Recreation opportunities or use occurring in the general forest area. Does not take place in developed sites.

disturbance (ecology) – Any relative discrete event in time that disrupts the ecosystem, community, or population structure and changes resources, substrate availability, or the physical environment.

disturbance-recovery regime – A natural pattern of periodic disturbance followed by a period of recovery. Examples include fire or flooding.

diversity - The distribution and abundance of different plant and animal communities and species within the area covered by a land and resource management plan.

drainage area/basin - The total area above a given point on a stream that contributes to the flow at that point. Term is often used interchangeably with watershed.

drum chopping - Method used to prepare areas for reforestation. Large drums with cutting blades attached are pulled over areas by vehicles that include crawler-type tractors and rubber-tired skidders.

E

early successional forest – The biotic community that develops immediately following the removal or mortality of most or all of forest canopy, resulting in a predominance of woody species regeneration. As used in the EIS and Plan, a stand age of 0 to 10 years is used to define this condition. See successional stage.

early successional habitat – A vegetative condition typically characterized by low density to no tree canopy cover and an abundance of herbaceous and/or woody ground cover. This condition may include early successional forest, maintained openings, pastures, balds, and open woodlands.

early successional species - Plant or animal species characteristic of early forest successional stages.

ecological classification system - A hierarchical system used to help organize and co-ordinate the classification of ecological types, units, and to make comparisons. Classification is ecologically based and integrates existing resource data including climate, topography, geology, soil, hydrology, and vegetation. The system includes many levels (from the top-down approach): domain, division, province, section, subsection, land type, land type association, land type phase, and site.

ecological management unit - A grouping of one or more soil series that have similar characteristics including texture, structure, or water retention capacity. EMUs are used in soil mapping.

ecosystem - A complete interacting system of organisms and their environment.

ecosystem/cover type - The native vegetation ecological community considered together with non-living factors of the environment as a unit. The general cover type occupying the greatest percent of the stand location. Based on tree or plant species forming a plurality of the stocking within the stand. May be observed in the field, or computed from plot measurements.

electronic sites - Areas designated for the operation of equipment which transmits and receives radio signals.

endangered species - Any species that is in danger of extinction throughout all or a significant portion of its range, other than members of the class Insecta that have been determined by the Department of Interior to constitute a pest whose protection under the provisions of this (Endangered Species Act of 1973) act would present an overwhelming and overriding risk to humans. It must be designated in the *Federal Register* by the appropriate secretary.

Endangered Species Act of 1973 - An act that enables endangered and threatened species to be conserved. It provides a program for the conservation of such species, and takes appropriate steps to achieve the purposes of the (relevant) treaties and conventions.

endemic – Species restricted to a particular geographic area. Usually limited to one or a few small streams or a single drainage.

ending inventory - The standing volume at the end of the planning horizon. It must be adequate for the maintenance of long-term sustained yield.

environment - All the conditions, circumstances, and influences surrounding and affecting the development of an organism, or group of organisms.

environmental consequence - The result or effect of an action upon the environment.

Environmental Impact Statement - A disclosure document revealing the environmental effects of a proposed action, which is required for major federal actions under Section 102 of the National Environmental Policy Act, and released to the public and other agencies for comment and review. Final Environmental Impact Statement (FEIS) is the final version of the statement disclosing environmental effects required for major federal actions under Section 102 of the National Environmental Policy Act.

environmental impact - Used interchangeably with environmental consequence or effect.

ephemeral streams - Streams having flows that occur for short periods of time in direct response to storm precipitation or snowmelt runoff. Their bottoms are always above the water table and do not contain fish or aquatic insects that have larvae with multiple-year life cycles. Ephemeral streams may have a defined channel, but may be manifested as a natural swale or depression with vegetation and organic material covering the bottom. They also may serve as a conduit for much of the sediment that enters the stream

system. Large woody debris associated with ephemeral streams may also contribute significantly to the stability of a stream system.
Ephemeral streams that exhibit an ordinary high watermark, show signs of annual scour or sediment transport, are considered navigable waters of the United States.

erosion - The wearing away of the land surface by the action of wind, water, or gravity.

essential habitat - Habitat in which threatened and endangered species occur, but which has not been declared as critical habitat. Occupied habitat or suitable unoccupied habitat necessary for the protection and recovery of a federally designated threatened or endangered species.

eutrophication – Condition of a lake where deleterious effects are caused by increased nutrients (nitrogen and phosphorous), and a decrease in oxygen.

evapotranspiration - The transfer of water vapor to the atmosphere from soil and water surfaces (evaporation), and from living plant cells (transpiration).

even-aged methods – Regeneration methods designed to maintain and regenerate a stand with a single age class.

even-aged silvicultural system - A planned sequence of treatments designed to maintain and regenerate a stand with one age class.

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 rotation.

existing wilderness - Those areas already designated as wilderness by Congress. There are two such areas on the forests—the Cohutta Wilderness Area and Ellicott Rock Wilderness Area.

extirpation – Extinction of a species from all pr part of its range.

F

facilities level – A term that refers to campgrounds, expressed as Development Level 1-5. Customers in levels 1 and 2 campgrounds generally seek a relatively primitive experience with a minimum of facilities for comfort or convenience. Tent camping dominates and spurs are too short to accommodate most RVs. Utilities are not provided and access is most difficult. Level 3 developments are called “Recreational Vehicle/Travel Trailer Parks” in national electrical and plumbing codes. The focus is on tent campers and small RVs that do not contain a water closet or bathing facilities. Spur length is usually limited to 35’; low amperage electrical service may be provided. Water hydrants are centrally located to serve 3-5 sites, and flush toilets are typical. Traditionally, a moderate degree of accessibility is provided. Level 4 and 5 developments serve users with RVs of all types. Showers, flush toilets, and other amenities are available; individual water, sewer, and electrical hookups are commonly provided; service buildings are located within 200-300 feet of all sites.

facility – A single or contiguous group of improvements that exists to shelter or support Forest Service programs. The term may be used in either a broad or narrow context; for example, a facility may be a ranger station compound, lookout tower, leased office, work center, separate housing area, visitor center, research laboratory, recreation complex, utility system, or telecommunications site.

farmer-owned land - Owned by farm operators, excluding incorporated farm ownerships.

featured species - The selected wildlife species whose habitat requirements guide wildlife management including coordination, multiple use planning, direct habitat improvements, and cooperative programs for a unit of land. In context of land management planning, featured species are similar to management indicator species.

Federal Register - The designated document that notifies the public of federal actions and includes Notice of Intent, calls for public involvement, etc. It also publishes the regulations needed to implement those federal actions.

felling – The cutting down of trees.

final crop – That portion of the growing stock (to be) kept until final commercial harvest, (i.e., final product objective).

fire condition class – Based on coarse scale national data, classes measure general wildfire risk:

> **Class One –** Fire regimes are usually within historical ranges. Vegetation composition and structure are intact. The risk of losing key ecosystem components from the occurrence of fire is relatively low.
>
> **Class Two –** Fire regimes on these lands have been moderately altered from their historical range by increased or decreased fire frequency. A moderate risk of losing key ecosystem components has been identified.
>
> **Class Three –** Fire regimes on these lands have been significantly altered from their historical return interval. The risk of losing key ecosystem components from fire is high. Fire frequencies have departed from historical ranges by multiple return intervals. Vegetation composition, structure and diversity have been significantly altered.

fire management effectiveness index - A measure of the effectiveness of annual fire management operational programs. Measured in dollars per thousand acres protected, the objective is to minimize the index value.

fire management plan – Strategic plans that define a program to manage wildland fires based on an area's approved land management plan. They must address a full range of fire management activities that support ecosystem sustainability, values to be protected, protection of firefighter and public safety, public health and environmental issues, and must be consistent with resource management objectives and activities of the area.

fire regime – A generalized description of the role a fire plays in the ecosystem. It is characterized by fire frequency, predictability, seasonality, intensity, duration, scale (patch size), and regularity or variability. Five combinations of fire frequency exist.

> **Groups One** and **Two** include fire return intervals in the 0-35 range. One includes Ponderosa Pine, other long needle pine species, and dry site Douglas-fir. Group Two includes the drier grassland types - tall grass prairie, and some Pacific chaparral ecosystems.
>
> **Groups Three** and **Four** include fire return intervals in the 35-100+ year range. Three includes interior dry site shrub communities including sagebrush and chaparral ecosystems. Group Four includes lodgepole and Jack pine.
>
> **Group Five** is the long interval (infrequent), stand replacement fire regime and includes temperate rain forest, boreal forest, and high elevation conifer species.

fire use – The combination of wildland fire use and prescribed fire application to meet resource objectives.

fisheries classification - Water bodies and streams classed as having a cold- or warm-water fishery. This designation is dependent upon the dominant species of fish occupying the water.

fisheries habitat - Streams, lakes, and reservoirs that support fish.

floodplains - Lowland or relatively flat areas joining inland and coastal water including, at a minimum, that area subject to a 1-percent (100-year return period) or greater chance of flooding in any given year. Although floodplains and wetlands fall within the riparian area, they are defined here separately as described in the Forest Service Manual.

floor on first period production - The minimum harvest volume in the first period that should be produced to prevent a significant impact on the local economy.

forage - All browse and non-woody plants that are available to livestock or game animals used for grazing or harvested for feeding.

forage production - The weight of forage that is produced within a designated period of time on a given area. The weight may be expressed as green, air dry, or oven dry. The term may also be modified as to time of production including annual, current years, or seasonal forage production.

foreground - The area between the viewer and the middle ground in a landscape.

forest - An area managed for the production of timber and other forest products, or maintained under woody vegetation for indirect benefits as protection of a watershed, recreation, or wildlife habitat.

forest type - A category of forest defined by its vegetation (particularly its dominant composition) as based on a percentage cover of trees.

forest development road - A road wholly or partly within, or adjacent to, and serving a part of the National Forest System. It also has been included in the Forest Development Road System Plan.

forest health – The perceived condition of a forest derived from concerns about factors as its age, structure, composition, function, vigor, presence of unusual levels of insects or disease, and resilience to disturbance.

forest land - Land at least 10 percent occupied by forest trees of any size, or formerly having had such tree cover, and not currently developed for non-forest use. Lands developed for non-forest use including areas for crops, improved pasture, residential, or administrative areas, improved roads of any width, adjoining road clearing, and power line clearing of any width.

Forest and Rangeland Renewable Resources Planning Act of 1974 - An act of Congress requiring the preparation of a program for the management of the national forests' renewable resources, and of land and resource management plans for units of the National Forest System. It also requires a continuing inventory of all National Forest System lands and renewable resources.

Forest Service Handbook (FSH) - A handbook that provides detailed instructions for proceeding with specialized phases of programs or activities for Forest Service use.

Forest Service Manual (FSM) - Agency manuals that provide direction for Forest Service activities.

forest trail system - Trails that are part of the forest transportation system. A designated path commonly used and maintained for hikers, horse riders, bicycles, or two-wheeled motorized vehicles.

forest type - A descriptive term used to group stands of similar composition and development because of given ecological factors, by which they may be differentiated from other groups of stands.

forest supervisor - The official responsible for administering the National Forest System lands in a Forest Service administrative unit. It may consist of two or more national forests or all the forests within a state. The supervisor reports to the regional forester.

forest-wide standard - A performance criterion indicating acceptable norms, specification, or quality that actions must meet to maintain the minimum considerations for a particular resource. This type of standard applies to all areas of the forest regardless of the other management prescriptions applied.

free-to-grow – A seedling or small tree free from direct competition from other trees, shrubs, grasses, or herbaceous plants.

fuel break - Any natural or constructed barrier used to segregate, stop, and control the spread of fire, or to provide a control line from which to work.

fuel treatment - The rearrangement or disposal of fuels to reduce fire hazard. Fuels are defined as living and dead vegetative materials consumable by fire.

fuels management - The planned treatment of fuels to achieve or maintain desired fuels conditions.

fuelwood - Wood used for conversion to some form of energy.

G

game species - Any species of wildlife or fish for which seasons and bag limits have been prescribed, and which are normally harvested by hunters, trappers, and fishermen under state or federal laws, codes, and regulations.

general forest area - National forest lands not categorized as developed recreation sites, trails or wilderness. It can be a logical working area, (i.e., a drainage, geographic area, forest district, etc.). Typically containing a wide spectrum of settings and opportunities, facilities and sites located inside the boundary of a GFA are sometimes considered *concentrated use areas* (CUA), that may include dispersed front- and/or backcountry campsites, parking areas, pullouts and landings, river and road corridors, lake surfaces, and day use areas including OHV areas, climbing areas, target shooting areas, etc. Amenities or constructed features inside GFAs are primarily for resource protection.

geologic features - Landforms or other features of significant geologic interest that may require special management to protect the special qualities, or provide interpretation to the public.

geologic formation - A mappable body of rock identified by distinctive characteristics, some degree of internal homogeneity, and stratigraphic position. The name normally consists of two parts. The first is the name of the geographic locality where the formation was first identified and described. This is followed by a descriptive geologic term, usually the dominant rock type.

Geographic Information System - An information processing technology to input, store, manipulate, analyze, and display spatial resource data to support the decision-making processes of an organization. Generally, an electronic medium for processing map information, typically used with manual processes to affect specific decisions about land base and its resources.

geological area - A unit of land that has been designated by the Forest Service as containing outstanding formations or unique geological features of the earth's development, including caves and fossils. Areas of this type and all other special interest areas are identified and formally classified primarily because of their recreational and educational values. Areas with similar types of values of scientific importance are formally classified as research natural areas.

global ranks – Ranks assigned by the Nature Conservancy and state heritage programs based on number of occurrences.

grassland - Areas on which vegetation is dominated by grasses, grass-like plants, forbs, and/or cryptogams (mosses, lichens, and ferns), provided these areas do not qualify as built-up land or cultivated cropland. Examples include tall grass and short grass prairies, meadows, cordgrass marshes, sphagnum moss areas, pasturelands, and areas cut for hay.

grazing - Consumption of range or pasture forage by animals.

grazing capacity - The maximum stocking rate possible without inducing damage to vegetation or related resources.

grazing permit - Official, written permission to graze a specified number, kind, and class of livestock for a specific period on a defined range allotment.

gross receipts - A total of all funds received by the U.S. Treasury as a result of Forest Service activities.

groundwater - Water in a saturated zone in a geologic stratum. Water stored below the water table where the soil (or other geologic material) is saturated.

group selection – An uneven-aged regeneration method in which trees are removed periodically in small groups. Uneven age classes for trees are established in small groups. The width of groups is about twice the height of the mature trees, with small opening providing microenvironments suitable for tolerant regeneration, and the larger openings providing conditions suitable for more intolerant regeneration.

growing stock trees - Live trees, meeting specified standards of quality or vigor, included in growth and yield projections to arrive at the allowable sale quantity.

growing stock volume - Volume (cubic feet) of solid wood in growing stock trees 5 inches DBH and larger, from a 1-foot stump to a minimum 4-inch top diameter, outside bark, on the central stem. Volume of solid wood in primary forks from the point of occurrence to a minimum 4-inch top diameter outside bark is included.

H

habitat - The native environment of an animal or plant.

harvest cutting – An intermediate for final cutting that extracts salable trees.

harvesting method - A procedure by which a stand is logged. Emphasis is on meeting logging requirements rather than silvicultural objectives.

herbicide – A pesticide used for killing or controlling the growth of undesirable plants.

heritage sites/assets – Remnants of past cultures that remind us of the centuries-old relationship between people and the land (from *National Heritage Strategy*); property, plant or equipment that are unique for one or more of the following reasons: (1) historical or natural significance; (2) cultural, educational or artistic/aesthetic significance; or (3) significant architectural characteristics.

high-grading - The removal from the most commercially valuable trees, often leaving a residual stand composed of trees of poor condition or species composition.

historic landscapes - Industrial, agricultural, pastoral or domestic landscapes that have evolved over many years from human alteration. Commonly functional and often vernacular, the landscapes may not always be visually pleasing, often responding to specific functions or topography, not formally planned or designed. They may be informal to the degree that they appear to be natural occurrences, or the spatial organization of built and natural elements may be quite traditional or formal. They are identifiable and can be mapped, either as point-specific features or enclaves within a larger landscape, as entire landscapes themselves, or as a combination of both.

human resource programs - Any of the federal labor programs providing work experience for local people.

hydric soils – Soils developed in conditions where soil oxygen is limited by the presence of saturated soil for long periods during the growing season.

I

improved pasture - Fenced, fertilized pastures intensively managed for livestock grazing.

improvement cutting – The removal of less desirable trees in a stand of poles or larger trees, primarily to improve composition and quality.

industrial fuelwood - Wood to be used specifically by industry for production of energy.

industrial wood - All commercial round wood products, except fuelwood.

infestation – The attack by macroscopic organisms in considerable concentration. Examples are infestations of tree crowns by budworm, timber by termites, soil or other substrates by nematodes or weeds.

initial attack – The aggressive response to a wildland fire based on values to be protected, benefits of response, and reasonable cost of response.

in-stream flow - The presence of adequate stream flow in channels necessary to maintain the integrity of the stream channel, and protection of downstream beneficial uses including fish and wildlife needs, outdoor recreation uses of water, and livestock watering needs.

integrated pest management (IPM) – The maintenance of destructive agents, including insects at tolerable levels, by the planned use of a variety of preventive, suppressive, or regulatory tactics and strategies that are ecologically and economically efficient and socially acceptable.

Interdisciplinary Team (IDT) - A group of resource specialists (e.g.: forester, wildlife biologist, hydrologist, etc.) responsible for developing the Forest Plan/Environmental Statement, and for making recommendations to the forest supervisor.

intermediate treatments - 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.

intermittent streams – Streams that flow in response to a seasonally-fluctuating water table in a well-defined channel. The channel will exhibit signs of annual scour, sediment transport, and other stream channel characteristics, absent perennial flows. Intermittent streams typically flow during times of elevated water table levels, and may be dry during significant periods of the year, depending on precipitation cycles.

interpretive association - A nonprofit, tax-exempt corporation or organization whose purpose is extending and enhancing the ability of the Forest Service to provide customer service to National Forest visitors. They work cooperatively with the Forest Service in educating the public about natural and cultural issues on public lands.

interpretive services - Visitor information services designed to present inspirational, educational, and recreational values to forest visitors in an effort to promote understanding, appreciation, and enjoyment of their forest experience.

intolerant – A plant requiring sunlight and exposure for establishment and growth.

L

land exchange - The conveyance of non-federal land or interests in the land in exchange for National Forest System land or interests in land.

landing – A cleared area in the forest to which logs are yarded or skidded for loading onto trucks for transport.

landline location - Legal identification and accurate location of national forest property boundaries.

land management planning – A formal process of management planning involving four interactive steps: monitoring, assessment, decision making, and implementations as described in the Federal Code of Regulations.

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 that are determined by interacting ecosystems.

landscape character – Particular attributes, qualities, and traits of landscape that give it an image and make it identifiable or unique.

land type - An intermediate level in the ecological classification system based on landform, natural vegetative communities, and soils.

land type association - A group of landtypes. The landtypes in the association are sufficiently homogeneous to be considered as a whole for modeling the future outputs and effects of planned management activities. Landtype associations may not follow watershed boundaries, and are defined on the basis of general similarities in climate, geology, landform, and vegetation.

large woody debris (LWD) (coarse woody debris) (CWD) – Any piece(s) of dead woody material, e.g., dead boles, limbs, and large root masses, on the ground in forest stands, or in streams.

late-seral (successional) stage - The stage of forest development at which overstory trees have attained most of expected height growth and have reached ecological maturity. As used in the EIS and Plan, a stand age of greater than 80 years is generally used to define this condition. Old growth forests occur during the latter periods of this seral stage and at ages that vary by forest type and in response to a variety of environmental conditions. See successional stage.

lease - A contract between the landowner and another granting the latter the right to search for and produce oil, gas, or other mineral substances (as specified in the document) on payment of an agreed rental, bonus, or royalty. This right is subject to the terms, conditions, and limitations specified in the document.

leave tree – A tree (marked to be) left standing for wildlife, seed production, etc, in an area where it might otherwise be felled.

limits of acceptable change (LAC) – A nine-step planning process used to establish acceptable wilderness resource and social conditions, and prescribe appropriate management actions.

local road - Roads that connect terminal facilities with forest collector or forest arterial roads, or public highways. Forest local roads may be developed and operated for either long- or short-term service. These roads are generally single lane.

logging - The felling, skidding, on-site processing, and loading of trees or logs onto trucks.

long-term facilities - Facilities that are developed and operated for long-term land management and resource utilization needs. They may be operated for constant or intermittent service.

1. **constant service -** Facilities developed and operated for continuous or annual recurrent service.
2. **intermittent service -** Facilities developed and operated for periodic service and closed for more than one year between periods of use. Closure is by means other than a gate.

long-term sustained-yield capacity - The highest uniform wood yield from lands being managed for timber production that may be sustained under a specified management intensity, consistent with multiple-use objectives.

low PSI skidder - A term used to identify any one of several types of vehicles used to move logs from stump to log loading area. Low PSI (pounds per square inch) identifies those vehicles that, because of design of tracks, wheels, or suspension system, exert much lower pressure on ground surface than other types of ground-based skidding vehicles.

M

M&E – Monitoring and Evaluation – Determining on a sample basis how well the objectives of Forest Plan management practices have been met and what effects those practices had on the land and environment. (See Monitoring.)

machine planting - A method by which tree seedlings are planted by mechanical means rather than by hand.

management action – A set of management activities applied to a land area to produced a desired output.

management action controls – Specifies the acreage or the proportion of an analysis unit assigned to a set of management actions. The controls can be specified in terms of greater than or equal to, equal to, or less than equal to some amount, or proportion of the analysis unit acreage.

management area - A selected grouping of capability or analysis areas selected through evaluation procedures used to locate decisions, and resolve issues and concerns. An area with similar management objectives, and a common management prescription.

Management Attainment Report (MAR) - A process used in determining whether work is progressing as planned. It provides the manager with information for measuring progress against objectives, information for measuring self and subordinates' performance, and an indication of a reporting unit's performance.

management concern - An issue, problem, or condition which constrains the range of management practices identified by the Forest Service in the planning process.

management direction - A statement of multiple-use and other goals and objectives. The associated management prescriptions, and standards and guidelines for attaining them.

management emphasis - The multiple-use values to be featured or enhanced.

management indicator species (MIS) – An animal or plant selected for use as a planning tool in accordance with 1982 NFMA regulations (36 CFR 219.19). These species are used to help set objectives, analyze effect of alternatives, and monitor Plan implementation. They are chosen because their population changes are believed to indicate the effects of management on selected biological components.

management intensity - A management practice or combination of management practices and associated costs designed to obtain different levels of goods and services.

management opportunity - A statement of general actions, measures, or treatments that address a public issue or management concern in a favorable way.

management practice - A specific action, measure, course of action, or treatment undertaken on a forest.

management prescription - Management practices and intensity selected and scheduled for application on a specific area to attain multiple-use and other goals and objectives.

management situation - A comprehensive statement of the planning area resources, its history as it may influence planning, past and present uses, and a review of the public issus directly concerned with the area.

management team – A decision-making group consisting of the forest supervisor, staff officers, and district rangers.

management type - The tree species or species group that should be grown on a specific site, whether or not it presently occupies the site that best suits the particular site soil, aspect, elevation, and moisture provided by the area and the forest plan's objectives.

mast tree - Generally hardwood trees of the heavy seeded variety including oaks, hickories, walnut, beech—25 years and older capable of producing frequent seed crops to feed a variety of wildlife species.

mature timber - The stage at which a crop or stand of trees best fulfills the main purpose for which it was grown.

maximum modification - A visual quality objective in which man's activity may dominate the characteristic landscape, but should appear as a natural occurrence when viewed as background.

mean annual increment of growth - The total increase in girth, diameter, basal area, height, or volume of individual trees or a stand up to a given age divided by that age.

mechanical site preparation - Soil disturbance by mechanical chopping, furrowing, dozing, or disking to prepare areas for reforestation. Objective is to reduce plant competition for trees to be planted.

mechanical transport – Any contrivance for moving people or material in or over land, water, or air, having moving parts, that provides a mechanical advantage to the user and that is powered by a living or non-living power source. This includes, but is not limited to, sailboats, hang gliders, parachutes, bicycles, game carriers, carts, and wagons. It does not include wheelchairs when used as necessary medical appliances. It also does not include skis, snowshoes, rafts, canoes, sleds, travois, or similar primitive devices without moving parts.

mesic – Sites or habitats characterized by intermediate moisture conditions, i.e., neither decidedly wet or dry.

middle ground - The space between the foreground and the background in a picture or landscape; generally ½ mile to 4 miles distance from the viewer.

mid-seral (successional) stage – The stage of forest development during which distinct overstory, midstory, and understory canopies are developed. As used in the EIS and Plan, a stand age of 41 to 80 years is generally used to define this condition. This seral stage occurs at various ages by forest type in response to a variety of environmental conditions. See successional stage.

mineral exploration - The search for valuable minerals on lands open to mineral entry.

mineral soil - Weathered rock materials without any vegetative cover.

mineral resource - A known or undiscovered concentration of naturally occurring solid, liquid, or gaseous material in or on the earth's crust in such form and amount that economic extraction of a commodity from the concentration is currently or potentially feasible.

minerals (leasable) - Coal, oil, gas, phosphate, sodium, potassium, oil shale, sulphur, and geothermal steam. All hard-rock minerals that occur on acquired lands, as opposed to public domain lands, are leasable.

minerals (salable) - Common variety deposits that—although they may have value or use in trade, manufacture, the sciences, or in the mechanical or ornamental arts—do not possess a distinct, special economic value for such use over and above the normal uses of the general sum of such deposits. These may include sand, stone, gravel, pumicite, cinders, pumice (except that occurring in pieces more than two inches on a side), clay, and petrified wood.

minimum management requirement - Any constraint imposed to comply with 36 CFR 219.27 and other legal restrictions that must be met by benchmark solutions as noted in 36 CFR 219.11(e)(1). These include requirements including conserving soil productivity, maintaining minimum viable populations of wildlife, preserving the habitat of endangered species' habitat, dispersing openings, and limiting cut size. It also includes any other st andards and guidelines, including best management practices that serve to define management prescriptions and resource response.

mitigation - Actions to avoid, minimize, reduce, eliminate, or rectify the impact of a management practice.

modification - A visual quality objective in which human activity may dominate the characteristic landscape but must, at the same time, use naturally established form, line, color, and texture appearing as a natural occurrence when viewed in foreground or middle ground.

monitoring - The periodic evaluation on a sample basis of Forest Plan management practices to determine how fully objectives have been met and how closely management standards have been applied.

montane – Relating to the zone of relatively moist, cool upland ;slopes characterized by the presence of large evergreen trees as a dominant life form.

mortality - Dead or dying trees resulting from forest fire, insect, diseases, or climatic factors.

motorized equipment - Machines that use a motor, engine, or other non-living power source. This includes, but is not limited to, such machines as chain saws, aircraft, snowmobiles, generators, motor boats, and motor vehicles. It does not include small battery or gas-powered hand carried devices that include shavers, wristwatches, flashlights, cameras, stoves, or other similar small equipment.

multiple use - The management of all the various renewable surface resources of the National Forest System so that they are used in a manner that will best meet the needs of the American people. Making the most judicious use of the land for these resources or related services over areas large enough to provide sufficient latitude for periodic adjustments in the use to conform to changing needs and conditions.

multipliers - The ratio of a total impact to a component of the impact in input/output analysis. An example would be the ratio of the sum of direct, indirect, and induced impacts to direct impacts.

N

National Ambient Air Quality Standards (NAAQS) – Standards established by EPA after passage of the Clean Air Act of 1970 that apply for outdoor air throughout the country.

National Environmental Policy Act (NEPA) of 1969 - An act to declare a national policy that will encourage productive and enjoyable harmony between humankind and the environment. It was created to promote efforts that will prevent or eliminate damage to the environment, biosphere, and stimulate the health and welfare of humanity. In addition, the act was crafted to enrich the understanding of the ecological systems and natural resources important to the nation, and establish a Council of Environmental Quality.

National Forest Land and Resource Management Plan (Forest Plan) - A plan developed to meet the requirements of the Forest and Rangeland Renewable Resources Planning Act of 1974, as amended, that guides all natural resource management activities and establishes management standards and guidelines for the National Forest System lands of a given national forest.

National Forest Management Act (NFMA) of 1976 - Act passed as an amendment to the Forest and Rangeland Renewable Resources Planning Act, requiring the preparation of regional guides and forest plans, and the preparation of regulations to guide them.

National Forest System (NFS) - All National Forest lands reserved or withdrawn from public domain of the United States and acquired through purchase, exchange, donation, or other means. National Grasslands and land utilization projects administered under Title III of the Bankhead–Jones Farm Tenant Act (50 Stat. 525, 7 U.S.C. 1010–1012), and other lands, waters, or interests that are administered by the Forest Service, or are designated for administration through the Forest Service as a part of the system.

National Forest System Land - Federal land that has been legally designated as National Forests or purchase units, and other land under the administration of the Forest Service, including experimental areas and Bankhead-Jones Title III land.

National Register of Historic Places – The National Register of Historic Places is the Nation's official list of cultural resources worthy of preservation. Authorized under the National Historic Preservation Act of 1966, the National Register is part of a national program to coordinate and support public and private efforts to identify, evaluate, and protect our historic and archeological resources. Properties listed in the Register include districts, sites, buildings, structures, and objects that are significant in American history, architecture, archeology, engineering, and culture. The National Register is administered by the National Park Service, which is part of the U.S. Department of the Interior.

National Recreation Trails - Trails designated by the Secretary of the Interior or the Secretary of Agriculture as part of the national system of trails authorized by the National Trails System Act. National recreation trails provide a variety of outdoor recreation uses, in or reasonably accessible, to urban areas.

National Visitor Use Monitoring - A systematic process to estimate annual recreation and other uses of National Forest lands through user surveys.

National Wild and Scenic Rivers System - Rivers with outstanding scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values designated by Congress under the Wild and Scenic Rivers Act of Oct. 2, 1968, for preservation of their free-flowing condition.

National Wilderness Preservation System - All lands covered by the Wilderness Act and subsequent wilderness designations, irrespective of the department or agency having jurisdiction.

natural regeneration - An age class created from natural seeding, sprouting, suckering, or layering.

net annual growth - The net change in merchantable volume expressed as an annual average between surveys in the absence of cutting (gross growth minus mortality).

net public benefits - An expression used to signify the overall long-term value to the nation of all outputs and positive effects (benefits) less all associated inputs and negative effects (costs) whether they can be quantitatively valued. Net public benefits are measured by quantitative and qualitative criteria rather than a single measure or index. The maximization of net public benefits to be derived from management of units of the National Forest System is consistent with the principles of multiple use and sustained yield.

no-action alternative - The most likely condition expected to exist in the future if current management direction would continue unchanged.

non-chargeable volume - All volume not included in the growth and yield projections for the selected management prescriptions used to arrive at the allowable sale quantity.

non-commodity output - A resource output that cannot be bought and sold.

non-declining yield - A level of timber production planned so that the planned sale and harvest for any future decade is equal to, or greater than the planned sale and harvest for the preceding decade.

non-forest land - Land that has never supported forests and lands formerly forested where use for timber utilization is precluded by development for other use. Lands that never have had, or that are incapable of having 10 percent or more of the area occupied by forest trees; or lands previously having such cover and currently developed for non-forest use.

non-game species - Any species of wildlife or fish which is ordinarily not managed or otherwise controlled by hunting, fishing, or trapping regulations. The designation may vary by state.

non-point source pollution – A diffuse source of pollution not regulated as a point source. May include atmospheric, deposition, agricultural runoff, and sediment from land-distributing activities.

non-stocked stands - Stands less than 16.7 percent stocked with growing stock trees.

non-timber forest products - All forest products except timber, including resins, oils, leaves, bark, plants other than trees, fungi, and animals or animal products.

O

objective - A concise, time-specific statement of measurable planned results that respond to pre-established goals. It forms the basis for further planning to define the precise steps to be taken and the resources to be used in achieving identified goals.

off-highway vehicle (OHV) – Any vehicle capable of being operated off established roads, e.g., motorbikes, four-wheel drives, and snowmobiles.

off-road vehicle (ORV) - Any motorized vehicle designed for or capable of cross county travel on or immediately over land, water, sand, snow, ice, marsh, swampland, or other natural terrain; except that term excludes (A) any registered motorboat; (B) any fire, military, emergency or law enforcement vehicle when used for emergency purposes, and any combat or combat support vehicle\when used for national defense purposes; and (C) any vehicle whose use is expressly authorized by the respective agency head under a permit, lease, license, or contract.

offstream use – Water withdrawn or diverted from a ground or surface-water source for public water supply, industry, irrigation, livestock, thermoelectric power generation, and other uses.

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 older forests dominated by early seral species, and forests in later successional stages dominated by shade tolerant species.

on-site - A term referring to species normally found on a site under natural conditions. The same or contiguous property that may be divided by a public or private right-of-way, provided that the entrance and exit between the properties is at a crossroads intersection, and that access is by crossing, as opposed to going along the right-of-way.

operating plan - A written plan, prepared by those engaged in mining activity on the forests, and approved by a forest officer for prospecting, exploration, or extraction activities that are slated to take place on National Forest System land.

ordinary high water mark - The line on the shore established by the fluctuation of water, and is indicated by physical characteristics including a clear, natural line impressed on the bank; shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter, debris, or other appropriate means that consider the characteristics of the surrounding area.

output - The goods, end products, or services that are purchased, consumed, or used directly by people. Goods, services, products, and concerns produced by activities that are measurable and capable of being used to determine the effectiveness of programs and activities in meeting objectives. A broad term for describing any result, product, or service that a process or activity actually produces.

output, minimum level - The amount of an output that will occur regardless of management activity.

outstanding mineral rights - Instances in which the minerals in federally- owned lands were severed prior to the transaction in which government acquired the land. Such rights are not subject to the Secretary of Agriculture's rules and regulations. Removal or extraction of these minerals must be allowed in accordance with the instrument severing the minerals from the surface and under applicable state and local laws and regulations.

overstory - That portion of trees in a two- or multi-layered forest stand that provides the upper crown cover.

overstory removal - The cutting of trees comprising an upper canopy layer in order to release trees or other vegetation in an understory.

P

PAOT – Persons At One Time – A measure of recreation carrying capacity, especially for developed sites. National conventions include 5 persons per family picnic/camp unit, 3.5 persons per parking lot stall at a trailhead or visitor center, 1.5 persons per motorcycle parking stall, and 40 persons per tour bus parking stall.

partial retention - A visual quality objective which in human activities may be evident, but must remain subordinate to the characteristic landscape.

partnership - Voluntary, mutually beneficial and desired arrangement between the Forest Service and another or others to accomplish mutually agreed-on objectives consistent with the agency's mission and serving the public's interest.

payments in lieu of taxes - Payments to local or state governments based on ownership of federal land, and not directly dependent on production of outputs or receipt sharing.

per capita use - The average amount of water used person during a standard time period, generally per day.

perennial stream - Any watercourse that generally flows most of the year in a well-defined channel and is below the water table. Droughts and other precipitation patterns may influence the actual duration of flow. It contains fish or aquatic insects that have larvae with multi-year life cycles. Water-dependent vegetation is typically associated with perennial streams.

person-year - About 2,000 working hours that may be filled by one person working during the course of one year or several people working a total of 2,000 hours.

petrographic – The description and systematic classification of rocks.

physiographic region - A region of similar geologic structure and climate that has had a unified geomorphic history.

planning area - The area of the National Forest System covered by a regional guide or forest plan.

planning criteria - Standards, tests, rules, and guidelines by which the planning process is conducted, and upon which judgments and decisions are based.

planning horizon - The overall time period considered in the planning process that spans all activities covered in the analysis or plan. All future conditions and effects of proposed actions which would influence the planning decisions.

planning period - One decade. The time interval within the planning horizon that is used to show incremental changes in yields, costs, effects, and benefits.

pre-commercial thinning - The selective felling, deadening, or removal of tree in a young stand not for immediate financial return, but primarily to accelerate diameter increment on the remaining stems, to maintain a specific stocking or stand density range, or to improve the vigor and quality of the remaining trees.

prescribed fire – Any fire ignited by management actions to meet specific objectives including disposal of fuels, and controlling unwanted vegetation. The fires are conducted in accordance with prescribed fire plans, and are also designed to stimulate grasses, forbs, shrubs, or trees for range, wildlife, recreation, or timber management purposes.

present net value - The difference between the discounted value (benefits) of all outputs to which monetary values or established market prices are assigned and the total discounted costs of managing the planning area.

preservation - A visual quality objective that provides for ecological change only.

presuppression - Activities required in advance of fire occurrence to ensure effective suppression action, including: (1) recruiting and training fire forces, (2) planning and organizing attack methods, (3) procuring and maintaining fire equipment, and (4) maintaining structural improvements necessary for the fire program.

primitive road - Roads constructed with no regard for grade control or designed drainage, sometimes by merely repeated driving over an area. These roads are single lane, usually with native surfacing and sometimes passable with four-wheel drive vehicles only, especially in wet weather.

process records - A system that records decisions and activities that result from the process of developing a forest plan, revision, or significant amendment.

proclamation boundary - The boundary contained within the presidential proclamation that established the National Forest.

productive deferred - Productive (capable) forest land which has been legislatively designated or administratively designated by the Secretary of Agriculture or Chief of the Forest Service for wilderness study or possible additions to the Wilderness System. This classification includes RARE II area designated as wilderness, but does not include RARE II areas designated as "further planning."

productivity class - A classification of the capacity of a given piece of land for timber growth is expressed in cubic feet per acre a year.

Class I - Lands capable of producing 120 cubic feet or more per acre a year.

Class II - Lands capable of producing 85 to 119 cubic feet per acre a year.

Class III - Lands capable of producing 50 to 84 cubic feet per acre a year.

Class IV - Lands capable of producing 20 to 49 cubic feet per acre a year.

program - Sets of activities or projects with specific objectives, defined in terms of specific results and responsibilities for accomplishments.

program budget - The schedule of projects and activities to be carried out on the forest for a year for which funds have been appropriated.

program development and budgeting - The process by which activities for the forest are proposed and funded.

project - A work schedule prescribed for a project area to accomplish management prescriptions. An organized effort to achieve an objective identified by location, activities, outputs, effects, time period, and responsibilities for execution.

proposed action - In terms of the National Environmental Policy Act, the project, activity, or decision that a federal agency intends to implement or undertake. The proposed action described in the Environmental Impact Statement is the Forest Plan.

proposed wilderness – Areas recommended for wilderness by the Forest Service as a result of the RARE II study, but which have yet to be acted on by Congress.

prospecting permit - A written instrument or contract between the landowner and another conveying to the latter the right to enter the former's property and search for mineral materials. Two types of permits are used: (1) a BLM Prospecting Permit is issued by the Bureau of Land Management upon recommendation of the Forest Service. In most cases, these are preference right permits in which the prospector has the first opportunity, to the exclusion of all others, to lease any minerals discovered, and (2) a Forest Service Prospecting Permit issued by the Forest Service. No preference rights are conveyed under Forest Service permits, except in some cases of common varieties on acquired lands.

public domain land - Original holdings of the United States that were never granted or conveyed to other jurisdictions or reacquired by exchange for other public domain lands.

public issue - A subject or question of widespread public interest relating to management of the National Forest System.

public participation activities - Meetings, conferences, seminars, workshops, tours, written comments, survey questionnaires, and similar activities designed or held to obtain comments from the general public and specific publics.

public roads - Roads across National Forest land which were in place as public ways when these lands were acquired. These roads may be a part of the forest, state, or county system, and may be maintained by any of these agencies.

public supply – Water withdrawn by public and private water suppliers and delivered to users.

pulpwood - Wood cut and prepared primarily for manufacture into wood pulp.

pure stand - A stand composed of essentially a single tree species, conventionally at least 85 percent based on numbers, basal areas, or volumes.

Q

qualifiers – Measurable characteristics of outputs and activities. They characterize properties or attributes of activities or outputs.

R

raking - A term used in land clearing whereby crawler tractors, or other types of similar heavy equipment, with a large rake device attached to the front end, are used to push clearing debris into piles or windrows.

range allotment - A designated area of land available for livestock grazing upon which a specified number and kind of livestock may be grazed under a range.

range management - The art and science of planning and directing range use to obtain sustained maximum animal production, consistent with perpetuation of the natural resources. Two types of range management are:

1. **extensive -** To control livestock numbers within present capacity of the range, but little or no attempt is made to achieve uniform distribution of livestock. Range management investments are minimal and only to the extent needed to maintain stewardship of the range in the presence of grazing. Past resource damage is corrected and resources are protected from natural catastrophes.
2. **intensive -** To maintain full plant vigor and to achieve full livestock utilization of available forage. This goal is achieved through implementation of improved grazing systems and construction and installation of range improvements. Cultural practices, (seeding and fertilizing), to improve forage quality and quantity may be used.

ranger district - Administrative subdivisions of the forest supervised by a District Ranger who reports to the Forest Supervisor.

rare species – Any native or once-native species of wild animal which exists in small numbers, and has been determined to need monitoring. May include peripheral species.

real dollar value - A monetary value, which compensates for the effects of inflation.

receipt shares - The portion of receipts derived from Forest Service resource management that is distributed to state and county governments, including the Forest Service, 25 percent fund payments.

reconstruction - Work that includes, but is not limited to, widening of roads, improving alignment, providing additional turnouts, and improving sight distance that improve the standard to which the road was originally constructed. Also undertaken to increase the capacity of the road or to provide greater traffic safety.

Record of Decision - A document separate from, but associated with an environmental impact statement that publicly and officially discloses the responsible official's decision on the alternative assessed in the environmental impact statement chosen to implement.

recreation - Leisure time activity including swimming, picnicking, camping, boating, hiking, hunting, and fishing.

recreation capacity – A measure of the number of people a site can reasonably accommodate at one time; sometimes measured as PAOT or RVDs.

Recreation Opportunity Spectrum (ROS) - A method for classifying types of recreation experiences available, or for specifying recreation experience objectives desired in certain areas. Classes are: Primitive, Semi-Primitive Non-Motorized, Semi-Primitive Motorized, Roaded Natural, Rural, and Urban.

- **Primitive (ROS) –** An area characterized by having essentially unmodified natural environment of fairly large size. 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 within the area is not permitted.

  The recreation experience opportunity level provided would be characterized by the extremely high probability of experiencing isolation from the signs 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 a high degree of challenge and risk.

- **Semi-primitive Non-Motorized (ROS) –** An area characterized by a predominantly natural or natural-appearing environment of moderate to large size. Interaction between users (or concentration of 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.

  The recreation experience opportunity level provided would be characterized by the high, but not extremely high, (or 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. (The opportunity to have a high degree of interaction with the natural environment.) Motorized use is not permitted.

- **Semi-primitive Motorized (ROS) –** An area characterized by a predominantly natural or natural-appearing environment of moderate to large size. Interaction between users (or concentration of 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.

  The recreation experience opportunity level provided would be characterized by the high, but not extremely high, (or 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. (The opportunity to have a high degree of interaction with the natural environment.) Motorized use is permitted.

- **Roaded Natural (ROS) –** An area characterized by predominantly natural-appearing environments with moderate evidences of the sights and sounds of man. 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. Conventional motorized use is provided for in construction standards and design of facilities.

  The recreation opportunity experience level provided would be characterized by the probability for equal experiencing of affiliation with individuals and groups, and for isolation from sights and sounds of humans. Opportunities for both motorized and non-motorized forms of recreation may be provided.

- **Rural (ROS) –** A classification for areas characterized by a substantially modified natural environment. Resource modification and utilization practices are to enhance specific recreation activities and to maintain vegetative cover and soil, but harmonize with the natural environment. A considerable number of facilities are designed for use by a large number of people. Moderate densities are provided away from developed sites. Facilities for intensified motorized use and parking are provided.

  The recreation opportunity experience level provided would be characterized by the 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 setting. Opportunities for wildland challenge, risk-taking, and testing of outdoor skills are generally unimportant.

- **Urban (ROS) –** An area characterized by a substantially urbanized environment, although the background may have natural-appearing elements. Renewable resources modification and utilization practices are to enhance specific recreation activities. Vegetative cover is often exotic and manicured. Sights and sounds of humans, on-site, are predominant. 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.

  The recreation opportunity experience level provided would be characterized by the probability for experiencing affiliation with individuals and groups is prevalent, as is the convenience of sites and opportunities. Experiencing natural environments, having challenges and risk 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.

recreation visit (also National Forest recreation visit) – The entry of one person upon a National Forest to participate in recreation activities for an unspecified period of time. A NF visit can be composed of multiple site visits.

recreation visitor day (RVD – also National Forest recreation visitor day) – Recreational use of National Forest sites, or areas of land or water, that aggregates 12 visitor-hours; may consist of one person for 12 hours, 12 persons for one hour, or any equivalent combination of continuous or intermittent recreation use by individuals or groups. This was the basic use-reporting unit in the Recreation Information Management (RIM) System.

reforestation – The re-establishment of forest cover by seeding, planting, and natural means.

regeneration - The act of renewing of a tree crop by establishing young trees by naturally or artificially. The young crop itself.

regeneration cutting - Any removal of trees intended to assist regeneration already present or to make regeneration possible.

regeneration (reproduction) method - A cutting procedure by which a new age class is created. The major methods are clearcutting, seed-tree, shelterwood, selection, and coppice.

regeneration (reproduction) period - The time between the initial regeneration cutting and the successful re-establishment of a new age class by natural means, planting, or direct seeding.

Region 8 - The states that make up the Southern Region of the USDA Forest Service.

Regional Forester - The official responsible for management of National Forest land within a USDA Forest Service region.

regulated harvest – Includes any volume scheduled in calculations of the allowable sale quantity which is harvested from suitable forest land.

release and weeding – A silvicultural treatment designed to free desirable trees from competition with overstory trees, less desirable trees, or grasses and other forms of vegetative growth. It includes release of natural and artificial regeneration.

removal cut - The cut which removes the last seed bearers of a seed tree or shelterwood regeneration method after the new seedling stand is considered to be established.

research natural area - An area set aside by the Forest Service specifically to preserve a representative sample of an ecological community, primarily for scientific and educational purposes. Commercial exploitation is not allowed and general public use is discouraged.

reserve trees - Trees, pole-sized or larger, retained after the regeneration period under the clearcutting, seed-tree, shelterwood, or coppice methods.

reserved mineral rights - Refers to those cases wherein the minerals were severed from the surface during the transaction whereby the government acquired the land. These rights are subject to the Secretary of Agriculture's rules and regulations that were applicable at the time of the transaction.

resource - An aspect of human environment which renders possible, or facilitates the satisfaction of, human wants, and the attainment of social objectives.

resource allocation model - A mathematical model using linear programming that will allocate land to prescriptions and schedule implementation of those prescriptions simultaneously. The end purpose of the model is to find a schedule and allocation that meets the goals of the forest and optimizes some objective function including minimizing costs. The model used for this planning is called spectrum.

resource use and development opportunities - A possible action, measure, or treatment and corresponding goods and services identified and introduced during the scoping process. It may subsequently be incorporated into and addressed by the land and resource management plan in terms of a management prescription.

responsible line officer - The Forest Service employee who has the authority to select and/or carry out a specific planning action.

retention - A visual quality objective in which man's activities are not evident to the casual forest visitor.

revegetation - The re-establishment and development of a plant cover. This may take place naturally through the reproductive processes of the existing flora or artificially through the direct action of humans (e.g.: afforestation and range reseeding).

revision - To make the plan new or up-to-date. Plan revision must be considered and approved in accordance with the requirements for the development and approval of a forest plan. Revisions take place every 10-15 years, but may occur more frequently if conditions or public demands change significantly.

right-of-way - A right of use across the lands of others. It generally does not apply to absolute purchase of ownership. Land authorized to be used or occupied for the construction, operation, maintenance, and termination of a project or facility passing over, upon, under, or through such land.

riparian – Land areas directly influenced by water. They usually have visible vegetative or physical characteristics showing this water influence. Streamside, lake borders, and marshes are typical riparian areas.

riparian areas - Areas with three-dimensional ecotones of interaction that include terrestrial and aquatic ecosystems that extend down into the groundwater, up above the canopy, outward across the floodplain, up the near-slopes that drain to the water, laterally into the terrestrial ecosystem, and along the watercourse at a variable width.

riparian corridor - An administrative zone applied to both sides of a stream or along side a pond, lake, wetland, seep or spring. It is a fixed width by stream type that may fall within or beyond the true riparian area.

riparian dependent species - Species that are dependent on riparian areas during at least one stage of their life cycle.

riparian functions - Activities that occur in a riparian area without the influence of management activities. Functions include erosion and deposition by the streams, nutrient cycling, movement and storage of water, vegetative succession, etc.

ripping - A process where the soil is mechanically sliced or broken to improve tilth, aeration, and permeability.

river classifications

(1) wild -- Rivers or sections of rivers that are free of impoundments and generally inaccessible except by trail, with watersheds or shorelines essentially primitive and waters unpolluted. These represent vestiges of primitive America.

(2) scenic -- Rivers or sections of rivers that are free of impoundments, with shorelines or watersheds still largely primitive and shorelines largely undeveloped, but accessible in places by roads.

(3) Recreational -- Rvers or sections of rivers that are readily accessible by road or railroad, that may have some development along their shorelines, and that may have undergone some impoundment or diversion in the past.

road – A motor vehicle path more than 50 inches wide, unless classified and managed as a trail. It may be classed as a system or non-system road.

road - constant service - A facility on the transportation system developed and operated for long-term land management and resource utilization needs. It is also operated for continuous or annual recurrent service. System-open roads generally remain open for public use except for seasonal closures to prevent road damage due to bad weather conditions.

road - intermittent service - A facility on the transportation system that is developed and operated for long-term land management and resource utilization needs. It is operated for periodic service and closed for more than one year between periods of use. System-closed roads are generally built to access logging sites and are closed once logging activities are completed. They can be re-opened several years later, however, when access is once again needed to the site.

road closure - A technique used by management to regulate and control the use of facilities to achieve transportation economy, user safety, protection of the public investment, and accomplishment of forest resource objectives. It may be intermittent or long term.

road density - A measure of the total length of road in any given unit of area (e.g.: 4 miles/square mile.)

road maintenance levels - A formally established set of objectives that describes the conditions necessary to achieve the planned operation of a road. The levels vary from Level I, basic custodial care, to Level V, which is assigned high use roads in which user safety and comfort are important considerations.

roadless area – Places that have retained or are regaining a natural untrammeled appearance; any signs of prior human activity are disappearing or being muted by natural forces. Criteria provide for an individual roadless area to include no more than one-half mile of improved road for each 1,000 acres.

Roadless Area Review and Evaluation (RARE) II - The assessment of “primitive” areas within the National Forests as potential wilderness areas as required by the Wilderness Act. This refers to the second such assessment that was documented in the final environmental impact statement of the Roadless Area Review and Evaluation, January 1979.

> **RARE II area -** An area of land identified during the RARE II and the re-evaluation process as having potential for inclusion in the National Wilderness Preservation System.
>
> **RARE II inventory boundary -** A boundary established with public input surrounding large areas of primarily Forest Service lands for the purpose of evaluation during the RARE II process. These lands meet minimum Forest Service criteria for potential wilderness.

rollover - A maximum PNV solution with an individual good or service production constrained at its maximum potential level. It provides an economically efficient basis for comparing all benchmark levels.

rotation - The number of years required to establish, including the regeneration period and grow timber crops, to a specified condition or maturity for harvest. Even- and two-aged management prescriptions in the Forest Plan use a rotation.

roundwood - Timber and fuelwood prepared in the round state - from felled trees to material trimmed, barked, and crosscut (e.g.: logs and transmission poles).

RPA Program - The recommended direction for long-range management of renewable resources of National Forest System lands. This direction serves as the basis for the regional targets assigned to the forest. The development of this direction is required by the Forest and Rangeland Renewable Resources Planning Act.

runoff - The total stream discharge of water from a watershed including surface and subsurface flow, but not groundwater. Usually expressed in acre-feet.

rural - A recreation opportunity spectrum classification for areas characterized by a substantially modified natural environment. Sights and sounds of man are evident.

Renewable resource modification and utilization practices enhance specific recreation activities or provide soil and vegetative cover protection.

rural water use – Term used in previous water-use circulars to describe water used in suburban or farm areas for domestic and livestock needs. The water is generally self-supplied.

S

sacred sites – Any specific, discrete, narrowly delineated location on Federal land that is identified by an Indian tribe, or Indian individual determined to be an appropriately authoritative representative of an Indian religion, as sacred by virtue of its established religious significance to, or ceremonial use by, an Indian religion; provided that the tribe or appropriately authoritative representative of an Indian religion had informed the agency of the existence of such a site.

sale schedule - The quantity of timber planned for sale by time period from an area of suitable land covered by a forest plan. The first period (usually a decade) of the selected sale schedule provides the allowable sale quantity. Future periods are shown to establish that long-term sustained yield will be achieved and maintained.

salmonids – Fish of the family salmon idea, the chars, trouts, salmons, and white fishes.

salvage cutting - The removal of dead trees or trees being damaged or killed by injurious agents other than competition. To recover value that would otherwise be lost.

sanitation cutting - The removal of trees to improve stand health and to reduce actual or anticipated spread of insects and disease.

sapling - A usually young tree that is larger than a seedling, but smaller than a pole. Size varies by region.

sawtimber - Trees suitable in size and quality for producing logs that can be processed into dimension lumber.

scalloping - The undulating vegetative treatment given to a roadside for aesthetic purposes.

Scenery Management System (SMS) - A system for the inventory and analysis of the aesthetic values of the National Forest lands. It replaces the Visual Management System (VMS) as defined in Agricultural Handbook #462.

scenic attractiveness – The scenic importance of a landscape based on human perceptions of the intrinsic beauty of landform, rockform, waterform, and vegatation pattern. Classified as A (Distinctive), B (Typical or Common), or C (Undistinguished).

scenic class – A system of classification describing the importance or value of a particular landscape or portions of that landscape. Values range from 1 (highest value) to 7 (lowest value).

scenic integrity – A measure of the degree to which a landscape is visually perceived to be "complete". The highest scenic integrity ratings are given to those landscapes which have little or no deviation from the character valued for its aesthetic appeal. Scenic integrity is used to describe an existing situation, standard for management, or desired future conditions.

scenic integrity objective (SIO) - A desired level of excellence based on physical and sociological characteristics of an area. Refers to the degree of acceptable alterations of the characteristic landscape. Objectives include Very High, High, Moderate, Low, and Very Low.

> **Very High (VH) –** Generally provides for only ecological changes in natural landscapes and complete intactness of landscape character in cultural landscapes.
>
> **High (H) –** Human activities are not visually evident to the casual observer. Activities may only repeat attributes of form, line, color, and texture found in the existing landscape character.
>
> **Moderate (M) –** Landscapes appear slightly altered. Noticeable human-created deviations must remain visually subordinate to the landscape character being reviewed.
>
> **Low (L) –** Landscapes appear moderately altered. Human-created deviations begin to dominate the valued landscape character being viewed, but borrow from valued attributes such as size, shape, edge effect, and pattern of natural openings, vegetative type changes, or architectural styles outside the landscape being viewed.
>
> **Very Low (VL) –** An existing scenic inventory classification in which landscapes appear heavily altered. Human-created deviations may strongly dominate the valued landscape character. They may not borrow from valued attributes of size, shape, edge effect, and pattern of natural openings, vegetative type changes, or architectural styles within or outside the landscape being viewed. However, deviations must be shaped and blended with the natural terrain so that elements such as edges, roads, landings, and structures do not dominate the composition.

scoured channel - A definable channel of flow where surface water converges with enough energy to remove soil, organic matter, and leaf litter.

secondary processor - A mill that processes partially manufactured wood (a wood product such as chips or lumber), into a finished product. Examples include paper and furniture.

secondary trout streams - Streams that do not contain naturally-reproducing trout populations, but will sustain trout throughout the year. Populations must be maintained by stocking.

sediment - Solid mineral and organic material that is in suspension, is being transported, or has been moved from its site of origin by air, water, gravity, or ice.

seedling/sapling seral (successional) stage – The stage of forest development characterized by high stem density, closed low canopies, and minimal herbaceous layer development. As used in the EIS and Plan, a stand age of 11 to 40 years is generally used to define this condition. See successional stage.

seedling/sapling stands - Stands at least 16.7 percent stocked with growing stock trees, of which more than one-half of total stocking is seedlings and saplings.

seed tree – An even-aged regeneration method where in a single cut, the removal of all merchantable trees in a stand, except for a small number of widely dispersed trees retained for seed production, and to produce a new age class in a fully-exposed microenvironment.

seed tree with reserves method - A two-aged regeneration method in which some or all of the seed trees are retained after regeneration has become established to attain goals other than regeneration.

seep - A wet area where a seasonal high water table intersects with the ground surface. Seeps that meet the definition of a wetland are included in the Riparian Corridor.

selected species - Species selected as indicators of the effects of management. Term is the same as management indicator species.

selection cutting - The removal of selected trees, particularly mature trees at planned intervals (cutting cycle), individually or in small groups, from an uneven-aged forest to realize the yield, and establish a new crop of desired tree species. Additionally, the tending of immature stand components are accomplished at each cutting cycle.

sensitive species - Those species that are placed on a list by the Regional Forester for which population viability is a concern. In this Region, we generally use Natural Heritage rankings G1-3, N1-3, T1-3, or H, and USDI Fish and Wildlife Service candidates as a basis for developing the list.

sensitivity analysis - A determination of the consequences of varying the level of one or several factors while holding other factors constant.

sensitivity level - A particular degree or measure of viewer interest in the scenic qualities of the landscape.

sequential lower bounds - The maximum percent decrease in harvest volume in any decade as compared to the preceding decade. This prevents the forest from significantly decreasing its share of the market, which would violate the assumptions of the horizontal demand curve.

sequential upper bounds - The maximum percent increase in harvest volume in any decade as compared to the preceding decade. This prevents the forest from significantly increasing its share of the market, which would violate the assumptions of the horizontal demand curve.

shearing - A method used in land clearing whereby tree stems are severed at ground line by large bladed mechanisms mounted on crawler tractors (e.g.: serrated tooth V-blade or KG blade).

shelterwood - A regeneration method of regenerating an even-aged stand in which a new age class develops beneath the partially shaped microenvironment provided by the residual trees. The sequence of treatments can include three distinct types of cuttings: (1) an optional preparatory harvest to enhance conditions for seed production; (2) an establishment harvest to prepare the seed bed, and to create a new age class; and 3) a removal harvest to release established regeneration from competition with the overwood.

shelterwood with reserves - A two-aged regeneration method in which some or all of the shelter trees are retained, well beyond the normal period of retention, to attain goals other than regeneration.

short-term facilities - Facilities developed and operated for limited resource activity or other project needs. It will cease to exist as a transportation facility after the purpose for which it was constructed is completed, and the occupied land is reclaimed and managed for natural resource purposes.

silvicultural system - A management process whereby forests are tended, harvested, and replaced, resulting in a forest of distinctive form. Systems are classified according to the method of carrying out the fellings that remove the mature crop, and provide for regeneration and according to the type of forest thereby produced.

silviculture - The art and 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 landowners and society on a sustainable basis.

silvics – The study of the life history and general characteristics of forest trees and stands, with particular reference to environmental factors, as a basis for the practice of silviculture.

single-tree selection - A regeneration method of creating new age classes in uneven-aged stands in which individual trees of all size classes are removed uniformly throughout the stand to achieve desired stand structural characteristics.

site - An area in which a plant or stand grows, considered in terms of its environment, particularly as this determines the type and quality of the vegetation the area can carry.

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 - The preparation of the ground surface prior to reforestation. Various treatments are applied as needed to control vegetation that will interfere with the establishment of the new crop of trees or to expose the mineral soil sufficiently for the establishment of the species to be reproduced.

site index – A series-specific measure of actual or potential forest productivity (site quality, usually for even-aged stands), expressed in terms of the average height of trees included in a specified stand component (defined as a certain number of dominants, codominants, or the largest and tallest trees per unit area) at a specified index or base age.

site productivity class - A species-specific classification of forest land in terms of inherent capacity to grow crops of industrial, commercial wood. Usually derived from the site index.

site quality (productivity) - The productive capacity of a site, usually expressed as volume production of a given species.

skid trails - A travel way through the woods formed by loggers dragging (skidding) logs from the stump to a log landing without dropping a blade and without purposefully changing the geometric configuration of the ground over which they travel.

skidding - A term for moving logs by dragging from stump to roadside, deck, or other landing.

slash - The residue left on the ground after felling, silvicultural operations, or as a result of storm, fire, girdling, or poisoning. All vegetative debris resulting from the purchaser's operations. Slash associated with construction of roads is subject to treatment according to construction specifications, all other is subject to the terms of contract provision B/BT6.7.

snag - A dead or partially dead (more than 50 percent) hardwood or pine tree which is used by many bird species for perching, feeding, or nesting.

social analysis - An analysis of the social (as distinct from the economic and environmental) effects of a given plan or proposal for action. It includes identification and evaluation of all pertinent desirable and undesirable consequences to all segments of society, stated in some comparable quantitative terms, including persons or percent of population in each affected social segment. In addition, social analysis also includes a subjective analysis of social factors not expressible in quantitative terms.

soil enhancement - Application of methods or materials to the soil to increase its productivity and stimulate growth of vegetation.

soil productivity - The inherent capacity of a soil to support the growth of specified plants, plant communities, or a sequence of plant communities. Soil productivity may be expressed in terms of volume or weight/unit area/year, percent plant cover, or other measures of biomass accumulation.

soil survey - A term for the systematic examination of soils in the field and in laboratories; their description and classification; the mapping of kinds of soil; the interpretation of soils according to their adaptability for various crops, grasses, and trees; their behavior under use of treatment for plant production or for other purposes; and their productivity under different management systems.

soil and water resource improvement - The application of preplanned treatment measures designed to favorably change conditions of water flow, water quality, rates of soil erosion, and enhancement of soil productivity.

southern pine beetle - One of the many species of pine bark beetles that are present in the forest at all times. When environmental and forest conditions become favorable, the beetle populations can increase and cause substantial timber losses over extensive areas in a relatively short period of time.

spatial feasibility testing - A process for verifying on a sample basis that land allocation and scheduling is actually implementable on the ground.

special concern species – Species that is federally listed as Category 2 or ranked as globally rare by state heritage programs and The Nature Conservancy. Also used by some states for any species of wild animal native or once native to the state, which is determined by the state to require monitoring.

special use authorization - A permit, term permit, or easement that allows occupancy, use, rights, or privileges of National Forest System land.

special use permit – A permit issued under established laws and regulations to an individual, organization, or company for occupancy or use of National Forest land for some special purpose.

splash dams – Dams, usually temporary, built of wood across mountain streams to pond up large amounts of water.

spring - A water source located where water begins to flow from the ground due to the intersection of the water table with the ground surface. Generally flows throughout the year. Springs that are the source of perennial or intermittent streams are included in the Riparian Corridor.

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.

stand density - A quantitative measure of stocking expressed either absolutely per unit of land in terms of number of trees, basal area, volume per unit area, or relative to some standard condition.

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.

standard - Requirement that precludes or imposes limitations on resource management practices and uses. Usually for resource protection, public safety, or addressing an issue.

state, county, and municipal land - Land owned by states, counties, and local public agencies or municipalities, or land leased to these governmental units for 50 years or more.

stocking - The degree of occupancy of land by growing stock trees, measured by basal area or number of trees per unit area and spacing compared with a minimum standard - which varies by tree size and species or species group - to the occupancy that is required to fully utilize the growth potential of the land.

stratified mixture - A stand in which different tree species occupy different strata of the total crown canopy.

stratigraphic – Pertaining to strata or layers, as in a description of layers of rock types.

stratum (canopy layer) - A distinct layer of vegetation within a forest community.

Streamside Management Zones (SMZ) - Land areas adjacent to natural streams, lakes, ponds, and seeps. These zones are typically designed to reduce, minimize or prevent non-point source pollution from entering a stream system (e.g.: sediment from a road or timber harvesting activity). Specific SMZ buffer widths are often defined in State Best Management Practice handbooks.

stressors – Pressure or change brought upon an ecosystem by pollution sources including sediment, contaminants, and toxins.

successional stage - A period, marked by distinctiveness of structure, in the development of a forest community from establishment of tree regeneration to advanced age. In general, successional stages used in the Plan and EIS are defined in terms of forest age as a surrogate measure of the distinct structure at each stage as follows:

- Early – 0 to 10 years old
- Seedling/sapling – 11 to approximately 40 years old
- Mid – approximately 41 to 80 years old
- Late – over 80 years old; includes old growth.

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. A unit of land may be suitable for a variety of individual or combined management practices.

suitable forest land - National Forest System land allocated by a Forest Plan decision to be managed for timber production on a regulated basis. *Regulated basis* means a systematic relationship between tree growth and timber harvest such that a specific timber volume objective level can be sustained indefinitely.

supply - The amount of a good or service that producers are willing to provide at a specified price, time period, and conditions of sale.

surficial water - Water on or at the ground surface. Does not include ditches, canals, spillways, or other human-created flow channels.

sustained yield of the products and services - The achievement and maintenance in perpetuity of a high-level annual or regular periodic output of the various renewable resources of the National Forest System without impairment of the productivity of the land.

sympatric – Condition where two or more closely related species live together in the same area. The species have overlapping distributions. Opposite of allopatric.

T

targets - Objectives assigned to the forest by the Regional Plan.

taxomic – Classification of organisms into categories according to their natural relationships.

tentatively suitable forest land - National Forest System land that meets specific criteria in the implementing regulations of the National Forest Management Act (36 CFR 219.14 for further consideration during the planning process for timber production on a regulated basis. Note that "tentatively suitable land" is not the same as the allocation of the existing Forest Plan, as amended since 1985, but is identified by a reanalysis. (Also called "Phase 1 suitability" or "Stage 1 suitability" because its designation as Part "A" of a three-part process described by the text of the National Forest Management Act.) (Timber Supply/Demand).

term permit - A special-use authorization to occupy and use National Forest System land, other than rights-of-way, for a specified period. It is revocable and compensable according to its terms.

theming – A land and/or management scheme created with the list of land and/or management.

thermoelectric power water use – Water used in the process of the generation of thermoelectric power.

thinning - A cutting made to reduce stand density of trees primarily to improve growth, enhance forest health, or to recover potential mortality.

thinning interval - The period of time between successive thinning entries, usually used in connection with even-aged stands.

threatened species - Any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range. Designated as a threatened species in the *Federal Register* by the Secretary of Interior.

tiering – A National Environmental Policy Act term used to reference the coverage of general matters in broader environmental impact statements (including national program or policy statements), with subsequent narrower statements or environmental analyses (including regional or basin-wide program statements or ultimately site-specific statements), incorporating by reference the general discussions and concentrating solely on the issues specific to the statement subsequently prepared.

timber - Wood retaining many of the recognizable characteristics of a tree: round, bark covered, and tapering, but without the limbs and leaves. In wood-industry usage, it may be “standing timber”- that portion of living trees with characteristics of value to the wood-using industry, or cut trees not yet processed beyond removing limbs and tops.

timber demand - A relationship between stumpage or delivered log price and the quantity of timber produced.

timber product market area - The geographic area enclosed within a polygon drawn by connecting those mills buying forest timber that are the farthest away from the forest.

timber production - The purposeful growing, tending, harvesting, and regeneration of regulated crops of trees to be cut into logs, bolts, or other round sections for industrial or consumer use. For purposes of forest planning, timber production does not include the production of fuelwood or harvests from unsuitable lands.

timber removals (drain) - The merchantable volume of trees removed from the inventory by harvesting, cultural operations including stand improvement, land clearing, or changes in land use expressed as an annual average between surveys. Within National Forests, removals are almost all timber harvest except that the inventory on lands withdrawn by legislative action is also normally accounted for as “removals.”

timber sale program quantity - The volume of timber planned for sale during the first decade of the planning horizon. It includes the allowable sale quantity (chargeable volume), and any additional material (non-chargeable volume), planned for sale. The timber sale program quantity is usually expressed as an annual average for the first decade.

timber stand improvement - A term comprising all intermediate cuttings made to improve the composition, constitution, condition, and increment of a timber stand.

timber supply - The amount of wood raw material available to be harvested within specified parameters of time and geographic area.

timberland - Forest land that is producing or capable of producing in excess of 20 cubic feet per acre per year of industrial wood crops under natural conditions. Not withdrawn from timber utilization, and not associated with urban or rural development. Currently, inaccessible and inoperable areas are included.

tolerance - The ability of a tree to grow satisfactorily in the shade of, and in competition with, other trees.

topography - The configuration of a land surface including its relief, elevation, and the position of its natural and human-made features.

toxicity index profile – Estimate of cumulative potential for toxic impacts in water.

traditional cultural property – A historic property that is eligible for inclusion in the National Register because of its association with cultural practices or beliefs of a living community that (a) are rooted in that community's history, and (b) are important in maintaining the continuing cultural identity of the community.

trailheads - The parking, signing, and other facilities available at the terminus of a trail.

traffic service levels – Describe a road's significant traffic characteristics and operating conditions.

transfer age – The age a stand will transfer from one Model 2 management class to another.

transfer class – A Model 2 management class that receives transferred acres. A regeneration transfer class has a transfer age of zero. All other transfer classes have an age greater than zero.

transfer columns – A column constructed the matrix generator to create special LP structures. They accumulate information from several decision variables into one column.

two-aged silvicultural system - A planned sequence of treatments designed to maintain and regenerate a stand with two age classes.

two-aged stand - A stand composed of two distinct age classes that are separated in age by more than 20 percent of rotation.

type conversion - A change from tree species or species group to another. An example is a change from hardwoods to pine.

U

undercutting (root pruning) - The root pruning of seedlings in a nursery bed.

understory - The trees and other vegetation growing under a more or less continuous cover of branches and foliage formed collectively by the upper portion (overstory) of adjacent trees and other woody growth.

uneven-aged regeneration methods - Methods of regenerating a forest stand, and maintaining an uneven-aged structure by removing some trees in all size classes either singly, in small groups, or strips. The methods are single-tree or group selection.

uneven-aged silvicultural system - A planned sequence of treatments designed to maintain and regenerate a stand with three or more age classes.

universal soil loss equation - An equation used to estimate soil erosion rates and for the design of water erosion control systems. A = RKLSPC wherein A = average annual soil loss in tons per acre per year; R = rainfall factor; K = soil erodibility factor, L = length of slope; S = percent of slope; P = conservation practice factor; and C = cropping and management factor.

unregulated forest - Commercial forest land that will not be organized for timber production under sustained-yield principles.

unsuitable forest land (not suited) - Forest land not managed for timber production because: (a) Congress, the Secretary [of Agriculture], or the Chief [of the Forest Service] has withdrawn it; (b) it is not producing or 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 based on existing technology and knowledge, that it is possible to restock lands within five years after final harvest, as reflected in current research and experience; (e) there is, at present, a lack of adequate information about responses 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.

urban – An area characterized by a substantially urbanized environment. The background may have natural-appearing elements.

utilization standards - Measurements for standing trees that describe the minimum size tree that will be designated for sale for various products including sawtimber or small roundwood.

V

values, market - Prices of market goods and services measured in real dollars in terms of what people are willing to pay as evidenced by market transactions.

values, non-market - Prices of non-market goods and services imputed from other economic values.

variety class - A classification system for establishing three visual landscape categories according to the relative importance of the visual features. This classification system is based on the premise that all landscapes have some visual values, but those with the most variety or diversity of visual features have the greatest potential for high scenic value.

vector – A matrix composed of only one row or column.

viable population - Population of plants or animals that has the estimated numbers and distribution of reproductive individuals to ensure its continued existence is well distributed in the planning area.

viewshed - The total landscape seen, or potentially seen from all or a logical part of a travel route, use area, or water body.

visibility – As an air quality related value, this term refers to the ability of an air mass to convey the landscape image. Similar to “turbidity”, except it is a measure of air quality.

visual quality objective - A desired level of excellence based on physical and sociological characteristics of an area under the Visual Management System. Refers to the degree of acceptable alterations of the characteristic landscape. Objectives include Preservation, Retention, Partial Retention, Modification, and Maximum Modification. Except for "preservation," each goal describes a different degree of acceptable alteration of the natural landscape based on the importance of esthetics.

visual resource - The composite of basic terrain, geological features, water features, vegetative patterns, and land-use effects that typify a land unit and influence the visual appeal the unit may have for visitors.

W

warm water fishery - Aquatic habitats that support fish species which have their best reproductive success and summer water temperature tolerance between 75 and 85 degrees Fahrenheit (23-29 C), or about 80 degrees Fahrenheit. Examples include sunfish species, and largemouth bass.

water supply area - Areas that serve present and future municipal water supply and trout hatching or rearing operations.

water yield - The measured output of the forest's streams expressed in acre-feet. The amount or volume of water that flows in a given period of time from a watershed.

waterbars - A change in the grade of a roadbed, trail surface, or fire line used to divert water off the surface to prevent it from eroding ruts and possibly carrying sediment to a stream.

watershed - The total area above a given point on a stream that contributes water to the flow at that point.

Weeks Act – Implemented in 1911, it authorized the acquisition of lands on the watershed of navigable streams for the purposes of conserving their navigability, or for the purpose of timber.

wetlands - (pursuant to the Federal Clean Water Act) - Areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances, support a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs and similar areas, and are found primarily within palustrine systems; but may also be within riverine, lacustrine, estruarine, and marine systems.

wild and scenic river - A river or section of river designated as such by congressional action under the Wild and Scenic Rivers Act of Oct. 2, 1968, as supplemented and amended, or those sections of a river designated as wild, scenic, or recreational by an act of the legislature of the state or states through which it flows.

wilderness – A Congressionally-designated area that is part of the National Wilderness Preservation System established through the Wilderness Act of 1964; also defined in the Act as a wilderness, in contract with those areas where man and his own works dominate the landscape; is hereby recognized as an area where the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain. An area of wilderness is further defined to mean an area of underdeveloped Federal land retaining its primeval character and influence, without permanent improvements or human habitation, which is protected and managed so as to preserve its natural conditions, and which (1) generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable; (2) has outstanding opportunities for solitude or a primitive and unconfined type of recreation; (3) has at least five thousand acres of land or is of sufficient size so as to make practicable its preservation and use in an unimpaired condition; and (4) may also contain ecological, geological, or other features of scientific, educational, scenic, or historical value.

Wilderness Act of 1964 – Act which gave Congress authority to designate certain areas of public land as wilderness. It established the National Wilderness Preservation System to secure an enduring resource of wilderness.

wilderness study area - One of the areas selected by the Chief of the Forest Service from an inventory of undeveloped National Forest System lands as having apparent high qualities for wilderness. Lands possessing the basic characteristics of wilderness and designated by Congress for further wilderness study. A study can determine whether they should be recommended for addition to the National Wilderness Preservation System.

wildland fire - Any non-structural fire on wildlands other than one intentionally set for management purposes. Confined to a predetermined area. Not to be confused with "fire use", which includes prescribed fire.

wildland urban interface – The line, area, or zone where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuels.

wildlife - All non-domesticated mammals, birds, reptiles, and amphibians living in a natural environment, including game species and non-game species. Animals, or their progeny (i.e., feral animals - including horses, burros, and hogs), that once were domesticated, but escaped captivity, are not considered wildlife.

wildlife and fish user-day – A 12-hour participation in the use of wildlife and fish primarily for consumptive or non-consumptive use including hunting, fishing, or wildlife viewing. Such use is the result of habitat management, and the populations supported by that habitat. A WFUD is counted as one day or any part of a day that the user participated in these activities. Does not include sport or commercial uses of anadromous fish.

wildlife habitat diversity - The distribution and abundance of different plant and animal communities and species within a specific area.

wildlife habitat improvement - The manipulation or maintenance of vegetation to yield desired results in terms of habitat suitable for designated wildlife species or groups of species.

wildlife tree - A den tree, snag, or mast or food tree.

with-without comparison - An evaluation that compares outputs, benefits, costs, and other effects with a base alternative.

withdrawal – Water removed from the ground or diverted from a surface water source for use.

withdrawal of land - An order removing specific land areas from availability for certain uses.

withdrawn National Forest lands - National Forest System lands segregated or otherwise withheld from settlement, sale, location, or entry under some or all of the general land laws.

woodland grazing - Grazing livestock on the grass-forbs existing under forested stands, mainly southern yellow pine types.

wrenching - The disturbance of seedling roots in a nursery bed (e.g.: with a tractor-drawn blade), with the objective of stimulating the development of a fibrous root system.

X

xeric – Pertaining to sites or habitats characterized by decidedly dry conditions.

Y

yarding - A term used to describe operations used to move logs from stump to point where logs are loaded for transport to mill. Most commonly used in cable logging operations.

yield composite – Activity and output relationships which estimate yields. They allow the development of a yield stream from a related yield stream without entering each yield coefficient independently. Yield composite relationships can be time, age, or sequence based.

yield stream – A subset of a yield table containing specific information for an activity or output. A timber output may have a yield stream for amount, diameter, basal area, or trees.

yield table - A tabular statement of outputs expected to be produced under a specific set of conditions.

Z

zone – Large, contiguous areas of land that include watersheds or management areas. It can be comprised of several complete analysis units. The land within a zone is generally a heterogenous mixture of environmental types.

zone management actions – Management actions available to zones. They contain the ability to coordinate the management activities that occur within a zone.

CHAPTER 7

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