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National Forests
in Mississippi

Land and Resource Management Plan

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Land and Resource Management Plan
National Forests in Mississippi

Forest Supervisor's Office – Jackson, Mississippi
Bienville National Forest – Forest, Mississippi
Delta National Forest – Rolling Fork, Mississippi
De Soto National Forest:
Chickasawhay Ranger District – Laurel, Mississippi
De Soto Ranger District - Wiggins, Mississippi
Holly Springs National Forest – Oxford, Mississippi
(Includes the Yalobusha Unit)
Homochitto National Forest – Meadville, Mississippi
Tombigbee National Forest – Ackerman, Mississippi
(Includes the Ackerman and Trace Units)

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Chapter 1 – Introduction. The introduction provides an overview of the National Forests in Mississippi and describes the purpose and structure of our revised land and resource management plan.

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Chapter 3 – Strategy. This section describes how the National Forests in Mississippi staff intend to move the Forests' resources toward desired conditions. It includes objectives and management approaches to implementation. Most objectives are quantifiable outcomes on the land that can be measured over time. Management approaches describe the program strategies for managing the Forests' national forest resources and show how we expect to implement plan direction.

Chapter 4 – Design Criteria. This section lists the standards and guidelines that are the sideboards framing our management activities. They ensure the protection of resources as projects are implemented to move toward the desired conditions. This chapter also points the way to other existing direction outside this plan. Management requirements found in public laws, regulations, Forest Service manuals and handbooks, and Federal policies are still firmly in place but are generally not repeated in this plan. This chapter also includes a discussion of management areas, as well as identification of suitable uses for different areas.

Chapter 5 – Monitoring and Evaluation. This section describes the monitoring program for the plan. Monitoring and evaluation provide information to determine whether programs and projects are meeting forest plan direction and whether the plan should be amended or revised. This chapter also establishes monitoring questions that are to be answered over the course of forest plan implementation.

Glossary. The glossary defines terms used in this plan that may not be familiar to the reader. In most cases, the entries are short definitions; however, in other instances, entries are expanded to clarify more complex concepts, such as "prescribed burning" or "multiple-use purposes."

References. This section lists references to external and internal documents relevant to the understanding of the plan.

Appendix A – Summary of Analysis of the Management Situation. This appendix summarizes the issues and changing conditions that led to the need for change in existing plan direction. It also includes a summary of the significant issues identified through public collaboration.

Appendix B – Timber Analysis. This appendix describes the analysis of lands suitable and not suitable for timber production, the allowable sale quantity, and other information on conditions where different silvicultural systems could be used.

Appendix C – Possible Actions and Vegetation Management Priorities by Administrative Unit. This appendix describes possible activities that may take place to help maintain existing conditions or move toward desired conditions. It also includes vegetation management priorities by administrative unit and silvicultural systems and cultural practices by ecosystem or forest cover type.

Appendix D – Old Growth Management Strategy. The old growth strategy extends the regional guidance for conserving old growth forests to specific circumstances on the National Forests in Mississippi and provides details on old growth status, desired conditions, management strategies, implementation guidelines, and monitoring.

Appendix E – Climate Change Strategies. This document provides a summary of potential climate change expectations and management strategies for the National Forests in Mississippi.

Appendix F – Geographic Unit Maps. This appendix includes links to maps depicting ecological systems, red-cockaded woodpecker habitat management areas, resource suitability classifications, and various other maps related to National Forests in Mississippi forest plan revision.

Chapter 1. Introduction

From the pine forests of the Gulf Coastal Plain to the upland hardwoods in the northern part of the state, the National Forests in Mississippi (also referred to as "the Forests") cover 1.2 million acres of diverse natural resources and valued public lands. This land and resource management plan (also referred to as the "forest plan" or "the plan") has been developed to guide the general management direction of the Forests over the next 15 years. This document is a revision of our original forest plan prepared in 1985 under the National Forest Management Act (NFMA). Over the years, some aspects of the original plan remained valid, but most issues, conditions, and practices changed. This revision of the forest plan for the National Forests in Mississippi incorporates new information, addresses evolving issues and trends, accounts for changes in national policies and direction, and includes updated views from public users and stakeholders.

This revised forest plan is the result of a multi-year planning process and collaboration with the public and other agencies, groups, and interested parties. It differs from the previous plan in focusing more on an integrated vision of how we want the national forests to look and function in the future rather than how individual projects would be implemented. This plan uses a new format and emphasizes an adaptive management approach that will continue to include public input and technical adjustments as changes are needed.

1.1 Overview of the National Forests in Mississippi

1.1.1 Description, Niche, and Contributions

The six proclaimed national forests that make up the National Forests in Mississippi are administratively managed as seven ranger districts (Figure 1). Although each national forest has unique characteristics and conditions, they all contribute to forestwide desired conditions and are managed under one land and resource management plan. The seven ranger districts or national forests that make up the National Forests in Mississippi are:

- Bienville National Forest
- Chickasawhay Ranger District of the De Soto National Forest
- De Soto Ranger District of the De Soto National Forest
- Delta National Forest
- Holly Springs National Forest
- Homochitto National Forest
- Tombigbee National Forest

Distributed across the State of Mississippi, National Forest System (NFS) lands include an array of ecological systems that are representative of the ecological diversity of the different portions of the state. Forestwide, pine-dominated stands (many of which resulted from reforestation efforts in the 1930s) are the most common forest communities. Large tracts of loblolly pine represent the most prevalent forest type, but fire-dependent stands of native longleaf pines along the lower Gulf Coastal Plain still occupy a portion of their historic range. Oaks and hickories dominate the dry slopes and ridges in the northern half of the state, where sheltered bluffs and mesic ravines contain a mix of hardwoods that includes American beech, white oak, and Southern magnolia. Along the Mississippi River Delta, approximately 60,000 acres of forested wetlands constitute the only bottomland hardwood national forest in the National Forest System.

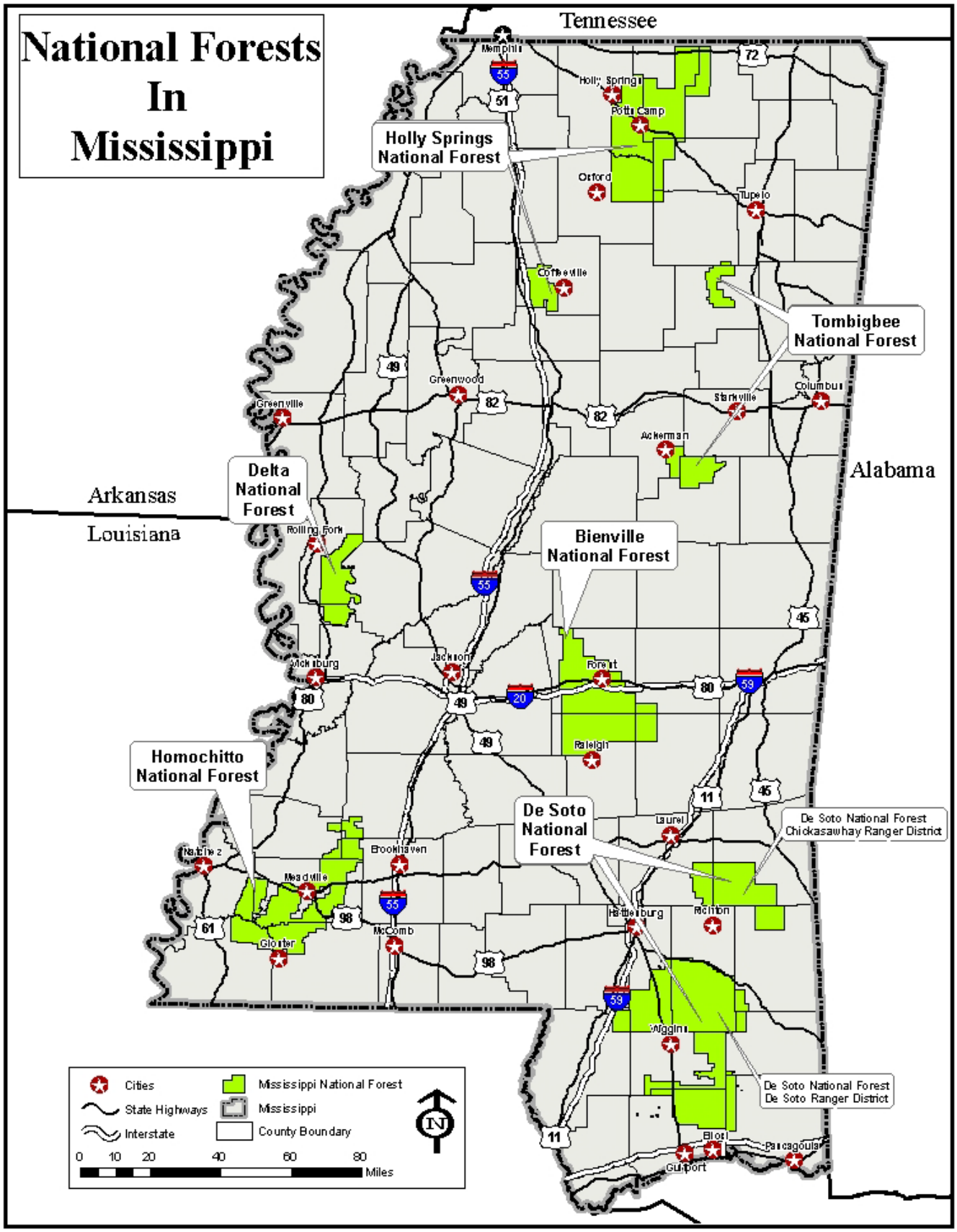


Figure 1. Map indicating the locations of national forests within the State of Mississippi

Other unique ecological systems include stands of bald cypress imbedded along oxbow lakes and sloughs, pitcher plant bogs, open grassy prairies, herbaceous seeps and flats, and xeric sandhills. The relative size and diversity of the National Forest System land base within the state is also important for recovery of native ecosystems and threatened and endangered wildlife species such as the red-cockaded woodpecker and gopher tortoise.

The restored forests and improved watersheds of today are in stark contrast to the cutover lands and abandoned farms that existed in the 1930s when the National Forests in Mississippi were established. These formerly cleared and eroded hillsides are now healthy forests that add to the economy and provide social opportunities and ecological diversity. Over the years, national forest lands have provided a steady flow of benefits to local and regional economies by drawing recreation visitors, offering minerals leasing, and providing a timber product mix that primarily includes softwood and hardwood sawtimber and pulpwood. Best management practices have reduced erosion, and healthy watersheds have protected water quality while providing refuge for a diversity of aquatic life within national forest boundaries.

Due to the intermingled nature of private landholdings and National Forest System lands, the National Forests in Mississippi are a “backyard” to many local communities and provide a variety of social gathering opportunities. Traditional national forest uses such as hunting and fishing continue to be highly desired by the public, as are other year-round recreation opportunities such as trail use, camping, nature watching, and enjoying beautiful scenery and solitude. Blackwater sloughs, scenic lakes, and meandering rivers add to the character of the landscape while providing quality boating, fishing, and other recreation experiences. The National Forests in Mississippi contain over 2,000 acres of lakes and ponds and 11,000 miles of streams within its proclamation boundaries. Lakes and streams associated with developed recreation sites provide popular summertime destinations, and many waterways are renowned sport fishing locations as well as key resting and feeding areas for waterfowl and other migratory bird species.

The National Forests in Mississippi contain two wilderness areas and a federally designated wild and scenic river. Fourteen wildlife management areas within national forest boundaries provide important wildlife habitat and are managed for game species such as deer, turkey, and quail. Cultural resources range from archaeological sites and Native American mounds to family cemeteries, old homesteads, interpretive trails, and lands along a portion of the Natchez Trace Parkway. With this rich combination of forest ecosystems and uses, Mississippi’s national forests have become a valued asset for the state and for the National Forest System.

1.1.2 Management Challenges

Many of the resource management challenges for the National Forests in Mississippi are similar to those faced by public land management agencies in other areas. Population growth and urbanization are resulting in a loss of undeveloped lands and increased pressures and conflicts over use of forest resources. Invasive species such as cogongrass and kudzu are a serious threat to native species. Changing recreation patterns, such as the use of all-terrain vehicles (also called off-highway vehicles or OHVs), have caused localized damage in some heavily used parts of the Forests. The nature of land ownership patterns in Mississippi, where National Forest System lands are tightly interspersed with tracts of private lands, makes consistent management practices difficult. Emerging issues such as climate change are not yet well understood, especially at the local forest level, and appropriate strategies are still evolving. Competing demands, reduced budgets, and limited internal staffing further impact our ability to complete desirable projects and maintenance activities.

In Mississippi, change is an inevitable part of the landscape and as such, is an important factor in developing a useful and adaptive land management plan for the national forests in the state. Whether the result of natural disturbances, human-induced pressures, or the outcome of new scientific understanding and technical research, changes are expected, and the ability to adapt and respond to changes in a productive way is a key part of our forest plan. Our intent in this plan is to reflect the changing needs and values of a diverse public while continuing to focus on sustainable management of National Forest System lands for the future.

One of the important goals in developing a forest plan for the National Forests in Mississippi was to rethink how we looked at land and resource management planning in the past and create a more integrated and adaptive plan for the future. In addition to this plan having a different focus than the one we prepared over 25 years ago, the process for creating our management direction was different as well. Since the revision process started, we have heard from thousands of Mississippi residents, visitors, conservation groups, recreation groups, industry representatives, community leaders, other agencies, and interested parties about the future they want to see for the six national forests within the state. Our resource specialists and forest managers worked together with universities, researchers, and other agencies to take into account the latest scientific findings, consider evolving management practices, and include new emerging issues such as urban expansion and climate change. Limited budgets and competing demands have required us to evaluate priorities, set feasible objectives, and work harder together with our partners to accomplish common goals.

Our intent in this plan is to reflect the changing needs and values of a diverse public while continuing to focus on sustainable management of National Forest System lands for the future.

1.1.3 Plan Purpose

The purpose of this forest plan is to guide the overall direction for sustainable management of the National Forests in Mississippi by establishing desired conditions that will guide future projects, practices, uses, and protection measures. Information is provided that describes our goals, what activities will be implemented, what public benefits are anticipated, and what will be the long-term condition of the National Forests in Mississippi as a result of implementing the plan. This plan supports an adaptive management approach, which emphasizes checking on results as projects are implemented and making plans more adaptable to changes in social, economic, and environmental conditions.

While many of the desired conditions are long-term expectations that may not be realized during the life of the plan, the forest plan establishes the direction management actions will move toward for the future. Key decisions made in this plan for guiding management actions are:

- To establish multiple-use goals and objectives that set the direction for forest management. The objectives are expectations of project activities that will move the National Forests in Mississippi toward desired conditions but do not represent a complete set of projects that could occur. Management approaches discussed along with objectives are general strategies for implementation and are not considered plan decisions.
- To identify standards and guidelines that apply to implementing the forest plan. Standards must be followed or the plan must be amended, and guidelines should be followed unless extenuating circumstances can be documented that would reasonably explain a deviation.

- To establish ecosystem-based prescriptions for management of broad areas of the National Forests in Mississippi and more specific direction for unique geographic portions of the Forests depending on location, ecological attributes, or special use characteristics.
- To identify lands suitable and not suitable for various uses, such as timber production.
- To determine an allowable sale quantity (ASQ) of timber to ensure a sustained yield of wood products.
- To establish habitat management areas for managing habitat for populations of the endangered red-cockaded woodpecker.
- To identify monitoring and evaluation requirements for tracking progress over time. These requirements are linked to desired conditions stated in the plan. Specific methodology for accomplishing monitoring and evaluations is not considered a plan decision and could change over time if new information or protocols come into use.

A separate decision, apart from the forest plan, that has been incorporated into this document is the determination of the National Forest System lands that will be administratively available for oil and gas leasing, as well as the associated stipulations. This leasing availability decision was finalized in 2010 and is considered a separate decision but closely linked to plan direction. The revised plan continues mineral management guided by the 2010 Oil and Gas Availability decision, but also includes management direction for Oil and Gas Availability on the Sandy Creek RARE II Further Study/Inventoried Roadless Area located on the Homochitto National Forest.

In November 2005, the Forest Service published a new travel management rule governing motor vehicle use on national forests and grasslands. Under the final rule, the National Forests in Mississippi designated those roads, trails, and areas open to motor vehicle use by class of vehicle and, if appropriate, by time of year. The motor vehicle use map is a requirement of the Travel Management Final Rule. The motor vehicle use map displays those National Forest System roads, trails, and areas (if any) that are designated open to motor vehicles, by vehicle class (highway-legal vehicles, high-clearance vehicles, ATVs, and motorcycles), and any seasonal or time allowances. The motor vehicle use map also provides information on other travel rules and regulations. The motor vehicle use map will be updated annually to correct mapping errors or discrepancies, and to reflect any changes in route status.

1.2 Consistency of Projects with the Forest Plan

While implementing the plan, all projects and activities authorized by the Forest Service must be consistent with the forest plan. If a project or activity as proposed would not be consistent with the forest plan, the responsible official has the following options:

- modify the proposal so that the project or activity will be consistent,
- reject the proposal, or
- amend the forest plan contemporaneously with the approval of the project or activity so that the project or activity is consistent with the forest plan, as amended. The amendment may be limited to apply only to the project or activity.

Chapter 2. Vision

2.1 Desired Condition Overview

Our vision for future management of the National Forests in Mississippi is a combination of the input we have received from the public, the mission of the Forest Service, national Forest Service goals, recent changes, and trends affecting the Forests, and best available science. This vision for the National Forests in Mississippi is expressed through the desired conditions described in this chapter. These desired conditions reflect the ecological, economic, and social attributes that we expect to exist on the National Forests in Mississippi in the future.

Our vision for the National Forests in Mississippi is expressed through the desired conditions described in this chapter. These desired conditions reflect the ecological, economic, and social attributes that we expect to exist on these national forests in the future.

The forest plan primarily addresses desired conditions on a forestwide scale (that is, the desired conditions are applicable across the landscape of the National Forests in Mississippi). Many of the desired conditions are ecosystem-based and interconnect across resource areas, geography, and ranger districts. However, where appropriate, conditions are described in relation to specific geographic areas to allow focus on unique or localized circumstances.

In some cases, a desired condition matches the current condition, so our goal is to maintain existing conditions. But in other cases, we need to work toward meeting the desired conditions, and success in achieving them can only be measured over the long term. Especially when trying to achieve far-reaching goals like the restoration of landscape-scale ecological systems, it may take many decades for some of these broad aspirations to be accomplished. However, with the adaptive approach that is inherent in this plan, we will periodically reassess progress and can make adjustments if monitoring results indicate desired conditions are not achievable or if there is an imbalance in what we are accomplishing.

Throughout chapter 2, each section is introduced by a general description of the topic that provides context. This background material includes basic introductory information, depicts current conditions, conveys values identified by the public, or describes linkages to sustainability. Introductory discussions are followed by a detailed narrative of desired conditions for that topic.

The following desired conditions describe the vision for the future of the National Forests in Mississippi. The recurring theme that runs throughout these descriptions is a focus on restoring and sustaining the native ecological communities, natural setting, and diversity of social and economic opportunities that are an intrinsic part of our Mississippi heritage and location. Although on-the-ground changes may be slow to show up at first, the emphasis on restoring native ecological systems and improving threatened and endangered species habitat as the primary focus of the revised plan is expected to have a lasting effect on future conditions of the National Forests in Mississippi. In addition, healthy forests and watersheds, safe and suitable access to the national forests, a balance of traditional and emerging recreational opportunities, and continued local economic benefits are all part of the desired future conditions explained in more detail in this chapter.

It should also be noted that many of these desired conditions do not represent traditional resource areas but are interconnected outcomes that provide multiple benefits and are supported by a variety of management programs. The more interrelated nature of this plan is evident in the broad description of forestwide desired conditions and the more detailed desired conditions discussions

that follow. Since restoring and sustaining ecosystem diversity provides the basis for many of the integrated desired conditions, desired conditions for the various ecosystems are described first, followed by species diversity, healthy watersheds, healthy forests, infrastructure, social opportunities, and economic benefits. While the plan emphasizes the major desired conditions that provide a high-level vision for the national forests, the ongoing daily operations and maintenance activities not detailed in this document also play a key part in accomplishing these desired outcomes.

Restoring and protecting the native ecological communities and diverse species within the natural setting of Mississippi provides the overarching framework for this forest plan.

2.2 Forestwide Desired Conditions

Although the National Forests in Mississippi are composed of six separate national forests with different environmental conditions and priorities, the vision for the future identified in this revised plan has a common focus. Restoring and protecting the native ecological communities and diverse species within the natural setting of Mississippi provides the overarching framework for the plan. The forestwide desired conditions described below convey our overall vision for the future of the National Forests in Mississippi.

Forestwide Desired Conditions

The public lands that make up the National Forests in Mississippi are a healthy and diverse collection of native ecological communities, natural features, and infrastructure that supports ecological, economic, and social sustainability. Native ecosystems sustain strong, resilient populations of associated terrestrial and aquatic species. The loblolly pine plantations that predominated after the reforestation efforts of the 1930s have been gradually reduced to historic sites and replaced by stands of restored native longleaf pines, shortleaf pines, and a mix of hardwoods. Rare communities such as prairies, bogs, and savannas add variety to the landscape and provide habitats for threatened, endangered, and sensitive species. Populations of threatened and endangered species, including the red-cockaded woodpecker and gopher tortoise, are growing and thriving in restored habitats.

Streams and lakes on the National Forests in Mississippi support healthy terrestrial and aquatic habitats, and provide quality recreation opportunities. Soil erosion is minimal, and soil properties maintain or improve ecological conditions. Forests are resilient and adaptive to natural disturbances such as infestations of non-native species, extreme weather events, and changing climate conditions. Healthy forests display a diverse mix of age classes, stand structures, density, and species composition. Fire regimes are within historical ranges across the Forests, fire-dependent ecological systems are healthy and functioning, hazardous fuel buildup is manageable, and risk to developments and private property is low. Consolidation of land ownership continues to be improved, and key parcels of land are added to the National Forests in Mississippi as opportunities arise.

The infrastructure system of roads, trails, and facilities on the Forests is well designed, well maintained, clean, safe, and structurally sound. The roads system provides adequate access to National Forest System lands and to private landholdings within the national forest boundary. A variety of trails is distributed across the Forests for use by hikers, bikers, horseback riders, off-road motorists, hunters, and anglers. Developed recreation areas containing picnic sites, camping areas, and access to water are popular destinations for visitors to enjoy outdoor activities and social gatherings. A variety of wildlife is present for hunting, fishing, viewing,

Forestwide Desired Conditions
and nature study. Scenery is generally naturally appearing, although forest management activities are also present. Cultural resources are preserved and offer a glimpse of the indigenous cultures and historic-era homesteads that were a characteristic part of Mississippi history. Timber commodities, oil and gas reserves, and recreational visitors provide a stable return of economic revenues and benefits to local communities without causing harmful impacts to the environment.

The following sections describe the primary desired conditions that set the direction for this forest plan. These desired condition descriptions are organized by major themes that came out of our public meetings rather than traditional resource areas. This organization also reflects the interconnected nature of these desired conditions and the integrated approach that will be a part of carrying out future on-the-ground projects.

2.3 Ecosystem Diversity

The lands within the National Forests in Mississippi support a broad range of ecological systems and species. Ecological systems (or ecosystems) represent recurring groups of biological communities found in similar physical environments that are influenced by similar dynamic ecological processes, such as fire or flooding. Ecosystem diversity and species diversity are closely connected, and by sustaining a diversity of ecosystems, National Forest System lands support ecological conditions for diverse plant and animal species.

The various ecological systems that occur on the National Forests in Mississippi were defined using NatureServe's classification system (NatureServe 2004a, 2004b), National Forest System forest types, and Natural Resource Conservation Service soil drainage types. We held a series of collaborative meetings with experts knowledgeable about ecological conditions and species in Mississippi, which helped us identify ecosystems, their historic occurrences, relative abundance, spatial distribution, and site types. We identified key characteristics (such as structure, age diversity, and fire regimes) for sustaining each ecosystem, along with information about existing and projected future ecological conditions. As part of the evaluation, we determined the locations and current extent of the ecological systems using Forest Service Geographic Information System data. All ecosystem and species information was incorporated into a relational database called the Ecological Sustainability Evaluation (ESE) tool. The Ecological Sustainability Evaluation tool is the primary process record for ecological information and includes documentation of scientific sources, experts consulted, uncertainties encountered, and relationships among species, systems, and plan direction.

The description of forestwide desired conditions for ecosystem diversity is followed by more specific narratives and desired conditions for each of the 24 ecosystems on the National Forests in Mississippi. The term "appropriate sites" when used in the context of ecological system restoration refers to areas of land on which the species or ecological system are of historic occurrence, where topographic features (such as slope and aspect) and soil characteristics are conducive to sustain the system, or where the species is not considered to be "off-site," invasive, or otherwise undesirable. You can find descriptions of appropriate sites, the ecosystem identification process, and other supporting information on ecological diversity in the "Ecosystems and Species Diversity Report" (appendix G – final environmental impact statement).

Forestwide Desired Conditions for Ecosystem Diversity

Native ecological systems occupy appropriate sites. There is a mix of closed-canopy forest, intermittent canopy woodlands, and open prairie, bog, and savanna conditions. Forest and woodland ecological systems support a diversity of tree ages, from regeneration to old growth, providing a relatively stable mix of ecological conditions across the landscape over time. Openings occur in individual tree-sized gaps and larger. Vegetation structure within patches of regenerating forest and woodland is diverse due to the presence of snags and live overstory trees. These forested systems are dominated by hardwoods, pines, or combinations of both. Nonforested systems are primarily dominated by shrubs, forbs, and grasses. Snags, downed wood, stumps, and other organic matter occur in sufficient abundance to support native species. Systems surrounding lakes and ponds contain large trees suitable for nesting by bald eagles, ospreys, and other species.

Wetland systems are present and functioning across the landscape on appropriate sites and provide habitat for a diversity of native species. Systems are shaped by intact hydrologic functions and processes. Riparian areas buffer the effects of management practices on water quality and quantity. Adequate water flows and levels protect stream processes, aquatic and riparian habitats, vegetative communities, species diversity, recreation, and aesthetic values. Watersheds are in condition class I. Water quality is excellent or good and supports species diversity. Soils have the necessary physical, biological, and chemical properties to maintain or improve ecological systems, soil productivity, soil hydrologic function, and slope stability.

Ecological systems are intact and resilient enough to absorb negative effects associated with open roads and trail densities, such as invasive species vectors and disturbance caused by human activities in these areas. Forest ecosystems are in their natural state with limited infestations of invasive species. Structural and compositional diversity occurs throughout the forest.

Vegetation, wildlife, soils, water, recreation, and fire resources all contribute to ecosystem diversity. Ecological sustainability in turn supports social and economic sustainability. Ecological systems allow opportunities to enjoy natural, relaxing, and scenic experiences in the woods. Forests provide opportunities for nature watching, hunting, fishing, wildflower viewing, and other recreational activities, and support local communities through sustainable yields of forest product.

Existing ecosystems on the National Forests in Mississippi generally include a variety of widely distributed native pine and hardwood ecological systems, as well as rare communities such as prairies, bogs, and savannas. Twenty-four different ecological systems occur across the Forests, including several aquatic systems. Loblolly and slash pine forests that were planted in the 1930s to restore the cleared and eroded lands acquired by the Forest Service are the most abundant ecosystems. The desired conditions in this plan are intended to shift away from the mass plantings of loblolly and slash pines, begin restoring and expanding native longleaf pine, shortleaf pine-oak, and floodplain forests ecosystems, and continue maintaining and enhancing native hardwoods and rare communities such as native prairies and bogs.

Table 1 identifies the 24 ecological systems and their general distribution across the units that make up the National Forests in Mississippi. Due to the unique character and distance between the two units that make up the Holly Springs National Forest (Holly Springs and Yalobusha) and the two units that make up the Tombigbee National Forest (Ackerman and Trace), data for these national forests are broken out by unit for ecological conditions discussions. Systems with

asterisks are considered rare ecological systems within this plan. These (embedded) systems either require special management or are naturally small in scale or distribution relative to the broader systems they occur within. Maps of the various ecological systems on each unit are available on the National Forests in Mississippi website at the following internet address: http://www.fs.fed.us/r8/mississippi/forest_plan/forest revision/index.htm.

Table 1. Distribution of ecological systems on the National Forests in Mississippi

Ecological System	Unit Name								
	Bienville	Chickasawhay	De Soto	Homochitto	Delta	Holly Springs	Yalobusha	Ackerman	Trace
Upland Longleaf Pine Forest and Woodland	■	■	■	■					
Shortleaf Pine-Oak Forest and Woodland	■					■	■	■	■
Loblolly Pine Forest	■	■	■	■		■	■	■	■
Southern Loblolly-Hardwood Flatwoods	■								
Slash Pine Forest		■	■				■	■	■
Northern Dry Upland Hardwood Forest						■	■	■	■
Southern Dry Upland Hardwood Forest	■	■	■	■					
Southern Loess Bluff Forest				■					
Southern Mesic Slope Forest	■	■	■	■					
Northern Mesic Hardwood Forest						■	■	■	■
Floodplain Forest	■	■	■	■		■	■	■	■
Lower Mississippi River Bottomland and Floodplain Forest					■				
Near-Coast Pine Flatwoods			■						
Xeric Sandhills*		■	■						
Rock Outcrops*	■	■	■	■		■	■	■	■
Black Belt Calcareous Prairie and Woodland*									■
Jackson Prairie and Woodland*	■								
Ephemeral Ponds and Emergent Wetlands*	■	■	■	■	■	■	■	■	■
Cypress Dominated Wetlands*				■	■	■			
Wet Pine Savanna*			■						
Seeps, Springs, and Seepage Swamps*	■	■	■	■		■	■	■	■
Herbaceous Seepage Bog and Flats*		■	■						

* Rare ecological systems within the forest plan

The various geographic locations of the national forest units across the state of Mississippi are reflected in the distribution of ecological systems summarized in Table 1. Upland longleaf pine forests are the predominant native community desired in forests in the southern portion of the state (De Soto, Chickasawhay, and Homochitto National Forests), with floodplain forests on

appropriate sites. The Bienville National Forest in the central portion of the state is transitional with a desired mix of upland longleaf pine, southern loblolly-hardwood flatwoods, and floodplain forest. The Holly Springs and Tombigbee National Forests, whose units are distributed over the northern part of the state, have a desired mix of shortleaf pine-oak forests, northern dry upland hardwood forests, northern mesic hardwood forests, and floodplain forests. A unique distinction of the Delta National Forest is that it lies completely within one ecological system, the lower Mississippi bottomland and floodplain forests.

Table 2 displays the desired percentage of each ecological system for the various units of the National Forests in Mississippi. The desired condition for abundance of each system is indicated as a range of ecologically optimum percentages for each geographic area. Major factors in the distribution of native ecological systems on appropriate ecological site types are landscape characteristics and soil drainage classifications.

Table 2. Desired percent of ecological systems by unit on the National Forests in Mississippi

	Desired Percent of Ecological System by Unit								
Ecological System	**Bienville**	**Chickasawhay**	**De Soto**	**Homochitto**	**Delta**	**Holly Springs**	**Yalobusha**	**Ackerman**	**Trace**
Upland Longleaf Pine Forest and Woodland	20-30	65-73	64-74	69-78					
Shortleaf Pine-Oak Forest and Woodland	5-15					34-52	34-52	30-47	28-43
Loblolly Pine Forest	0-5	0-5	0-5	0-5		0-5	0-5	0-5	0-5
Southern Loblolly-Hardwood Flatwoods	35-45								
Slash Pine Forest		0-5	1-7				0	0	0
Northern Dry Upland Hardwood Forest						34-51	34-52	30-46	28-43
Southern Dry Upland Hardwood Forest	0-5	0-5	0-5	3-12					
Southern Loess Bluff Forest				3-10					
Southern Mesic Slope Forest	5-15	0-5	1-8	2-10					
Northern Mesic Hardwood Forest						6-13	1-8	6-12	18-24
Floodplain Forest	10-20	23-32	12-20	9-16		6-13	11-18	16-22	7-13
Lower Mississippi River Bottomland and Floodplain Forest					100				
Near-Coast Pine Flatwoods			3-9						
Wet Pine Savanna			0.6-7						

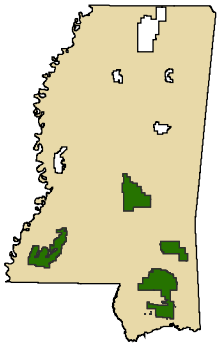
Some systems are not listed in Table 2 because they are either embedded within other major ecological systems on the National Forests in Mississippi or limited naturally by ecological site types. These systems are xeric sandhills; rock outcrops; black belt calcareous prairie and woodland; Jackson prairie and woodland; ephemeral ponds and emergent wetlands; cypress dominated wetlands; seeps, springs, and seepage swamps; herbaceous seepage bogs and flats; rivers and streams; and lakes and permanent ponds.

The desired conditions identified in Table 2 may take decades to achieve, as conversion from one system to another is a complex multi-step process. In some locations such as on the Bienville National Forest, the conversion to native pine ecosystems will happen more slowly due to existing use of loblolly forests as habitat by threatened and endangered species. On the Delta National Forest, no conversion is needed, but enhancements of habitat for desirable species and age classes are envisioned. A discussion of where and how these shifts may occur on each unit of the National Forests in Mississippi over the next 10 years is provided in the "Possible Actions by Administrative Unit" section in appendix C of this plan.

Each of the ecological systems listed in Table 1 and Table 2 are addressed in sections 2.3.1 through 2.3.24. Each section contains an introduction that briefly describes the ecological system composition, identifies the management units where the systems occur, and provides a brief summary of existing conditions. Additional detail for each ecological system is provided in the "Ecosystems and Species Diversity Report" (appendix G – final environmental impact statement).

2.3.1 Upland Longleaf Pine Forest and Woodland

This ecological system represents forests and woodlands dominated by longleaf pine occurring across a range of soil and moisture conditions. It is synonymous with NatureServe's East Gulf Coastal Plain Interior Upland Longleaf Pine Woodland (CES203.496).



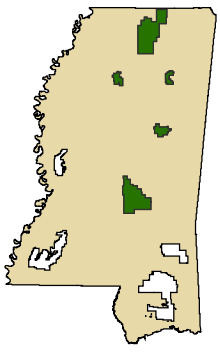
Longleaf pine was once the dominant tree species of the piney woods region of south Mississippi and dominated all or significant portions of lands now included in the Bienville, Chickasawhay, De Soto, and Homochitto Ranger Districts. The piney woods were essentially clearcut around the turn of the 20th century prior to Forest Service acquisition. Immediately following acquisition, management emphasis was on reforestation, conservation of wildlife, and controlling wildfire. Because the technology of the time did not allow for planting of longleaf pine on large areas, loblolly pine and slash pine were planted on what had previously been longleaf pine woods. Table 2 depicts the desired range of distribution on the four units where this ecological system occurs.

Desired Conditions for Upland Longleaf Pine Forest and Woodland

Longleaf pine occurs on appropriate sites. Overstories are typically dominated by longleaf pine with relatively low frequencies of oaks, other hardwoods, and other yellow pines. Scattered clumps of xeric hardwoods occur in the driest examples of this system. Shortleaf pine occurs on mesic sites. Midstories are sparse and typically dominated by scrub oaks, and other hardwoods. Understories are open and dominated by dense growth of grasses and forbs. This system supports populations of associated threatened and endangered species, including the endangered red-cockaded woodpecker, the threatened gopher tortoise, and endangered dusky gopher frog. Several rare communities are typically embedded within this larger system including herbaceous seepage bogs, xeric sandhills, and depression ponds. Where site conditions are appropriate, these communities are present and functioning within the larger system.

This system is dominated by mature forest and woodland (60 years old or older). A network of well-distributed old growth is present. Early seral components exist in sufficient quantities to sustain this system over time. Forests and woodlands are open to very open, with canopy closure in mature examples of this system being less than 80 percent and often less than 60 percent, especially within gopher tortoise habitat. Fire occurs at an interval of 1 to 3 years with approximately 40 percent of fires occurring in the growing season.

2.3.2 Shortleaf Pine-Oak Forest and Woodland



This ecological system represents forests and woodlands dominated by shortleaf pine occurring on dry to dry-mesic ecological site types. It occurs primarily on the Bienville, Holly Springs, and Tombigbee Ranger Districts. It is synonymous with the East Gulf Coastal Plain Interior Shortleaf Pine-Oak Forest Ecological System (CES203.506) of NatureServe's International Ecological Classification Standard. There are occurrences of shortleaf pine on the Chickasawhay, De Soto, and Homochitto Ranger Districts, but these occurrences are managed as inclusions in the longleaf pine system. The Bienville National Forest is

within the transition zone between the northern reach of longleaf pine and southern reach of the shortleaf pine ecosystem range. Fire is possibly the most important natural process affecting the floristic composition and vegetation structure of this system. Table 2 depicts the desired range of distribution where this ecological system is managed.

Desired Conditions for Shortleaf Pine-Oak Forest and Woodland

Overstories are typically dominated by shortleaf pine with a mixture of upland hardwoods and other yellow pines. Midstories of oaks, hickories, sweetgum, yellow poplar, maples, and blackgum are sparse. Understories are dominated by dense growth of grasses and forbs.

This system supports populations of associated species, including Bachman's sparrow and the northern bobwhite. Several rare communities are typically embedded within this larger system including rock outcrops; seeps, springs, and seepage swamps, and ephemeral ponds and emergent wetlands. Where site conditions are appropriate, these communities are present and functioning within the larger system.

This system is dominated by mature forest and woodland (60 years old or older). A network of well-distributed old growth is present. Early seral components exist in sufficient quantities to sustain this system over time. Forests and woodlands are open to very open, with canopy closure in mature examples of this system being less than 80 percent. Fire occurs at an interval of 1 to 3 years with approximately 40 percent of fires occurring in the growing season.

2.3.3 Loblolly Pine Forest

This ecological system represents loblolly pine-dominated forests and woodlands occurring predominately on upland sites. It occupies more acres of habitat than any other in the National Forests in Mississippi, and is the result of the reforestation and fire suppression efforts after the acquisition of the national forests. When it was planted beginning in the 1930s, loblolly pine was easily established, had value for stopping soil erosion, was fast growing, and valuable for producing timber products. As a result, loblolly pine has greater dominance than historically occurred. This system is found on every unit except the Delta Ranger District. Loblolly pine typically occurs on historic longleaf and shortleaf pine sites. Table 2 depicts the desired range of distribution on the units where this ecological system occurs.

Desired Conditions for Loblolly Pine Forest

This system is a predominately mature or old-growth forest with a diverse age and vertical structure on sites to which this species is appropriate and of historical occurrence. Sites on which this association occurs that are not of historical occurrence are restored to the desired historical type. Until restoration to appropriate historical condition is completed, loblolly pine forests and woodlands are managed toward the desired condition for the appropriate ecological system.

2.3.4 Southern Loblolly-Hardwood Flatwoods

This ecological system represents open forests dominated by loblolly pine with patches of hardwoods on gilgai (alternating mounds and depressions occurring in a tight local mosaic). Known examples display a range of moisture conditions from dry to wet. Although the specific role of fire in this system is unknown, low-intensity ground fires may have been ecologically important. The system occurs on the Bienville Ranger District. This community is synonymous with the East Gulf Coastal Plain Southern Loblolly-Hardwood Flatwoods (CES203.557) of NatureServe's International Ecological Classification Standard. Abundance of this system is currently at desired condition with more than 90 percent of potential sites containing this system (Table 2). This system supports populations of the federally endangered red-cockaded woodpecker by providing foraging and nesting opportunities.

Desired Conditions for Southern Loblolly-Hardwood Flatwoods

Overstories are typically dominated by loblolly pine and associated hardwoods, especially water oak. This system supports populations of the federally endangered red-cockaded woodpeckers. Several rare communities are typically embedded within this larger system including Jackson Prairie, rock outcrops, and seeps, springs, and seepage swamps. Where site conditions are appropriate, these communities are present and functioning within this larger system.

This system is dominated by mature and mid-aged forest. A network of well-distributed old growth is present. Early seral components exist in sufficient quantities to sustain this system over time. Forests are open to very open, with canopy closure in mature examples of this system being less than 80 percent. Fire occurs at an interval of 1 to 3 years with approximately 40 percent of fires occurring in the growing season.

2.3.5 Slash Pine Forest

This ecological system represents slash pine-dominated forests and woodlands, and is the result of the reforestation and fire suppression efforts that occurred after acquisition of the national forests. When it was planted in the 1930s, slash pine was easily established, had value for stopping soil erosion, was fast growing, and valuable for timber products. As a result, this ecological system has greater dominance than what historically occurred. This system occurs on the Chickasawhay, De Soto, and Tombigbee Ranger Districts and the Yalobusha Unit of the Holly Springs Ranger District. Table 2 depicts the desired range of distribution on the units where this ecological system occurs.

Desired Conditions for Slash Pine Forest

This system is a predominately mature or old-growth forest with a diverse age and vertical structure on sites where this species is appropriate and of historical occurrence. Sites where this forest type occurs that are not of historical occurrence are converted to the desired historical type.

2.3.6 Northern Dry Upland Hardwood Forest

This ecological system represents forests dominated by upland hardwoods. It occupies dry upland slopes and ridgetops and is generally on nutrient-poor soils. It occurs on the Holly Springs and Tombigbee Ranger Districts. It may overlap to some degree with the Southern Dry Upland Hardwood Forest where the two systems meet and may be difficult to distinguish from one another in this geographic area of overlap. It is synonymous with the East Gulf Coastal Plain Northern Dry Upland Hardwood Forest (CES203.483) of NatureServe's International Ecological Classification Standard. Abundance of this system is below the desired range depicted in Table 2. Many historic northern dry upland hardwood forests have been converted to other forest types, and fire suppression has led to increases in overstory canopy and shrub densities.

Desired Conditions for Northern Dry Upland Hardwood Forest

Overstories are typically dominated by upland oaks (post, southern red, blackjack, scarlet and black) and hickories (mockernut and sand). Pines (loblolly and shortleaf) are often intermingled with hardwoods. Midstories are sparse and typically dominated by dogwood, persimmon, and other hardwoods. Understories are sparse and dominated by seedling hardwoods, shrubs, and forbs. This system supports populations of associated species, including the worm-eating warbler and the yellow lady's-slipper. Several rare communities are typically embedded within this larger system including rock outcrops, seeps, springs, and depression pondshores. Where site conditions are appropriate, these communities are present and functioning within this larger system.

This system is dominated by mature forest and woodland (60 years old or older). A network of well-distributed old growth is present. Early seral components exist in sufficient quantities to sustain this system over time. Forests are typically closed, with canopy closure in mature examples of this system being greater than 80 percent. Some portions of this system will have open canopies. Fire occurs at an interval of 1 to 6 years with approximately 40 percent of fires occurring in the growing season.

2.3.7 Southern Dry Upland Hardwood Forest

This ecological system represents forests dominated by upland hardwoods. It occupies dry or dry-mesic acidic soils in naturally fire-protected landscapes. It occurs on the De Soto, Chickasawhay, Homochitto, and Bienville Ranger Districts. In northern Mississippi, it may overlap with and merge into northern dry upland hardwood forest where the two occur together. Important tree species in both of the dry upland hardwoods forests vary geographically and according to previous disturbance regimes, such as fire or harvest activities. Abundance of this system falls within the lower to mid-desired range as depicted in Table 2. This community is synonymous with the Southern Coastal Plain Dry Upland Hardwood Forest (CES203.560) of NatureServe's International Ecological Classification Standard.

Desired Conditions for Southern Dry Upland Hardwood Forest

Overstories are typically dominated by upland oaks (post, southern red, and less frequently white) and hickories (mockernut and sand). Pines (longleaf, loblolly, and shortleaf) may be a significant component but do not dominate. Midstories are typically dominated by dogwood and other hardwoods. Understories are sparse and dominated by hardwood seedlings, shrubs, and forbs. This system supports populations of associated uncommon species, including the worm-eating warbler and the mimic glass lizard. Several rare communities are typically imbedded within this larger system including seeps, springs, and seepage swamps and emergent ponds and wetlands. Where site conditions are appropriate, these communities are present and functioning within this larger system.

This system is dominated by mature forest and woodland (60 years old or older). A network of well-distributed old growth is present. Early seral components exist in sufficient quantities to sustain this system over time. Forests are typically closed, with canopy closure in mature examples of this system being greater than 80 percent. Some portions of this system will have open canopies. Low-intensity fire creeps into this system from the surrounding upland community and occurs at an interval of 1 to 6 years.

2.3.8 Southern Loess Bluff Forest

This ecological system represents forests dominated by a mix of hardwood species occurring on loess soil. Historically, pine was notable for its absence within this system. It occurs on the Homochitto Ranger District. This community is synonymous with the East Gulf Coastal Plain Southern Loess Bluff Forest (CES203.556) of NatureServe's International Ecological Classification Standard. Abundance of this system approaches the lower end of the desired range as depicted in Table 2.

Desired Conditions for Southern Loess Bluff Forest

Overstories are typically dominated by many types of hardwoods, especially cherrybark oak, water oak, swamp chestnut oak, yellow poplar, Florida sugar maple, and pignut hickory. The sparse understory contains magnolia, hornbeam, yellow poplar, red maple, and dogwood. Shrubs and woody vines are relatively sparse in the understory. Switchcane is a prevalent member of the shrub layer and may dominate in places.

This system supports populations of associated uncommon species, including Webster's salamander, Swainson's warbler, and fetid trillium. Several rare communities are typically embedded within this larger system including rock outcrops, seeps, and springs. Where site conditions are appropriate, these communities are present and functioning within this larger system.

This system is dominated by mature forest and woodland (60 years old or older). A network of well-distributed old growth is present. Forests typically have canopy closure in mature examples of this system of 80 percent or greater. Low intensity fire creeps into this system from the surrounding upland community and occurs at an interval of 6 to 20 years.

2.3.9 Southern Mesic Slope Forest

This ecological system represents forests dominated by hardwoods occurring on steep slopes, bluffs, or sheltered ravines where fire is naturally rare. The system occurs on the De Soto, Chickasawhay, Homochitto, and Bienville Ranger Districts. This community is synonymous with the East Gulf Coastal Plain southern mesic slope forest (CES203.476) of NatureServe's International Ecological Classification Standard. East Gulf Coastal Plain Northern Mesic Hardwood Slope Forest (CES203.477) is a similar mesic forest system to the north of this one in the Upper East Gulf Coastal Plain that has greater dominance by deciduous trees. Abundance of this system generally falls within the lower end of the desired range as depicted in Table 2, except on the Bienville where abundance approaches the upper range. Past land management practices have favored a greater pine component than historical reference conditions indicate would naturally occur. Fire intensity and more frequent fire-return intervals may have contributed to an imbalance in current species composition.

Desired Conditions for Southern Mesic Slope Forest

Overstories are typically dominated by hardwoods, such as beech, white oak, cherrybark oak, and southern magnolia. Mixed loblolly pine-hardwood conditions may exist within this system. Understories are sparse and typically contain magnolia, hornbeam, yellow poplar, red maple, and flowering dogwood. Shrubs include red buckeye, switch cane, witch hazel, and deciduous holly. The forest floor typically has a rich organic layer with abundant leaf litter. This system supports populations of associated uncommon species, including Webster's salamander, bay starvine, and ravine sedge. Several rare communities are typically embedded within this larger system including rock outcrop, seeps, and springs. Where site conditions are appropriate, these communities are present and functioning within this larger system.

This system is dominated by mature forest and woodland (60 years old or older). A network of well-distributed old growth is present. Forests typically have canopy closure in mature examples of this system of 80 percent or greater. Low-intensity fire creeps into this system from the surrounding upland community and occurs at an interval of 1 to 6 years.

2.3.10 Northern Mesic Hardwood Forest

This ecological system represents forests dominated by hardwoods occurring on slopes and ravines between dry uplands and stream bottoms. It occurs on the Holly Springs and Tombigbee Ranger Districts. This community is synonymous with the East Gulf Coastal Plain northern mesic hardwood forest (CES203.477) of NatureServe's International Ecological Classification Standard. Southern Coastal Plain Mesic Slope Forest (CES203.476) is a similar mesic forest system to the south of this one with greater dominance by broad-leaved evergreen trees and more pine. Abundance of this system generally falls within the mid- to upper-end of the desired range as depicted in Table 2.

Desired Conditions for Northern Mesic Hardwood Forest

Overstories are typically dominated by hardwoods, such as beech, white oak, cherry-bark oak, and American holly. Mixed loblolly pine-hardwood conditions may exist within this system in the southern portion of the range. Understories are sparse and typically contain American holly, hornbeam, yellow poplar, red maple, and flowering dogwood. Shrubs include red buckeye, switch cane, witch hazel, and deciduous holly. The forest floor typically has a rich organic layer with abundant leaf litter. This system supports populations of associated uncommon species, including Webster's salamander, American ginseng, and Turk's-cap lily. Several rare communities are typically embedded within this larger system including rock outcrops, seeps, and springs. Where site conditions are appropriate, these communities are present and functioning within this larger system.

This system is dominated by mature forest and woodland (60 years old or older). A network of well-distributed old growth is present. Early-seral components exist in sufficient quantities to sustain this system over time. Forests typically have canopy closure in mature examples of this system of 80 percent or greater. Low-intensity fire creeps into this system from the surrounding upland community and occurs at an interval of 1 to 6 years.

2.3.11 Floodplain Forest

This ecological system represents forests dominated by bottomland hardwoods occurring on alluvial soils in riparian areas. It occurs on all ranger districts except the Delta. It includes streamside riparian areas. This community includes elements of the following ecological systems of NatureServe's International Ecological Classification Standard: East Gulf Coastal Plain Large River Floodplain Forest (CES203.489), East Gulf Coastal Plain Small Stream and River Floodplain Forest (CES203.559), and Southern Coastal Plain Blackwater River Floodplain Forest (CES203.493). Abundance of this system generally falls below the desired range as depicted in Table 2. Potential floodplain forests typically have loblolly pine dominating the species composition where hardwoods would have historically been expected to dominate.

Desired Conditions for Floodplain Forest

Overstories are typically dominated by hardwoods, such as beech, white oak, cherrybark oak, and southern magnolia. Mixed pine-hardwood conditions may exist within this system in the southern portion of the range. Understories are sparse and typically contain magnolia, hornbeam, yellow poplar, red maple, and flowering dogwood. Shrubs include red buckeye, switch cane, witch hazel, and deciduous holly. Switchcane is a prevalent member of the shrub layer and may dominate in places. The forest floor typically has a rich organic layer with abundant leaf litter. Riparian areas buffer the effects of forest management practices on water quality.

This system supports populations of associated uncommon species, including Rafinesque's big-

Desired Conditions for Floodplain Forest
eared bat, American ginseng, and Turk's-cap lily. Several rare communities are typically embedded within this larger system including rock outcrops, seeps, and springs. Where site conditions are appropriate, these communities are present and functioning within this larger system. This system is dominated by mature forest and woodland (60 years old or older). A network of well-distributed old growth is present. Early seral components exist in sufficient quantities to sustain this system over time. Forests typically have canopy closure in mature examples of this system of 80 percent or greater. Low-intensity fire infrequently creeps into this system from the surrounding upland community.

2.3.12 Lower Mississippi River Bottomland and Floodplain Forest

This ecological system represents forests dominated by bottomland hardwoods occurring on the Mississippi River alluvial plain. It includes streamside riparian areas. It occurs on the Delta National Forest. This community includes elements of Mississippi River Low Floodplain (Bottomland) Forest (CES203.195), and Mississippi River Bottomland Depression (CES203.490), of NatureServe's International Ecological Classification Standard. The entire Delta National Forest lies within this ecological system.

Desired Conditions for Lower Mississippi River Bottomland and Floodplain Forest
Bottomland hardwood tree species, such as Nuttall oak, overcup oak, honey locust, and American elm, are present in the canopy. Midstories are sparse and typically dominated by upper canopy species. Understories are generally open with sparse grass, forbs, and woody vine species. The forest floor typically has a rich organic layer with abundant leaf litter. Canebrakes are scattered throughout the system in appropriate sites. This system is shaped by healthy hydrologic functions and processes. It supports populations of associated uncommon species, including the endangered pondberry, the threatened Louisiana black bear, several bat species, and the red milk snake. It also supports demand species such as waterfowl and white-tailed deer, and the black Delta fox squirrel. Several rare communities are typically embedded within this larger system including canebrakes, beaver ponds, seeps, springs, and cypress-dominated wetlands. Where site conditions are appropriate, these communities are present and functioning within this larger system. Riparian areas buffer the effects of forest management practices on water quality. This system is dominated by mature forest and woodland (60 years old or older). A network of well-distributed old growth is present. Early seral components exist in sufficient quantities to sustain this system over time. Forests typically have canopy closure in mature examples of this system of 80 percent or greater.

2.3.13 Near-Coast Pine Flatwoods

This system of open forests or woodlands occupies broad, sandy flatlands in a relatively narrow band along the northern Gulf of Mexico coast east of the Mississippi River. It differs from wet pine savanna in being more forested, whereas savanna is by definition more treeless. This ecological community represents sparse woodlands dominated by longleaf pine and slash pine with scattered loblolly pine, occurring predominately on nonriverine hydric soil site types. It occurs on the De Soto Ranger District. This community is synonymous with the East Gulf Coastal Plain Near-Coast Pine Flatwoods (CES203.375) of NatureServe's International Ecological Classification Standard. Abundance of this system generally falls within the lower end of the desired range as depicted in Table 2. The existing species composition and structural conditions are generally considered outside the normal historical range for this system.

Desired Conditions for Near-Coast Pine Flatwoods

The amount of woody vegetation is variable, but canopy closure is generally less than 60 percent. Vegetative condition is characterized by widely scattered longleaf pine and in wetter sites by scattered slash pine. Loblolly pine may also occur as scattered trees. Understory conditions range from densely shrubby to open and herbaceous dominated, based largely upon fire regime. Fire occurs at an interval of 1 to 3 years with approximately 40 percent of fires occurring in the growing season. Effects of past beddings and fertilization are no longer evident. This system supports populations of associated species, including the endangered red-cockaded woodpecker and flame flower. Herbaceous seepage bogs and flats and wet pine savannas are typically embedded within this larger system where site conditions are appropriate.

2.3.14 Xeric Sandhills

This rare community represents sandhills characterized by deep, somewhat excessively and excessively well-drained loamy sands and sands supporting plants adapted to xeric (dry) conditions such as wiregrass, prickly pear cactus, and saw palmetto. It occurs on the Chickasawhay and De Soto Ranger Districts. This system includes all gopher tortoise priority soils as identified by the USDI Fish and Wildlife Service. Gopher tortoise burrows are often a distinctive feature of sandhill communities and provide shelter to many vertebrate and invertebrate species, such as the black pine snake and the oldfield mouse.

Desired Conditions for Xeric Sandhills

This ecological system is managed with emphasis on recovery of the federally threatened gopher tortoise. Examples of this system are in an open to woodland condition with canopy closure typically less than 60 percent. Dominant tree species include longleaf pine, bluejack oak, turkey oak, and other oaks. Ground cover is sparse and fire occurs at an interval of 1 to 3 years with approximately 40 percent of fires occurring in the growing season. Ephemeral ponds and wetlands are embedded within this system and provide quality habitat for a diversity of native species.

2.3.15 Black Belt Calcareous Prairie and Woodland

This rare community represents open grassy areas dominated by characteristic prairie species and is restricted to the black belt region of Mississippi and Alabama. Within this grassland matrix, woody vegetation occurs sparingly in stream bottoms and hilltops with caps of acid soil. This ecological system occurs on the Trace Unit of the Tombigbee Ranger District. This community is synonymous with the East Gulf Coastal Plain Black Belt Calcareous Prairie and Woodland Ecological System (CES203.478) of NatureServe's International Ecological Classification Standard. Many blackbelt prairies have reverted to other forest types and are in need of restoration of their historical grass-forb cover.

Desired Conditions for Black Belt Calcareous Prairie and Woodland

Prairie species such as Indian-grass, bluestem grasses, rosinweeds, prairie-clovers, yellow-puffs, purple cone-flowers, prairie cone-flowers, and others dominate the landscape. Woody vegetation is sparse and scattered and consists of characteristic prairie species such as post oak, rock chestnut oak, blackjack oak, and, occasionally, eastern red-cedar. Sparse woody vegetation surrounds the prairie and allows distribution and dispersal of prairie obligate species. Fire occurs at an interval of 1 to 3 years with approximately 40 percent of fires occurring in the growing season. This system supports populations of associated species including the prairie king snake, white-flowered beardtongue, Mead's sedge, and rough rattlesnake-root.

2.3.16 Jackson Prairie and Woodland

This rare community represents open grassy areas dominated by characteristic prairie species within the Jackson Prairie physiographic province in central Mississippi. Jackson Prairie occurs as calcareous islands (less than 1 acre to 160 acres) on gently sloping uplands surrounded by pine and hardwood forest on generally acid soils. It occurs on the Bienville Ranger District. This community is synonymous with the East Gulf Coastal Plain Jackson Prairie and Woodland Ecological System (CES203.555) of NatureServe's International Ecological Classification Standard. Many of the known examples are in a woodland or sparse forest condition in need of restoration.

Desired Conditions for Jackson Prairie and Woodland

Prairie species such as indiangrass, bluestem grasses, rosinweeds, prairie-clovers, yellow-puffs, purple cone-flowers, prairie cone-flowers, and others dominate the landscape. Woody vegetation is sparse and scattered and consists of characteristic prairie species such as hawthorns and crabapples. Sparse woodland condition surrounds the prairie and allows distribution and dispersal of prairie obligate species. Fire occurs at an interval of 1 to 3 years with approximately 40 percent of fires occurring in the growing season. This system supports populations of associated species, including the Jackson Prairie crayfish, American kestrel, Ashe Hawthorn, great-plains ladies tresses, and Oglethorpe oak.

2.3.17 Wet Pine Savanna

This rare wetland community represents open savannas dominated by grasses, sedges, orchids, and carnivorous plants. Examples occupy low, flat plains on poorly drained soils, often saturated for 50 to 100 days per year. Wet pine savanna is different from near coast pine flatwoods in that it has fewer trees, and it differs from herbaceous seepage bogs by being larger in scale. It occurs on the De Soto Ranger District. This community is synonymous with the East Gulf Coastal Plain Treeless Savanna and Wet Prairie (CES203.192) of NatureServe's International Ecological Classification Standard. Occurrence on National Forest System lands typically has too much canopy closure, with resultant impacts to hydrologic regime.

Desired Conditions for Wet Pine Savanna

This rare wetland system has a scattered canopy (typically 5 to 10 percent cover) of stunted longleaf pine and slash pine that is shaped by healthy hydrologic functions and processes. Pitcher plants are characteristic of this system. Fire occurs at an interval of 1 to 3 years with approximately 40 percent of fires occurring in the growing season. This system supports populations of associated uncommon species, including the endangered Mississippi sandhill crane, pitcher plants, and giant spiral ladies'-tresses. Herbaceous seepage bogs and flats are typically embedded within the larger system where site conditions are appropriate.

2.3.18 Herbaceous Seepage Bogs and Flats

This rare wetland community represents open seepage communities dominated by grasses, sedges, orchids, and carnivorous plants. Examples occupy gentle, almost imperceptible slopes maintained by constant seepage zones and/or perched water tables. Pitcher plants are notable indicators of many community types in this system. Herbaceous seepage bogs and flats are embedded in other ecological systems. This ecological system occurs on the Chickasawhay and De Soto Ranger Districts. This community includes the Southern Coastal Plain Herbaceous Seepage Bog (CES203.078) of NatureServe's International Ecological Classification Standard. Increases or decreases in precipitation patterns resulting from climate change may affect the extent and condition of this system. Occurrence on National Forest System lands typically has too much canopy closure resulting in lower water tables.

Desired Conditions for Herbaceous Seepage Bogs and Flats

The system is typically open, although the amount of woody vegetation is variable. Hydrologic function of this community is intact. Fire occurs at an interval of 1 to 3 years with approximately 40 percent of fires occurring in the growing season. A subset of this system known as "quaking bogs" generally have a higher percentage of woody shrub coverage due to extreme wetness of the system which prevents fire from spreading across the surface except in very dry years. This system supports populations of associated uncommon species, including the Camp Shelby burrowing crayfish, pitcher plants, and the bog spicebush.

2.3.19 Rivers and Streams

Rivers and streams consist of all lotic (flowing-water) aquatic systems on the National Forests in Mississippi including ephemeral channels. These systems provide critical habitats for fish, mussels, invertebrates, reptiles, and amphibians. They occur on all ranger districts.

Desired Conditions for Rivers and Streams

Rivers, streams, and ephemeral channels have good water quality, water quantity, site productivity, channel stability, intact riparian vegetation, sustainable sport fisheries, and connectivity of habitats for riparian-dependent species. Rivers, streams, and ephemeral channels function properly and support native aquatic species. Movement of fish and other aquatic organisms in otherwise free-flowing perennial and other streams is not obstructed by road crossings, culverts, or other human-caused obstructions. Instream flows and water levels protect stream processes, aquatic and riparian habitats and communities, and recreational, scenic and research values. Flow regimes and habitat connectivity in streams that provide habitat for aquatic and riparian-dependent species are sufficient to allow the affected species to complete all phases of their life cycles.

Fishable waters have high-quality angling opportunities and good to excellent water quality, site productivity, associated vegetation, and habitat for associated riparian and aquatic-dependent species. Fisheries management is practiced on the National Forests in Mississippi to provide fishing opportunities to the public.

2.3.20 Lakes and Permanent Ponds

Lakes and permanent ponds consist of all lentic (still, impounded, or otherwise non-flowing) aquatic systems on the National Forests in Mississippi, including the ecological system ephemeral ponds and emergent wetlands. Oxbow lakes and sloughs are included within this system and consist of all waterbodies associated with floodplain aquatic ecosystems on the forest. These systems provide critical habitats for fish, mussels, invertebrates, reptiles, and amphibians. They occur on all ranger districts.

Desired Conditions for Lakes and Permanent Ponds

Lakes and permanent ponds have good to excellent water quality, water quantity, site productivity, intact riparian vegetation, and sustainable sport fisheries. Lakes and permanent ponds function properly and support native and desired nonnative aquatic species. Instream flows and water levels in surrounding streams protect stream processes, aquatic and riparian habitats and communities, and recreational, scenic and research values.

Habitat surrounding lakes and ponds includes large trees in sufficient numbers to provide adequate habitat for nesting by ospreys, bald eagles, and other species. Aquatic resources provide a natural setting and unique opportunities for a variety of recreational activities

Desired Conditions for Lakes and Permanent Ponds
including nature viewing, hunting and fishing, boating, swimming, photography, and scenic views. Unstocked ponds and waterholes provide habitat suitable for amphibians and other wildlife and a source of water for upland wildlife species. Fishable waters have high-quality angling opportunities and good to excellent water quality, site productivity, associated vegetation, and habitat for associated riparian and aquatic dependent species.

2.3.21 Rock Outcrops

Rock outcrops are rare, localized features of the landscape that mainly occur along steep hill slopes, ravines, or river channels where soils have eroded away. Rock outcrops are usually embedded in a larger ecological system and rely heavily on surrounding habitats for landscape-scale functions and processes. There are an estimated 500 acres of this habitat in the entire state of Mississippi. Distribution on the National Forests in Mississippi is unknown; however, rock outcrops may occur on all ranger districts except the Delta Ranger District. Although of minor extent, the rock outcrops provide quality habitat for several species of animals and plants including Webster's salamander, several bat species, and hairy lip fern.

Desired Conditions for Rock Outcrops
Rock outcrops are present and undisturbed on the landscape. No impacts from upslope erosion and soil disturbance are evident. They typically occur within mature or old-growth closed-canopy forests. Human interaction with outcrops is limited and human disturbance is not evident.

2.3.22 Ephemeral Ponds and Emergent Wetlands

This wetland system represents a variety of seasonally and permanently flooded depression wetlands, freshwater marshes, and ephemeral ponds. Included here are ponds of various geomorphic origins in a variety of substrates including lime sinks and "Grady" ponds, which may hold areas of shallow open water for significant portions of the year. Also included are all impoundments and associated wetlands resulting from beaver activity. Ephemeral ponds and emergent wetlands occur on all ranger districts. This community includes elements from the East Gulf Coastal Plain Depression Pondshore Ecological System (CES203.558) of NatureServe's International Ecological Classification Standard.

Desired Conditions for Ephemeral Ponds and Emergent Wetlands

Ephemeral ponds and emergent wetlands are dispersed across the landscape. They are characterized by soils that are semi-permanently to permanently saturated as a result of groundwater seepage, perched water tables, rainfall, or beaver activity. Wetland-associated species such as panic-grasses, rushes, spikerushes, beak-rushes, meadow beauties and marsh-pinks are present.

Ephemeral ponds are present and functioning across the landscape in appropriate sites and provide habitat for a diversity of native species. Hydrologic function remains intact. Naturally fish-free isolated wetlands and ponds exist on the landscape. Freshwater marshes may contain native fish species. Fire naturally occurs in and around this environment, burning through it when water levels are naturally low.

This system supports populations of associated species, including the tiger salamander, the crayfish snake, and several other amphibian and reptile species. The most critical example of this habitat is the "Grady" pond, which provides breeding habitat for the endangered dusky gopher frog and Mississippi sandhill crane.

2.3.23 Cypress-dominated Wetlands

This rare wetland community represents cypress-dominated wetlands found in a range of sizes, generally conforming to the size of the depression in which they occur. They may occur embedded sporadically in floodplain forest or other wetland systems, around oxbow lakes, and abandoned stream channels, as well as in smaller backwater areas where they may occur next to other bottomland hardwood forest types. This system occurs on the Delta, Homochitto, and Holly Springs Ranger Districts.

Desired Conditions for Cypress-dominated Wetlands

Mature or old-growth forest or woodland dominates this system, with a varying degree of canopy closure shaped by healthy hydrologic functions and processes. Bald cypress occurs on historical sites with hydric soils. Conditions in the surrounding vegetation types allow distribution and dispersal of cypress-dominated wetland obligate species. This system supports populations of associated species, including the cypress-knee sedge, swallow-tailed kite, and southeastern myotis.

2.3.25 Seeps, Springs, and Seepage Swamps

This wetland community represents forested wetlands in acidic, seepage-influenced habitats. It is generally found at the base of slopes where seepage flow is concentrated and resulting moisture conditions are saturated or inundated. It occurs on all ranger districts except the Delta. This community combines elements of the following ecological systems of NatureServe's International Ecological Classification Standard: Southern Coastal Plain Seepage Swamp and Baygall (CES203.505) and the East Gulf Coastal Plain Northern Seepage Swamp (CES203.504).

Desired Conditions for Seeps, Springs, and Seepage Swamps

This system is dominated by mature forest (60 years old or older). Forests typically have canopy closure in mature examples of this system of 80 percent or greater. In the northern part of the state, this system is a deciduous forest typically characterized by black gum, water tupelo, and red maple. To the south, it grades into an evergreen forest characterized by sweetbay and black gum. Fire creeps into this system from the surrounding upland community; however, fire typically only burns during extreme droughty periods. This system is largely undisturbed and hydrologic function is intact.

2.4 Species Diversity

Maintaining a diversity of habitats for all native species on the National Forests in Mississippi (especially threatened or endangered species) and enhancing native wildlife habitat are important desired conditions for our public stakeholders and agency partners. A diversity of plant and animal species is part of the natural heritage of the state and provides forest visitors the opportunity to recreate in natural settings, view and study nature, hunt and fish, and harvest a variety of forest products. Forest lands serve as refuges for threatened, endangered, and other uncommon species. They offer large contiguous forested areas where animal species can successfully reproduce and rear their young, contain key rest and feeding areas for waterfowl and other migratory bird species, and provide important linkages (travel corridors) between State and Federal wildlife refuges and other blocks of forested land.

While developing a plan for species diversity, the National Forests in Mississippi staff started with a series of collaborative meetings with technical experts and taxonomic specialists familiar with the plant and animal species across Mississippi. They developed an initial species list containing 652 species that had ranges occurring in the state. They then removed species from the list if they did not occur or have the potential to occur on National Forest System land based on availability of suitable habitat, range, or expert taxonomic consensus. As part of the agency's prescribed screening process, remaining species were then identified as federally threatened and endangered species, sensitive species, and locally rare species. This screening and evaluation process helped ensure that we documented diverse species needs and incorporated it into the plan. Details on this process and key characteristics and desired ecological conditions for threatened and endangered species, regional forester-designated sensitive species, and locally rare species can be found in the "Ecosystems and Species Diversity Report" (appendix G – final environmental impact statement).

Desired Conditions for Species Diversity

Species diversity is high, reflecting and supporting diverse and fully functioning ecological systems. Native species are well distributed within appropriate habitat and sites across the National Forests in Mississippi. Threatened and endangered species are recovered or are moving towards recovery. Populations of threatened, endangered, sensitive, and locally rare species are robust. Populations of game species such as deer, turkey, quail, squirrel, raccoons, duck, and game fish are abundant and support quality hunting and fishing opportunities. Flow regimes and habitat connectivity in streams that provide habitat for native and desired nonnative aquatic and riparian-dependent species are sufficient to allow the affected species to complete all phases of their life cycles. Forest visitors are knowledgeable about our natural heritage, enjoy viewing and learning about native species and ecosystems, and appreciate the benefits these species provide.

2.4.1 Threatened and Endangered Species

Ten threatened and endangered species are identified as potentially occurring on the National Forests in Mississippi. These species are not located on every unit, so the list of threatened and endangered species and the units on which they are most likely to occur are presented in Table 3. Their status, habitat conditions, and distribution vary across the Forests.

Throughout the plan, threatened and endangered species protection and habitat enhancement are a priority.

Table 3. Federally endangered or threatened species that occur in the National Forests in Mississippi

Species	Status	District Where Most Likely to Occur
Red-cockaded Woodpecker (*Picoides borealis*)	Endangered	Bienville, Chickasawhay, De Soto, Homochitto
Gopher Tortoise (*Gopherus polyphemus*)	Threatened	Chickasawhay, De Soto
Louisiana Black Bear (*Ursus americanus luteolis*)	Threatened	Delta, De Soto, Homochitto
Indiana Bat (*Myotis sodalis*)	Endangered	Holly Springs
Dusky Gopher Frog (*Rano sevosa*)	Endangered	De Soto
Louisiana Quillwort (*Isoetes louisianensis*)	Endangered	Chickasawhay, De Soto
Pondberry (*Lindera melissifolia*)	Endangered	Delta
Mississippi Sandhill Crane (*Grus Canadensis pula*)	Endangered	De Soto
Gulf Sturgeon (*Acipenser oxyrinchus desotoi*)	Threatened	Bienville, Chickasawhay, De Soto
Pallid Sturgeon (*Scaphirhynchus albus*)	Endangered	Delta

For red-cockaded woodpeckers, populations are generally increasing as habitat is being maintained, enhanced, or restored, and nesting and foraging conditions are being improved. Gopher tortoise habitat conditions are also improving, but populations are declining for many reasons such as disease and nest predation. Dusky gopher frog also has a stagnant to declining population, although a new breeding pond was recently discovered. Populations of the more habitat-generalist black bears are increasing. The Indiana bat is a newly discovered species on the Forest and is currently found in one maternity roost in the northern portion of the Holly Springs Ranger District. The National Forests in Mississippi are now known to be home to more Louisiana quillwort populations than anywhere else in the species' range, and home to numerous pondberry colonies. Despite the Forest Service's attempts to maintain the forested habitats for pondberry, its populations on National Forests continue to be threatened by hydrological modifications associated with large flood-control projects. Mississippi sandhill cranes lack suitable nesting habitat on National Forest System lands, but populations along the Gulf are thought to be stable to slowly decreasing. Although there is also little evidence of Gulf sturgeon and pallid sturgeon on National Forest System lands, they could be using tributaries that run through the National Forests in Mississippi. Populations for both sturgeons are thought to be declining overall.

Habitat recovery activities for red-cockaded woodpecker and gopher tortoise generally affect a broader portion of the overall forest and reflect more active management efforts than other threatened and endangered species, which tend to occur in more isolated settings. Over 367,000 acres of the National Forests in Mississippi are focused on habitat management for red-cockaded woodpeckers. As of 2011, there were 338 total active red-cockaded woodpecker clusters, which is an increase from the 196 clusters in 1987 when red-cockaded woodpecker monitoring was initiated. Although much red-cockaded woodpecker habitat was lost as a result of damage sustained from Hurricane Katrina, approximately 140 new red-cockaded woodpecker inserts were installed to replace cavities destroyed by the hurricane, and more habitat restoration is planned. The gopher tortoise, currently found on the De Soto National Forest, requires an open canopy overstory with a grass forb understory habitat.

2.4.2 Regional Forester's Sensitive Species

Regional foresters identify sensitive species occurring in a region by examining up-to-date sources of information pertaining to the population status and viability of each species as well as habitat conditions and threats to those species. These sources include the U.S. Fish and Wildlife Service and National Marine Fisheries Service candidates for Federal listing and state lists of endangered, threatened, rare, endemic, unique, or vanishing species in the region, especially those listed as threatened under State law. Regional forester’s sensitive species are managed to ensure their population viability and preclude a trend towards Federal listing. Prior to any action, there must be an analysis of effects on regional forester’s sensitive species populations and population viability, as well as habitat. Population viability objectives must be established when making decisions that would significantly reduce sensitive species numbers.

2.4.4 Management Indicator Species

Under the National Forest Management Act, the Forest Service is charged with managing national forests to provide for a diversity of plant and animal communities consistent with overall multiple-use objectives. One planning tool we use to accomplish this requirement is the designation of management indicator species. During forest planning, we designate certain species as management indicator species "because their population changes are believed to indicate the effects of management activities" (36 CFR 219.19 (a)(1)) on important elements of plant and animal diversity. They and their habitat needs are used to set management objectives and minimum management requirements, to focus effects analysis, and to monitor effects of plan implementation. The following species have been selected as management indicator species because their population changes are believed to indicate the effects of management activities:

- Red-cockaded woodpecker (*Picoides borealis*)
- Pileated woodpecker (*Dryocopus pileatus)*
- Wood thrush (*Hylocichla mustelina*)
- Longleaf pine (*Pinus palustris*)
- Southern pine beetle (*Dendroctonus fontalis*)
- Largemouth bass (*Micropterus salmoides*)

2.4.5 Locally Rare Species

Locally rare species are species whose population viability and/or continued existence on the National Forests in Mississippi are a concern. Unlike the previous two categories, these species are considered to be at no risk of imperilment at a rangewide scale. Plan components may or may not be necessary to achieve management goals for these species.

2.5 Healthy Watersheds

Watershed health is essential to sustaining the ecological function and productive capacity of National Forest System lands. Productive soils, clean water, and clean air are integral to all aspects of resource management, and are important desired conditions identified by our stakeholders across the state. Healthy watersheds in these desired conditions include the physical elements that make up the natural resource base on the National Forests in Mississippi.

2.5.1 Water

Within the proclaimed boundaries of the National Forests in Mississippi there are over 11,000 miles of streams and more than 2,000 acres of lakes and permanent ponds. Average annual rainfall ranges from 65 inches along the gulf coast to about 55 inches in the northern part of the state. The National Forests in Mississippi are underlain by 8 of the state's 15 major aquifers, which supply drinking water for state residents. The nine major watershed basins that cross the Forests' boundaries drain over 48,000 square miles.

Watershed health is essential to sustaining the ecological function and productive capacity of National Forest System lands.

Due to the fragmented land ownership patterns across the National Forests in Mississippi units, stream conditions are heavily affected by land use upstream and on nearby private properties. Stream conditions vary across the National Forests in Mississippi, and many streams have been channelized or modified in the past. Erosion and headcutting are problems on districts with

steeper topography, but they are often caused or exacerbated by offsite actions out of Forest Service control. Of the 25 watershed subbasins within the proclamation boundaries of the National Forests in Mississippi, only eight have more than 5 percent National Forest System land and only two have greater than 10 percent National Forest System land. Although the Forest Service administers only a small percentage of the lands within the subbasins, it provides an important refuge for aquatic species.

Several different areas in this forest plan have desired outcomes that relate to improving or sustaining a diversity of aquatic species and water-related ecosystems. The combination of these outcomes, including the watershed-based conditions below, describes the overall desire for sustaining aquatic life and water resources.

Desired Conditions for Watersheds

Watersheds on the National Forests in Mississippi have good to excellent water quality, intact hydrologic function, support associated terrestrial systems, and provide important refuge for associated species to the extent possible given limited ownership. Water surfaces are clean and clear of trash and sediments; streamsides are dominated by native riparian vegetation; and fish and other aquatic species are healthy and abundant. Vegetation along waterbodies provides shading, shelter, and undisturbed areas for aquatic biota. Large woody debris is present at appropriate levels in streams for hydrologic stability and instream fish habitat. Road and trail crossings allow passage of fish and other aquatic animals up and down stream corridors. Stream channels are properly functioning, and damaging impacts from historic modifications, sedimentation, and degradation from upstream sources are improving. Erosion and headcutting along steep streambanks are slowed, and hydrologic conditions are improving.

2.5.2 Soils

The varied soils on the National Forests in Mississippi reflect the statewide distribution of national forest units and include well-drained sandy loams along the coastal plain; windblown and highly productive loess soils in the western part of the state; and upland mixes of sandy soils, high shrink-swell clays, and blackland prairie soils. Forest soils cover a range of slopes, from nearly level (less than 2 percent slope) to very steep (up to 45 percent slope). Throughout the National Forests in Mississippi, the majority of the land (approximately 90 percent) has high to moderate soil productivity.

Desired Conditions for Soils

Forest soils have adequate physical, biological, and chemical properties to maintain or improve ecological systems, productivity, hydrologic function, and slope stability. Minimal erosion and sedimentation occur due to successful use of best management practices during forest activities. Partnerships between the Forest Service and other agencies and landowners create statewide improvements in soil quality and function across watersheds.

2.5.3 Air Quality

Air quality for the state of Mississippi is generally good, and the State has met all national ambient air quality standards (NAAQS) established by the Environmental Protection Agency. The air quality program for the National Forests in Mississippi provides guidance for conducting forest management activities in a manner that complies with State and Federal standards, protects

human health, promotes safety, and does not degrade air quality. Prescribed burning is the activity most likely to contribute air emissions, but current burning levels are not exceeding air quality standards and best management practices are used to protect air quality.

Desired Conditions for Air Quality
Activities on National Forest System lands meet national ambient air quality standards and State standards. Smoke impacts on the general public and adjacent landowners from prescribed fires are minimal and short-term.

2.6 Healthy Forests

Healthy forests contain all the features and functions necessary to meet management objectives for the land area. Desired conditions associated with healthy forests involve a variety of resource areas, including vegetation, wildlife, invasive species, soils, water, air, lands, and fire management. The development of desired conditions was based on input from public stakeholders, agency directives, and regulatory requirements under the National Forest Management Act. The "Ecosystems and Species Diversity Report" (appendix G – final environmental impact statement) and "Possible Actions and Vegetation Management Priorities by Administrative Unit" (appendix C) include the ecological basis for the desired conditions and information on the long-term sustained yields of timber products that result from achieving and maintaining these desired conditions.

2.6.1 Vegetation Management

During the establishment of the National Forests in Mississippi in the 1930s, the replanting of cleared farmland and severely eroded slopes with fast-growing pines helped develop today's widespread forests and improved watershed conditions. These stands of predominantly loblolly and slash pines provided an economic commodity that was a major management priority in the 1985 forest plan. Since then, our management emphasis has shifted toward restoring healthy and thriving native ecological communities, and we use vegetation management activities as tools for achieving habitat and ecosystem restoration.

Ecological sustainability requires a diversity of species composition, age classes, stand structure, and densities. These conditions provide for a forest resilient or resistant to insects, disease, and natural disturbances. Healthy forest conditions also include a mix of younger regenerating vegetation and old-growth stands. Based on the history of the National Forests in Mississippi, there is currently a higher percentage of forests in the middle age classes, with approximately 25 percent of forested areas 21 to 60 years old and 37 percent in the 61- to 80-year age class. Forestwide, an estimated 5 percent of today's forests are in the 0- to 10-year age class and 15 percent are over 80 years old.

Our management emphasis has shifted toward restoring healthy and thriving native ecological communities. We use vegetation management activities as tools to achieve habitat and ecosystem restoration.

Pine types are the dominant forest types statewide, and this dominance is expected to continue into the future. But the amount of that dominance and the dominant species represented are expected to shift as loblolly and slash pine forests are converted to stands of longleaf pine, shortleaf pine, and hardwoods. The mix of seral stages and specific conditions desired on the landscape are described for the individual ecosystems in sections 2.3.1 through 2.3.24. Primary vegetation management

activities for attaining healthy forests include regeneration, thinning, timber harvest, and prescribed burning. While timber harvesting contributes to the local economy and America's supply of wood products, it is also used to create wildlife habitat conditions, manage fuels, and manage vegetation to achieve shifts in species composition and restoration of native ecological communities.

Healthy forests are resilient to stressors and have sufficient nutrients and physical growing conditions. For the National Forests in Mississippi, the most common traditional threats to forest health include nonnative invasive species (especially cogon grass and kudzu), disease outbreaks, and insect infestations (particularly recurring cycles of southern pine beetle infestations). However, overly dense stands, hazardous fuel levels, urban expansion, and climate change disturbances can also affect forest health.

Desired Conditions for Vegetation Management

Healthy forests are evident across the landscape and have the physical and biotic resources to support desired ecological systems and conditions, as well as desired species. Forests are resistant or resilient to dramatic change caused by abiotic and biotic stressors and mortality agents (e.g., the southern pine beetle). Resilient native ecosystems better withstand hurricanes and other extreme weather events, and recovery from disturbances is enhanced through advanced planning. The supply of essential resources (e.g., light, moisture, nutrients, growing space) for major vegetation of desired ecological systems is functionally in balance with the demands of those systems. As stand succession progresses or disturbances occur, availability of essential resources changes causing some vegetation to decline or die while other vegetation benefits. Healthy forest conditions reflect plant competition for these resources by the decline and death of some vegetation in the production of desired ecological systems and conditions. Healthy forests display a diversity of seral stages (e.g., pioneer to climax), ages (regeneration to old growth), desired ecological systems, and stand structures that provide all essential ecosystem processes and habitat for the desired diversity of native species. The spread of nonnative invasive species is halted or reversed.

2.6.2 Old Growth

The staff of the National Forests in Mississippi has developed a preliminary inventory of possible old-growth acreage that totals more than 118,000 acres (appendix D). This is approximately 10 percent of the forested acres and is distributed among 12 community types. Most of this acreage was selected based on stands identified for late seral management or met the minimum age in the regional old-growth guide. All districts contain possible old-growth acreage, with amounts ranging from 6 percent on the Homochitto to 32 percent on the Delta.

Desired Conditions for Old Growth

Forest and woodland ecological systems support a diversity of tree ages, from regeneration to old growth, providing a relatively stable mix of ecological conditions across the landscape over time. The age class distribution across the landscape provides for small (1 to 99 acres) to medium-sized (100 to 2,499 acres) old-growth areas. Old-growth areas are interconnected by mature forests. Approximately 10 percent of each forest and woodland ecological system consists of old-growth areas identified and managed to meet ecological objectives of the plan.

2.6.3 Fire

Historically, fire may have been the most common form of natural disturbance on the landscape now managed as the National Forests in Mississippi. With an ideal climate for vegetative growth, most major ecological communities in the forest, if left undisturbed for even a short time, will develop dense understory growth that results in high fuel loadings. Downed trees from recurring windstorms further add to the buildup of forest fuels. When fire occurs under these hazardous fuel conditions, the intensity is higher and damage can be catastrophic. Disastrous wildfires can significantly alter vegetation composition, cause mortality to mature trees, and pose a threat to safety and property. Adding to this undesirable situation is the interspersed nature of private property with national forest lands in Mississippi and the growth of communities closer to national forest boundaries.

Periodic prescribed burning can recreate historic fire regimes and reduce the risk of catastrophic fires, while restoring conditions that favor desirable native ecosystems. The fire intervals identified in section 2.3 for the native fire-dependent communities typical of this region are an indication of how frequently fires burned through these forests prior to settlement and an emphasis on fire suppression. Based on the fire frequency needed to maintain these ecosystems today, low-intensity fires would have typically burned a mosaic pattern through coastal ecosystems every 1 to 3 years and swept through more upland communities every 1 to 6 years. The result of this type of disturbance is more open woodlands with sparse midstories, and understories dominated by grasses and forbs, providing favorable habitat for threatened and endangered species such as the red-cockaded woodpecker, gopher tortoise, and dusky gopher frog. Hazardous fuel buildup under these conditions is low.

Desired Conditions for Fire
Fire regimes across the National Forests in Mississippi are within historical ranges (fire condition class 1). Low-intensity fires periodically burn through forests removing surface fuels and maintaining an open understory. Native vegetation patterns, species composition, and structure are intact and functioning within natural limits. The risk of losing key ecosystems is low. Fire is allowed to operate as close as possible to its historic, ecological role. Appropriate management response to wildland fire is based on ecological, social, and legal consequences of the fire. The risk to developments and private property is low due to reduced levels of forest fuels along interface areas.

2.6.4 Lands and Special Uses

The National Forests in Mississippi encompasses almost 1.2 million acres, but the makeup of the national forests is a series of widely separated ranger districts scattered across the state. Even within districts, national forest boundaries are not contiguous. Land ownership is generally a fragmented pattern of small isolated parcels of private lands interspersed with National Forest System lands. Although the areas around the National Forests in Mississippi still retain a rural character, changes are expected as the population in the state continues to grow and urban development spreads into rural areas. In recent years, there have been increasing numbers of people moving in closer proximity to National Forest System lands, especially from expanding developments along the gulf coast and near urban centers such as Memphis, Tennessee and Jackson, Mississippi. Due to the effects of Hurricane Katrina, rebuilding efforts in many locations

moved inland from the gulf coast, placing future homes and business construction closer to national forest boundaries, particularly along the De Soto National Forest.

This pattern of noncontiguous land holdings plus mixed ownership and growing wildland-urban interface presents problems in conducting effective vegetation management programs. Control of invasive species, insects, and diseases is more difficult if untreated properties adjacent to the Forests provide continued opportunities for reinfestation. Prescribed burning to reduce fuel hazards and restore desired ecosystems creates smoke that can be minimized but not eliminated from impacting nearby roadways and homes. Restoration of ecosystems for wildlife and uncommon species often requires large blocks of appropriate habitat that are buffered from conflicting land uses. Protection and improvement of water quality, soil erosion, and sedimentation on the National Forests in Mississippi may be undone by upstream activities and offsite sources. In parts of the Forests where inholdings are common, there is also an increased potential for boundary line conflicts, easement and access issues, encroachment, and the need for more special use permits.

While major changes in National Forest System land parcels are not anticipated, opportunities occur at times to acquire or exchange land parcels. By creating a larger consolidated land base, the National Forests in Mississippi can not only enhance resource protection and management operations but also reduce boundary conflicts and access issues.

Desired Conditions for Lands and Special Uses
National Forest System lands within the boundaries of the National Forests in Mississippi are more consolidated, with key parcels of land added to the National Forest System as opportunities arise. The land base of the National Forests in Mississippi is sufficient to protect native ecosystems, provide critical habitat, support diverse species, provide a variety of recreation experiences, and preserve a natural-appearing setting. Isolated tracts with special resource values are also part of the land base. Private landowners have appropriate access to their property, and the public has appropriate access to National Forest System lands. Boundaries are clearly marked so that national forest land ownership is easily recognized along property lines with adjoining tracts.

2.7 Infrastructure

The infrastructure on the National Forests in Mississippi includes a wide variety of roads, trails, and facilities necessary for management, public use, and protection of National Forest System lands. A system of roads and trails that provides access to the National Forests in Mississippi for a variety of uses is consistently one of the most important desired conditions expressed by the general public. This system needs to be safe and reliable while protecting natural resources. Facilities on the National Forests in Mississippi range from campgrounds and bathhouses to ranger stations and warehouses. Needed facilities are structurally sound, durable, low maintenance, accessible, and appropriate for the use and setting.

2.7.1 Roads

Currently there are 2,938 miles of system roads on the National Forests in Mississippi. The roads system serves multiple uses, functioning both as access to the national forests and through routes to private lands within national forest boundaries. While there are some paved roadways, most of the commonly used national forest roads are gravel surfaced for all-weather travel. Further into

the national forests, roads become narrow dirt paths useable by foot traffic or high-clearance vehicles. These interior roads may be opened only as needed for activities such as timber harvesting, prescribed burning, or fire suppression. Of the National Forest System roads on the National Forests in Mississippi, 32 percent are suitable for passenger car use, 24 percent are for use by high-clearance vehicles, and 44 percent are closed for administrative and/or intermittent use only.

Very little new road construction has occurred in recent years, and there is not an anticipated need for new roads over the next 10 to 15 years. Structural soundness of bridges is especially important as these structures age and continue to be used not only for national forest activities but also by county residents for everyday access to private property. Culverts at stream crossings are also a concern since they may function adequately from a roads standpoint but may be a barrier for aquatic organism passage.

Another issue is the user-created roads that exist across all the National Forests in Mississippi that are not part of the Forest Service road system. Some are narrow dirt trails created by recent off-highway vehicle (OHV) use and some are roads that were once permitted or authorized but were never decommissioned after they were no longer needed. Use of these user-created roads and pathways has caused damage to parts of the National Forests in Mississippi including soil erosion, sedimentation in streams, damage to wetlands and wildlife habitat, and spread of invasive species.

Desired Conditions for Roads

The roads system for the National Forests in Mississippi is a network of well-maintained roads that are safe for travel and provide reasonable access to the national forests and private landholdings within the national forests. Bridges are sound, and culverts at stream crossings are properly designed and constructed to allow passage of aquatic organisms and to protect stream quality. Roadway surfaces are smooth, properly sloped, and useable in most weather conditions. Ditches are cleared, and evidence of soil erosion is minor. There is adequate signage throughout the roads system. Roads not needed for extended periods are closed, stabilized, and have native vegetation cover; while those no longer needed have been obliterated. Wheeled motorized access occurs only on designated roads and trails, and the occurrence of unauthorized, user-created roads is minimal.

2.7.2 Trails

The National Forests in Mississippi are a major provider of recreational trails in the state with over 265 miles of nonmotorized hiking, biking, and horseback riding trails and about 140 miles of motorized trails for all-terrain vehicles (ATVs) and motorcycles. Use of trails has become increasingly popular in recent years due to a growing population and limited trails systems elsewhere in the state.

In contrast to the situation when the 1985 forest plan was developed, the demand for trails is now more than can be

provided. Heavier trail use and new types of users that were not anticipated when trails were originally designed and constructed have led to resource damage and user conflicts in some areas. Trails in some parts of the National Forests in Mississippi have been damaged and are in need of extensive maintenance, reconstruction, or relocation. User-created trails have also caused damage, especially along creeks and on slopes with easily eroded soils. (Use of national forest trails as a recreation experience is further described in section 2.8.1.).

Desired Conditions for Trails
Exceptional trails are available for use by hikers, bikers, horseback riders, off-road motorized users, hunters, and anglers. The trail program is managed from a forestwide perspective and opportunities are offered where they are most responsive to demand, minimize conflicts with other recreation users, and can be managed in an environmentally sustainable and operationally efficient manner. The National Forests in Mississippi trail program has trail systems of varied lengths, including loop trails and multiple access points. Individual trails provide enough mileage to support multiple day-use experiences. There is a variety of challenge levels available, including hiking trails that are accessible to persons with disabilities. Trails are well designed and maintained to minimize impacts to other forest resources. Trail information is readily available to the public. Travel routes to and from trailheads locations are appropriately signed, and trails are well marked and easy to follow. Trails and trailhead parking areas are free from hazards and litter. OHV use is permitted on designated trails and routes that are clearly defined on maps and on the ground. The designated OHV trail system is well maintained, and resource impacts are minimal. User-created trails are restored to natural conditions, and system trails that are no longer needed are decommissioned.

2.7.3 Facilities

The National Forests in Mississippi currently have an inventory of approximately 300 facilities. Three facilities are historic and are listed on the National Register of Historic Places: the ranger residence at Choctaw Lake on the Tombigbee National Forest; the picnic pavilion at Clear Springs Recreation Area on the Homochitto National Forest; and Moore Lookout Tower on the Bienville National Forest. The Moore Lookout Tower is also listed on the National Register of Historic Lookout Towers.

Just over 200 facilities are categorized as administrative (offices, warehouses, ranger houses, sheds, and storage buildings) and the remaining are used for recreation (such as bathhouses, pavilions, and gazebos). Many of the administrative structures, built in the 1950s and 1960s, have outlived their economic and service lives and are no longer needed. Some of the problems with these older buildings are energy inefficiency; safety problems due to deterioration of structural, electrical, and mechanical systems; costly preventative maintenance; and being too small to accommodate the programs they serve. Also, a consolidation in the mid-1990s reduced the number of ranger districts across the National Forests in Mississippi from 10 to 7, resulting in some administrative sites and buildings being underutilized or no longer needed.

Desired Conditions for Facilities
Administrative buildings and recreation facilities are in good condition, safe, clean, structurally sound, and energy efficient. Facilities meet the needs of the agency and public visitors. Structures are accessible to all users and enhance the recreational experiences of visitors to the National Forests in Mississippi.

2.8 Recreation, Cultural Resources, and Forest Setting

The natural setting, beautiful scenery, diverse recreational opportunities, peace and quiet, ready access, local heritage, and educational programs provided by the National Forests in Mississippi have been continually identified by our stakeholders as key features of their desired social experiences in the national forests. The focus of this plan on managing National Forest System lands for diverse native ecosystems supports the naturally appearing forest setting, traditional uses, and emphasis on local cultural heritage desired by the public.

2.8.1 Recreation

The National Forests in Mississippi are a primary provider of developed and dispersed outdoor recreation in the state. Developed recreation on the Forests is characterized by constructed features and amenities that enhance the visitor's experience, such as campgrounds with utilities, picnic areas, swimming areas, boat ramps, and trailheads. Developed recreation sites that provide water-based recreation are particularly popular in the warm, humid climate of Mississippi and may become even more desirable if projected global climate change impacts result in even warmer temperatures and a higher heat index.

Hunting, fishing, trails use (for hiking, OHVs, horseback riding, biking, bird watching, and other activities), nature study, driving for pleasure, wildlife viewing, and primitive camping are examples of popular dispersed recreational activities that occur broadly across the National Forests in Mississippi. The Forests represent some of the few sizeable public lands open to local residents for traditional hunting and fishing experiences and one of the largest trails systems in the state.

Meeting the growing demand for recreational opportunities will be an ongoing challenge in the future. Population growth in Mississippi over the past decade and increasing urban expansion, especially on the southern and northern ends of the state, have created a demand for recreation resources that at times exceeds supply. Construction of new facilities or expanded amenities to meet growing demands has been limited in recent years by the capacity of the Forest Service to fund and maintain additional infrastructure as well as the capacity of sensitive sites to support heavy usage without damaging the environment. The make-up of the National Forests in Mississippi presents an additional challenge since the six national forests (or seven ranger districts) consist of different environmental settings, serve different recreational niches, and cannot each provide every desired recreation opportunity. Balancing multiple, and sometimes competing, local desires in the future with limited agency resources will require public support and new, more sophisticated partnerships to focus and improve recreation opportunities or facilities on the National Forests in Mississippi.

Desired Conditions for Recreation

The National Forests in Mississippi continue to be a leader in the state for providing high quality natural settings, opportunities for the public to enjoy outdoor activities, and places for family and friends to assemble. Opportunities for traditional rural recreational uses such as hunting and fishing are available, along with many of the recreational interests of a growing number of urban residents and visitors. Recreation demands are balanced with the ability of the land to sustain use and the capacity of the Forests' staffs to manage use. Partnerships flourish, including long-term secure working relationships with communities, special interest groups, and State and local governments. These partnerships support and enhance recreation programs across the National Forests in Mississippi.

Developed recreation areas provide safe, well-maintained facilities at concentrated use locations for camping, picnicking, boating, and swimming. Picnic sites and pavilions are available for small and large family gatherings. Access to water is provided at lakes, major rivers and creeks, and ponds to support boating, swimming, fishing, canoeing, and other water-based recreation. Campgrounds and developed day-use areas are located in most ranger districts across the state and are accessible to a variety of forest visitors. Local businesses offer opportunities that the National Forests in Mississippi program cannot provide, such as privately owned campgrounds or outfitter/guide services.

The general forest area provides a variety of dispersed recreational opportunities (such as hunting, fishing, driving for pleasure, nature viewing, and trails use). The setting is generally natural appearing, although forest management activities are also present. Game and nongame wildlife populations are abundant and support viewing, photography, nature study, and hunting. Many areas of solitude and quiet offer visitors a refuge from hectic daily life. In other parts of the National Forests in Mississippi, access is available for scenic drives, OHV use on designated routes, and group experiences such as horseback riding and environmental education programs. Although not every desired outdoor experience is available on every individual national forest unit, collectively the National Forests in Mississippi provide a broad variety of desired outdoor opportunities and well-maintained facilities for residents and visitors.

Educational programs provide visitors opportunities to learn about the forest environment and the State's cultural heritage. Information is readily accessible to inform visitors about recreational facilities, activities, services, and regulations. Directional signs are appropriately placed, and maps are available both in print and electronically to help visitors easily find their way to developed sites. A variety of brochures, tour maps, bulletin boards, interpretive sites, and other environmental and cultural information is available on websites and at local destinations.

2.8.2 Scenic Quality

The land base of the National Forests in Mississippi generally has a natural-appearing scenic character in a typically rural setting. The interspersed nature of private and public lands integrates evidence of human development throughout the Forests, although there are areas of less development. Agricultural lands, residences, local communities, and commercial pine plantations are intermixed with National Forest System lands. Vegetation is typically fast growing so indications of disturbance are quickly absorbed. Pines dominate the visual character and flat topography of the southern half of the state, with corridors of hardwoods along stream channels. Rolling hills and mixed pines and hardwoods characterize the northern part of the state. Although

visual separation of intermixed private and public lands has limitations, scenic characteristics important to the public include an emphasis on beautiful scenery, peaceful settings, opportunities for nature study, minimally intrusive management practices, and a visually appealing recreation setting.

Desired Conditions for Scenic Quality
Scenery is natural appearing and generally consists of a mix of closed-canopy forest and park-like, semi-open woodlands, except in young regeneration areas, bogs, prairies, and wildlife openings. Signature landscapes that are unique to Mississippi national forests, such as longleaf pines and bottomland hardwoods, are found throughout the National Forests in Mississippi. Rare showcase plant communities like Buttercup Flats and Harrell Prairie provide opportunities for nature study, wildflower viewing, and photography. Primitive and semiprimitive settings provide visitors with a feeling of solitude and challenge. Facilities and constructed improvements are visually appealing and blend into the surrounding environment.

2.8.3 Wilderness and Wild and Scenic Rivers

Wilderness designations are given a higher standard of care to maintain the wildland characteristics they are valued for. The wild and scenic river and the Black Creek Corridor Scenic Area will have their free flowing stream conditions and outstandingly remarkable scenic and recreational values preserved.

Desired Conditions for Wilderness and Wild and Scenic Rivers
Wilderness designations have unique wildland character with little evidence of human-caused disturbance. The wild and scenic river and the associated scenic area corridor have free flowing stream conditions and remarkable scenic and recreational values.

2.8.4 Cultural Resources

The heritage of the area encompassed by the National Forests in Mississippi is a rich blend of indigenous cultures and historic-era homesteads. Archaeological sites across the state show evidence of indigenous population use that ranges from permanent villages to briefly occupied campsites. Several properties are listed in the National Register of Historic Places: the Owl Creek Indian Mounds and the ranger residence at Choctaw Lake on the Tombigbee National Forest, Moore Tower on the Bienville National Forest, and the picnic pavilion at Clear Springs on the Homochitto National Forest. In addition, there are scattered remains of early historic settlements such as farmsteads, cemeteries, lumber camps, sawmill towns, turpentine stills, and Civilian Conservation Corps (CCC) camps that help round out an understanding of the history of the state as well as past land use on National Forest System lands.

Desired Conditions for Cultural Resources
Prehistoric Native American archaeological sites and remnants of historic developments are found across the National Forests in Mississippi. Cultural resources are protected and offer an opportunity to learn about the past. Interpretive sites, tours, and educational programs create opportunities to understand Mississippi's cultural heritage, the people who lived here in the past and their effects on the land.

2.9 Minerals Management

The National Forests in Mississippi recognizes that demand is high for oil and gas, and provides for Federal oil and gas leasing along with all other forest resources. The Forests occupy approximately 67 percent of Federal mineral estate in Mississippi. As the largest Federal agency land management base in Mississippi, as a demonstrated producer of Federal oil and gas, and as a Federal agency with a congressionally designated multiple-use mission, the National Forests in Mississippi are key to the Federal oil and gas leasing program in Mississippi.

Desired Conditions for Minerals Management
The National Forests in Mississippi manages minerals development to optimize the use of these resources in a manner that contains suitable environmental safeguards and contributes to the Nation's energy needs without detrimental effects to the environment.

2.10 Economic Benefits

National forest activities that generate the majority of revenues that feed back into the local economy in Mississippi come from timber, minerals, and recreation. These economic returns include direct benefits through jobs, timber sales, and mineral leasing receipts as well as indirect benefits such as expenditures from out-of-town visitors who come to enjoy recreation opportunities on the National Forests in Mississippi. Other economic contributions come from Federal employee salaries and payments to counties that have National Forest System lands.

Timber, minerals, and recreation revenues are expected to continue to be the leading sources of economic benefits from National Forest System lands to local communities over the next 10 to 15 years. Vegetation management activities that contribute to achieving the desired ecological conditions in the forest plan are expected to generate revenues and economic benefits similar to recent years. The economic contribution from minerals is primarily from oil and gas leasing, which is projected to maintain current values or increase slightly. Recreation opportunities are expected to continue to draw visitors and add revenue at a similar level to the past. Although the National Forests in Mississippi do not have a major impact on the economic health of the state, economic benefits do contribute to local economies and are expected to be sustained at or above current levels.

Desired Conditions for Economic Benefits
The National Forests in Mississippi provide a stable return of economic revenues and benefits to local economies. Timber commodities provide economic benefits to the community while achieving restoration and habitat improvement practices. Oil and gas resources contribute to the Nation's energy needs without detrimental effects to the environment. Local economies benefit from visitors attracted to forest recreation opportunities that are exceptional and valued for a scenic natural forest setting.

Chapter 3. Strategy

This chapter of the land and resource management plan describes our strategies for moving the National Forests in Mississippi resources toward desired conditions. This section starts with descriptions of management approaches and objectives paired to correspond with each of the desired conditions identified in chapter 2. Management approaches describe how we will achieve desired conditions over time and consider priorities such as program direction, budget trends, past program accomplishments, and partnership opportunities. Objectives are measurable, time-specific accomplishments that typically represent stages in reaching desired conditions. These objectives are intended to be achieved during the first 10 years of the planning period.

The prescribed management strategies for achieving desired conditions will be applied to areas that are similar in some respect across the National Forests in Mississippi. These management areas may contain similar ecosystems, features, uses, or special attributes that guide future project activities. Generally, national forests are suitable for a variety of uses that are compatible with the goals or desired conditions for an area. This chapter also describes key suitable uses on broad areas of the Forests and identifies specifically designated, unique geographic areas that have special management requirements to protect their unique characteristics. These areas have physical, biological, or social circumstances that influence suitable uses and warrant placing them under special management guidance.

3.1 Objectives and Management Approaches

In the following sections, we have placed objectives in boxed insets following a brief narrative on likely management approaches to achieving those objectives. Management approaches describe our priorities and expectations for future program direction. Partnerships and collaborative arrangements are also included as part of the strategy for accomplishing desired conditions, especially those that are dependent on cooperative efforts for regional issues.

> ***Objectives*** *are measurable, time-specific accomplishments that typically represent stages in reaching desired conditions.*
>
> ***Management approaches*** *describe how we will achieve desired conditions over time.*

Generally, the Forest Service has managed forest activities through a variety of separate resource programs. However, this plan is an integration of desired conditions and objectives across multiple program areas. Therefore, many of the resource programs share similar objectives and contribute to multiple desired conditions. For example, ecosystem diversity objectives are connected to the program strategies for species diversity, fire, soils, water, and healthy forest conditions, while recreation objectives are linked to management approaches for infrastructure and economic strategies. Although separate objectives are not repeated or identified for every program area, all contribute to achieving desired conditions for the National Forests in Mississippi.

The following objectives and strategies are stepping-stones of achievement that will move the National Forests in Mississippi toward the desired conditions described in chapter 2. Objectives and associated program strategies are strongly influenced by recent trends, past experiences, current staffing levels, and anticipated near-term budgets.

3.2 Ecosystem Diversity

Restoring and maintaining a diversity of native ecological systems is the foundation of this plan. As we implement the plan, striving to achieve desired conditions and objectives, following standards and guidelines, and recognizing the contribution of unique geographic areas, ecosystem functionality should improve. This should not only improve ecosystem diversity, but also provide for many of the needs of plant and animal species on the forest.

To achieve desired conditions for ecosystem diversity, we need to restore native ecological systems on suitable sites. We plan to accomplish these conversions primarily through vegetation management programs that result in improved habitats for a variety of plants and animals (including threatened, endangered, sensitive, and locally rare species) and increased resilience to potential effects from climate change. Restoration activities will mainly involve reducing loblolly and slash pine plantations in favor of reestablishing longleaf pine, shortleaf pine, and hardwood communities. Restoring and maintaining less common communities on appropriate sites will further enhance ecosystem diversity and conserve rare systems. Part of the vision of this plan is to create open woodland settings and forest structures similar to conditions that existed in past centuries. Restoring historic fire regimes in a way that mimics the timing and seasonality of past natural events is essential to sustaining native ecological systems in Mississippi. While it may take many decades to completely achieve these ecosystem shifts, actions initiated during the next 15 years covered by this plan will set the stage for continued progress.

Objectives for each of the 24 ecological systems described in chapter 2 are addressed in the sections 3.2.1 through 3.2.21. Each section contains an introduction that briefly describes the management strategies for that ecosystem. Structural objectives focus on regeneration age classes (0 to 10 years old) and mature age classes (60 years old and older) because these groups are key to providing for species diversity. We assume that if mature and young regenerating age classes are sustainable, so are age classes in between. Aquatic resource priorities focus on water quality maintenance, water quantity, stream restoration, and lake and pond enhancement. Maintenance and restoration efforts are coordinated across all program areas to achieve the desired conditions. Additional discussions of program strategies that support ecosystem diversity objectives are found in subsequent sections on species diversity, healthy watersheds, and healthy forests.

3.2.1 Upland Longleaf Pine Forest and Woodland

Located on: De Soto, Chickasawhay, Homochitto and Bienville Ranger Districts

This ecological system represents forests and woodlands dominated by longleaf pine occurring across a range of soil and moisture conditions. The site types range from xeric to mesic as well as occasionally on flatwoods wetlands. See section 5 of appendix G of the FEIS for a site type soils crosswalk used for plan analysis.

Key characteristics of this system are abundance, fire regime, canopy structure, and tree age diversity. The highest priority for long-term sustainability of this ecological system is restoration of the longleaf pine forest ecological system to appropriate sites. Frequent growing-season burns reduce woody vegetation in the understory and promote the herbaceous vegetation, which is integral to this system. Open longleaf pine forests provide foraging and nesting opportunities for many species. These woodlands are ideal habitat for the federally threatened gopher tortoise and associated species. Mature forests and woodlands (including old growth) in this system

provide a variety of nesting and foraging opportunities for many species and provide adequate fine fuels to carry fire throughout the system. Maintaining a sustainable mix of tree ages is vital to long-term stability of the ecological system and resilience of the forest to disturbances. Integrated wildlife, fire, and vegetation management programs are essential to accomplish longleaf pine restoration.

Objectives for Upland Longleaf Pine Forest and Woodland

At the end of the first decade of the plan:

- An estimated 251,000 acres of upland longleaf pine forest and woodland on National Forest System lands continue to be present as longleaf pine forests and woodlands.
- Approximately 13,000 acres of longleaf pine exist on sites formerly occupied by loblolly pine forest and slash pine forest.
- Approximately 29,000 acres of previously closed canopy longleaf pine stands are in open canopy condition to maintain forest health and sustain foraging and nesting opportunities for species.
- Approximately 4,000 acres of xeric sandhills and adjacent upland woodlands have been created to promote gopher tortoise habitat.
- Approximately 13,000 acres of the 251,000 total acres of longleaf pine are in the 0- to 10-year age class (from conversion), and approximately 153,000 acres are in mature condition (60 years old or older).
- The estimated 251,000 acres of this fire-dependent ecosystem have received a prescribed burn return interval of 1 to 4 years, with approximately 40 percent of the burns conducted in the growing season for the first decade.

3.2.2 Shortleaf Pine-Oak Forest and Woodland

Located on: Bienville, Holly Springs, and Tombigbee Ranger Districts

This ecological system represents forests and woodlands dominated by shortleaf pine occurring on dry to dry-mesic ecological site types. See section 5 of appendix G of the final environmental impact statement for a site type soils crosswalk used for plan analysis.

The most important characteristic of this system is abundance of the shortleaf pine-oak forest and woodland ecological system on the landscape. The highest priority for long-term sustainability of this ecological system is restoration of the shortleaf pine-oak forest and woodland ecological system to appropriate sites. Other important ecosystem characteristics include fire regime, canopy structure, and tree age diversity. Frequent growing-season burns reduce woody vegetation in the understory and promote the herbaceous component, which is integral to this system. Mature open forest and woodland (including old growth) in this system provide a variety of nesting and foraging opportunities for many species and provide adequate fine fuels to carry fire throughout the system. Maintaining a sustainable mix of tree ages is vital to long-term stability of the ecological system. Integrated wildlife, fire, and vegetation management programs are essential to accomplish of shortleaf pine restoration.

The public has expressed a desire for restoration of native ecosystems, and the Forest Service has been promoting the establishment of ecological restoration goals and objectives. Our strategy for

this ecosystem is to expand it across its natural range to promote species diversity and improve resiliency to changing climate conditions and other stressors.

Objectives for Shortleaf Pine Oak Forest and Woodland

At the end of the first decade of the plan:

- An estimated 62,000 acres of shortleaf pine forest and woodland on National Forest System lands continue to be present as shortleaf pine forest and woodland.
- Approximately 2,800 acres of shortleaf pine exist on sites formerly occupied by loblolly pine forest increasing the relative abundance of this system on the landscape to 62,000 acres.
- Approximately 4,100 acres of previously closed canopy shortleaf pine stands are in open canopy condition to maintain forest health and sustain foraging and nesting opportunities for species.
- Approximately 4,000 acres of the 62,000 total acres of shortleaf pine are in the 0- to 10-year age class (from conversion and regeneration), and approximately 41,000 acres are in mature forest condition (60 years old or older).
- The estimated 62,000 acres of this fire-dependent ecosystem have received a fire return interval of 1 to 4 years, with approximately 45 percent of the burns conducted during the growing season.

3.2.3 Loblolly Pine Forest

Located on: all ranger districts, except the Delta Ranger District

This system represents loblolly pine-dominated forests and woodlands occurring predominately on upland sites. See section 5 of appendix G of the final environmental impact statement for a site type soils crosswalk used for plan analysis.

Loblolly pine forest is widespread throughout the National Forests in Mississippi. It often occupies sites that historically supported other forest types. Conversion of the loblolly pine forest ecological system to appropriate ecological systems is our highest priority for long-term sustainability. Existing loblolly pine forests should be managed toward the desired conditions of the ecological system to which they are being converted. Continued emphasis on integrated wildlife, vegetation, and fire management program activities in existing loblolly pine forests will be necessary to promote and maintain desired ecological structural conditions during conversion to appropriate ecological systems. Mature, open forest (including old growth) in this system provides a variety of nesting and foraging opportunities for many species and provides adequate fine fuels to carry fire throughout the system. Species diversity and richness are dependent upon growing-season fire to maintain open canopy conditions and floristic composition. Uncertain impacts from climate change could increase the rate of change and affect the objectives for restoration of native systems from loblolly pine forests. We have identified loblolly pine forest as a target to convert to longleaf and shortleaf pines to accomplish those species respective ecosystem restoration goals and objectives. Other communities such as upland hardwoods and mesic slope forests will also be converted from loblolly sites as well.

Objectives for Loblolly Pine Forest

At the end of the first decade of the plan:

- An estimated 351,000 acres of loblolly pine forest continue to be present on National Forest System lands.
- Approximately 15,000 acres of loblolly pine are converted to appropriate ecological systems.
- Approximately 58,000 acres of previously closed canopy loblolly pine stands are in open canopy condition to maintain forest health and sustain foraging and nesting opportunities for species.
- Approximately 500 acres (from regeneration) of loblolly pine are in the 0- to 10-year age class, and approximately 154,000 acres are in mature forest condition (60 years old or older);
- The estimated 351,000 acres of this fire-dependent ecosystem have received a fire return interval of 1 to 4 years, with approximately 45 percent of the burns conducted in the growing season.

3.2.4 Southern Loblolly-Hardwood Flatwoods

Located on: Bienville Ranger District

This ecological system represents open forests dominated by loblolly pine with patches of hardwoods on alternating mounds and depressions occurring in a tight local mosaic (gilgai), and this system only occurs on the Bienville National Forest on both mesic and xeric sites. See section 5 of appendix G of the final environmental impact statement for a site type soils crosswalk used for plan analysis.

Tree age diversity, canopy structure, and fire regime are the most important characteristics for long-term sustainability of this ecological system. These characteristics are important for management of the federally endangered red-cockaded woodpecker, which is dependent upon this system for recovery on the Bienville National Forest. Maintaining a sustainable mix of tree ages is vital to long-term stability of the system and a mature, open canopy structural condition is vital to the survival of red-cockaded woodpecker. Mature open flatwoods (including old growth) provide a variety of nesting and foraging opportunities for many species and provide adequate fine fuels to carry fire throughout the system. Frequent growing-season burns reduce woody vegetation in the understory and promote the herbaceous component, which is integral to this system. Integrated wildlife, fire, and vegetation management programs are essential to accomplish restoration of loblolly-hardwood flatwoods.

Objectives for Southern Loblolly-Hardwood Flatwoods

At the end of the first decade of the plan:

- An estimated 79,000 acres of southern loblolly-hardwood flatwoods are present on National Forest System lands.
- Approximately 20,000 acres of previously closed canopy southern loblolly-hardwood flatwoods stands are in open canopy condition to maintain forest health and sustain foraging and nesting opportunities for species.

Objectives for Southern Loblolly-Hardwood Flatwoods

- None of the 79,000 total acres of southern loblolly-hardwood flatwoods is in the 0- to 10-year age class, and approximately 52,000 acres are in mature forest condition (60 years old or older).
- The estimated 79,000 acres of this fire-dependent ecosystem have received a fire return interval of 1 to 4 years, with 40 to 45 percent of the burns conducted in the growing season.

3.2.5 Slash Pine Forest

Located on: Chickasawhay, De Soto, and Tombigbee Ranger Districts and the Yalobusha Unit of the Holly Springs Ranger District

This system represents slash pine dominated forests and woodlands in areas of natural historic occurrence and areas where this species has been planted on both appropriate and atypical locations. Therefore, slash pine occurs on xeric to wetland sites. The appropriate site types are mesic to wet. See section 5 of appendix G of the final environmental impact statement for a site type soils crosswalk used for plan analysis.

Conversion of off-site slash pine to appropriate ecological systems is a high priority for long-term sustainability. Conversion will generally occur while slash pine is in a mature structural condition. Existing slash pine forests will be managed toward the desired conditions of the ecological system to which they are being converted. Mature, open forest (including old growth) in this system provides a variety of nesting and foraging opportunities for many species and provides adequate fine fuels to carry fire throughout the system. Converting slash pine to the appropriate species emphasizes integrated wildlife, vegetation, and fire management programs. Uncertain impacts from climate change could increase the rate of change and affect the objectives for restoring native systems from slash pine forests. We have identified slash pine as a potential candidate for regeneration to longleaf pine on the Chickasawhay and De Soto where it occurs on historic longleaf pine sites. On the Yalobusha unit, we have identified slash pine as a candidate for regeneration to shortleaf pine-oak or hardwood ecological systems to accomplish ecosystem goals and objectives.

Objectives for Slash Pine Forest

At the end of the first decade of the plan:

- An estimated 110,000 acres of slash pine forest continue to be present on National Forest System lands.
- Approximately 5,000 acres of slash pine are converted to appropriate ecological systems.
- Approximately 16,000 acres of previously closed canopy slash pine stands are in open canopy condition to maintain forest health and sustain foraging and nesting opportunities for species.
- None of the approximately 110,000 total acres of slash pine are in the 0- to 10-year age class, and approximately 39,000 acres are in mature forest condition (60 years or older).
- The estimated 110,000 acres of this fire-dependent ecosystem have received a fire return interval of 1 to 4 years, with approximately 40 percent of the burns conducted in the growing season.

3.2.6 Northern Dry Upland Hardwood Forest

Located on: Holly Springs and Tombigbee Ranger Districts

This ecological system represents forests dominated by upland hardwoods occupying xeric upland slopes and ridgetops with nutrient-poor soils. See section 5 of appendix G of the final environmental impact statement for a site type soils crosswalk used for plan analysis.

Our highest priority for long-term sustainability of this ecological system is restoration of the northern dry upland hardwood forest ecological system to appropriate sites. Important ecosystem characteristics are fire regime, species composition, canopy structure, and tree age diversity. Fire is important to achieve regeneration of desired hardwood species and maintain community function. Closed canopy hardwood forests provide foraging and nesting opportunities for many species. Maintaining a sustainable mix of tree ages is vital to long-term stability of this ecological system. Mature forest (including old growth) in this system provides a variety of nesting and foraging opportunities for many species. Restoring, maintaining, and enhancing the northern dry upland hardwood forest ecological system emphasizes integrated wildlife, vegetation, and fire programs to accomplish upland hardwood restoration.

Objectives for Northern Dry Upland Hardwood Forest

At the end of the first decade of the plan:

- An estimated 56,000 acres of northern dry upland hardwood forest on National Forest System lands are present as northern dry upland hardwood forest.
- Approximately 3,000 acres of the existing 56,000 acres of northern dry upland hardwood forest are in regeneration contributing to forest health by maintaining tree age diversity.
- Approximately 1,600 acres of northern dry upland hardwood forest exist on sites formerly occupied by loblolly pine forest increasing the relative abundance of this system on the landscape to 56,000 acres.
- Approximately 1,700 acres of northern dry upland hardwood forest have reduced overstory density and a species composition shifted toward desired characteristic species for this ecological system.
- Approximately 3,200 acres of the 56,000 total acres of northern dry upland hardwood forest are in the 0- to 10-year age class (from conversion and regeneration), and approximately 53,000 acres are in mature forest condition (60 years old or older).
- The estimated 56,000 acres of this ecosystem have received a fire return interval of 1 to 6 years, with 15 to 25 percent of the burns conducted in the growing season.

3.2.7 Southern Dry Upland Hardwood Forest

Located on: De Soto, Chickasawhay, Homochitto, and Bienville Ranger Districts

This ecological system represents forests dominated by upland hardwoods. It occurs on xeric or intermediate -acidic soils in naturally fire-protected landscapes. See section 5 of appendix G of the final environmental impact statement for a site type soils crosswalk used for plan analysis.

Maintenance of the southern dry upland hardwood forest ecological system on appropriate sites is important for long-term sustainability of this ecological system. Fire regime, canopy structure and tree age diversity are important ecosystem characteristics fundamental to long-term sustainability of this ecological system. While the system did not burn frequently, it does exist within the matrix

of fire-maintained ecosystems, and fire is an important tool for maintaining vegetative composition. Our strategy is to restore this ecosystem to a 1- to 6-year fire return interval, allowing low-intensity fires to creep into the system from adjacent areas. Closed canopy hardwood forests provide foraging and nesting opportunities for many species. Maintaining a sustainable mix of tree ages is vital to long-term stability of the ecological system. Maintaining and enhancing the southern dry upland hardwood forest ecological system emphasizes using natural processes to reach the desired conditions.

Objectives for Southern Dry Upland Hardwood Forest

At the end of the first decade of the plan:

- An estimated 49,000 acres of southern dry upland hardwood forest on National Forest System lands continue to be present as southern dry upland hardwood forest.
- Approximately 46,000 acres of the 49,000 total acres are in mature forest condition (60 years old or older).

3.2.8 Southern Loess Bluff Forest

Located on: Homochitto Ranger District

This ecological system represents forests dominated by a mix of hardwood species occurring on loess soil. See section 5 of appendix G of the final environmental impact statement for a site type soils crosswalk used for plan analysis.

Relative abundance of the southern loess bluff forest on loess soils is the most important characteristic of this system due to its conversion to other forest types in the past. Our highest priority for long-term sustainability of this ecological system is restoration of the southern loess bluff forest ecological system on appropriate sites. Characteristics important to species diversity and long-term sustainability of this ecological system are canopy structure, tree age diversity, and fire regime. Mature closed canopy hardwood forests (including old growth) provide foraging and nesting opportunities for many species. Maintaining a sustainable mix of tree ages is vital to long-term stability of the ecological system. While the system did not burn frequently, it does exist within the matrix of a fire-maintained ecosystem. Our strategy is to restore this ecosystem to a 6- to 20-year fire return interval, allowing low-intensity fires to creep into the system from adjacent areas. Restoring, maintaining, and enhancing the southern loess bluff forest ecological system emphasizes using natural processes to reach the desired conditions. However, an integrated vegetation management approach is necessary to promote oak regeneration and conversion to this ecological system over time.

Objectives for Southern Loess Bluff Forest

At the end of the first decade of the plan:

- An estimated 3,000 acres of southern loess bluff forest on National Forest System lands continue to be present as southern loess bluff forest.
- Approximately 500 acres of southern loess bluff forest exist on sites formerly occupied by loblolly pine forest.
- Approximately 500 acres of the 3,600 total acres of southern loess bluff forest are in the 0- to 10-year age class (from conversion).

3.2.9 Southern Mesic Slope Forest

Located on: De Soto, Chickasawhay, Homochitto, and Bienville Ranger Districts

This ecological system represents forests dominated by hardwoods occurring on steep mesic slopes, bluffs, or sheltered ravines where fire is naturally rare. See section 5 of appendix G of the final environmental impact statement for a site type soils crosswalk used for plan analysis.

Abundance of the southern mesic slope forest is the most important characteristic of this system due to its conversion to other forest types over the past century. Restoration of the southern mesic slope forest ecological system on appropriate sites is the highest priority for long-term sustainability of this ecological system. Fire regime and canopy structure are characteristics important to species diversity and long-term sustainability of this ecological system and its associated components. Low-intensity fire is important to achieve regeneration of desired hardwood species and maintain community function. While this system did not burn frequently, it does exist within the matrix of a fire-maintained ecosystem, and fire is an important tool for maintaining vegetative composition. Our strategy is to restore this ecosystem to a 1- to 6-year fire return interval, allowing low-intensity fires to creep into the system from adjacent areas. Closed canopy hardwood forests provide foraging and nesting opportunities for many species. Restoring, maintaining, and enhancing the southern mesic slope forest ecological system emphasizes using natural processes to reach the desired conditions.

Objectives for Southern Mesic Slope Forest

At the end of the first decade of the plan:

- An estimated 17,000 acres of southern mesic slope forest on National Forest System lands continue to be present as southern mesic slope forest.
- Approximately 1,000 acres of southern mesic slope forest exist on sites formerly occupied by loblolly pine and slash pine forest.
- Approximately 1,000 acres of the 17,000 total acres of southern mesic slope forest are in the 0- to 10-year age class (from conversion), and approximately 15,000 acres are in mature forest condition (60 years old or older).

3.2.10 Northern Mesic Hardwood Forest

Located on: Holly Springs and Tombigbee Ranger Districts

This ecological system represents forests dominated by hardwoods occurring on mesic slopes and ravines between dry uplands and stream bottoms. See section 5 of appendix G of the final environmental impact statement for a site type soils crosswalk used for plan analysis.

Abundance of the northern mesic hardwood forest is the most important characteristic of this system due to its conversion to other forest types over the past century. Our highest priority for long-term sustainability of this ecological system is restoration of the northern mesic hardwood forest ecological system on appropriate sites. Fire regime and canopy structure are characteristics important to species diversity and long-term sustainability of this ecological system and its associated components. Low-intensity fire is important to achieve regeneration of desired hardwood species and maintain community function. While this system did not burn frequently, it does exist within the matrix of a fire-maintained ecosystem, and fire is an important tool for maintaining vegetative composition. Our strategy is to restore this ecosystem to a 1- to 6-year fire return interval, allowing low-intensity fires to creep into the system from adjacent areas. Closed

canopy hardwood forests provide foraging and nesting opportunities for many species. Our strategy for restoring, maintaining, and enhancing the northern mesic hardwood forest ecological system emphasizes an integrated vegetation management program to accomplish mesic hardwood restoration.

Objectives for Northern Mesic Hardwood Forest

At the end of the first decade of the plan:

- An estimated 3,900 acres of northern mesic hardwood forest on National Forest System lands continue to be present as northern mesic hardwood forest.
- Approximately 200 acres of northern mesic hardwood forest exist on sites formerly occupied by loblolly pine.
- Approximately 100 acres of northern mesic hardwood forest have improved species composition to maintain forest health and sustain foraging and nesting opportunities for species.
- Approximately 400 acres of the 4,400 total acres of northern mesic hardwood forest are in the 0- to 10-year age class (from conversion), and approximately 3,000 acres are in mature forest condition (60 years old or older).

3.2.11 Floodplain Forest

Located on: all ranger districts except the Delta Ranger District

This ecological system represents forests dominated by bottomland hardwoods occurring on alluvial soils in riparian areas. See section 5 of appendix G of the final environmental impact statement for a site type soils crosswalk used for plan analysis.

Our highest priority for long-term sustainability of this ecological system is maintenance and improvement of species composition of the floodplain forest ecological system on appropriate sites. Abundance is an important characteristic of this system due to its conversion to other forest types over the past century. Closed canopy structure is an important characteristic to species diversity and long-term sustainability of this ecological system and its associated components. A predominately closed-canopy hardwood forest provides foraging and nesting opportunities for many species. Maintaining a sustainable mix of tree ages is vital to long-term stability of the ecological system. Natural processes will contribute significantly to attaining the desired conditions within this system, and low-intensity fires may creep into the system from adjacent areas. Over time, an integrated vegetation management approach will promote desirable hardwood composition and conversion to this ecological system.

Objectives for Floodplain Forest

At the end of the first decade of the plan:

- An estimated 97,000 acres of floodplain forest on National Forest System lands continue to be present as floodplain forest.
- Approximately 1,000 acres of floodplain forest exist on sites formerly occupied by loblolly and shortleaf pine.

Objectives for Floodplain Forest

- Approximately 600 acres of floodplain forest have reduced overstory density and a species composition shifted toward desired characteristic species for this ecological system to maintain forest health and sustain foraging and nesting opportunities for species.
- Approximately 1,300 acres of the 97,000 total acres of floodplain forest are in the 0- to 10-year age class (from conversion), and approximately 88,000 acres are in mature forest condition (60 years old or older).

3.2.12 Lower Mississippi River Bottomland and Floodplain Forest

Located on: Delta Ranger District

This ecological system represents forests dominated by bottomland hardwoods occurring on the Mississippi River alluvial plain. See section 5 of appendix G of the final environmental impact statement for a site type soils crosswalk used for plan analysis.

Our highest priority for long-term sustainability of this ecological system is maintenance and improvement of species composition of the lower Mississippi River bottomland and floodplain forest on appropriate sites. Canopy structure and tree age diversity are two principal ecosystem characteristics important to species diversity and long-term sustainability of this ecological system and its associated components. Mature closed-canopy hardwood forests provide foraging and nesting opportunities for many species. A sustainable mix of tree ages is vital to the long-term stability of the ecological system. Our strategy for restoring, maintaining, and enhancing the lower Mississippi River bottomland and floodplain forest will emphasize using an integrated vegetation management approach to improve species composition and maintain mature structural condition, and low intensity fires may be utilized to accomplish ecosystem objectives.

Objectives for Lower Mississippi River Bottomland and Floodplain Forest

At the end of the first decade of the plan:

- An estimated 59,000 acres of lower Mississippi River bottomland and floodplain forest on National Forest System lands continue to be present as lower Mississippi River bottomland and floodplain forest;
- Approximately 1,400 acres of lower Mississippi River bottomland and floodplain forest are in regeneration contributing to forest health by maintaining tree age diversity.
- Approximately 6,500 acres of lower Mississippi River bottomland and floodplain forest have improved species composition to maintain forest health and sustain foraging and nesting opportunities for species.
- Approximately 1,400 acres of the 59,000 total acres of floodplain forest are in the 0- to 10-year age class (from regeneration), and approximately 42,000 acres are in mature forest condition (60 years old or older).

3.2.13 Near-coast Pine Flatwoods

Located on: De Soto Ranger District

This ecological system represents sparse woodlands dominated by longleaf and slash pine with scattered loblolly pine, and predominately occurs on non-riverine hydric soil site types. See section 5 of appendix G of the final environmental impact statement for a site type soils crosswalk used for plan analysis.

Near-coast pine flatwoods currently occupy 18,000 acres on the National Forests in Mississippi. Canopy structure is the most important characteristic to species diversity and long-term sustainability of this ecological system because it has been greatly altered by past forest management practices. Open conditions with widely scattered longleaf and slash pine trees are critical to the long-term sustainability of this system providing ideal conditions for threatened, endangered, sensitive, and locally rare species to flourish. Species diversity and richness are dependent upon fire to maintain open conditions and floristic composition. Our strategy for restoring, maintaining, and enhancing the near-coast pine flatwoods ecological system emphasizes using both natural processes and an integrated fire and vegetation management program. Maintaining adequate water levels is integral to maintain this system.

Objectives for Near-Coast Pine Flatwoods

At the end of the first decade of the plan:

- An estimated 17,000 acres of near-coast pine flatwoods on National Forest System lands continues to be present as near-coast pine flatwoods.
- Approximately 200 acres of near-coast pine flatwoods are in open condition to increase species diversity and vegetative composition.
- Approximately 1,000 acres of previously near-coast pine flatwoods are in wet pine savanna.
- The estimated 17,000 acres of this fire-dependent ecosystem have received a fire return interval of 1 to 4 years, with approximately 40 percent of the burns conducted in the growing season.

3.2.14 Xeric Sandhills

Located on: Chickasawhay and De Soto Ranger Districts

This rare ecological system represents sandhills characterized by xeric deep, well-drained sands. See section 5 of appendix G of the final environmental impact statement for a site type soils crosswalk used for plan analysis.

Fire regime and canopy structure are the most important characteristics for restoring and maintaining the xeric sandhills ecological system. Restoration objectives for xeric sandhills are included in conversion of loblolly and slash pine forest to upland longleaf pine forest and woodland. Xeric sandhills should be given priority when applying treatments within longleaf pine systems because they support the federally threatened gopher tortoise and its associated species. Frequent growing-season burns reduce woody vegetation in the understory and promote the herbaceous component, which is integral to this system.

Objectives for Xeric Sandhills
Objectives for this ecological system are stated within the objectives for longleaf pine forest and woodland ecological system.

3.2.15 Black Belt Calcareous Prairie and Woodland

Located on: Trace Unit of the Tombigbee Ranger District

This rare ecological system represents open grassy areas dominated by characteristic prairie species. See section 5 of appendix G of the final environmental impact statement for a site type soils crosswalk used for plan analysis.

Within this grassland matrix, woody vegetation occurs sparingly in stream bottoms and hilltops with caps of acid soil. Abundance of black belt prairie is the most important characteristic of this ecological system. Removal of canopy species on prairie soils to create open conditions is the highest priority to ensure the long-term sustainability of the system. Frequent growing-season burns reduce woody vegetation and promote the herbaceous component, which is integral to this system.

Objectives for Black Belt Calcareous Prairie and Woodland
At the end of the first decade of the plan: • An estimated 600 acres of black belt calcareous prairie and woodland on National Forest System lands continue to be present as black belt calcareous prairie and woodland. • Approximately 350 acres of black belt prairie exist on sites formerly occupied by loblolly pine and upland hardwood. • The estimated 600 acres of this system have improved species composition. • The estimated 600 acres of this ecosystem have received a fire return interval of 1-3 years, with 40 percent of the burns conducted in the growing season.

3.2.16 Jackson Prairie and Woodland

Located on: Bienville Ranger District

This rare ecological system represents open grassy areas dominated by characteristic prairie species. Jackson prairie occurs as calcareous islands (less than 1 to 160 acres) on gently sloping uplands surrounded by pine and hardwood forest on generally acid soils. See section 5 of appendix G of the final environmental impact statement for a site type soils crosswalk used for plan analysis.

Abundance of Jackson prairie is the most important characteristic of this ecological system. Removal of canopy species on prairie soils to create open conditions is the highest priority to ensure the long-term sustainability of the system. Frequent growing-season burns reduce woody vegetation and promote the herbaceous component, which is integral to this system.

Objectives for Jackson Prairie and Woodland
At the end of the first decade of the plan: • An estimated 1,200 acres of Jackson prairie on National Forest System lands continue to be present as Jackson Prairie. • Approximately 1,000 acres of Jackson prairie exist on sites formerly occupied by loblolly pine and upland hardwood. • The estimated 1,200 acres have improved species composition; • The estimated 1,200 acres of this ecosystem have received a fire return interval of 1-3 years, with approximately 40 percent of the burns conducted in the growing season.

3.2.17 Wet Pine Savanna

Located on: De Soto Ranger District

This rare wetland system represents open savannas dominated by grasses, sedges, orchids, and carnivorous plants, and is located on low, flat plains with poorly drained soils. See section 5 of appendix G of the final environmental impact statement for a site type soils crosswalk used for plan analysis.

Abundance of this system on the landscape is the most important characteristic for long-term sustainability of the system. Removing canopy species to create open conditions supports the federally endangered Mississippi sandhill crane. Frequent growing-season burns reduce woody vegetation in the understory and promote the herbaceous component, which is integral to this system. Maintaining adequate water levels is integral to maintain this system.

Objectives for Wet Pine Savanna
At the end of the first decade of the plan: • Approximately 1,000 acres of wet pine savanna exist on sites formerly occupied by other ecosystem types contributing to an increase of relative abundance of this system on the landscape to approximately 1,000 acres. • The estimated 1,000 acres of this ecosystem have received a fire return interval of 1-4 years, with 25 to 30 percent of the burns conducted in the growing season for the first 5 years and over 30 percent in the growing season over the next 5 to 10 years.

3.2.18 Herbaceous Seepage Bog and Flats

Located on: Chickasawhay and De Soto Ranger Districts

This rare wetland system represents open seepage communities dominated by grasses, sedges, orchids, and carnivorous plants. These wetlands are generally found on gentle, almost imperceptible slopes maintained by constant seepage zones or perched water tables. See section 5 of appendix G of the FEIS for a site type soils crosswalk used for plan analysis.

Abundance of this system on the landscape is the most important characteristic for long-term sustainability of the system. Removing canopy species to create open conditions supports threatened, endangered, sensitive, and locally rare species. Frequent growing-season burns reduce woody vegetation in the understory and promote the herbaceous component, which is integral to

this system. Maintaining adequate water levels is integral to maintain this system. Uncertain patterns of precipitation due to climate change could increase or decrease the extent and the rate of change in this system.

Objectives for Herbaceous Seepage Bogs and Flats

At the end of the first decade of the plan:

- Approximately 6,000 acres of herbaceous seepage bogs and flats exist on National Forest System lands, some of which are restored from sites formerly occupied by pine forests;
- The estimated 6,000 acres of this ecosystem have received a fire return interval of 1 to 4 years, with 25 to 30 percent of the burns conducted in the growing season for the first 5 years and over 30 percent in the growing season over the next 5 to 10 years.

3.2.19 Rivers and Streams

Located on: all ranger districts

Our strategy for restoring, maintaining, and enhancing rivers and streams emphasizes maintaining water quality and stream restoration. Maintenance and restoration efforts cooperate with all program areas to achieve the desired conditions. Introduction of coarse woody debris is important for sustaining species diversity within rivers and streams.

Objectives for Rivers and Streams

The annual outcome is improvement of a minimum of 3 miles of stream habitat towards desired conditions.

3.2.20 Lakes and Permanent Ponds

Located on: all ranger districts

Our strategy for restoring, maintaining, and enhancing lakes and permanent ponds emphasizes maintaining water quality and lake and permanent pond enhancement. Fisheries management provides fishing opportunities to the public. Management practices include improving access for anglers, liming and fertilization, controlling aquatic weeds, improving fish habitat, and fish stocking. Maintenance and restoration efforts cooperate with all program areas to achieve desired conditions.

Objectives for Lakes and Permanent Ponds

The annual outcome is improvement of a minimum of 1,000 acres of lake habitat towards desired conditions.

3.2.21 Other Ecological Systems

The following ecological systems share common strategies and are presented here as a group: rock outcrops; ponds and emergent wetlands; cypress-dominated wetlands; and seeps, springs, and seepage swamps. There are no current objectives for these systems; however, forest strategy emphasizes inventory and mapping of these small, embedded communities. Complete inventories are vital to protect and manage these rare communities. Our wildlife program strategy emphasizes using rapid assessment protocols to assess the condition of vegetation species composition and structure, hydrologic integrity, and effects of fire. Standards and guidelines to buffer rock outcrops with mature forest and limit management activities within their immediate area will help us reach and maintain desired conditions. Standards and guidelines to protect hydrologic function, structure, and composition within the wetland systems will help us reach and maintain the desired conditions in those areas.

3.3 Species Diversity

As noted throughout the plan, managing for ecosystem diversity is integral to providing appropriate ecological conditions for a diversity of plant and animal species. In addition to relying on management strategies for ecosystem diversity, species habitat conditions are dependent on a variety of integrated resources and management activities. Management strategies for soils, water, fire regimes, vegetation management, infrastructure, and other resource areas also contribute to healthy conditions for a diversity of plants and animals.

While developing this plan, the iterative series of screenings and evaluations that we conducted to identify ecosystems and species that could occur on the National Forests in Mississippi included an assessment of whether species needs and habitats were covered and protected within the direction of this plan. Most species needs were covered by plan direction for ecosystem diversity and documented in the final environmental impact statement. However, in some circumstances, species required additional plan direction specific to their needs or were addressed in the desired conditions, objectives, or standards and guidelines developed for other resource areas. These species and the plan direction that addresses their needs are also described and documented in the final environmental impact statement. All species on the threatened and endangered, sensitive, and locally rare species lists were addressed in the plan through this collective combination of plan direction.

Our management strategies for sustaining species diversity emphasize providing ecological conditions that: (1) protect and promote improved habitat conditions for federally listed species and (2) support a diversity of native plant and animal species over the long term. The overall approach for managing species diversity is similar to that used for ecosystem diversity and focuses on restoring composition, structure, and relative abundance while reducing invasive species. Healthy, functioning ecosystems support species diversity and contribute to the conservation of threatened, endangered, sensitive, and locally rare species. Restoration efforts will emphasize returning native ecological systems to appropriate sites and restoring historic fire regimes to the landscape. Species diversity is achieved in cooperation with State, Federal, and private partners.

Protection and promotion of threatened and endangered species drive much of the plan direction and are a fundamental part of our overall management strategies for species diversity. Red-cockaded woodpecker is the only federally listed species with specific population objectives. The four habitat management areas that contain red-cockaded woodpecker populations are described below, and specific plan component objectives for red-cockaded woodpecker are listed on page 63.

Although the dusky gopher frog has no established recovery plan, our management strategy for this species is to work collaboratively with our partners to develop a plan. Critical habitat, however, was designated for the dusky gopher frog on June 12, 2012 which includes seven areas within DeSoto Ranger District. These areas include habitat surrounding Glen's Pond and associated ponds, Carr Bridge Road Pond, the Ashe Nursery ponds, and three ponds in the Mars Hill area of Perry County. Cooperative management units were created to better emphasize management for both the dusky gopher frog and the Mississippi sandhill crane. The Forest Service's strategy is to follow the established recovery plans for all threatened and endangered species. Where recovery plans do not provide sufficient detail for appropriate management of the species, conservation plans for endangered and threatened species should be developed in consultation with the U.S. Fish and Wildlife Service, in accordance with Section 7(a)(1) of the Endangered Species Act.

Our management strategies for sustaining species diversity emphasize providing ecological conditions that protect and promote improved habitat conditions for federally listed species and support a diversity of native plant and animal species over the long term.

Another focus of our habitat management programs is on demand species associated with recreational wildlife pursuits such as hunting, fishing, and viewing. Because these activities are generally limited or restricted on private lands, the National Forests in Mississippi offer a unique opportunity within the state for those wishing to participate in these activities. Wildlife providing these opportunities include white-tailed deer, eastern wild turkey, fox and gray squirrels, northern bobwhite, eastern bluebird, and a diversity of neotropical migratory birds passing through during migration. Partnerships with other agencies and conservation partners are important in providing a variety of appropriate wildlife habitat. The National Forests in Mississippi have 14 wildlife management areas that are managed under a cooperative agreement between the USDA Forest Service and the Mississippi Department of Wildlife, Fisheries, and Parks (MDWFP). Our staff also conducts activities and programs to assist in identification, conservation, and recovery of threatened and endangered plant and animal species in cooperation with the USDI Fish and Wildlife Service and the MDWFP.

Since federally listed threatened and endangered species have additional mandates guiding their management, they are considered individually in the forest plan, as well as within the context of their respective ecological systems. Plan components for species diversity (such as desired conditions, objectives, and guidelines) also provide additional support for long-term sustainability of threatened and endangered species. Some guidelines within the plan are specific to threatened and endangered species, while most encompass needs and protection of threatened and endangered species along with other species and their associated ecological systems. Table 4 identifies some of the additional objectives included in the plan to support individual threatened and endangered species.

Special areas also support species diversity by designating distinctive locations with natural features and settings that are managed for botanical or research values. In many cases, these areas conserve desired native ecosystems and rare communities that support threatened and endangered species. During consideration of the need for additional plan components to enhance habitat conditions or reduce threats, we included threatened and endangered species in evaluations for species groups. Some of these species groups were analyzed at a macrohabitat scale, which included multiple ecological systems, while other groups were considered at a microhabitat scale that reflected species associated with local features or site conditions that crossed ecological systems.

Table 4. Threatened and endangered species, associated ecological systems, and objectives

Species	Ecosystem	Forest Plan Objectives
Red-cockaded Woodpecker	All pine dominated ecological systems occurring on the Bienville, Chickasawhay, De Soto, and Homochitto National Forests.	Improve structural condition to create open canopy conditions in mature and old-growth pine forests and woodlands with 1- to 3-year fire intervals. Improve structural condition to create open canopy conditions in mature and old-growth pine forests and woodlands and maintain an understory by fire.
Gopher Tortoise	Upland longleaf pine forest and woodland and the embedded xeric sandhills.	Restore and improve canopy conditions on priority soils and surrounding areas to the acreage with 1- to 3-year fire intervals.
Mississippi Sandhill Crane	Wet Pine Savanna	Restore near-coast pine flatwoods to an open condition.
Dusky Gopher Frog	All pine dominated ecological systems and ponds and emergent wetlands occurring on the De Soto National Forest.	Restore and improve canopy conditions and conversion to appropriate ecological system with 1- to 3-year fire intervals and management of embedded ponds and emergent wetlands.
Indiana Bat	Floodplain, riparian, lowland, and upland ecosystems and ponds and emergent wetlands occurring on the Holly Springs Ranger District.	Manage naturally occurring tree species composition to provide a continuous supply of suitable roost trees and foraging habitat for Indiana bats. Achieve vegetative diversity that maintains or improves Indiana bats habitat. Where consistent with management prescription emphasis, use a variety of silvicultural methods to create desired age class diversity.
Louisiana Black Bear	Lower Mississippi River bottomland and floodplain forest and embedded cypress dominated wetlands.	Manage and improve species composition of ecological system and management of embedded cypress dominated wetlands.
Pallid Sturgeon	Rivers and streams	Improve stream habitat, stream channel habitat and watersheds.
Gulf Sturgeon	Rivers and streams	Improve stream habitat, stream channel habitat and watersheds.
Louisiana Quillwort	Rivers and streams	Improve stream habitat, stream channel habitat and watersheds.
Pondberry	Lower Mississippi River bottomland and floodplain forest.	Manage and improve species composition of ecological system.

The following subsections describe the habitat management areas and our management approach for red-cockaded woodpecker, the objectives that specifically focus on increasing populations for red-cockaded woodpecker, our management strategy for dusky gopher frog since it does not yet have a recovery plan, and a description of the cooperative management units for both the dusky gopher frog and Mississippi sandhill crane.

3.3.2 Red-cockaded Woodpecker Habitat Management Areas

Red-cockaded woodpecker habitat management areas, as described in the "Final Environmental Impact Statement for the Management of the Red-cockaded Woodpecker and its Habitat on National Forest Lands in the Southern Region" (USDA Forest Service 1995), have been designated for each ranger district where birds are currently found (Bienville, Chickasawhay, De Soto, and Homochitto). Red-cockaded woodpecker habitat management area designation involves the delineation of an area that represents the desired future demographic configuration of a red-cockaded woodpecker population. It is a strategy of management at a landscape scale. Our intent is to manage an area large enough to avoid or overcome the adverse effects of habitat fragmentation and to reduce the risks involved with small populations. The area within habitat management areas and outside of cluster, recruitment stand, and replacement stand boundaries will be managed for a full range of multiple uses, but would emphasize the sustainable production of red-cockaded woodpecker foraging and future nesting habitat. The basic strategy to maintain a healthy population of red-cockaded woodpeckers is to provide sufficient old pine trees that are suitable for nesting cavities and sufficient mature pine forest suitable for foraging with little midstory. Each unit listed below has unique red-cockaded woodpecker population and delisting objectives. The FEIS was used to define the strategy for the habitat management areas while the most current U.S. Fish and Wildlife Service recovery plan for the species (2003) will be used to define habitat management strategy, population management guidance and goals, and monitoring guidance.

Bienville National Forest Red-cockaded Woodpecker Management Strategy

The Bienville National Forest currently supports a population of red-cockaded woodpeckers. The U.S. Fish and Wildlife Service recovery plan for the species identifies the Bienville National Forest as playing a significant role in species recovery. The Bienville red-cockaded woodpecker population has been designated as a "primary core" population with a delisting population goal of 350 potential breeding groups. All suitable pine forest types on the Bienville National Forest are included for management as a red-cockaded woodpecker habitat management area. The habitat management area population objective is 500 active clusters of red-cockaded woodpeckers. The determination of red-cockaded woodpecker habitat management areas is important to ensure that population objectives are met for long-term species recovery. Our red-cockaded woodpecker management strategy for the Bienville National Forest is to create and maintain an open loblolly pine forest containing a sparse midstory and an understory consisting of a diversity of grasses and forbs maintained by fire.

Chickasawhay Ranger District (De Soto National Forest) Red-cockaded Woodpecker Management Strategy

The Chickasawhay Ranger District currently supports a population of red-cockaded woodpeckers and also has been identified as playing a significant role in species recovery by the U.S. Fish and Wildlife Service recovery plan. The Chickasawhay red-cockaded woodpecker population has been designated as a "primary core" population with a delisting population goal of 350 potential breeding groups. All suitable pine forest types on the Chickasawhay Ranger District are included for management as a red-cockaded woodpecker habitat management area. The habitat management area population objective is 502 active clusters of red-cockaded woodpeckers. The determination of red-cockaded woodpecker habitat management areas is important to insure that

population objectives are met for long-term species recovery. Our red-cockaded woodpecker strategy for the Chickasawhay Ranger District is to restore an open longleaf pine ecosystem consisting of a sparse scrub oak midstory and a grass understory maintained by fire.

De Soto Ranger District (De Soto National Forest) Red-cockaded Woodpecker Management Strategy

The De Soto Ranger District currently supports a population of red-cockaded woodpeckers and also has been identified as playing a significant role in species recovery by the U.S. Fish and Wildlife Service recovery plan. The De Soto red-cockaded woodpecker population has been designated as a "secondary core" population with a delisting population goal of 250 potential breeding groups. Two red-cockaded woodpecker habitat management areas, have been identified for the De Soto Ranger District (appendix F, map 21 and map 28). The total population objective for the two HMAs is 376 active clusters of red-cockaded woodpeckers. The determination of red-cockaded woodpecker habitat management areas is important to insure that population objectives are met for long-term species recovery. Our red-cockaded woodpecker strategy for the De Soto Ranger District is restoration of an open longleaf pine ecosystem consisting of a sparse scrub oak midstory and a grass understory maintained by fire.

Homochitto National Forest Red-cockaded Woodpecker Management Strategy

The Homochitto National Forest currently supports a rapidly expanding population of red-cockaded woodpeckers and has been identified as playing a significant role in species recovery by the U.S. Fish and Wildlife Service recovery plan. The Homochitto red-cockaded woodpecker population has been designated as a "secondary core" population with a delisting population goal of 250 potential breeding groups. A red-cockaded woodpecker habitat management area has been identified for the Homochitto National Forest as depicted in appendix F, map 47. The habitat management area population objective is 276 active clusters of red-cockaded woodpeckers. The determination of red-cockaded woodpecker habitat management areas is important to insure that population objectives are met for long-term species recovery. Our red-cockaded woodpecker strategy for the Homochitto National Forest is to restore an open longleaf pine ecosystem consisting of a sparse hardwood midstory and an understory containing grasses and forbs maintained by fire.

Red-cockaded Woodpecker Habitat Management Area Objectives

At the end of 5 years:

- On the Bienville National Forest, red-cockaded woodpecker populations exhibit a 5 percent average annual increase from the 2005 population of 95 active clusters.
- On the Chickasawhay Ranger District, red-cockaded woodpecker populations exhibit a 5 percent average annual increase from the 2005 population of 21 active clusters.
- On the De Soto Ranger District, red-cockaded woodpecker populations exhibit a 5 percent average annual increase from the 2005 population of 20 active clusters.
- On the Homochitto National Forest, red-cockaded woodpecker populations exhibit a 5 percent average annual increase from the 2005 population of 70 active clusters.

3.3.4 Dusky Gopher Frog Cooperative Management Unit

The dusky gopher frog requires special attention beyond that provided by its associated ecological system, ephemeral ponds and emergent wetlands. Our management strategy for protection of the frog and restoration of frog habitat will be guided by the memorandum of understanding between the Forest Service, the U.S. fish and Wildlife Service, and Mississippi Department of Wildlife Fish and Parks. A 1,655-acre dusky gopher frog cooperative management unit has been designated in the southern portion of De Soto Ranger District, which encompasses Glen's Pond and surrounding habitat. This area of the district contains the only known breeding population of the dusky gopher frog in 2012. In 2013, dusky gopher frogs bred at Pony Ranch Pond. These frogs are part of the Glen's Pond population, but this new site indicates the beginnings of the establishment of a metapopulation, which was the intent of the management that has been on-going by the Forest Service on DeSoto Ranger District. The establishment of this cooperative management unit would assist in further management of this species by creating a focus point for management needs including restoration of longleaf pine, protection of Glen's pond and its hydrology, invasive species management, and prescribed fire. The continuity of habitat over a large area should focus management, preclude isolation, and allow for dispersal of the species across the landscape.

Prescribed fire is a necessary tool to manage dusky gopher frog habitat. Timing of prescribed fire is critical to minimize direct mortality of individuals. Timing prescribed fire to when individuals are less likely to be moving during a breeding period will minimize effects to the species. A burn matrix within gopher frog habitat (approximately 300 acres surrounding each breeding pond) has been developed to minimize effects of prescribed fire (table 5).

Table 5. Dusky gopher frog-prescribed burn matrix

Forest Service burn conditions**	Burn Uplands	Burn Pond Basin
Use existing standards		
Frog Parameters		
Adult frogs not in pond (Jan – Mar)	yes	no
Adult frogs in pond	no	no
Adult frogs not in pond (Apr – Sep)	yes	yes
Burning Oct-Dec	no	no
Most (> 75%) adult frogs left pond (>7 days since last movement at drift fence)	yes	no
Tadpoles present and after April 1st	no	no

** Burn parameters to be defined by Forest Service using existing standards.

3.3.6 Mississippi Sandhill Crane Cooperative Management Unit

A 3,357-acre Mississippi sandhill crane cooperative management unit has been designated in the southeast corner of De Soto Ranger District, which encompasses part of Harrison and Jackson counties and lies within 10 miles of the coastline of southern Mississippi. This area of the district once contained suitable Mississippi sandhill crane habitat, as evidenced by records of crane sightings and nests on National Forest System land. The nearly 20,000-acre Mississippi Sandhill Crane Wildlife Refuge is located only a few miles from this area. The establishment of a cooperative management unit in this southeast corner will assist with further management of this species by increasing the spatial extent of the species' range. This includes increased nesting and foraging habitat and creating habitat through ecosystem restoration of wet pine savannah, seeps, springs, and seepage swamps, and creation of ephemeral ponds and wetlands. The size and location of the cooperative management unit was dependent on the amount of potential wet pine savanna in contiguous blocks and distance from the Mississippi Sandhill Crane Refuge. The continuity of crane habitat over large areas should preclude isolation and allow for dispersal of the species across the landscape.

Prescribed burning, mechanical clearing, thinning, and restoration of habitat and hydrology will effectively restore and maintain open savanna. Restoring Mississippi sandhill crane habitat on the De Soto Ranger District will promote recovery of the species and promote effective collaboration with the U.S. Fish and Wildlife Service as they work to maintain crane habitat on the nearby refuge.

3.3.7 Management Indicator Species

Under the National Forest Management Act (1976), the Forest Service is charged with managing national forests to provide for a diversity of plant and animal communities consistent with multiple-use objectives. Management indicator species are one tool used to accomplish this requirement as they and their habitat needs are used to set objectives and minimum management requirements, to focus effects analysis, and to monitor effects of plan implementation. Management indicator species represent species for which population viability is a concern, and serve as ecological indicators of certain communities or habitats.

The National Forest Management Act intends use of management indicator species, in part, to ensure that National Forest lands are managed to "maintain viable populations of existing native and desirable nonnative vertebrate species." Because indicator species cannot adequately represent all species, new strategies are emerging for accomplishing this goal. This analysis uses habitat availability for management indicator species to ensure that a mix of habitat types is provided across the landscape.

We have selected the following species as management indicator species because their population changes are believed to indicate the effects of management activities. Objectives for use of these management indicator species are shown below.

Management Indicator Species Objectives	
Species Names	**Indicators of Management Effectiveness**
Largemouth bass	Maintain a healthy, balanced population structure of this species that will serve as an indicator of effectiveness of management practices such as liming, fertilizing, and spawning habitat improvement on recreational fishing opportunities.
Longleaf pine	Plant or improve approximately 38,500 acres of longleaf pine per decade. This will serve as an indicator of longleaf pine ecosystem restoration on the National Forests in Mississippi.
Red-cockaded woodpecker	Red-cockaded woodpecker populations on habitat management areas exhibit a 5 percent average annual increase from 2005 populations. This will serve as an indication of red-cockaded woodpecker habitat improvement.
Southern pine beetle	Reduce population levels of this species that will serve as an indicator of forest health and effectiveness of management practices such as site and soil-based species selection, appropriate fire cycles, and thinning overstocked stands.
Pileated woodpecker	Maintain or improve populations of this species that will serve as an indicator of effectiveness of management practices such as retention of mature forests and retention of snags and cavities.
Wood thrush	Maintain or improve populations of this species that will serve as an indicator of effectiveness of minimizing “edge” in the implementation of vegetation management program.

Largemouth Bass (*Micropterus salmoides*)

Many management practices such as liming, fertilizing, and spawning habitat improvement are focused on providing recreational fishing opportunities on the National Forests in Mississippi. Largemouth bass is the principal predator in most lakes and is a demand species in the Forests. Population structure of this species has been a good indicator the effectiveness of Forest Service management activities.

Longleaf Pine (*Pinus palustris*)

This species was selected to measure the effectiveness of management to restore the longleaf pine ecosystem. Measure of effectiveness is by number of acres of longleaf pine planted by year and number of acres of longleaf pine classified in the Forest Service Vegetation Management Database (FSVEG).

Red-cockaded Woodpecker *(Picoides borealis)*

This species was selected to represent mature longleaf/yellow pine forest. The red-cockaded woodpecker is listed as federally endangered throughout its range and is dependent on national forest management for its recovery and survival. Many management practices on the National Forests in Mississippi are focused on improvement of red-cockaded woodpecker habitat (such as prescribed burning, mid-story removal, and forest thinning). There is a direct correlation between

management activities and red-cockaded woodpecker population levels. The forest has numerous years of population trend data.

Southern Pine Beetle (*Dendroctonus fontalis*)

This species was selected to measure the effects of forest management aimed at promoting forest health (e.g., site and soil-based species selection, appropriate fire cycles, and preventing or thinning of overstocked stands). Monitoring will be conducted using southern pine beetle pheromone trapping survey.

Pileated Woodpecker *(Dryocopus pileatus)*

This species was selected to represent mature forests. It is also an indicator of snag and cavity habitat. Monitoring will be by evaluating breeding bird survey and FSVEG data in conjunction with geographic information system (GIS) analysis of mature forest stands.

Wood Thrush (*Hylocichla mustelina*)

This species is known to require large tracts of unbroken forest interior for successful breeding to occur. This will measure effectiveness of minimizing “edge” in the during vegetation management. Monitoring will be by evaluating breeding bird survey and FSVEG data in conjunction with GIS analysis of mature forest stands as compared to open areas.

3.4 Healthy Watersheds

Our approach for achieving desired conditions for healthy watersheds is a combination of maintaining, restoring, and monitoring the soil, water, and air resources on the National Forests in Mississippi. National Forest System lands encompass only a small percentage of the streams and associated drainage areas within the state, and much of the impacts to water resources are due to activities upstream or downstream from the areas managed by the Forest Service. Groundwater and air quality issues also cross national forest boundaries and are affected by multiple regionwide impacts such as increased agricultural use, growing urban development, cumulative effects from regional emissions and discharge sources, and slow recovery from past actions. Therefore, our strategy is to focus on sustaining and improving watershed areas within national forest control while working cooperatively with other agencies and landowners to improve statewide watershed health.

3.4.1 Water and Aquatic Resources

Program management strategies for water and aquatic resources require an integrated approach to move toward our vision for healthy watersheds. Best management practices are typically used during ground-disturbing activities to meet water quality standards and for watershed protection. The National Forests in Mississippi has adopted, and in most cases exceeds, State best management practices when conducting projects on the national forest. Use of best management practices cross resource program areas and include such practices as establishing streamside buffer zones, restricting vegetation management activities in riparian zones, and employing erosion control measures.

As noted above, water resources can be affected by a variety of activities and uses that often reach beyond national forest boundaries and require regional solutions. Some of the most significant water quality and hydrologic concerns on the National Forests in Mississippi are these types of issues that are outside Forest Service control such as sediment loading, headcutting of streams, upstream discharges, past channelization practices, and mixed ownership patterns. To

address these issues, the National Forests in Mississippi works with other agencies, research institutions, and interested partners to collect data, monitor conditions, and collectively try to address solutions. Some of the major groups that will continue to be part of our regional watershed efforts include: the Environmental Protection Agency, the U.S. Army Corps of Engineers, U.S. Geological Survey, Department of Energy, USDI Fish and Wildlife Service, Natural Resources Conservation Service), National Oceanic and Atmospheric Administration, Mississippi Department of Environmental Quality, Mississippi Museum of Natural Science, State universities, and local watershed consortia.

Watershed management and restoration strategies include those ecosystem diversity objectives described in section 3.2 for ecological communities such as floodplain forests; lower Mississippi River bottomland and floodplain forests; rivers and streams; lakes and ponds; and other ecological systems associated with seeps, springs, and swamps. Emphasis is placed on incorporating plan direction during project planning that would seek to maintain or restore watershed health and aquatic systems, with emphasis placed on addressing the watershed stressors for which the agency has control or jurisdiction.

The National Forests in Mississippi use the watercourses within its boundaries for many beneficial uses including recreation, fish and wildlife maintenance, and instream flow or water level protection. These uses are expected to continue as part of our management strategy. Management of greentree reservoirs constructed for waterfowl habitat and sediment control is an important focus on the Delta National Forest. Providing a refuge for aquatic life that typically is not found on adjacent lands helps sustain natural habitat to support native fish and aquatic populations.

One of the most serious but difficult watershed concerns to mitigate is headcutting of streams and associated bank erosion, especially on the Homochitto, Holly Springs, Tombigbee, and Delta National Forests. The mixed land ownership patterns along stream courses, past dredging and channelization activities, lack of control over the headwaters, and complexity of feasible solutions continue to make this a difficult issue to address over most of the National Forests in Mississippi. The most viable opportunity for future headcutting restoration activities may be along Brushy Creek on the Homochitto National Forest where the Forest Service controls 80 to 90 percent of the land along this stream.

Objectives for Water and Aquatic Resources

At the end of 15 years after plan approval:

- Mitigation efforts are completed on Brushy Creek on the Homochitto National Forest to reduce stream headcutting and minimize sediment loading.

In each 5-year period after plan approval:

- Approximately 10 miles of stream channel habitat are restored in conjunction with culvert replacement to remove barriers to aquatic organism passage.

Each year after plan approval:

- Approximately 10 to 15 acres of degraded watershed areas are improved through watershed restoration projects.

(Also see objectives for restoration of water-related ecosystems in section 3.2.)

3.4.2 Soils

Soil condition on the National Forests in Mississippi can be affected by activities that disturb the soil surface such as vegetation management projects, prescribed burning, and recreation use of trails and roads. Each national forest also has distinct soil characteristics that must be managed appropriately to avoid erosion, compaction, rutting, and drainage issues. Our management strategy for protecting soil condition is to use appropriate best management practices and match national forest activities with specific soil types and topography to minimize erosion. Use of buffers to protect wetland communities, restrictions on mechanical equipment operation, use of filter strips to protect perennial and intermittent streams, installation of water diversions, and careful designing and engineering of roads and firelines are just a few of the best management practices used during ground-disturbing activities on the National Forests in Mississippi.

Knowing the soil characteristics and soil inventory information is important in delineating where different ecosystems and desired habitats occur and the appropriate locations for restoration activities. Restoration of native ecosystems and habitat for threatened and endangered species is a primary focus of this forest plan, and soil properties and conditions are an important consideration for successfully accomplishing these goals. The physical, biological, and chemical properties of soils determine the capability and success of many forest management activities, so maintaining updated soil inventories and conducting site-specific soil surveys prior to restoration activities are important strategies for attaining desired watershed conditions.

Protection and restoration of soils are primarily addressed through the application of Forest Service directives, best management practices, and meeting objectives for ecological communities. In areas on the National Forests in Mississippi where previous activities or offsite actions have resulted in deteriorating watershed conditions, our management approach for achieving healthy watersheds is to conduct targeted watershed restoration projects. Most watershed projects address old access roads where concentrations of water flow have resulted in gullies and erosion. Soil erosion also happens on steep slopes and erosive soils typical of the Homochitto and Holly Springs National Forests; although newly acquired lands on relatively flat terrains where there were lower previous soil management standards are also frequent watershed restoration targets. With the recent designation of routes for motorized vehicles, the closure and restoration of undesignated trails are expected to be part of our management strategies for improving soil conditions on the National Forests in Mississippi.

3.4.3 Air Quality

On the National Forests in Mississippi, prescribed burning is the activity most likely to contribute to air emissions. The prescribed burning levels (described in sections 3.2 and 3.5.3) associated with returning the national forests to more historic fire conditions are consistent with forestwide prescribed burn acreages in recent years. At these rates, air emissions are not expected to increase over current levels, and emissions are currently within air quality standards. Smoke management procedures and best management practices are currently used to comply with air quality standards and protect health and safety. These practices will continue to be part of our program strategy, as is cooperation with State and Federal agencies to improve regional air quality.

3.5 Healthy Forests

Our overall strategy for achieving healthy forests is to use a combination of vegetation management practices and prescribed burning to restore and maintain resilient native ecosystems. The emphasis in this plan on converting loblolly and slash pine stands that are not on appropriate sites to longleaf and shortleaf pine forests is expected to not only improve native species diversity but also improve resilience of ecological communities to nonnative invasive species, disease and insect outbreaks, extreme weather disturbances associated with climate change, and other stressors. In addition to resilience, a variety of age classes, including old growth, is needed for ecological sustainability. Also, preventive measures for reducing forest pests are more successful when the land base is more consolidated, so all the factors described in this section contribute to healthy forests.

3.5.1 Vegetation Management

Ecological restoration is the primary management emphasis of this forest plan. Restoration objectives address forest health needs through improved species composition and structural and age diversity. Forest management practices are the means for carrying out restoration goals while sustaining healthy forests that are resilient to extreme natural events and supply desired goods and services.

Resilient forest conditions are also the key to the Forests' strategy for climate change. In much of the southeastern United States, climate variability and weather events such as hurricanes, heat waves, droughts, tornadoes, floods, and lightning storms have long been part of the natural environment. However, projections of climate change impacts for the region indicate that over the coming decades, there is expected to be an increase in extreme weather events and other climate-related natural disturbances affecting the National Forests in Mississippi. Some of our strategies for addressing climate-related disturbances over the life of the plan are to:

1. reduce vulnerability by maintaining and restoring resilient native ecosystems, particularly longleaf and shortleaf pines;
2. enhance adaptation of species by reducing the effects of serious disturbances where possible and taking advantage of disruptions to convert to more resilient and desirable ecosystems;
3. use preventative measures for reducing opportunities for forest pests; and
4. mitigate greenhouse gas emissions by reducing carbon loss from hurricanes and restoring species such as longleaf pine that have higher carbon sequestration rates.

Although research is still evolving, these approaches are consistent with achieving desired conditions in the plan as well as improving resiliency to changing climate and weather conditions. For details, see "Climate Change Strategies" in appendix E.

For general forest health, our management strategies will vary somewhat across the different units and forest stands based on existing conditions such as species composition, stand density, and age classes. Also, over the life of the plan, priorities may shift to respond to changing conditions such as expansion of nonnative invasive species, southern pine beetle outbreaks, disease infestations, or storm events. Minimizing tree mortality caused by southern pine beetle outbreaks will be an important priority during the plan period. By aggressively treating southern pine beetle spots as they occur on the National Forests in Mississippi, reducing risks by thinning, and establishing less susceptible species on appropriate sites, we expect damage from outbreaks to be reduced.

Ecological restoration will take many decades to accomplish, particularly in light of current budgets and staffing levels. However, our overarching management goal is to support native ecosystem restoration across the National Forests in Mississippi. One consequence of restoration activities would be the generation of a steady volume of commercial timber that supports local, regional, and national economies. Priorities are expected to be placed on locating new stands adjacent to existing young or regenerating stands to maximize the amount of contiguous mature forest. Harvest units are also expected to be addressed in a way to avoid fragmentation.

Objectives for Vegetation Management

At the end of the first decade of plan implementation:

- At least 25,000 acres are regenerated to appropriate forest types.
- At least 20,000 acres of regenerating forest have desirable species released from competition.
- At least 20,000 acres of overly dense regenerating and young small-diameter vegetation have more desirable (lower) density.
- At least 141,000 acres of overly dense young to mature larger-diameter vegetation have more desirable density.
- Approximately 180 MMCF (900 MMBF) of commercial timber volume is removed to achieve ecological restoration and forest health objectives on lands where timber production achieves or is compatible with desired conditions and objectives.
- Approximately 3 MMCF (15 MMBF) of commercial timber volume is removed to achieve ecological restoration and forest health objectives on lands identified as not suitable for timber production.
- At least 1,800 previously infested acres are free of invasive species.
- Approximately 13,000 acres of regenerating longleaf receive sufficient fire occurrence to reduce the impacts of disease and competition on developing longleaf seedlings.

3.5.2 Old Growth

A detailed assessment of the status of old-growth conditions on the National Forests in Mississippi is described in appendix D of this plan. Areas preliminarily identified as possible old growth range in size from small (less than 100 acres) to large (over 2,500 acres) patches. The Black Creek Wilderness and the connected wild and scenic river corridor constitute the only possible large old-growth areas on the National Forests in Mississippi. Some research natural areas and other administratively designated geographic areas provide possible medium-sized old-growth patches. The remainder of the preliminary list of possible old growth is made up of small-sized patches distributed across the Forests. The current percentage of forested acres on each district included in the preliminary list of possible old growth varies from 6 to 32 percent, and the overall forest average is 10 percent.

Our forestwide strategy is to establish a network of well-distributed old growth stands in all forest and woodland ecological systems. Our goal will be to identify 10 percent of all forested ecosystems to manage for old-growth conditions. The old-growth network will consist of both small and medium-sized areas based on an evaluation of the distribution necessary to ensure the integrity of ecological functions. The following old-growth objectives are designed to help assure

the integrity of ecological function and to assure systems on the National Forests in Mississippi are sustainable.

Objectives for Old Growth
At the end of the first decade of plan implementation: • Approximately 10 percent of all forest and woodland ecological systems, in all districts, is identified for old growth or future old growth. • Approximately 10 percent of the old-growth objective is identified as medium-sized (100 to 2,500 acres) areas of old growth on each district.

3.5.3 Fire

Fire management strategies support a variety of desired conditions and objectives across the National Forests in Mississippi (see previous sections on ecosystem diversity, species diversity, and healthy forests). The fire program includes response to unplanned ignitions or wildfires as well as periodic planned prescribed burning to reduce risk of catastrophic fires, recreate historic fire regimes, restore native ecosystems, create appropriate habitat for fire-dependent and threatened and endangered species, and control invasive species and pests.

Our strategy for managing forest fuels in recent years has been to move toward historic fire conditions. In the immediate aftermath of Hurricane Katrina, prescribed burn levels in 2006 dropped significantly. Although fuel levels were removed in some stands through salvage, a large buildup of hazardous fuels remained on the national forests most impacted by Katrina, especially the De Soto National Forest. Before Katrina, the fuel loadings on the De Soto National Forest averaged 1 to 4 tons per acre, and following Katrina they were as high as 40 tons per acre. Many residual large materials have since degraded naturally, and the prescribed burning program in the southern half of the state has returned to a more normal burn cycle that concentrates on removing the more dangerous fine materials and volatile live fuels. Forestwide, prescribed burning accomplishments have returned to pre-Katrina annual acreage.

The number of acres treated each year by prescribed burning varies based on a variety of factors such as weather conditions, budget, and available staff. Changes in any of these factors or unexpected events can sometimes dramatically affect the acreage burned forestwide from year to year. Based on anticipated funding levels and capacity, we estimate that approximately 180,000 to 250,000 acres will be treated by prescribed burning annually across the Forests, with an estimated average of 220,000 acres per year. Increases in the number of acres burned may be possible with favorable weather conditions, additional agency capacity, or opportunities for joint efforts with State programs. When these opportunities occur, our strategy is to take advantage of these occasions to accelerate ecosystem restoration and make improvements toward desired conditions.

Timing of prescribed burns is also a key part of our strategy for accomplishing desired conditions. Prescribed burns should be scheduled for the appropriate season, weather, fuel, and topographic conditions to achieve management goals. The frequency of return intervals for prescribed burns and the percent of burns conducted during the growing season will vary depending on the ecosystem and habitat needs. Fire-dependent species should be given priority consideration

during planning and implementation of prescribed burns. Also, if disturbance events result in an unusual buildup of fuels, dormant season burns should be used to reduce hazards until fuels are minimized to levels that can be controlled to mimic the natural fire regime. Changing conditions such as increased development along urban interface areas may also change our approach to prescribed burning (i.e., burning in smaller blocks or increasing our use of mechanical treatments).

Our strategy for responding to wildland fires is based on the ecological, social, and legal consequences of the fire. Wildland fires are unplanned ignitions that may be human-caused or from natural storm events. The circumstances under which a fire occurs, and the likely effects on firefighter and public safety, dictate the appropriate response to the fire. Wildland fires are managed according to the Federal Wildland Fire Management Policy, which is a unified and cohesive federal fire management policy codified in agency, interagency and departmental manuals, guidebooks and other documents through clear, concise, and uniform language across all agencies. All wildland fires managed for resource benefits follow appropriate reference guides for wildland fire use implementation procedures and are assessed using a decision support process that examines the appropriate range of responses for a given situation or circumstance.

Objectives for Fire

Over the first decade of the plan, prescribed burning of approximately 220,000 acres occurs each year, with the following average annual breakdown by district:

- Approximately 33,000 acres on Bienville National Forest.
- Approximately 33,000 acres on Chickasawhay Ranger District of the De Soto National Forest.
- Approximately 84,000 acres on De Soto Ranger District of the De Soto National Forest.
- Approximately 10 acres on Delta National Forest.
- Approximately 23,000 acres on Holly Springs National Forest.
- Approximately 36,000 acres on Homochitto National Forest.
- Approximately 11,000 acres on Tombigbee National Forest.

3.5.4 Lands and Special Uses

The lands and special uses program manages the real estate-related activities associated with National Forest System lands. The overall direction for the program is to consolidate National Forest System lands through acquisitions and exchanges while providing appropriate access to Federal property for public services and other special uses. For land ownership adjustments, this typically focuses on land parcels within or adjacent to national forest boundaries; however, isolated tracts that have special values or contribute to the mission of the Forest Service are also included in our goals.

Following the early land acquisition period during the mid-1930s to early 1940s when the bulk of National Forest System lands in Mississippi were purchased, the land adjustment program has historically been pursued as a small-scale program of tract-by-tract land acquisition and disposal actions to improve consolidation of National Forest System land ownership. Over time, the National Forests in Mississippi have typically acquired or conveyed roughly 1,000 to 2,500 acres annually by donation, purchase, transfer, or land-for-land exchange taking advantage of the best opportunities available at any particular time. Due to the occasional nature of land acquisition opportunities, it is difficult to predict likely land ownership adjustments in future years, but a

generally low level of program activity is expected to continue into the near term. Main concerns for consolidating and expanding land holdings include acquiring high-value ecosystems, threatened and endangered species habitat, critical water corridors, and desirable adjoining or infill tracts.

Our program strategy for continued land ownership adjustments is to give priority to the following situations:

- tracts that help consolidate large blocks of existing National Forest System lands (as opposed to adding onto small or isolated blocks),
- acquisitions that protect resource values on adjacent, existing National Forest System land,
- acquisitions that contribute to the recovery of threatened or endangered species or will aid in the protection of diverse species,
- lands that enhance recreation, public access, and protection of aesthetic values, especially those that provide public access to waterways,
- lands are needed for the protection of important cultural resources,
- acquisitions that will complement a designated special area such as a wilderness area or wild and scenic river,
- lands needed for new administrative or recreational sites and/or protection of existing improvements,
- other environmentally sensitive lands such as tracts containing unusual geographic features, wetlands or floodplains, rare plant or animal communities, or other attributes of uncommon or striking character.

Right-of-way acquisition opportunities are similarly variable in nature. From 1986 through 1995, the National Forests in Mississippi acquired an average of 25 easements per year; however, from 1996 through 2000, the average dropped to 13 per year. Since 2000, only one or two easements have been acquired each year; sometimes none. Such low level of easement activity is expected to continue as most of the National Forests in Mississippi are already well served by an existing road network, and the need to access additional areas is minimal.

Special use authorizations provide for those private uses of National Forest System lands that are necessary to serve the public interest and those that cannot be accommodated on non-Federal land. This includes National Forest System lands used for utility corridors and transmission lines, communication sites, military training activities, and special events. Our management approach for maintaining desired conditions on the National Forests in Mississippi is to continue to include and enforce appropriate environmental protection controls in leases, easements, right-of-way grants, licenses, and other special use permits.

Military Use: On December 17, 2007, the National Forests in Mississippi reissued Camp Shelby Special Use Permit for a 20-year term. The permit provides for continued military training on approximately 117,000 acres of national forest system lands on the De Soto National Forest and incorporated projects and proposals related to military training and readiness activities. Administration of this long-term special use permit continues with the revised plan.

3.7 Infrastructure

The main priorities for managing the roads, trails, and facilities that make up the infrastructure within the National Forests in Mississippi are focused on safety and maintenance of existing facilities. This includes backlogged repairs and upgrades, improvements to infrastructure for environmental protection, disposal of facilities that are no longer needed, and rehabilitation of user-created trails and roads. Infrastructure additions are anticipated to be limited and dependent on funding availability.

3.7.1 Roads

Our primary focus for the future will be on maintenance and rehabilitation of our existing road system. Maintenance priorities will include bridge safety, adequate signs, suitable stream crossings, and any resurfacing or reconstruction needed to provide an overall road system that is useable and safe. To promote ecological sustainability, wetlands and unique or common communities should be given priority when considering closing or obliterating existing roads. Areas with known populations of black bear and road density exceeding 1.25 miles per square mile should also be given priority when considering road closures or obliteration.

The travel management policy issued by the National Forests in Mississippi in 2008 to comply with national rules regulating OHV use on public lands designated those roads, trails, and open areas that are open to motor vehicle use. Unauthorized travelways will either be decommissioned or left to naturally revegetate.

Objectives for Roads and Motor Vehicle Use

- Annually update maps identifying the roads and trails open to motor vehicles, the season of use, and the types of motor vehicles allowed.
- Within 6 years of plan implementation, the maintenance level of 6 percent of system roads is downgraded (open to closed, closed to obliterated, passenger car to high clearance vehicle, etc.).
- In each 5-year period after plan implementation, approximately 10 culverts identified as aquatic organism passage barriers are replaced.
- At the end of 5 years:
    - All precast concrete road bridges have concrete substructures.
    - All bridges are capable of passing the legal State weight limit.
    - All low-water fords that do not meet aquatic organism passage guidelines are replaced.

3.7.2 Trails

Work on trail infrastructure will focus on maintaining an environmentally and financially sustainable trail system. Based on a forestwide assessment, the full range of trail types (hiking, biking, motorized, equestrian) will be available throughout the state, but on any national forest, the specific type of trail opportunities may not encompass the whole range. Expected work will bring all existing designated trails to a suitable standard by redesigning and reconstructing trails as necessary. Building new partnerships will be important to providing benefits of trails to local communities as well as maintaining safe, sustainable trails throughout the National Forests in Mississippi.

Building a coalition of the entire trails community and trained volunteer base will help set priorities for work and reduce user conflicts. Better information will be available to our trail users by providing detailed, up-to-date trail information on our National Forests in Mississippi website and making recreation opportunity guides available for the public to access information regarding the status of trails.

Objectives for Trails

Each year following plan approval:

- An average of 10 miles of trails is improved to standard.
- An average of one trail maintenance workday per forest occurs in conjunction with partners and is open to the general public.
- Host annual trail training day for trail volunteers and groups on each forest.
- One to two miles of unauthorized trails are closed, with particular consideration given to trails that impact archeological sites, rare communities, and streamside forests

3.7.3 Facilities

The facilities program includes new construction and maintenance of a variety of structures and associated utilities across the National Forests in Mississippi that are used for recreation, administration, research, maintenance, storage, tree nurseries, fire operations, and other general management purposes. Program priorities for the future will be directed toward:

1. reducing the backlog of facility deferred maintenance which has accrued, particularly those items associated with health and safety;
2. right-sizing the facility inventory to match current management needs, including decommissioning and disposing of those facilities which are no longer required to support management objectives;
3. reducing the operating and maintenance costs associated with the facility portfolio; and
4. providing limited new facilities to support priority programs and areas such as new day use facilities at Okhissa Lake on the Homochitto National Forest.

We intend to continue evaluating the inventory of administrative facilities and dispose of those that are no longer needed, such as unmanned work centers, unused ranger houses, and excess buildings that were part of a property exchange with the University of Mississippi a few years ago. New facility construction in the future is expected to be limited to improvements and expansions at day-use recreation areas, particularly at the newly constructed Okhissa Lake on the Homochitto National Forest. Recreation facilities are generally newer than administrative facilities, and compliance with applicable accessibility requirements has been a priority. Maintenance at all facilities is a growing issue, with a current backlog of about $5 million in deferred maintenance. Buildings that are in use are safe and structurally sound but may be lacking in preventative maintenance and aesthetics.

Objectives for Facilities
• Within 10 years following plan approval, unmanned work centers, unused ranger houses, and excess buildings from the University of Mississippi exchange are properly disposed. • Following a 5-year capital improvement schedule, the current maintenance backlog for recreation facilities and trails is reduced by at least 25 percent.

3.8 Recreation, Cultural Resources, and Forest Setting

The program strategies for providing outdoor recreation opportunities, protecting heritage sites, and maintaining a natural forest setting all require balancing the increasing demand for more uses with protecting and maintaining existing desirable conditions.

3.8.1 Recreation

The National Forests in Mississippi provide a diverse range of quality natural and cultural resource-based recreation opportunities in partnership with people and communities. Our management strategy for working toward desired recreation conditions is to dedicate resources to those outdoor recreational opportunities that are unique or of exceptional value, in a manner that maximizes visitor satisfaction within financial and environmental constraints.

Our focus is to align management of facilities and services with visitor demand and our capability to manage the recreation program. Priority for recreation infrastructure will be to improve conditions by reducing maintenance backlogs in both facilities and trails. Based on current agency capacity, development of new infrastructure is not likely and some less-frequently used sites may be closed in the future. Priority will be placed on high-use areas near larger urban population centers. This work will bring existing trails up to sustainable standards through redesign and reconstruction as necessary. A second key part of our strategy will be to seek long-term funding and partnerships as a way to offer better opportunities and support services for facilities and trails.

Our management approach for hunting and fishing opportunities associated with the 14 wildlife management areas on National Forest System lands in Mississippi is to continue to work cooperatively with the Mississippi Department of Wildlife, Fisheries, and Parks (MDWFP). Joint efforts may include annual planting and maintenance of wildlife openings and collecting biological data to determine population, condition, and habitat trends. Where appropriate, additional access for hunters by seasonally opening some routes on the National Forests in Mississippi will also be considered in consultation with the MDWFP and in conjunction with other Forest Service policies. Annual habitat improvements in the Forests' waterbodies will maintain a strong recreational fishing program that appeals to both the game fishing enthusiast and the hobby angler.

The common desire from the public for better visitor information (both trip planning and on site at recreation areas) and more opportunities for learning about the natural environment are expected to be addressed through:

1. the development of family outing tours along unique areas of the forest,
2. local and State partnerships with educator organizations and tourism agencies,
3. superior trip planning information and maps on forest websites including links to other pertinent websites for hunting and fishing information,

4. designated motorized trail maps, and
5. other current or seasonal information of interest.

Objectives for Recreation
At the end of 5 years following plan approval: • The current maintenance backlog for recreation facilities and trails is reduced by at least 25 percent. • Two new long-term partnerships are established at a statewide level. • Two new long-term partnerships are established at a local community level. • At least two new driving tours are developed to highlight unique forest features, scenic routes, heritage sites, or seasonal natural interests. • At least one new bank angler access area is constructed.

3.8.2 Scenery

The existing forest setting is generally naturally appearing and rural. According to analysis in the Scenery Management System (Peters et al. 2005), the landscape for the National Forests in Mississippi has a high ability to absorb human alterations without a loss of character and scenic quality. In most cases, disturbances to the ground and understory recover to a naturally appearing character within one or two growing seasons. As loblolly and slash pine plantings are restored to native ecosystems, forest management activities such as thinning and burning will be evident but will be managed through buffers and other scenery management techniques to maintain scenic integrity. Use of prescribed burning to sustain historic fire regimes will also have a visual effect on the landscape.

Although disturbances will be temporary, changes will be visible as forest stands transition from existing conditions to a more native character. Our focus for future enhancement of scenic quality will be to carefully manage the transition to more native ecosystems using mitigation techniques so that scenic integrity is maintained. As we establish native communities over time, the less natural-appearing pine plantations will be replaced with more natural-appearing mixed-age and mixed-species forests. Viewpoints along roads and trails will become evident and reveal mid- and long-distance views of attractive environments.

The “Scenery Treatment Guide for the Southern Region” (issued April 23, 2008) and scenic integrity objectives provide guidance for mitigating scenery impacts for management activities and should be incorporated into project planning and implementation. Table 6 identifies the scenic integrity objectives by scenic class for each management area:

Table 6. Scenic integrity objectives by management area

Management Area	Scenic Class					
Ecosystem	1	2	3	4	5	6
Upland Longleaf Pine Forest and Woodland	H	M	M	M	M	M
Shortleaf Pine-Oak Forest and Woodland	H	M	M	M	M	M
Loblolly Pine Forest	H	M	M	M	M	M
Southern Loblolly-Hardwood Flatwoods	H	M	M	M	M	M
Slash Pine Forest	H	M	M	M	M	M
Northern Dry Upland Hardwood Forest	H	H	M	M	M	M
Southern Dry Upland Hardwood Forest	H	H	M	M	M	M
Southern Loess Bluff Forest	H	H	M	M	M	M
Southern Mesic Slope Forest	H	H	M	M	M	M
Northern Mesic Hardwood Forest	H	H	M	M	M	M
Floodplain Forest	H	H	M	M	M	M
Lower Mississippi R. Bottomland and Floodplain Forest	H	H	M	M	M	M
Near-Coast Pine Flatwoods	H	H	M	M	M	M
Wet Pine Savanna	H	H	M	M	M	M
Geographic Management Areas						
Red-cockaded Woodpecker Habitat	H	M	M	M	M	M
Administrative Areas	H	H	H	H	H	H
Developed Recreation Areas	H	H	M	M	M	M
Botanical Areas	H	H	M	M	M	M
Research Natural Areas	VH	VH	VH	VH	VH	VH
Scenic Areas	H	H	H	H	H	H
Wild & Scenic Rivers	H	H	H	H	H	H
Wilderness	VH	VH	VH	VH	VH	VH
Archeological Sites	H	H	H	H	H	H

VH = Very High; H=High; M=Moderate

Scenic Integrity Objectives (SIO) – A desired level of excellence based on physical and sociological characteristics of an area. Refers to the degree of acceptable alterations to the valued attributes of the characteristic landscape. Objectives include very high, high, moderate, and low. These categories are defined as:

- **Very High** – Generally provides for only ecological changes in natural landscapes and complete intactness of landscape character in cultural landscapes.
- **High** – Human activities are not visually evident to the casual observer. Activities may repeat attributes of form, line, color, and texture found in the existing landscape.
- **Moderate** – Landscapes appear slightly altered. Noticeable human created deviations remain visually subordinate to the landscape character being viewed.

3.8.3 Wilderness and Wild and Scenic Rivers

These two designations require a higher standard of care to maintain the wildland characteristics they are valued for. Wilderness will be managed in accordance with the 1964 Wilderness Act and its establishing legislation. Tools, such as the "minimum requirements decision analysis," are used when considering if a project is appropriate in wilderness. Wild and scenic river corridors will be managed to preserve their free flowing stream condition and outstandingly remarkable scenic and recreational values.

Detailed management strategies, standards and guidelines for the Black Creek and Leaf Wilderness Areas and the Black Creek Wild and Scenic River were developed through the limits of acceptable change process and amended into the 1985 Land and Resource Management Plan in 1994. The limits of acceptable change process is documented in two volumes, which are located in the process records. Management direction varies by opportunity class (see "Step 2 – Opportunity Class Definitions and Descriptions" found in Vol. I – Limits of Acceptable Change). The standards and guidelines for the areas in the different opportunity classes are described in "Step 5 – Specifications for Standards For Resource and Social Conditions" in Vol. I – Limits of Acceptable Change.

This management direction that was developed in 1994 for the two wilderness areas and the wild and scenic river is being brought forward into this revised land and resource management plan.

3.8.4 Cultural Resources

Our overall strategy for sustaining the heritage that is a desirable part of the setting and character of the National Forests in Mississippi involves continuing to identify significant sites, protecting them from damage, and planning for future research and interpretation opportunities. Approximately 30 percent of the National Forests in Mississippi have been surveyed for archaeological and historic sites. Surveys will continue to be routinely conducted prior to site disturbance activities. Workload priorities are often affected by available staffing and resources; therefore, partnerships and agreements with universities play an important role in helping to achieved desired conditions.

3.9 Minerals Management

The 1985 National Forests in Mississippi Forest Plan provided for management of minerals (primarily oil and gas). Oil and gas management was addressed in an environmental assessment that revisited and updated this aspect of forest management. The Lands Available for Oil and Gas Leasing Environmental Assessment and the associated Decision Notice and Finding of No Significance (signed August 6, 2010) have recently been implemented on the National Forests in Mississippi. This decision covered oil and gas leasing on most of the Forests except for one area, the Sandy Creek RARE II Further Study Area. The Sandy Creek RARE II Further Study Area is located in Adams County and is 2,558 acres. Included within the boundary of the Sandy Creek Further Study Area is the Sandy Creek Botanical Area, consisting of 300 acres. The minerals leasing availability of the Sandy Creek Further Study Area was evaluated as part of this plan revision. Under this revised plan, new oil and gas leasing would be permitted in the Sandy Creek RARE II Further Study Area, which is also identified as an inventoried roadless area, subject to the 2001 Roadless Area Conservation Rule restrictions. These restrictions prohibit new road construction or reconstruction in the roadless area; therefore, existing system roads would be used as access for lease activities in this area.

Before any operations can be conducted under a lease, the Forest Service and the Bureau of Land Management (BLM) are required to review the proposed operations (i.e., an Application for Proposal to Drill or APD). Prior to authorizing ground-disturbing operations the agencies must conduct a site-specific environmental analysis, including site-specific design criteria, such as forest plan standards and guidelines, and best management practices as appropriate.

The Forest Service leasing decisions apply to federally owned minerals, and do not apply to privately owned mineral rights (outstanding or reserved mineral rights) on National Forest System lands as long as the mineral rights remain privately owned. If the Federal Government was to acquire any such private mineral rights that include oil and gas rights, then these newly acquired Federal mineral rights would be administratively available for Federal oil and gas leasing. The Forest Service would then authorize the BLM to offer these areas as specific lands for Federal oil and gas leasing subject to the stipulations identified in this plan.

After a Federal oil and gas lease is issued, the Federal leaseholder cannot construct a road, drill a well, or conduct ground-disturbing operations until the Federal Government reviews and approves plans for each proposed well and associated roads. Before ground-disturbing operations can occur, the leaseholder must submit an APD, including a Surface Use Plan of Operation (SUPO), for review and approval by the Federal Government (BLM and Forest Service). The Forest Service, in cooperation with the BLM, conducts a site-specific NEPA analysis of the proposed operation as required by the NEPA (1969). Alternatives, such as different access road locations, are assessed to address issues. An interdisciplinary team reviews the proposed operations and develops site-specific environmental protections that are applied to the APD. The environmental protections are derived from environmental protection laws and regulations applicable to National Forest System lands. Proposed lease operations are subject to environmental protection requirements in a wide range of laws and regulations, including the Endangered Species Act, Archaeological Resources Protection Act, Federal Water Pollution Control Act, Clean Water Act, Clean Air Act, and all the other environmental protection laws and regulations applicable to National Forest System lands.

Proposed lease operations are subject to environmental protection requirements in (1) Forest Service regulations, including the 36 CFR 228E, regulations developed to implement Federal Onshore Oil and Gas Leasing Reform Act of 1987, and (2) the forest plan.

Protection measures include:

- locating facilities in areas that are already altered or largely fragmented;
- locating facilities along peripheries of large habitat patches rather than in interiors;
- minimizing area-to-edge ratios of access and well sites where they are located in or along large forest patches;
- using existing roads, corridors, and openings to the extent possible;
- revegetating disturbed and abandoned areas with native species or non-intrusive temporary cover and
- requiring timing limitations for seasonally sensitive species can help to minimize impacts of ground disturbance on wildlife and wildlife habitat.

3.10 Economic Benefits

The economic revenues generated by the National Forests in Mississippi contribute a steady financial benefit to the economic health of the region. However, the value of the National Forests in Mississippi for providing ecological services may be more significant, yet harder to quantify. While products such as timber, minerals, special commodities, and even recreation opportunities have obvious economic importance, ecological services such as clean water, clean air, healthy watersheds, species diversity, appropriate biological habitats, carbon storage, preservation of cultural heritage, and scenic qualities also have value for neighboring communities and the region. Many of these ecological services are highly important to the public and other stakeholders, and restoring and maintaining healthy and resilient ecosystems is a key factor in many desired conditions in this forest plan.

Our approach for maintaining traditional economic benefits while also managing for ecological services is to focus on restoration and habitat improvement and economic benefits will follow. As a result of restoring native ecosystems to appropriate sites and maintaining healthy and resilient forests, there should be a steady flow of economic benefits.

Chapter 4. Design Criteria

4.1 Overview of Design Criteria

While chapters 2 and 3 describe the direction and strategies for moving toward desired conditions on the National Forests in Mississippi, chapter 4 identifies the criteria to be followed in designing and managing projects for implementing the plan. Standards and guidelines address project implementation forestwide, and the management area prescriptions and special uses provide additional guidance for specially designated areas.

4.2 Standards and Guidelines

The National Forests in Mississippi follow the Forest Service directive system that consists of Forest Service manuals and handbooks, which codify the agency's policies, practices, and procedures. The system serves as the primary basis for internal management and control of all programs and the primary source of administrative direction to Forest Service employees. Forest-level standards and guidelines supplement this direction for national forest-specific conditions.

> ***Standards*** *are specific management directions required for achieving resource protection; project-specific deviations require plan amendment.*
>
> ***Guidelines*** *do not approve or force actions but describe recommended parameters or technical and scientific specifications for use in designing projects and activities. The rationale for any deviation, however, must be documented in the project-level decision.*

Standards and guidelines provide information and guidance that can be applied to projects or activities aimed at achieving desired conditions. Guidelines do not approve or force actions but describe recommended parameters or technical and scientific specifications for use in designing projects and activities. The rationale for any deviation, however, must be documented in the project-level decision. Standards are specific management directions required for achieving resource protection; project-specific deviations require plan amendment.

4.2.1 Vegetation, Wildlife, and Fisheries

Vegetation and wildlife guidelines are combined since effects to wildlife habitat depend in large part on how projects and activities affect the structure and composition of the vegetation.

Guidelines for Vegetation, Wildlife and Fisheries
1. Maximizing the amount of contiguous forest should be a consideration when planning stand regeneration. Priority should be placed on locating new stands adjacent to existing young or regenerating stands consistent with the above maximum regeneration opening sizes and the following adjacency guides. Openings created by even-aged and two-aged regeneration treatments will be separated from each other by a minimum distance of 330 feet. Such openings may be clustered closer than 330 feet as long as their combined acreage does not exceed the maximum opening size. An even-aged regeneration area will no longer be considered an opening when the certified reestablished stand has reached an age of 5 years.
2. When considering regeneration timber harvests, openings should be shaped and blended to the extent practicable with the natural terrain.

Guidelines for Vegetation, Wildlife and Fisheries

3. When regenerating or restoring a mesic deciduous forest ecological system, residual overstory (two-aged) should be used.
4. A regenerating forest may exceed 10 percent of ecological system acres during restoration while sites are being converted from off-site species to the desired ecosystem type. Regenerating forests and woodlands (0 to 10 years old) should generally comprise 5 to 10 percent of system acreage once restoration from off-site species is achieved.
5. Areas identified to provide old growth should not be scheduled for regeneration. However, some forest types included in the preliminary list of stand designations identified as possible old growth may need to be converted to more desirable species for the site.
6. Soft mast-producing species (i.e., dogwood, black gum, hawthorn, grapes, serviceberry, etc.) should be retained during vegetation cutting treatments to the extent compatible with meeting treatment objectives.
7. Planning and implementation of timber harvests and other silvicultural treatments that occur in hardwood dominated ecosystems should promote natural regeneration of desired species from existing root stocks and consider and incorporate measures that enhance wildlife habitat productivity.
8. Stumps, standing snags, and den trees should generally be retained to maintain structural diversity during vegetation management treatments. Exceptions may be made when necessary to control insects or disease or to provide for public and employee safety. Distribution of retained snags may be clumped.
9. Timber management within dusky gopher frog critical habitat should be limited to longleaf restoration, managing for woodland conditions, and other dusky gopher frog specific habitat objectives.
10. Project planning and implementation should include measures to provide protection for the "species needing occurrence protection" group (see final environmental impact statement (FEIS), appendix H).
11. Planning and implementation of timber harvests and other silvicultural treatments that reduce canopy cover should include measures to provide protection for threatened, endangered, sensitive, and locally rare species that are susceptible to damage or extirpation from canopy cover reduction. This group is referred to as "species sensitive to canopy cover modifications" (see FEIS, appendix H).
12. Management activities planned within rare ecological systems should generally be limited to maintenance or restoration activities addressing their specific composition, structure, or natural system function needs (see Table 1 for a list of rare ecological systems within this plan).
13. Planned activities adjacent to rare communities (see glossary) should consider and incorporate measures that address potential detrimental impacts.
14. Collection of flora and fauna from rare communities, wetland systems, and "species sensitive to over-collection" group (see FEIS, appendix H) should generally be limited to approved scientific purposes.
15. Dead and downed logs or other woody debris should generally not be removed from rare communities. Where needed to ensure public or employee safety, snags may be felled, but will be retained within the community as downed wood.

Guidelines for Vegetation, Wildlife and Fisheries

16. When creating wildlife food plots, they should be located outside of rare and wetland communities.
17. Potential black bear den trees should be retained during all vegetation management treatments occurring in habitats suitable for bears. Potential den trees are those that are greater than 36 inches diameter at breast height (d.b.h.) containing visible cavities.
18. Planning and implementation of road construction, fireline construction, wildlife pond and opening construction, timber harvests, and other ground disturbing projects should include measures to provide protection for threatened, endangered, sensitive, and locally rare species that are susceptible to damage or extirpation from ground disturbance. These are referred to as "species sensitive to soil disturbance and species sensitive to recreational traffic."
19. Before buildings, bridges, wells, cisterns, and other man-made structures are structurally modified or demolished, they should be surveyed for bats. If significant bat roosting is found, these structures should be maintained where consistent with multiple-use objectives, or alternative roosts suitable for the species and colony size should be provided prior to adverse modification or destruction when feasible.
20. New road bridge construction should include bat-friendly technology and construction materials to provide roosting habitat for bats.
21. If occupied Indiana bat maternity roost trees are discovered, protect them from physical disturbance until they naturally fall to the ground.
22. Based on site-specific consultation, Indiana bat areas of use (foraging and roosting) should be designated based on site conditions, radio-tracking or other survey information, and best available information regarding maternity habitat needs. Minimize human disturbance in the maternity colony areas of use until the colony has left the maternity area for hibernation.
23. Within the Indiana bat area of use (known or likely foraging and roosting) determined for each maternity colony, prescribed burning should generally be conducted during the hibernation season.
24. Protect occupied Indiana bat male roost trees discovered during the summer season (not migration), from physical disturbance by designating a 75-foot radius buffer zone around the tree(s). The buffer zone shall remain in place until migration to hibernacula begins (around September 1). Prohibit ground-disturbing activity or timber harvest within the buffer zone. Prescribed burning may be done within the buffer zone if a fireline is manually constructed no less than 25 feet from, and completely around, the tree to prevent it from catching fire.
25. Where Indiana bats are known to occur, maintain a component of large, mature trees in hardwood harvest areas, retaining at least three live trees per acre greater than 20 inches d.b.h. of these preferred species (leave trees will be located along edges of the harvest area or in clumps to maximize their benefit to bats): silver maple (*Acer saccharinum*), bitternut hickory (*Carya cordiformis*), shellbark hickory (*Carya laciniosa*), shagbark hickory (*Carya ovata*), white ash (*Fraxinus americana*), green ash (*Fraxinus pennsylvanica*), eastern cottonwood (*Populus deltoides*), white oak (*Quercus alba*), northern red oak (*Quercus rubra*), post oak (*Quercus stellata*), black locust (*Robinia pseudoacacia*), American elm (*Ulmus americana*), slippery elm (*Ulmus rubra*).

Guidelines for Vegetation, Wildlife and Fisheries

26. Where Indiana bats are known to occur, any dead, decadent or identified hazard tree that has characteristics of a potential Indiana bat maternal roost tree (splintered bole that provides crevices, evidence of decay so that either their bark is exfoliating, it possesses cavities, or dead portions of the tree have been used, excavated, or occupied by species such as woodpeckers or other cavity nesting birds and, most importantly, exposure of the roost to sunlight) will not be removed until consultation with a Forest Service biologist has been completed. An exception is trees may be cut that are an immediate safety danger to an individual.
27. Where Indiana bats are known to occur, project areas where large overstory hardwood trees could be cut, mist-netting surveys, exit surveys, or other surveys approved by the U.S. Fish and Wildlife Service, must be done to identify known Indiana bat roosting habitats prior to harvest or cutting. Mature leave-trees in areas where the shelterwood or shelterwood-with-reserves harvest methods are applied (including the uplands) should include mixtures of tree species preferred by Indiana bats for roosting: Silver maple, bitternut hickory, shellbark hickory, shagbark hickory, white ash, green ash, eastern cottonwood, white oak, northern red oak, post oak, black locust, American elm and slippery elm.
28. Maintain a component of large over-mature trees, if available, in all uneven-aged harvest units to provide suitable roosting habitat for Indiana bats where they occur.
29. New communication tower installation and ridgetop developments should be designed to mitigate collision impacts to migratory birds through coordination of project planning and implementation with the USDI Fish and Wildlife Service.
30. National Forest System trails will not be used as skid trails. Crossings of system trails should be minimized and occur only at right angles to the extent feasible. Implement restorative measures to damaged trail tread and profile as soon as practicable upon completion of management activities.
31. Scenery treatment guidelines will be incorporated into the planning of vegetation management activities.
32. Integrated pest management principles should be used during pest management project analysis, decision making and implementation. The pest management specialist should be consulted during development and implementation of pest management projects.
33. When pests occur in or near red-cockaded woodpecker colonies, a Forest Service pest management specialist and biologist may recommend treatment with cut and remove, cut and leave, or cut and spray to prevent destruction or loss of the colony site.
34. Ponds less than 2 acres and isolated seasonal wetlands should not be stocked with fish as a means to provide habitat for amphibian species.
35. The minimum relative neutralizing value of agricultural lime used for liming lakes shall be 63 percent (Grade A lime). Hydrated lime will be applied a using water pump system where it is slowly washed into the lake as slurry from a raft or boat. It should be applied in the open water area of the lake away from the littoral zone (shallow water). Hydrated lime is of a caustic nature and should only be used at the specific recommendation and guidance of a fisheries biologist.
36. Liquid fertilizer should be applied at a rate of ½ to 1 gallon per surface acre per application. Powdered fertilizer should be applied at a rate of 2 to 8 pounds per surface acre per application. Granulated fertilizer should be applied at a rate of 4 to 12 pounds per

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surface acre per application. Secchi disc visibilities should be maintained between 18 and 24 inches on lakes without swimming, and between 24 and 30 inches on lakes with swimming.

37. Only certified triploid (sterile or non-reproducing) grass carp from licensed distributors will be stocked into lakes within the National Forests in Mississippi. Grass carp should only be used at the specific recommendation and guidance of a fisheries biologist.
38. To protect Indiana bat foraging habitat and travel corridors along rivers and streams on the Holly Springs Unit, a forested stream buffer strip will be maintained in all areas receiving vegetation management activities. The buffer will be a minimum of 50 feet on each side of perennial streams or rivers and 25 feet on both sides of intermittent streams.
39. Ensure all Forest Service employees and contractors working within Indiana bat habitat are educated to recognize and avoid potential Indiana bat roost trees and the required habitat components for a complete Indiana bat home range.

Standards for Vegetation and Wildlife

1. Stands of trees planned for regeneration harvest should generally have reached culmination of mean annual increment (CMAI) of growth. Typically, even-age regeneration harvests should not be made prior to age 35 for loblolly, shortleaf, and slash pine or age 50 for longleaf. However, plantations of loblolly and slash on longleaf or shortleaf sites may be harvested for restoration purposes as early as age 20. Generally, hardwood regeneration harvests will not be made prior to age 90.
2. Stands of any species meeting the Southern Region criteria for damaged, sparse, or low quality may be regenerated prior to CMAI unless needed for threatened, endangered, or other wildlife species habitat needs. Salvage and sanitation harvesting of timber stands substantially damaged by fire, wind-throw, or other catastrophe, or those in imminent danger from insect or disease attack should not be subject to CMAI.
3. Creation of regenerating forest and woodland may occur in small scattered patches (less than 10 acres), but typically should occur in even-aged stands of 10 to 80 acres. Opening sizes created by timber harvest for silvicultural purposes should not exceed 80 acres for pine and pine/hardwood forest types and 40 acres for hardwood and hardwood/pine forest types. Exceptions to these acreage limitations may be permitted following public notice and review by the regional forester. These acreage limits do not apply to areas treated because of natural catastrophic conditions such as fire, insect or disease attack, or windstorm. Areas managed as permanent openings (such as meadows, pastures, food plots, rights-of-way, woodlands, savannas, and grasslands) are not subject to these standards and are not included in calculations of opening size, even when within or next to created openings.
4. The anticipated decadal commercial timber volume removal should not exceed the estimated allowable sale quantity of 178.7 million cubic feet or 893.5 million board feet.
5. No timber harvest for the purposes of timber production may occur on lands classified as not suited for timber production.
6. Timber harvesting activities may occur on lands classified as not suited for timber production when needed to achieve or maintain other multiple-use values; or for salvage,

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sanitation, public health or safety reasons.

7. Timber harvesting activities can only occur where soil, slope, or other watershed conditions would not be irreversibly damaged.

8. Even-aged harvests may occur only upon a finding that it is appropriate and clearcutting may occur only upon a finding that it is the optimum method to meet the objectives of the plan.

9. Regeneration harvests should not be planned unless there is reasonable assurance of adequate stocking within 5 years of final harvest. (Five years after final harvest means 5 years after clearcutting, 5 years after final over story removal in shelterwood cutting, and 5 years after the seed tree removal cut in seed tree cutting.) Table 7 should be used as a guide for number of trees per acre (stocking level) for reforestation and stand improvement treatments to attain appropriate stocking levels for diagnostic species. This guide should be used with professional judgment to determine adequate stocking levels following the third growing season. Where appropriate for threatened and endangered or other wildlife habitat needs, planting may target the lower portion of the range. The lower and upper levels indicate a need to consider additional cultural treatments such as replanting or precommercial thinning. However, these remedial treatments should not be required if the objectives of the forest plan can be achieved.

Table 7. Stocking levels for reforestation and stand improvement treatments

Species	Lower Level	Target Level	Upper Level
Shortleaf, Loblolly Pine	300	400-600	900
Longleaf, Slash Pine	300	400-600	700
Mixed Pine-Hardwood	300	400-600	None
Hardwood	100	150-250	None

Longleaf pine lower level stocking standards for the Bienville and Homochitto National Forests will be 100 longleaf trees with other pine species contributing to attaining the 300-tree lower limit for the stand.

10. Follow the habitat management strategies found in the most current USDI Fish and Wildlife Service Recovery Plan for each threatened or endangered species relevant to the National Forests in Mississippi.

11. When treating southern pine beetle infestations within a red-cockaded woodpecker colony, trees vacated by southern pine beetle will not be cut or chemically treated. Uninfested trees within a 200-foot red-cockaded woodpecker colony buffer zone will not be cut or chemically treated unless such efforts would likely prevent southern pine beetle infestation of cavity trees. Disturbance in the colony sites will be kept to a minimum especially during breeding season.

12. When treating southern pine beetle infestations within an Indiana bat roosting area, trees vacated by southern pine beetle will not be cut or chemically treated. Un-infested trees within a 200-foot buffer zone will not be cut or chemically treated unless such efforts would likely prevent southern pine beetle infestation. Disturbance in the maternity roosting area will be kept to a minimum especially during breeding season.

13. Heavy equipment (including mowers) should stay at least 25 feet from known gopher tortoise burrow aprons (heavy equipment is defined as agricultural tractors, crawler

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loaders, crawler dozer, backhoe/loader, front end loader, scraper pan, motor grader, skid steer, forklift [P.I.T.], hydraulic excavator, and specialty tracked equipment). Logging slash should be kept at least 25feet from known tortoise burrows as well. Within that 25-foot buffer area, light machinery and hand tools should be used for vegetation control.

14. Feral hog traps or other control activities that lure hogs to a concentrated area will be located at a minimum of 100 feet from known Louisiana quillwort and pondberry plants/colonies.
15. No herbicides will be mixed or applied within 100 feet of Louisiana quillwort and pondberry plants/colonies.
16. Heavy logging equipment will not be used within a 165-foot buffer area of Louisiana quillwort plants/colonies. Suitable habitats for Louisiana quillwort within areas intended for timber harvesting and thinning will be surveyed prior to beginning operations.
17. Removal of beaver dams shall be conducted in such a manner as to minimize or avoid increased sedimentation and impacts to hydrology of streams and riparian areas associated with Louisiana quillwort.
18. New roads, off-road vehicle trails, and building construction will not be created within 165 feet of existing Louisiana quillwort plants/colonies. Suitable habitats for Louisiana quillwort within areas intended for new construction will be surveyed prior to beginning work. Road and trail construction and maintenance and general construction activities shall be conducted in such a manner as to minimize or avoid increased sedimentation and impacts to hydrology of streams and riparian areas associated with Louisiana quillwort.
19. Avoid timber harvesting, thinning operations, road and trail construction or building construction within 100 feet of pondberry plants/colonies. Heavy logging equipment will not be used within this buffer area.
20. Known black bear den sites will be protected from impacts associated with vegetation management and ground-disturbing activities, within a minimum of 100 feet around the den, until they are no longer usable as a den site.
21. Mature forest cover should be maintained within 100 feet slope distance from the top of rock outcrops and 200 feet slope distance from the base of rock outcrops to provide habitat for associated wildlife.
22. Establish a maternity roosting buffer zone (75 feet) around all known Indiana bat roost sites. No ground-disturbing activities will take place within this buffer other than activities specifically designed to enhance or improve roosting habitat (i.e. removal of shade trees) and only when bats have left the maternity roost (September 1 to March 31). Prescribed burning will also only take place during the non-maternity roosting season (September 1 to March 31).
23. Establish a maternity foraging buffer zone (2.5 miles) around all known Indiana bat roost sites. No timber removal will take place during the non-hibernation/maternity season (April 1 and August 31), unless specifically designed to enhance foraging habitat.
24. For all vegetation management activities and commercial timber sales on the Holly Springs Unit, retain at least three (3) live trees per acre greater than 20 inches d.b.h. of these preferred species (shagbark, shellbark, and bitternut hickory; white and green ash; white, northern red, and post oak; American and slippery elm; eastern cottonwood, black locust,

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and silver maple).

25. For all vegetation management activities and commercial timber sales on the Holly Springs Unit, retain at least 5 snags per acre greater than 9 inches d.b.h. and 1 snag per acre over 19 inches d.b.h. Oaks, hickories, and ashes will be favored for retention of snags. During timber harvests, snags will not be removed except where they constitute a human safety hazard. Snags will be retained in groups with live trees to prevent snag loss to wind throw.

4.2.2 Soil and Water

The following guidelines are associated with ground-disturbing activities from vegetation and fire management activities as well as fisheries resource management and conservation activities.

Guidelines for Soil and Water

1. Best management practices should be used during ground-disturbing activities.
2. Soil and debris should not be deposited in lakes, streams, wetlands, springs, or seeps.
3. Activities that could result in sedimentation or other changes in water quantity and quality should have project level design criteria that maintain or improve the hydrologic function of wetland communities.
4. Erosion control measures should be applied in all ground-disturbing activities to reduce movement of bare soil and minimize direct delivery of sediment to streams or other waterbodies. Appropriate erosion control measures (installing water diversion, revegetation, mulch, silt fences, etc.) should be implemented as promptly as practical.
5. Construct and maintain water diversions along skid trails, haul roads, firelines or other disturbed areas susceptible to scour or erosion. Water diversions (water bars, dips, and lead off ditches) should be properly spaced to disperse runoff before it gains enough velocity to start eroding.
6. Historical skid roads, haul roads, log landings, and mechanical firelines should be reused.
7. Skid trails and mechanical firelines should not be placed parallel to a scoured stream channel.
8. Firelines and roads should be constructed with turnouts that will allow runoff to be dispersed and absorbed before reaching stream filter strips.
9. Filter strips should be used to protect perennial and intermittent streams. Filter strips should be at least 33 feet plus 1.5 times the percent slope. Activities that expose more than 10 percent mineral soil should be avoided unless the activity occurs at a designated crossing. Site-specific analysis should determine any mitigation measures in addition to standard best management practices needed to protect water quality.
10. Windrows and piles should be spaced less than 200 feet apart to limit soil exposure, soil compaction, and nutrient loss from piling and raking. Windrows should be aligned on the contour. When piling, at least 80 percent of the area should retain some ground cover of litter and duff, and soil displacement by piling rakes should be minimized.

Guidelines for Soil and Water

11. Mechanical site preparation exposing bare soil should not occur on slope grades greater than 20 percent. Raking of debris-for mechanical site preparation will not be used on sustained slopes over 15 percent. Mechanical site prep treatments will not be used on sustained slopes over 35 percent.
12. Mechanical equipment may operate as long as the soils are dry enough to sustain activity without excessive compaction or rutting. In order to minimize resource damage, access may be restricted during wet seasons or following rainfall events. This guideline does not apply to dedicated intensive use areas such as roads, primary skid trails, and logging decks. Ruts should be smoothed to restore hydrology and drainage paths.
13. Low-ground-pressure equipment and cable logging systems should be used as needed on sensitive-soil sites to minimize soil damage.
14. Mechanical equipment should not be allowed to operate in any stream channel except to cross at designated points, except where involved in stream improvement work. Crossings should be at right angles to the stream or riparian area.
15. Water should not be diverted from streams (perennial or intermittent) or lakes when an instream flow assessment indicates the diversion would adversely affect protection of stream processes, aquatic (including wetlands) and riparian habitats and communities, or recreation and aesthetic values.
16. Coarse woody debris should be retained in streams except where it results in risk to public and employee safety or transportation infrastructure.
17. Removal of any woody vegetation should be avoided within 5 feet of intermittent and perennial stream banks.
18. Felling of trees into intermittent and perennial streams should be avoided except as necessary for fisheries management.

4.2.3 Roads and Motor Vehicle Use

Guidelines for Roads and Motor Vehicle Use

1. Motor vehicle use allowances, not identified on the motor vehicle use map, may occur for administrative uses such as administrative maintenance and inspection of trails, law enforcement, authorized contractor use, prescribed fire activities, and emergencies such as wildfire or search and rescue.
2. To reduce erosion, roads under construction but not completed prior to the wet weather season should be seeded temporarily and barricaded.
3. Fireline and road locations should be assessed for the presence of species sensitive to soil disturbance prior to construction and adjusted to avoid impacts.
4. Where roads or trails cross streams, crossings should be at right angles where possible.
5. Diverting surface water from existing roads or facilities into wetlands and streams should be avoided.
6. All new stream crossings should be constructed so that aquatic organism passage is not

Guidelines for Roads and Motor Vehicle Use

impaired and so that the natural flow regime is not significantly altered.

7. Reconstruction of all stream crossings should consider aquatic organism passage and incorporate structures to aid such passage where practical.
8. Where necessary and consistent with other uses, consideration should be given to seasonal closure of Forest roads during critical periods for wildlife species known to be sensitive to human disturbance and during seasons with higher rainfall or other seasonal conditions that make roads more vulnerable to erosion by normal traffic patterns.

Standard for Roads and Motor Vehicle Use

1. Motor vehicle use by the public will occur on routes and areas specifically designated as open to such vehicles on the National Forests in Mississippi motor vehicle use map.

4.2.4 Fire

The following guidelines relate to both wildland fire response and prescribed fire application.

Guidelines for Prescribed Fire

1. The smoke management screening process will be applied to all prescribed fires, especially those within 3 miles of critical smoke-sensitive targets (e.g., schools, churches, hospitals, major highways, and airports).
2. Prescribed burns should be scheduled for the appropriate season, weather, fuel, and topographic conditions to achieve objectives.
3. Planning and implementation of prescribed burns should include measures to provide protection for known occurrences of threatened, endangered, sensitive, and locally rare species that are susceptible to damage or extirpation from fire injury. This group is referred to as “species sensitive to fire injury.”
4. During planning and implementation of prescribed burns in grassland and savanna habitats where known occurrences of the Argos skipper butterfly are present, measures should be taken to ensure that no more than one-third of known populations are burned in any given year.
5. When deciduous forest communities on mesic and alluvial site types are included within burning blocks, low-intensity fires with less than 2-foot flame length should be employed. Direct firing should be avoided unless needed to secure control lines or to encourage ecological restoration of native communities.
6. During prescribed burning, some fires should be allowed to burn in a mosaic pattern resulting from differential influence of topography, fuel loading and moisture, and vegetation type.
7. Steps taken to limit soil heating should include use of backing fires on steep slopes, scattering slash piles, and burning heavy fuel pockets separately.
8. Existing barriers (e.g., streams, lakes, wetlands, roads, and trails) should be used whenever

Guidelines for Prescribed Fire

possible to reduce the need for fireline construction and to minimize resource impacts.

9. When rehabilitating tractor firelines, grade dips or other measures should be installed to properly drain water and prevent erosion.

Standards for Prescribed Fire

1. Slash burns are done so they do not consume all litter and duff and alter structure and color of mineral soil on more than 20 percent of the area. Steps taken to limit soil heating include use of backing fires on steep slopes, scattering slash piles, and burning heavy fuel pockets separately.
2. Mechanical firelines which expose mineral soil are not located in filter strips along lakes, perennial or intermittent springs and streams, wetlands, or water-source seeps, unless tying into lakes, streams or wetlands as firebreaks at designated points with minimal soil disturbance. Low-intensity fires with less than 2-foot flame lengths may be allowed to back into the strip along water bodies, as long as they do not kill trees and shrubs that shade the stream. The strip's width in feet is at least 33 plus 1.5 times the percent slope.
3. Plowed firelines are not located within savannahs except when needed to protect facilities or threatened, endangered, proposed, or sensitive species.
4. Fire control lines that tie into travelways (roads and trails) will be obliterated and the topography restored to original conditions as soon as possible following the fire.
5. When used for control lines, trails (including tread, structures, and improvements) will be restored to pre-burn conditions as soon as practicable.

4.2.5 Invasive Species

Guidelines for invasive species are intended to minimize or eliminate the spread of nonnative invasive species during project implementation.

Guidelines for Invasive Species

1. All ground-disturbing activities should be designed and implemented using practices for prevention of spread of nonnative invasive species.
2. Contracts and permits should include provisions to prevent the introduction and/or spread of nonnative invasive species on National Forest System lands and resources.
3. National Forests in Mississippi facilities, including administrative sites, campgrounds, and offices, should be maintained to be free of nonnative invasive species.
4. Gravel and other soil or fill products used on National Forest System lands should come from pits that are free of nonnative invasive species.
5. Noxious weed seed-free materials should be used for erosion control, mulch, and other purposes.
6. Native or noninvasive nonnative species should be used when seeding temporary openings

Guidelines for Invasive Species

(temporary roads, skid trails, and log landings), wildlife food plots, or for use in erosion control.

7. Treatment of nonnative invasive species should be considered in all project planning. Authorized uses of timber sale receipts should include needs for nonnative invasive species monitoring and treatment, as appropriate.
8. Personnel involved in nonnative invasive plant treatments should be able to identify federally listed, sensitive, and locally rare species to minimize or eliminate the risk of damage to these nontarget plant populations.
9. Nonnative invasive species should be controlled where they are causing negative effects to rare ecological systems (see Table 1 for a list of rare ecological systems within this plan). Nonnative invasive plants should not be introduced into native communities, and regional guidance should be followed when considering the use of nonnative species in administrative and recreational sites.
10. Opportunity for introduction of nonnative invasive species during road construction and associated timber harvest should be minimized including washing equipment after use and before moving to the next site.

4.2.6 Pesticide Use

The following guidelines address both human and wildlife health and safety concerns for projects that may require the application of pesticides to achieve desired conditions.

Guidelines for Pesticides

1. A certified pesticide applicator should administer all pesticide application contracts and supervise any Forest Service personnel involved with the application of pesticides on the National Forests in Mississippi.
2. Pesticide application rates should be the lowest rate effective in meeting project objectives.
3. Pesticide application rates, work duration, and methods of application should be within those found to have acceptable levels of risk to human and wildlife health based on Forest Service risk assessments provided by Washington Office Forest Health Protection. The Forest Service Washington Office Forest Health Protection risk assessments define acceptable risk as being a risk assessment for which no hazard quotient for an operational scenario exceeds 1.0.
4. For pesticide applications not covered by Washington Office Forest Health Protection risk assessments (application rates higher, application method differs, personnel exposure higher, new herbicide proposed for use, etc.), project specific risk assessment should indicate a hazard quotient less than or equal to 1 for human and wildlife exposures.
5. Herbicides should not be applied within 100 feet of any endangered or threatened plant species (or plant species of concern), unless analysis indicates herbicide use is the best way to protect the species from invasive weeds or promote the species, and application methods are selective to the target plants being treated.
6. Herbicide should not be applied within 100 horizontal feet of any public or domestic water

Guidelines for Pesticides

source. Selective treatments may occur within these buffers and/or aquatic ecosystems to prevent significant environmental damage such as noxious weed infestations. Aerial application of herbicide should not occur within 100 horizontal feet, and ground-applied herbicides should not be within 30 horizontal feet of lakes, wetlands, or perennial or intermittent springs and streams if using a non-aquatic labeled herbicide.

7. Pesticide mixing, loading, or container or equipment cleaning should not occur within 200 feet of private land, open water or wells, or other sensitive areas.
8. Areas should not be burned under prescription for at least 30 days after herbicide treatment.
9. Weather is monitored and the project is suspended if temperature, humidity, or wind become unfavorable as shown in Table 8.

Table 8. Unfavorable wind conditions for applications

Application Type	Temperatures Higher Than	Humidity Less Than	Wind (at Target) Greater Than
Ground:			
Hand (cut surface)	Not applicable	Not applicable	Not applicable
Hand (other)	98 °F	20%	15 mph
Mechanical (liquid)	95 °F	30%	10 mph
Mechanical (granular)	Not applicable	Not applicable	10 mph
Aerial:			
Liquid	90 °F	50%	5 mph
Granular	Not applicable	Not applicable	8 mph

10. Nozzles that produce large droplets (mean droplet size of 50 microns or larger) or streams of herbicide are used. Nozzles that produce fine droplets are used only for hand treatment where distance from nozzle to target does not exceed 8 feet.
11. People living within ¼ mile of an area to be treated aerially will be notified during project planning and shortly before treatment.
12. Application equipment, empty containers, clothes worn during treatment, and skin are not cleaned in open water or wells. Mixing and cleaning water must come from a public water supply and be transported in separate labeled containers.
13. To avoid dissolved oxygen depletions for aquatic weed control applications, no more than half of the lake should be treated at one time.
14. Prior to rotenone treatment of lakes, the lake will be drawn down to prevent water flow through the spillway or outflow structure. The drainage structure would also be closed to prevent water flow downstream. If rotenone escapes the treated area, potassium permanganate ($KMnO_4$) should be used to neutralize it. Fish pickup (to the extent possible) and disposal should be done on the day of treatment.

4.2.7 Lands and Special Uses

Guidelines for Lands and Special Uses

1. Land exchanges should not detract from the biological diversity of the forest, as determined in the biologist report(s) associated with the land exchange.
2. Land ownership adjustments should not dispose of habitat for threatened and endangered species within the boundaries of the national forest except with another agency or a tribal government with equivalent responsibility for the species' protection.
3. Land ownership adjustments should not dispose of significant historical or archeological sites within the boundaries of the national forest except with another Federal or State agency or a tribal government with equivalent responsibility for cultural resources.
4. Special use authorizations for utilities should generally utilize the existing corridors across the National Forests in Mississippi.
5. When compatible, manage new land acquisitions according to the adjacent or surrounding Management Prescription Area(s). The determination of the suitability of the acquired lands for the various resource uses, including timber production, will follow the plan direction for the applicable Management Prescription Area(s). When not compatible, conduct an environmental analysis and prepare the appropriate decision document to amend the Forest Plan.

4.2.8 Minerals Management

Guidelines for Minerals Management

1. Minimize ground-disturbing effects by: (1) properly locating activities (i.e., access may be provided on necessity rather than convenience); (a) use previous disturbed areas (access routes) as much as possible; (b) avoid sensitive soils or soils with severe limitations/hazards (i.e., steep or unstable slopes, hydric soils, etc.) as much as possible; (2) limit activities when soils are wet (i.e., access may be restricted during wet seasons or following rainfall events).
2. A buffer of at least 250 feet would be the minimum allowance permitted for surface occupancy within riparian, wetlands, and floodplains. This provision would be based on site-specific analysis rather than a standard operating procedure.
3. To prevent the introduction and spread of non-native species onto the National Forest land, the operator shall ensure that all equipment moved onto National Forest land is free of soil, seeds, vegetative matter of other debris that could contain or hold nonnative species.
4. A timing stipulation restricting ground disturbing construction and drilling during the wet season from 11/30 thru 3/31 would be applied to all leases, when needed for site protection.
5. A controlled surface use stipulation would be applied to all leases containing areas larger than a 40-acre legal subdivision of high erosion hazard, steep slopes, or high susceptibility to wetness. A notice to lessee would be applied to leases where the high erosion hazard, steep slopes, or high susceptibility to wetness are less than a 40-acre legal subdivision.
6. A no surface occupancy stipulation would be applied to leases of special areas containing

Guidelines for Minerals Management

research, botanical, zoological, archaeological, or scenic areas.

7. A no surface occupancy stipulation would be applied to leases on developed recreation sites, administrative sites, and military site Camp Keller and portions of military site Camp Shelby on the De Soto National Forest. Special stipulations would also be applied to leases on Camp Shelby (refer to the National Forests in Mississippi Lands Available for Oil and Gas Leasing Environmental Assessment, dated August 2010, for a description of the special stipulations applicable to Camp Shelby).
8. A Lease Notice regarding a potential reservoir of 3,000 surface acres on the Bienville National Forest would be applied to leases in the portion of the potential reservoir.
9. Any new leases for lands in the Sandy Creek RARE II Further Study Area/Roadless Area would need to contain stipulations that address the road construction/reconstruction restrictions found in 36 CFR 294.

4.2.9 Cultural Resources

Guidelines for Cultural Resources

1. If previously undocumented cultural resources are encountered during ground-disturbing activities, those activities should be halted until site significance is determined.
2. Access to cemeteries should meet or exceed the type that existed when it became Federal property.

4.2.10 Administration, Facilities, Recreation, Wilderness, and Wild and Scenic Rivers

Guidelines for Administration, Facilities, Recreation, Wilderness, and Wild & Scenic Rivers

1. When planning new structures, they should be as maintenance free, aesthetically pleasing, and energy efficient as reasonably possible while optimally located to serve their intended purpose. All structures should be monitored to ensure they are necessary to support recreation and/or administrative activities on the National Forests in Mississippi.
2. OHVs may be used for administrative uses such as maintenance and inspection of trails, open lands and prescribed fire, and emergencies such as wildfire and search and rescue.
3. If unacceptable resource damage is identified in a section of any trail, that section should be closed for mitigation, rerouted, and/or obliterated.
4. OHV use by the public may occur on routes and areas specifically designated as open to such vehicles on the National Forests in Mississippi's motor vehicle use map. Permits may be issued for special events according to appropriateness and timing of the event.
5. Planning and development of trails, campsites, and other recreational facilities should include measures to provide protection for known occurrences important to conservation of threatened, endangered, sensitive, or locally rare species that are susceptible to damage or extirpation from trampling or other forms of human disturbance.

Guidelines for Administration, Facilities, Recreation, Wilderness, and Wild & Scenic Rivers
6. Where recreational uses are negatively affecting rare ecological systems, and wetland systems, the use should be modified to reduce or eliminate negative effects. New recreational developments should be designed to avoid adverse effects to rare ecological systems, and wetland systems.
7. Trail marking should be considered and evaluated as part of routine trail condition surveys.
8. Management activities needed or considered for wilderness, wild and scenic river, and the Black Creek Corridor Scenic Area will be evaluated and implemented utilizing the standards and guidelines found in the Limits of Acceptable Change approved in 1994 for management of these designated areas.

4.3 Management Area Prescriptions

Management areas are areas within the national forest that are similar in some respect. They may have similar features or uses or contain special attributes that must be taken into account when considering management activities.

4.3.1 Ecosystem-based Management Areas

As discussed earlier, this forest plan has been developed around a primary theme of restoring and sustaining native ecological communities. The general locations and extent of the major ecosystems on the National Forests in Mississippi are mapped by ranger district and found in appendix F. These broad areas of similar ecological makeup constitute the management areas on the Forests where the collective management direction described in this plan will be applied. These ecologically based management areas do not have precise boundaries and may contain less-common ecosystems or other designated geologic areas or special uses that have additional requirements or different prescriptions. So, while management area prescriptions are generally ecosystem-based, future projects will also take into account the various uses within these systems that may have special limitations, such as wilderness, utility corridors, research natural areas, and other special uses.

As noted in chapter 2, existing ecosystems on the National Forests in Mississippi generally include a variety of widely distributed native pine and hardwood ecological systems, as well as rare communities that are often embedded within these major systems. The table below identifies the major ecological systems that comprise the management areas and the extent to which they occur on the National Forests in Mississippi. The management area prescriptions apply to the acres allocated to the management areas and implement the overall direction in the forest plan, including the desired conditions, objectives, management approach, standards, and guidelines. Specific guidance for managing the various categories of management areas are also identified in Forest Service policies and directives, national requirements, or individual project level management plans.

The management area acreages in Table 9 reflect beginning of first period (decade) vegetation management model allocations. A general description of the vegetative management practices for each major ecosystem is also included in the following sections.

Table 9. Approximate land allocations for the ecosystem-based management areas

Management Areas	Acres
Upland Longleaf Pine Forest and Woodland	238,027
Shortleaf Pine-Oak Forest and Woodland	59,139
Loblolly Pine Forest	365,273
Slash Pine Forest	114,844
Dry Upland Hardwood Forest	105,885
Mesic Slope Forest	19,401
Southern Loblolly-Hardwood Flatwoods	78,662
Floodplain Forest	96,424
Lower Mississippi River Bottomland & Floodplain Forest	59,197
Near-Coast Pine Flatwoods	16,859

Upland Longleaf Pine Forest and Woodland – Three to four thinnings would typically occur through the life of the stand. Thinnings for gopher tortoise management on priority soils (including dry buffer areas) would be lower density woodland thinnings. Stand replacement would be anticipated to occur about every 120 years.

Shortleaf Pine-Oak Forest and Woodland – Three to four thinnings would typically occur through the life of the stand. On dry and xeric uplands, these thinnings may be to lower densities for woodland habitat management. Stand replacement would be anticipated to occur about every 120 years. Where shortleaf pine occurs as a minor component on the forest, management may not be emphasized except for thinning.

Loblolly Pine Forest – The loblolly pine system consists of loblolly forests in upland settings, typically on dry or xeric sites and a small percentage of mesic site loblolly. Overabundance of the upland loblolly pine forest ecological system on the landscape is the most important characteristic of this system. Conversion of most of the dry upland loblolly pine forest to appropriate ecological systems is a high priority for long-term sustainability of the forest. Three to four thinnings would typically occur through the life of the stand. In the general forest area, stand replacement emphasis would be on restoring sites to appropriate systems such as longleaf or shortleaf pine and dry upland hardwood as early as age 20 at a rate generally not exceeding 16.7 percent per decade of existing loblolly forest. In red-cockaded woodpecker habitat management areas, stand replacement would not occur before age 31 or exceed 12.5 percent per decade. Mesic loblolly would be managed to the desired condition of mesic slope forest described below.

Slash Pine Forest – The slash pine system consists of slash forests in upland settings, on xeric to mesic sites and some floodplain slash. Overabundance of the slash pine forest ecological system on the landscape is the most important characteristic of this system. Converting most of the slash pine forest to appropriate ecological systems is a high priority for long-term sustainability of the forest. Three to four thinnings would typically occur through the life of the stand. In the general forest area, stand replacement emphasis would be on restoring appropriate systems such as longleaf or shortleaf pine and dry upland hardwood as early as age 20 at a rate generally not exceeding 16.7 percent per decade of existing slash forest. In red-cockaded woodpecker habitat management areas, stand replacement would not occur before age 31 or exceed 8.3 percent per decade. Slash occurring in floodplains would be managed to desired condition for floodplain forests described below.

Northern Dry Upland Hardwood Forest – One to two thinnings may occur through the life of the stand. On xeric uplands, these thinnings may be to lower densities for woodland habitat management. Stand replacement could start around age 90 and be anticipated to occur about every 130 years. Harvests in these hardwood forest settings to meet vegetation management objectives are not a high priority.

Southern Dry Upland Hardwood Forest – The management practices for southern dry upland hardwood forest setting are generally the same as described above for the northern dry upland hardwood forest.

Southern Loess Bluff Forest – This management area only occurs on the Homochitto National Forest on loess soils and the management prescription is to manage for southern loess bluff forest on loess soils. However, the management practices are generally the same as for the southern dry upland hardwood forest above.

Southern Mesic Slope Forest – This system consists of a hardwood-dominated forest on mesic slopes. One to two thinnings may occur through the life of the stand. Stand replacement could start around age 90 and be anticipated to occur about every 200 years. Harvests in these hardwood forest settings to meet vegetation management objectives are not a high priority.

Northern Mesic Hardwood Forest – The management practices for Northern Mesic Hardwood Forest settings are generally the same as described above for the southern mesic slopes forest.

Southern Loblolly-Hardwood Flatwoods – This loblolly pine system located on the Bienville National Forest consists of loblolly forests in mesic flatwoods settings. Three to four thinnings would typically occur through the life of the stand. This system is generally within the red-cockaded woodpecker habitat management area. Stand replacement would not occur before age 80 or exceed 12.5 percent per decade.

Floodplain Forest – This management area is hardwood-dominated forest on alluvial soils. The management practices are generally the same as described above for the southern mesic slope forest.

Lower Mississippi River Bottomland & Floodplain Forest – This management area is located on the Delta National Forest. This system consists of a hardwood-dominated forest. One to two thinnings may occur through the life of the stand. Stand replacement could start around age 90 and be anticipated to occur about every 200 years. Harvests in this hardwood forest setting are for maintaining wildlife habitat and ecological diversity.

Near-Coast Pine Flatwoods – This management area is located on the De Soto National Forest and not appropriate for timber production. This system consists of longleaf pine and slash on non-riverine hydric soils. The existing pine component in this ecosystem will be managed for either woodland, essentially treeless savanna or herbaceous seepage bog as appropriate based on soils and hydrology.

4.3.2 Designated Geographic Areas

Within the broad management areas across the National Forests in Mississippi, there are distinct, defined geographic areas that have special characteristics or uses, which may modify or take precedence over management area prescriptions for ecosystems. These designated geographic areas include a variety of distinctive uses or settings with exceptional or uncommon botanical, scenic, research, wilderness, recreational, or archaeological values.

Many of these areas exhibit or support the desired attributes and diversity toward which this plan is directed. For example, some designated geographic areas are mature examples of desired

ecosystems and serve as some of the best locations of mid-sized or larger expanses of old growth conditions on the National Forests in Mississippi. These areas also provide sites for native ecosystems, habitats for species diversity, refuge areas for aquatic and terrestrial wildlife and threatened and endangered species, mid-sized to large patches of old growth forest communities, experimental sites for vegetation management practices, unique recreational opportunities, and desirable scenic conditions. Designating and managing these areas for their special characteristics are part of our strategy for moving toward desired conditions.

The following is a list and description of designated geographic areas on the National Forests in Mississippi. Maps of these geographic areas can be viewed through links for each district in appendix F.

Red-cockaded Woodpecker Habitat Management Areas

The red-cockaded woodpecker habitat management areas are found on the Bienville, Chickasawhay, De Soto, and Homochitto National Forests. General uses on these areas differ based on whether they are "cluster" sites where bird colonies nest, or the larger, adjacent foraging areas. See appendix F: Administrative Unit Maps for link to view a map of each habitat management area.

Administrative Areas

Administrative areas on the National Forests in Mississippi are mainly work centers and district offices, but they also include facilities with a more defined purpose such as the Erambert and Black Creek Seed Orchards, the Jamie L. Whitten Plant Materials Center jointly operated by USDA and Natural Resource Conservation Service, and the upper part of Paul B. Johnson State Park located on National Forest System land. Administrative areas generally have limited uses due to restricted public access for safety and security reasons. Administrative Areas are not suitable for timber production. However, timber harvest may be used to facilitate management.

Developed Recreation Areas

Developed recreation sites on the National Forests in Mississippi include campgrounds, picnic areas, boat ramps, swimming areas, and associated constructed facilities. Developed recreation areas are not suitable for timber production. Timber harvest may however be used to facilitate management.

Botanical Areas

Designated botanical management areas are generally good representatives of native ecological systems such as longleaf pines, floodplain hardwoods, prairies, or southern mesophytic forests. These sites provide habitats for an array of characteristic species, popular demand species, threatened, endangered and sensitive species, and locally rare species. Botanical areas will be managed to restore, maintain and protect the unique botanical characteristics for which each has been designated to represent. Botanical areas are not suitable for timber production. However, timber harvest may be used to facilitate management. Designated botanical areas on the National Forests in Mississippi include the following:

- **Harrell Prairie Botanical Area (Bienville National Forest, 153 acres):** Harrell Prairie Hill comprises the largest and best example of native tall grass prairie from the Jackson Prairie and is designated as a national natural landmark. It has been the focus of restoration work dating

back to the mid-1980s and is further along in restoration than any other known relict of this type in Mississippi. The Jackson Prairie is healthy and provides the necessary habitat conditions to support a full array of native prairie species such as Indian grass, bluestem grasses, rosinweeds, prairie-clovers, yellow-puffs, prairie cone-flowers, and others.

- **Tiger Creek Botanical Area (Chickasawhay Ranger District, De Soto National Forest, 375 acres):** This site is located on a minor stream bottom. Dominant species are white oak, southern magnolia, and loblolly pine. As an undisturbed representation of a floodplain forest ecological community, the area serves as an area in which natural biological diversity is conserved.

- **Red Hills Botanical Area (De Soto Ranger District, De Soto National Forest, 194 acres):** The Red Hills are an area of deeply dissected terrain overlooking Black Creek. The ridgetops, moist slopes, and ravines support a rich flora typical of the forest commonly called "beech-magnolia." The southern mesophytic forest is intact and the hydrologic function of associated springs and seeps is intact.

- **Laurel Oak Botanical Area (Chickasawhay Ranger District, De Soto National Forest, 277 acres):** As a botanical area, this area provides undisturbed baseline area to monitor changes in natural conditions associated with management of similar areas and serves as an area in which natural biological diversity is conserved. The area is a minor stream bottom with stands predominated by laurel oak and loblolly pine. This botanical area is a new designation established by this plan.

- **Railroad Creek Titi Botanical Area (De Soto Ranger District, De Soto National Forest, 451 acres):** This botanical area includes an impressive and extensive stand of 30-feet-tall, 4- to 7-inch-diameter buckwheat trees beneath a slash pine-dominated swamp forest along a black water creek. Swamp titi is also present but is not dominant. This area provides an undisturbed baseline to monitor changes in natural conditions associated with management of similar areas and serves as an area in which natural biological diversity is conserved. This botanical area is a new designation established by this plan.

- **L ittle Florida Botanical Area (De Soto Ranger District, De Soto National Forest, 121 acres):** Little Florida contains the most extensive and highest quality xeric sandhill community with longleaf pine forest, saw palmetto, and other characteristic species remaining in Mississippi. Several plant species such as scarlet basil and littleleaf milkpea reach the western limits of their range at this site. The sand ridge is surrounded by more typical mesic longleaf forest and several drainages. This botanical area is a new designation established by this plan.

- **Pitcher Plant Botanical Area (De Soto Ranger District, De Soto National Forest, 251 acres):** The Pitcher Plant Botanical Area consists of three distinct and rather unique "quaking bogs" in relatively close proximity to each other. Vegetation in these bogs "floats" atop a saturated layer of peat atop an impervious sand layer 2 meters or more below the surface. This botanical area provides habitat for a variety of bog species as well as more common and diagnostic members of this ecosystem including pitcher plants, sundews, grasses, and sedges. This botanical area is a new designation established by this plan.

- **Buttercup Flat Botanical Area (De Soto Ranger District, De Soto National Forest, 164 acres):** The Buttercup Flat Botanical Area consists of a scenic pitcher plant savanna along State Highway 26. The savanna is intact hydrologically and provides habitat for a wide variety of common and diagnostic members of this system including pitcher plants, sundews, grasses, and sedges. This botanical area is a new designation established by this plan.

- **Loblolly Bay Botanical Area (De Soto Ranger District, De Soto National Forest, 93 acres):** This botanical area is a classic bayhead community with sweetbay, swamp gum and slash pine as common dominants with yellow poplar, red maple, and water oak less common. Loblolly bay is present here in good numbers. The bayhead community provides habitat for the uncommon loblolly bay. Gopher tortoises live on the adjacent uplands, which support longleaf pine. This botanical area is a new designation established by this plan.

- **Ragland Hills Botanical Area (De Soto Ranger District, De Soto National Forest, 237 acres):** The Ragland Hills Area is a classic southern mesophytic forest in deeply dissected ravines separated by well-drained ridgetops that support longleaf pine. National Forest System lands are flanked by land owned by the University of Southern Mississippi and the Mississippi National Guard. Together these three publicly owned tracts offer opportunity for a multi-agency natural area preserve. The endemic big-leaf witch-hazel has recently been described from this community. This area provides an undisturbed baseline site on which to monitor changes in natural conditions associated with management of similar areas and serves as an area in which natural biological diversity is conserved. This botanical area is a new designation established by this plan.

- **Wyatt Hills Botanical Area (De Soto Ranger District, De Soto National Forest, 100 acres):** The Wyatt Hills is an area of locally high topographic relief deeply dissected into narrow ridges, ravines, and bottomland forests along small creeks. It is notable for its woody plant diversity. Over 70 species of trees, shrubs and woody vines have been recorded, including 7 species of oak, 5 species of magnolia, 4 pines, 4 hollies, 4 blueberries, and 3 cat-briers. Florida anisetree is by far the most common shrub on slopes, with mountain laurel thickets along the ridge crests. This botanical area is a new designation established by this plan.

- **Cypress Bayou Botanical Area (Delta National Forest, 262 acres):** The Cypress Bayou Botanical Area is a tract of old growth delta bottomland hardwood forest dominated by overcup oak. Timber was established on the stand in 1874 and has not been cut since. Other dominant trees include green ash, sugarberry, bitter pecan, Nuttall oak and sweetgum. This botanical area is a new designation established by this plan.

- **LA-2 Botanical Area (Holly Springs National Forest, 12 acres):** This is an area of old-growth hardwood forest in steep topography that was identified as being one of the best remaining areas of old-growth forest in Mississippi's lignite belt during a 1980s evaluation done by Dr. Frank Miller at Mississippi State University's remote sensing laboratory under contract to Mississippi Natural Heritage Program. This botanical area is a new designation established by this plan.

- **LA-6 Botanical Area (Holly Springs National Forest, 158 acres):** This is an area of old-growth hardwood forest in steep topography that was identified as being one of the best remaining areas of old-growth forest in Mississippi's lignite belt during a 1980s evaluation done by Dr. Frank Miller at Mississippi State University's remote sensing laboratory under

contract to Mississippi Natural Heritage Program. This botanical area is a new designation established by this plan.

- **Sandy Creek Botanical Area (Homochitto National Forest, 300 acres):** This is an area of mesic to dry mesic loessial forest. Dominant species are various hardwoods with scattered loblolly pine that are dropping out of the stand as the stand ages. The stand is about 70 years old. This area provides undisturbed baseline sites on which to monitor changes in natural conditions associated with management of similar areas and serves as an area in which natural biological diversity is conserved. This botanical area is a new designation established by this plan.

- **Shagbark Hickory Botanical Area (Tombigbee National Forest, 109 acres):** The Shagbark Hickory Botanical Area is an area of mesic hardwood in steep highly dissected terrain that had been utilized as outdoor classroom for many years by professors and students of Mississippi State University. This area provides educational opportunities as an outdoor classroom for future students and professors. This botanical area is a new designation established by this plan.

- **Choctaw #4 Botanical Area (Tombigbee National Forest, 45 acres):** This is an area of old-growth hardwood forest in steep topography that was identified as being one of the best remaining areas of old-growth forest in Mississippi's lignite belt during a 1980s evaluation done by Dr. Frank Miller at Mississippi State University's remote sensing laboratory under contract to Mississippi Natural Heritage Program. This botanical area is a new designation established by this plan.

- **Prairie Mount Botanical Area (Tombigbee National Forest, 370 acres):** The Prairie Mount Botanical Area represents a good example of the native tall grass prairie from the Black Belt region. The Black Belt Prairie provides the necessary habitat conditions to support a full array of native prairie species such as indiangrass, bluestem grasses, rosinweeds, prairie-clovers, yellow-puffs, prairie cone-flowers, and others. This area provides undisturbed baseline sites on which to monitor changes in natural conditions associated with management of similar areas and serves as an area in which natural biological diversity is conserved. This botanical area is a new designation established by this plan.

- **Bogue Cully Botanical Area (Tombigbee National Forest, 500 acres):** The Bogue Cully Botanical Area represents a good example of the native tall grass prairie from the Black Belt region. The Black Belt Prairie provides the necessary habitat conditions to support a full array of native prairie species such as Indian grass, bluestem grasses, rosinweeds, prairie-clovers, yellow-puffs, prairie cone-flowers, and others. This area provides undisturbed baseline sites on which to monitor changes in natural conditions associated with management of similar areas and serves as an area in which natural biological diversity is conserved. This botanical area is a new designation established by this plan.

Scenic Areas

Scenic areas contribute to the desired naturally appearing character of the National Forests in Mississippi, including the old-growth loblolly-shortleaf pine forests in the Bienville Pines Scenic Area and the picturesque river setting along the Black Creek Wild and Scenic River. The designated scenic areas will be managed to maintain highly valued scenic qualities. Scenic areas are not suitable for timber production. However, timber harvest may be used to facilitate management. The designated scenic areas on the National Forests in Mississippi include:

- **Bienville Pines Scenic Area (Bienville National Forest, 189 acres):** The Bienville Pines Scenic Area is a designated national natural landmark and was established to showcase the original old-growth loblolly pine-shortleaf pine forest that was typical of the area before logging. The mill owner kept the site from being logged as a monument to what was, and it was passed on to the Forest Service intact. The Bienville Pines Scenic Area continues to provide visitors the opportunity to witness trees that were once part of the original forest before logging and to witness the effects of change as these old trees are dying of natural causes and being replaced.

- **Black Creek Corridor Scenic Area (De Soto Ranger District, De Soto National Forest, 9,149 acres):** This area consists of a ¼-mile-wide corridor on either side of Black Creek, beginning at the Big Creek landing and ending at Alexander Bridge; a distance of about 41 miles. It includes the designated Black Creek Wild and Scenic River and all portions of the corridor are managed the same as the designated scenic river section (see below).

Wild and Scenic Rivers

One designated wild and scenic river is located on the National Forests in Mississippi.

- **Black Creek Wild and Scenic River (De Soto Ranger District, De Soto National Forest, 21 miles):** Black Creek is the only congressionally designated wild and scenic river in the state. It is a tributary of the Pascagoula River, which flows into the Gulf of Mexico. Twenty-one miles of Black Creek within the De Soto Ranger District (between Moody's Landing and Fairley Bridge Landing) are designated in a scenic classification. Generally, Black Creek has been described as having outstanding scenery due to the highly varied terrain, wide sandbars, overhanging vegetation, and steep bluffs. Moss-covered banks and colorful vertical bluffs add to the picturesque setting. Little evidence of man is noticeable along the designated river except where Highway 29 crosses near Janice Landing. The outstandingly remarkable values are the scenery and recreational attributes that make the river corridor a popular destination for canoeing, fishing, and other water-based recreation. Black Creek is also potential habitat for the federally threatened Gulf Sturgeon. A system of trails provides access along the Black Creek corridor. The Black Creek Trail is a designated national recreation trail.

  

  A total of 41 miles of Black Creek were studied for wild and scenic river suitability. Only 21 miles were deemed eligible and in 1986, these became the congressionally designated Black Creek Wild and Scenic River. The density of private land in these undesignated sections of the creek was a key issue in why these segments were not included in the congressional designation. As lands are acquired within the designated or undesignated portions of Black Creek they will be evaluated for possible annexation and expansion of the scenic river corridor.

  The management emphasis for the Black Creek Wild and Scenic River is to maintain the river's outstandingly remarkable scenic and recreation values, and to preserve it's free-flowing condition. Both the Black Creek Wild and Scenic River and the Black Creek Scenic Corridor are not suitable for timber production. However, timber harvest may be used to address management needs, such as maintaining diversity, in those portions of the corridor outside the designated Black Creek Wilderness.

Within the scenic corridor, but outside of the wilderness, timber management activities such as creating small openings and thinning/improvement cuts, would only be done to maintain the pine, hardwood and mixed pine-hardwood components in a healthy, vigorous condition. All regeneration activities in the created openings will be by natural means. However, there could be times when artificial regeneration methods will be required to successfully regenerate openings created by natural means. No timber harvesting will be allowed within 300 feet of the bank of Black Creek except for the control of insect and disease infestations. Other resource management activities including prescribed burning, watershed restoration, and erosion control may also be implemented for the protection and enhancement of wildlife, watershed, and recreational values. These activities would be minor in nature and will not diminish the scenic value and character of the Corridor. Trails and recreation areas will be maintained at current levels to provide basic customer/user services and facilities that are natural appearing and fit natural surroundings. Any future development will be for providing basic customer and resource protection needs.

Detailed management direction was developed for the Black Creek Wild and Scenic River using the limits of acceptable change process. This management direction was amended into the 1985 Land and Resource Management Plan in 1994 and the applicable standards and guidelines (which are identified in the "Limits of Acceptable Change – Vol. I" document under "Step 5 – Specifications for Standards for Resource and Social Conditions") are brought forward and incorporated by reference into this Revised Land and Resource Management Plan. The standards and guidelines identified in "Step 5" vary by opportunity class as delineated in "Step 2 – Opportunity Class Definitions and Descriptions" of the "Limits of Acceptable Change – Vol. I" document.

Wilderness Areas

The two wilderness areas designated on the National Forests in Mississippi are protected, managed, and monitored to preserve their wilderness character and provide habitat for sustaining a diversity of species. The more "remote" parts of these wilderness areas will be managed to provide for semi-primitive recreation experiences with natural processes occurring. The remaining parts of the wilderness areas can provide for more intensive recreation uses, and some recreation site and trail modifications could occur. Wilderness areas are not suitable for timber production and are not appropriate for timber harvesting activities.

- **Black Creek Wilderness Area (De Soto Ranger District, De Soto National Forest, 5,052 acres):** The Black Creek Wilderness is named after its dominant feature, Black Creek, which bisects the wilderness, creating a large hardwood floodplain containing oxbow lakes and stands of sweetgum, loblolly pine, spruce pine, willow oak, bald cypress, sweetbay and red maple. Under provisions of the Clean Air Act, this wilderness is classified as a class II area, the same as all other National Forest System lands in Mississippi. Most of the Black Creek Wilderness occupies part of the broad valley of Black Creek. Relief is fairly gentle with elevations ranging from 100 to 130 feet above sea level within the creek valley, and up to 270 feet above sea level on the adjoining uplands. This area is predominately pine and pine hardwood, with hardwoods along the drainages. The Black Creek Wilderness is potential habitat for the federally endangered Louisiana black bear. The only development in the area is the Black Creek Trail; no other facilities are provided. This area offers semi-primitive recreation opportunities and moderate levels of solitude.

- **Leaf Wilderness Area (De Soto Ranger District, De Soto National Forest, 994 acres):** The Leaf Wilderness (994 acres) lies almost entirely on the floodplain of the west-to-east

flowing Leaf River. Except for a small upland area on the extreme western edge of the wilderness, the area primarily consists of meandering sloughs, oxbow lakes, and level terrain with spruce-pine forest or oak-gum-cypress river bottom types. The upland is covered in loblolly and shortleaf pines. Elevations average 50 feet mean sea level. The Leaf Wilderness Area offers semi-primitive recreation opportunities and moderate levels of solitude.

Detailed management direction was developed for the Black Creek and Leaf Wilderness Areas using the limits of acceptable change process. This management direction was amended into the 1985 Land and Resource Management Plan in 1994 and the applicable standards and guidelines (which are identified in the "Limits of Acceptable Change – Vol. I" document under "Step 5 – Specifications for Standards for Resource and Social Conditions") are brought forward and incorporated by reference into this Revised Land and Resource Management Plan. The standards and guidelines identified in "Step 5" vary by opportunity class as delineated in "Step 2 – Opportunity Class Definitions and Descriptions" of the "Limits of Acceptable Change – Vol. I" document. These opportunity classes also include delineating the "remote" sections of the wilderness areas.

Archaeological Sites

The Owl Creek Mounds and the Dowling Bayou archaeological sites protect Indian mounds and village sites and support the desired conditions for cultural resources. Management activities will provide protection, study opportunity, and public access consistent with Forest Service Manual guidance for the designation. Archaeological sites are not suitable for timber production. However, timber harvest may be used to facilitate management.

- **Dowling Bayou Archaeological Site (Delta National Forest, 10 acres):** Dowling Bayou Archaeological Site is an Indian mound and village site on the Delta National Forest. It dates from the late woodland period (A.D. 800) and is a classic example of the mounds of this period. The cultural resources are protected and available for research.
- **Owl Creek Mounds Archaeological Site (Tombigbee National Forest, 29 acres):** Owl Creek Mounds Archaeological Site is an Indian mound and village site on the Tombigbee National Forest. It dates from the late woodland period (A.D. 800) and is a classic example of the mounds of this period. This site is listed on the National Register of Historic Places. The cultural resources are protected and available for research.

Recreational Areas

These geographical management areas have special recreation attributes or management emphasizes that predominate other resource management activities for the area and contribute to achieving overall recreation management strategies.

- **Unmanaged Forty Recreation Area (Chickasawhay Ranger District, De Soto National Forest, 41 acres):** The "Unmanaged Forty" is part of the 1935 Gavin Slash Pine Plantation and has been withdrawn from timber and fire management activities by Forest Supervisors since 1945. It is part of the Gavin Auto Tour. This auto tour uses interpretive signs to inform visitors about south Mississippi's beautiful pine forests, and the practices used to manage these renewable resources. Sites along the 11-mile tour include mature pine timber; natural and artificial regeneration areas; game forage plots; prescribed burn areas; and this

unmanaged 40 acres of timber. The Unmanaged Forty will be protected, but continue to not be managed actively. The Unmanaged Forty Recreation Area is not suitable for timber production and is not appropriate for timber harvest.

- **Hawk's Nest Backcountry Area (Ackerman Unit, Tombigbee National Forest, 4,431 acres):** The Hawk's Nest area contains unusually high terrain for Mississippi and potential scenic values. There are 24 miles of developed mountain bike trails and 12 miles of interior forest roads in the area. Suitability for various uses in this area is the same as the ecosystem-based management areas that comprise the area. However, management for the area emphasizes retaining more undeveloped characteristics with a remote roaded natural (RN2) Recreation Opportunity Spectrum (ROS) classification. Interaction with other users is low, but with evidence of other users prevalent.

Experimental Forests

Desired conditions are for healthy and resilient forests for a broad range of studies such as stand management, watershed management, restoration of wildlife and plant populations, maintenance of biological diversity, and effects of disturbances such as climate change. These areas are less disturbed than is typical for this region and provide a valuable baseline for monitoring changes in natural conditions on National Forest System lands. Experimental Forest will be managed cooperatively to support the research objectives of the Southern Research Station Unit assigned responsibility for use of the area. Experimental forests are not suitable for timber production. However, timber harvest may be used to facilitate management or research. Existing experimental forests on the National Forests in Mississippi include:

- **Harrison Experimental Forest (De Soto Ranger District, De Soto National Forest, 4,066 acres): S**cientists in Forest Service research work units use the Harrison Experimental Forest as a site for their studies and demonstration projects in conjunction with the National Forests in Mississippi and the De Soto Ranger District. Among the experiments conducted on this forest are studies on stand management and regeneration, restoration of wildlife and plant populations, watershed management, and the effects of pollution, climate change, and timber harvest.

- **Tallahatchie Experimental Forest (Holly Springs National Forest, 3,502 acres):** Scientists in research work units use the Tallahatchie Experimental Forest as a site for their studies and demonstration projects in conjunction with the National Forests in Mississippi. Among the experiments conducted on these forests are studies on stand management and regeneration, restoration of wildlife and plant populations, watershed management, and the effects of pollution, climate change, and timber harvest.

Research Natural Areas

Research natural areas have complex requirements for designation. These areas must be viable preserves from a research perspective and provide a niche that is not already in place. Research natural areas are not suitable for timber production. Timber harvest is generally not allowed unless the establishment record allows it. The following research natural areas have been established and are designated on the National Forests in Mississippi:

- **Harrison Research Natural Area (De Soto Ranger District, De Soto National Forest, 113 acres):** This area contains an extensive and high-quality xeric longleaf pine forest with saw palmetto and other characteristic species. The sand ridge is surrounded by more typical mesic longleaf forest and several drainages. This xeric sandhill community remains a healthy example of its type. As an established research natural area, this area provides undisturbed

baseline areas to monitor changes in natural conditions associated with management of similar areas. As an undisturbed representation of an ecological community, it serves as an area in which natural biological diversity is conserved.

- **Red Gum Research Natural Area (Delta National Forest, 40 acres):** The Red Gum Research Natural Area is a stand of huge sweet gum trees, some of them over 300 years old. This is a "ridge bottom" delta forest with dense understory of dwarf palmetto and switchcane. This relatively undisturbed Mississippi River Delta bottomland hardwood forest has never been logged. This example of Mississippi River bottomland hardwood forest is intact and properly functioning hydrologically. As an established research natural area, this area provides undisturbed baseline sites on which to monitor changes in natural conditions associated with management of similar areas. As an undisturbed representation of an ecological community, it serves as an area in which natural biological diversity is conserved.
- **Overcup Oak-Water Hickory Research Natural Area (Delta National Forest, 40 acres):** The Overcup Oak-Water Hickory Research Natural Area is remnant of virgin bottomland forest in the Mississippi River Delta Region. The forest is dominated by large overcup oaks and water hickories estimated to be about 200 years old. This example of Mississippi River bottomland hardwood forest is intact and properly functioning hydrologically. As an established research natural area, this area provides undisturbed baseline sites on which to monitor changes in natural conditions associated with management of similar areas. As an undisturbed representation of an ecological community, it serves as an area in which natural biological diversity is conserved.
- **Green Ash-Sugarberry Research Natural Area (Delta National Forest, 67 acres):** The Green Ash-Sugarberry Research Natural Area is a remnant of the virgin bottomland hardwood forest that once covered the Mississippi River Delta. This research natural area has huge green ash trees that are in excess of 250 years old. This example of Mississippi River bottomland hardwood forest is intact and properly functioning hydrologically. As an established research natural area, this area provides undisturbed baseline sites on which to monitor changes in natural conditions associated with management of similar areas. As an undisturbed representation of an ecological community, it serves as an area in which natural biological diversity is conserved.
- **Noxubee Crest Research Natural Area (Tombigbee National Forest, 552 acres):** The Noxubee Crest Research Natural Area encompasses the headwaters of a branch of the Little Noxubee River. Much of the uplands are old agricultural field areas that were abandoned in the 1930s, but the steep side slopes and creek bottoms contain fine examples of 120-year-old and older shortleaf pine-oak-hickory forest. Noxubee Crest continues to provide habitat for wooded spring seep and dry-mesic mixed oak forest. Hydrological function of associated seeps and springs is intact. As a research natural area, this area provides undisturbed baseline sites on which to monitor changes in natural conditions associated with management of similar areas. As an undisturbed representation of an ecological community, it serves as an area in which natural biological diversity is conserved.
- **Chuquatonchee Bluffs Research Natural Area (Tombigbee National Forest, 218 acres):** This bluff area is on a steep north-facing mesic slope overlooking the floodplain of Chuquatonchee Creek. This is an old-growth Pontotoc Ridge forest. Aerial photographs dated 1937 show trees in the area with large crowns. The area supports a rich flora.

  The bluff area continues to support healthy examples of the Pontotoc Ridge forest type. Hydrological function of associated seeps and springs is intact. As a research natural

area, this area provides undisturbed baseline sites on which to monitor changes in natural conditions associated with management of similar areas. As an undisturbed representation of an ecological community, it serves as an area in which natural biological diversity is conserved.

- **Nutmeg Hickory Research Natural Area (Bienville National Forest, 307 acres):** This calcareous variant of floodplain forest ecological system is being established as a new research natural area. It is a mature wet-mesic floodplain forest dominated by mature specimens of native prairie forest species such as nutmeg hickory, Durand oak, and big shellbark hickory. This area provides undisturbed baseline areas to monitor changes in natural conditions associated with management of similar areas and serves as an area in which natural biological diversity is conserved.

- **Granny Creek Bay Research Natural Area (De Soto Ranger District, De Soto National Forest, 127 acres):** This area is being established as a new research natural area. Granny Creek Bay is a large spring seep and associated seepage swamp of exceptional quality. It has been the focus of research conducted by biologists with the University of Southern Mississippi and the Mississippi Natural Heritage Program. This area provides undisturbed baseline areas to monitor changes in natural conditions associated with management of similar areas and serves as an area to conserve natural biological diversity.

4.4 Suitability of Uses

National Forest System lands are suitable for a variety of uses (36 CFR 219), including outdoor recreation, livestock grazing, timber, wildlife, wilderness, energy resource development, cultural and heritage interpretation, and watershed purposes, among others. An area is suitable for uses that are compatible with desired conditions and objectives for that area. The primary uses on National Forests in Mississippi lands where management area prescription suitability determinations may differ are:

- timber (both production and harvest)
- recreation
- minerals (leasing and surface extraction)
- special uses (such as utility corridors, easements, and driveways)
- fire management (prescribed burns)

Certain uses (timber, recreation, minerals, special uses, and use of fire as a management tool) are more compatible with some portions of the National Forests in Mississippi than others. Table 10 displays the suitability of these uses on a broad scale for the major geographic areas of the Forests. In some cases, uses or areas are subdivided when there are important distinctions within a use or within a general area of the Forests. Notable exceptions or extenuating circumstances are further described in the discussion that follows.

Table 10. Suitability of areas for various uses on the National Forests in Mississippi

Management Areas of the Forest	Uses					
	Timber Production	Recreation	Minerals		Special Uses	Fire Uses
			Leasing	Surface Extraction		
Ecosystem-based management areas	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable
Red-cockaded woodpecker habitat management areas						
Clusters	Not suitable	Suitable	Suitable	Not suitable	Not suitable	Suitable
Foraging	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable
Administrative areas	Not suitable	Not suitable	Suitable	Not suitable	Not suitable	Not suitable
Riparian areas	Suitable	Suitable	Suitable	Not suitable	Suitable	Suitable
Special areas						
Wild & scenic river corridor	Not suitable	Suitable	Suitable	Not suitable	Suitable	Suitable
Wilderness	Not suitable	Suitable	Not suitable	Not suitable	Not suitable	Suitable
Botanical, scenic, & archaeological	Not suitable	Suitable	Suitable	Not suitable	Not suitable	Suitable
Research natural areas	Not suitable	Suitable	Suitable	Not suitable	Not suitable	Suitable
Experimental forests	Not suitable	Suitable	Suitable	Suitable	Suitable	Suitable
Developed recreation areas	Not suitable	Suitable	Suitable	Not suitable	Not suitable	Not suitable
Old growth	Not suitable	Suitable	Suitable	Not suitable	Not suitable	Suitable
Nonforested lands	Not suitable	Suitable	Suitable	Suitable	Suitable	Suitable
Water	Not suitable	Suitable	Suitable	Not suitable	Not suitable	Not suitable

4.4.1 Forest Land Suitability for Timber Production

Determination of suitability of National Forest System lands for timber production and harvest is a requirement under the National Forest Management Act. National Forest System lands are classified into three categories related to timber production suitability:

- lands tentatively suitable for timber production,
- lands suitable for timber production, and
- lands not suitable for timber production.

Lands not suitable for timber production include lands withdrawn from timber production by statute, executive order, regulation, Secretary of Agriculture or the Chief, as well as non-forest

land. The remaining lands are classified as "tentatively suitable for timber production", which comprises most of the land base (97 percent) on the National Forests in Mississippi.

The lands classified as not suitable for timber production also includes those lands identified as "not appropriate" for timber production. The near coast flatwoods ecological system and areas identified on the National Forests in Mississippi preliminary list of possible old growth are considered not appropriate for timber production. Timber production is not compatible with the open woodland savanna and bog or old growth desired condition of these sites. Areas have also been identified as not appropriate for timber production during past inventories due to site characteristics, uses, barriers to management or red-cockaded woodpecker management guides.

After the lands that are not appropriate for timber production are identified, the remaining lands are classified as "suitable for timber production." Most of the land base (81 percent) on the National Forests in Mississippi is considered suitable for timber production.

The table below summarizes acres for the timber land suitability classification categories. These land classifications are subject to change based on field inventory and subsequent classifications.

Table 11. National Forests in Mississippi timber suitability totals

Classification	Approximate Acres
Total National Forest System Land	**1,172,524**
Non-forest lands	18,826
Lands that have been withdrawn from timber production	14,426
Lands where technology is not available to ensure timber production would not cause irreversible resource damage	
Lands where there is no reasonable assurance they can be adequately restocked	
Lands Tentatively Suitable for Timber Production	**1,139,282**
Lands where timber production is not compatible with achieving desired conditions and objectives (Lands not appropriate for timber production)	185,017
Lands Suitable for Timber Production	**954,265**
Lands Not Suitable For Timber Production	**218,269**

4.4.2 Recreation Use

The National Forests in Mississippi are suited for a variety of dispersed recreation uses such as hunting, fishing, hiking, horseback riding, biking, nature study, driving for pleasure, and wildlife viewing. These recreation uses are suitable for most areas on the Forests, although OHV use is suited only for designated routes and trails. The only areas not suitable for dispersed recreation uses are administrative areas, which are closed to the public due to safety and security reasons.

Developed recreation use is associated with specific sites on the National Forests in Mississippi. These areas often include developed infrastructure and are suitable for a variety of uses but are not suitable for timber production, minerals surface extraction, special uses, and prescribed fire use.

4.4.3 Minerals Use

For Mississippi, minerals use consists primarily of oil and gas extraction. All of the National Forests in Mississippi is suitable for oil and gas leasing except wilderness areas, which are legislatively withdrawn under the Wilderness Act. However, surface occupancy for oil and gas drilling and extraction would not be suitable for red-cockaded woodpecker cluster areas, administration areas, special areas, wild and scenic rivers and developed recreation areas.

No surface occupancy or use is allowed on the lands described below as they are actively used by the National Guard for impact areas, tank and artillery firing positions, small arms ranges, ammunition supply points, and safety areas around such facilities:

T. 2 N., R. 10 W. – Those lands within the East Air to Ground Range in parts of sections 10, 11 and 14; sections 15 and 16; parts of 17 and 20-23.

T. 2 N., R. 11 W. – Part of section 6; section 7; part of sections 8 and 9; part of sections 14 and 15; 16-22; part of sections 23 and 26; 27-30; part of sections 31-35.

T. 2 N., R. 12 W. – Those lands within the Multi-Purpose Range Complex – Heavy (MPRCH), MPRCH safety fan, Small Tank Fan, and ammunition supply point in parts of sections 1 and 2; sections 12 and 13; part of sections 14 and 23; 24 and 25; part of sections 26 and 35; 36.

T. 3 N., R. 12 W. – Those lands within the MPRCH in sections 35 and 36; those lands within Ragland Hills Research Natural Area in all of section 23 and part of section 24.

4.4.4 Special Uses

Special uses include a variety of purposes such as military training exercises, power lines, pipeline corridors, driveways, easements, and commercial activities such as outfitters. These uses are suited to the general forest, foraging areas for red-cockaded woodpeckers, experimental forests, riparian areas, and wild and scenic corridors if the use is consistent with desired conditions for the corridor. Special uses are not suited for red-cockaded woodpecker cluster areas, administrative areas, most special areas, and developed recreation areas.

4.4.5 Fire Use (as a management tool)

Fire is a widespread use that is suitable across much of the National Forests in Mississippi. It encompasses the use of fire, whether from intentional prescribed burns or unplanned wildland fires, to produce a variety of benefits on the landscape, ranging from enhanced threatened and endangered species habitat in fire-dependent ecological communities to reduced hazardous fuel levels.

Both planned, periodic prescribed burns and unplanned ignitions can lead to outcomes consistent with desired conditions, depending on the circumstances under which the fire occurs and the likely safety consequences. However, in certain areas of the National Forests in Mississippi where infrastructure may be damaged, unique resources lost, or safety is a concern, fire use is not suitable. Areas of the Forests not suitable for fire use include administrative areas and developed recreation areas.

Chapter 5. Monitoring and Evaluation

5.1 Introduction

This chapter provides information on implementing the revised forest plan and monitoring progress. Monitoring and evaluation are the means for determining whether programs and projects are meeting forest plan direction and whether the plan should be amended or revised. This section establishes monitoring questions to be answered during the course of implementation and discusses how the forest plan may be amended or revised as a result of monitoring and evaluation.

5.2 Implementation

This forest plan establishes direction for including an "interdisciplinary approach to achieve integrated consideration of physical, biological, economic, and other sciences" in future planning activities (16 USC 1604(b)). The plan will be implemented through a series of project-level decisions based on appropriate site-specific environmental analysis and disclosure to assure compliance with the National Environmental Policy Act (NEPA). The NEPA analysis process begins once these individual projects have been identified. The final environmental impact statement (FEIS) for the revised forest plan will be an aid to project-level NEPA compliance providing a context for development of appropriate site-specific analysis.

Common project-level decisions may include whether and in what way timber will be harvested in a given area, a campground will be constructed, or a fisheries structure will be installed. The form of documentation for such analysis will be consistent with the Council on Environmental Quality (CEQ) NEPA regulations (40 CFR 1500-1508) and Forest Service manual and handbook procedures.

The forest plan does not commit to the proposal or selection of any specific project. Instead, it determines what types of projects are permissible, under what conditions, and in what part of the National Forests in Mississippi. For example, the forest plan may determine that portions of specific management units are suitable for timber production. The plan does not make decisions on specifics of any site work or timber sales that could occur on lands suitable for timber production. Such decisions must be based on appropriate site-specific analysis and appropriate disclosure during analysis.

Accomplishment of the annual program of work on the National Forests in Mississippi is the process for incrementally implementing the direction in the forest plan. The projects chosen to implement this plan should be those that lead to achieving objectives and moving towards desired conditions. Progress in implementing the forest plan will be based on the availability of funds and in-kind contributions, periodic evaluations and identification of opportunities and priorities. Evaluations of these programs of work will be based on the most recent monitoring results and other sources of new information. Midterm course corrections will be made as operational details and the potential for additional resources are encountered.

5.3 Monitoring and Evaluation

The monitoring program tracks changes in physical, biological, social, and economic conditions and trends, and provides for continuous improvement. Monitoring addresses:

- whether multiple-use objectives of the plan are being achieved,

- the effects of the various resource management activities within the plan area on land productivity and resource sustainability, and
- the degree to which on-the-ground management is maintaining or making progress toward the desired conditions and objectives of the plan.

The concept of adaptive management is important for land management planning and project implementation in a dynamic and changing environment. Forest plans need to be adaptive to account for changes in resource conditions (such as from hurricanes or insect infestations), new information or scientific findings, or new regulations or policies. An effective monitoring and evaluation program is essential for determining when these situations exist and when we need to make changes. When there are unanticipated changes in environmental conditions, we may need to adjust the monitoring program.

Monitoring activities generally involve collecting data and information by observation, direct measurement, or from other appropriate sources. Evaluation is the analysis of this data and is used to determine whether the plan is being implemented correctly and whether changes are needed. The monitoring program for the plan was developed using the following criteria:

a. The amount and timing of change expected between the existing and desired conditions; monitoring is to be focused on conditions where large changes are expected during the planning period.

b. The effect of management activities on desired conditions; monitoring is to be focused on actions being taken to carry out the plan.

c. Desired conditions considered key by the participating public and agency specialist; monitoring is to be focused on the highest values expressed by the public and those required to meet legal and regulatory requirements.

Monitoring questions and performance measures tie back to the desired conditions and objectives outlined in the plan. Selected monitoring questions and performance measures reflect the influence of public involvement and the financial and technical capabilities of the Forest Service. Performance measures are the key social, economic, and ecological aspects driving the plan and represent the best available science. Practical and affordable performance measures were selected to address the monitoring questions identified, using existing information sources and systems to the greatest extent possible.

This monitoring program may require modification as subsequent projects or activities are approved under the plan. Changes in conditions, such as those that would result from catastrophic events could lead to rescreening and revising this monitoring program. Changes in the plan could also lead to revising this monitoring program. As the plan is carried out and monitoring is accomplished, a need to change the monitoring program to address pertinent new information or uncertainties may surface. Monitoring activities may also be performed jointly with others, such as other Forest Service units, Federal, State or local government agencies, federally recognized Indian Tribes, and members of the public.

Monitoring is continuous and provides feedback for the planning cycle. Every two years we will produce an evaluation report summarizing monitoring results and findings The emphasis of this report will be on those results of monitoring that indicate how well objectives have been met, how well guidelines have been followed, what expenditures have been made to execute the forest plan, and what changes to the plan may be needed.

5.3.1 Monitoring Questions and Performance Measures

Table 12 displays the monitoring questions and performance measures that will be used to evaluate movement toward key forest plan desired conditions. In some cases, a monitoring question and performance measures directly address a specific desired condition. In other cases, they address one or more objectives associated with a desired condition.

Table 12. Evaluation and monitoring questions and performance measures that address desired conditions and objectives of the forest plan

Evaluation and Monitoring Questions	Plan Component		Performance Measure	Frequency of Measurement / Evaluation [1]	Precision/ Reliability
	Desired Condition	Objective			
A.1 - Has progress been made toward maintaining and restoring desired conditions so that native ecological systems occupy appropriate sites?	2.3 Ecosystem Diversity		Abundance and distribution of ecological systems	5 Years	Moderate
			Forest structure measured by age classes		
			Fire return interval and percent of growing-season burns by system		
			Acres of longleaf pine, a management indicator species (MIS), planted by year and number of acres of longleaf pine classified in Forest Service Vegetation Management Database (FSVEG).		High
A.2 - Are wetland systems present on appropriate sites and functioning across the landscape?	2.3 Ecosystem Diversity		Distribution and abundance of wetland systems	5 Years	Moderate
			Intact hydrologic function		
			Presence of native species		
A.3 - Are annual average forestwide and ecological system objectives being achieved?		3.2 Ecosystem Diversity	Lake and stream improvement acres and miles	5 Years	Moderate
			Ecosystem restoration acres by type		High
			Acres identified for management of old growth compared to 10% objective for each district		Moderate
			Forest thinning acres by type		High
			Prescribed burning acres by system and percentage of burns by season		

Table 12. Evaluation and monitoring questions and performance measures that address desired conditions and objectives of the forest plan

Evaluation and Monitoring Questions	Plan Component		Performance Measure	Frequency of Measurement / Evaluation [1]	Precision/ Reliability
	Desired Condition	Objective			
B.1 - Are threatened and endangered species recovered or moving toward recovery?	2.4 Species Diversity		Threatened and endangered species status reports	5 Years	Moderate
B.2 - Are populations of rare species robust and secure?	2.4 Species Diversity		Species of concern status reports	5 Years	Moderate
B.3 - Are species diversity and game abundance supporting nature viewing and quality hunting opportunities?	2.4 Species Diversity		Wildlife census	5 Years	Low
			Statewide game population estimates		
			Visitor use monitoring	5 Years	Moderate
B.4 - Are habitat conditions sufficient to allow aquatic and riparian-dependent species to complete all phases of their life cycles?	2.4 Species Diversity		Habitat connectivity measured by accomplishments of and miles of stream improved through culvert and low-water ford replacements	5 Years	Moderate
B.5 - Are conditions needed for sustaining healthy populations of native plants and animals being maintained?	2.4 Species Diversity		Abundance of ecological attributes required for native plants and animals	10 Years	Moderate
B.6. Are annual average T&E species recovery treatment objectives being accomplished?		3.3 Species Diversity	Populations trends for red-cockaded woodpecker (MIS)	5 Years	Moderate
			Red-cockaded woodpecker habitat improvement, acres of prescribed burning, mid-story removal, and forest thinning.		High
			Status of key ecological attributes for rare species by land suitability class	10 Years	Moderate

Table 12. Evaluation and monitoring questions and performance measures that address desired conditions and objectives of the forest plan

Evaluation and Monitoring Questions	Plan Component		Performance Measure	Frequency of Measurement / Evaluation [1]	Precision/ Reliability
	Desired Condition	Objective			
C.1 - Are conditions needed to sustain ecological function and productivity of the land being maintained?	2.5 Healthy Watershed		Identified water quality concerns	10 Years	Moderate
			Intact hydrologic conditions		
			Conditions of soil cover and stability		
			Prescribed fire impacts measured against National Ambient Air Quality Standards	10 Years	Moderate
			Results of Long-Term Soil Productivity Study		
C.2 - Are stream mitigation and restoration measures being implemented?		3.4 Healthy Watershed	Acres of Brushy Creek watershed treated for head-cutting and sediment reduction projects	5 Years	High
			Miles of stream channel habitat restored in conjunction with aquatic organism passage culvert replacements		
D.1 - Are forests in healthy condition?	2.6 Healthy Forests		Abundance of insect or disease damage	5 Years	Moderate
			Infestations of invasive species		
			Abundance and distribution of forest seral stages and ages, including old growth		
			Timber yields compared to long term sustained yield capacity and allowable sale quantity		
			Fire condition class within and out of urban interface areas		
			Fire return Interval		
D.2 - Are disturbance events, including those that may be related to climate change, changing in frequency?	2.6 Healthy Forests		Extent, severity and frequency of wind and ice storms, drought, and insect, disease or decline outbreaks	5 Years	Moderate

Table 12. Evaluation and monitoring questions and performance measures that address desired conditions and objectives of the forest plan

Evaluation and Monitoring Questions	Plan Component		Performance Measure	Frequency of Measurement / Evaluation [1]	Precision/ Reliability
	Desired Condition	Objective			
D.3 - Are disturbance events, including those may be related to climate change, affecting desired conditions on the forest?	2.6 Healthy Forests		Changes in condition caused by disturbance events	10 Years	Moderate
			Rate of mortality of large trees		
D.4 - Are healthy forest objectives being achieved?		3.5 Healthy Forests	Timber removal volume	5 Years	High
			Five-year regeneration certifications measuring regeneration to desirable species		
			Commercial thinning acres	5 Years	High
			Noncommercial thinning acres		
			Regeneration release acres		
			Effective nonnative invasive species treatment acres/sites	5 Years	Moderate
			Southern pine beetle (MIS) mortality and removal acres	5 Years	High
			Southern pine beetle pheromone trapping survey results and Southern Pine Beetle Information System (SPBIS) database review.		
			Longleaf pine (MIS) regeneration prescribed burn acres	5 Years	High
			Percentage of each unit and system managed for old growth	10 Years	Moderate
			Prescribed burning acres by unit and season	5 Years	High
			Acres of land acquired by donation, purchase, transfer, or land-for-land exchange	10 Years	High

Table 12. Evaluation and monitoring questions and performance measures that address desired conditions and objectives of the forest plan

Evaluation and Monitoring Questions	Plan Component		Performance Measure	Frequency of Measurement / Evaluation [1]	Precision/ Reliability
	Desired Condition	Objective			
			Trend monitoring of pileated woodpecker (MIS) by breeding bird survey and Forest Service Vegetation database in conjunction with geographic information system (GIS) analysis of mature forest stands.	5 Years	Moderate
			Trend monitoring of wood thrush (MIS) by breeding bird survey and Forest Service Vegetation database in conjunction with GIS analysis of mature forest stands as compared to open areas.	5 Years	Moderate
D.5 - Are disturbance events impacting the accomplishment of forest plan objectives		3.5 Healthy Forests	Effect on performance measures for all land management plan objectives attributed to wind and ice storms, drought, insect or disease outbreaks and any effects on workload and funding that result.	10 Years	Moderate
E.1 - Is reasonable and safe access and use by the public and for resource management being provided?	2.7 Infra-structure		Open road and trail mileage	5 Years	High
			Off-system road and trail use violations	5 Years	Moderate
E.2 - Are important road and trail maintenance, closure, and construction activities being accomplished to provide for public access, public safety and resource protection?		3.6 Infra-structure	Miles of road down-graded, including decommissioning	5 Years	High
			Number of structurally deficient bridges		
			Number of culverts replaced for aquatic organism passage		
			Number of low-water fords replaced		
			Miles of trail construction or reconstruction		
			Trail miles maintained to standard		

Table 12. Evaluation and monitoring questions and performance measures that address desired conditions and objectives of the forest plan

Evaluation and Monitoring Questions	Plan Component		Performance Measure	Frequency of Measurement / Evaluation [1]	Precision/ Reliability
	Desired Condition	Objective			
F.1 - Do the National Forests in Mississippi provide forest visitors safe and enjoyable developed and dispersed outdoor recreation experiences that are diverse and responsive to their needs?	2.8 Recreation, Wilderness, Wild and Scenic River, Cultural Resources, and Forest Setting		Visitor use	5 Years	Moderate
			Visitor satisfaction		
			Recreation facility condition	5 Years	High
			Recreation information availability		
F.2 - Are important recreational, cultural resource, and forest setting opportunities being provided?		3.7 Recreation, Wilderness, Wild and Scenic River, Cultural Resources, and Forest Setting	Acres of primitive and semi-primitive recreation settings identified	5 Years	Moderate
			Track use of visitor information		Low
			Miles of short loop trails		High
			Surface acres of aquatic invasives treatment		High
			Largemouth bass (MIS) monitoring by electrofishing and seining to evaluate population structure.		Moderate
F.3 – Are wilderness characters being preserved or enhanced?			Wilderness Character	5 Years	Moderate
F. 4 – Are the free flowing condition, scenic and recreational values for the wild and scenic river and the Black Creek Corridor Scenic Area being protected or enhanced?			Wild and scenic river and associated scenic corridor conditions	5 Years	Moderate

1. Frequency of Measurement / Evaluation - The collection of data elements may occur and be reported in the corporate database of record annually, an evaluation of the collected data will occur at the frequency specified.

Table 13. Other evaluation and monitoring questions and performance measures

Evaluation and Monitoring Questions	Plan Component	Performance Measure	Frequency of Measurement / Evaluation [1]	Precision/ Reliability
G.1 - Are appropriate and relevant design criteria (guidelines) applied and effective in projects?	Guidelines	Annual review of records and field checks for effectiveness of guidelines in a sampling of projects by project type	5 Years	Moderate
G.2 - Are special area conditions and needs consistent with the land management plan?	Special Areas	Assessment of existing areas and new proposals during comprehensive evaluations	10 Years	Moderate
G.3 - Are final, project determinations of suitability of uses and activities in harmony with forest plan desired conditions and determinations of generally compatible?	Suitability of Land	Annual review of final suitability of uses and activities for a sample of projects compared with the plan	5 Years	Moderate
		Assessment of total acres classified as suitable for timber production during comprehensive evaluations	10 Years	Moderate
G.4 - Are the costs of implementing this Plan comparable to the estimated costs?	Strategies	Annual tracking of costs for land management activities (timber sales, silvicultural, prescribed fire, wildlife and fish habitat improvement, etc.), recreation and other user services, roads and facilities maintenance	5 Years	Moderate
		Five-year review of projected forest plan costs compared to actual costs and annual budgets		
G.5 – Are the forest management activities in compliance with terms and conditions of USDI F&WS Biological Opinion on Indiana bat and Dusky gopher frog?	Guidelines	Annual summary of number of acres of non-commercial and commercial forest management practices and prescribed fires implemented on the Holly Springs Unit to ensure the total acreages do not exceed the authorized incidental take criteria.	Annually	High
	Guidelines	Annual summary of number of acres of non-commercial and commercial forest management practices and prescribed fires implemented in Dusky gopher frog critical habitat on the De Soto Ranger District. Ensure the total annual treatment acreages do not exceed the authorized incidental take criteria.	Annually	High

[1] **Frequency of Measurement / Evaluation -** The collection of data elements may occur and be reported in the corporate database of record annually, an evaluation of the collected data will occur at the frequency specified.

5.4 Research Needs

Research and monitoring are related activities that help to meet information needs for adaptive management of national forests. Research activities involve rigorous study under controlled conditions following the scientific method. Typical research activities include study planning, design, quality control, peer review, and relatively rigid publication standards. Monitoring is generally conducted under less controlled conditions and results are often more general in contrast with research. Research needs for management of the National Forests in Mississippi were identified during planning and will be periodically reviewed during monitoring and evaluation of this plan (36 CFR 219.28).

The Forest Service Research Branch is the largest forestry research organization in the world and a national and international leader in forest conservation. Agency research contributes to the advancement of science and the conservation of many of our Nation's most valuable natural resources, both on private lands and the national forests. Research needs identified during planning, monitoring and evaluation are to be included in formulating overall research programs and plans for Forest Service research to support or improve management of the national forests.

The following are some of the key research needs for the National Forests in Mississippi:

- Develop knowledge of ecological communities and processes that affect restoration of longleaf pine woodlands and at risk native plant species. Provide strategies and practices for more effective restoration of longleaf pine ecosystems.
- Improve the knowledge of the cumulative and long-term responses of ecosystem dynamics to changes in soil quality brought about by management practices such as harvesting, fire, fertilizers, herbicides, and various forms of mechanized traffic, so that managers can more effectively maintain and improve the health, sustainability, and productivity of southern pine-dominated forest stands. Include outcomes and outputs such as timber, cellulosic biomass for bioenergy, carbon, high-quality wildlife habitat, and abundant and clean water. This need is currently being addressed by the Long-Term Soil Productivity Study Area.
- Develop knowledge about the effects of large-scale natural disturbances, climate change, and other human-caused influences on forest ecosystems so that managers can anticipate and detect when forest ecosystems may be affected by these events, and make appropriate changes in management plans and implementation.
- Develop knowledge about how forest management, forest fragmentation, and climate change affect the quality and quantity of riparian and aquatic habitats and associated wildlife species, so land managers can make better decisions about managing riparian zones and wetlands for resource benefits that feature wildlife species of interest.
- Improve the understanding of management needs and interactions on gopher tortoises, red-cockaded woodpeckers, other associated species, and southern pine beetles, so that land managers can make more effective management decisions.

5.4.2 Amendments

The forest plan can be amended at any time during its existence. Such amendments are necessary to ensure the plan remains a viable, flexible document for managing the National Forests in Mississippi.

Errata sheets may be issued, if necessary, to correct spelling or grammatical errors which may lead to confusion in the forest plan. Such changes are not considered amendments.

The forest plan may also be amended as part of a project-level decision where a change or adjustment in the plan is appropriate for that project but is not applicable forestwide. Examples of such changes might be adjustments or waivers of standards. If we determine during project design that the best method of meeting the management area goals of the forest plan is in conflict with either forestwide or management area standards, the forest supervisor may approve a project-specific amendment to the forest plan.

5.4.3 Revision

This forest plan will be revised on a 10-year cycle or at least every 15 years. It may also be revised whenever the forest supervisor determines that conditions or demands in the area covered by the forest plan have changed significantly or when changes in policies, goals, or objectives would have a significant effect on Forest-level programs. In the monitoring and evaluation process, the interdisciplinary team may recommend a revision of the forest plan at any time.

Future revisions are not effective until considered and approved in accordance with the requirements for the development and approval of a forest plan.

Glossary of Commonly Used Terms

A

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.

affected environment: The relationship of the physical environment to the changes that will or may take place as a result of human activity.

analysis area: A collection of lands, not necessary contiguous, sufficiently similar in character, that they may be analyzed at the forest plan level.

appropriate management response: The response to a wildland fire based on an evaluation of risks to firefighter and public safety. Evaluation includes the consideration of 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: System that includes streams, lakes, the stream channel, lake and estuary beds, water, biotic community, and associated habitat features.

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.

B

basal area (BA): the area, in square feet, of the cross section of a single tree measured at 4.5 feet above ground, usually expressed as square feet per acre.

best management practices (BMP): A series of guidelines or minimum standards for proper application of forestry operations, designed primarily to prevent soil erosion and water pollution, and to protect certain wildlife habitat values in riparian and wetland areas.

biodiversity: The variety of life, 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.

C

calcareous: Composed of, containing, or characteristic of calcium carbonate, calcium, or limestone; chalky.

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, landform, soil and geology, and the application of management practices and protection from fire, insects, and disease.

cluster: The aggregate of cavity trees used by one group of red-cockaded woodpeckers for nesting and roosting. This includes all active and inactive cavity trees plus at least a 60 meter (200-foot) zone around them. If this area is less than 4 hectares (10 acres), additional area of the best nesting habitat contiguous with the cavity trees is delineated to establish the minimum 4-hectare stand.

Coastal Plain: In the United States, an ecoregion or physiographic province located near the Atlantic Ocean or Gulf of Mexico.

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 thinning: Any type of thinning producing merchantable material at least equal to the value of the direct cost of harvesting.

Continuous Inventory of Stand Conditions (CISC): the USDA Forest Service, Southern Region's forest stand database containing descriptive and prescriptive data about mapped stands of forest land.

conversion (forest management): A change from one forest type to another in a stand on land that has the capability of both forest types.

critical habitat: Habitat as defined by the U.S. Fish and Wildlife Service to be essential to meet the needs of an endangered species.

cultural resources: Physical remains of districts, sites, structures, buildings, networks or objects that were used by humans. They may be historic, prehistoric, archaeological, architectural, or spiritual in nature. Cultural resources are nonrenewable.

D

demand species: Wildlife species with high social, cultural, or economic values.

den tree: A tree with cavities that provide shelter and nesting sites for various wildlife species.

developed recreation site: Relatively small, distinctly defined area where facilities are provided for concentrated public use. Examples include campgrounds, picnic areas, and swimming areas.

developed recreation: Recreation that requires facilities that in turn result in concentrated use of an area. Examples of recreation areas are campgrounds and ski areas; facilities in these areas might include roads, parking lots, picnic tables, toilets, drinking water, and buildings.

diameter at breast height (d.b.h.): the standard method for measuring tree diameter at 4.5 feet from the ground.

dispersed recreation: A general term referring to recreation use outside a developed recreation site, this includes activities such as scenic driving, rock climbing, boating, hunting, fishing, backpacking, and recreation in primitive environments.

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.

diversity: The distribution and abundance of different plant and animal communities and species within the area covered by a land and resource management plan.

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.

E

early seral: Vegetative condition typically characterized by low density to no canopy cover and an abundance of herbaceous ground cover. May include forest 0 to 10 years of age, maintained openings, pastures, balds, or open woodlands.

ecosystem management: An ecological approach to natural resource management to assure productive, healthy ecosystem by blending social, economic, physical and biological needs and values.

ecosystem/cover type: The native vegetation ecological community considered together with nonliving 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.

endangered species: Any species of animal or plant that is in danger of extinction throughout all or a significant portion of its range. Plant or animal species identified or proposed by the Secretary of the Interior as endangered in accordance with the 1973 Endangered Species Act.

endemic: Species restricted to a particular geographic area. Usually limited to one or a few small streams or a single drainage.

environment: All the conditions, circumstances, and influences surrounding and affecting the development of an organism, or group of organisms.

environmental analysis: An analysis of alternative actions and their predictable short and long-term environmental effects, which include physical, biological, economic, social and environmental design factors and their interaction. (36 CFR 219.3)

environmental consequence: The result or effect of an action upon the environment.

environmental impact: Used interchangeably with environmental consequence or effect.

ephemeral stream: A watercourse that may or may not have a well-defined channel, and which flows only for short periods (less than 10 percent of an average year) during and following precipitation. Ephemeral stream bottoms are usually above the water table and do not contain fish or aquatic insects with larvae that have multi-year life cycles.

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.

even-aged: A forest (stand) composed of trees having no, or relatively small, differences in age.

even-aged management: The application of a combination of actions that results in the creation of stands in which trees of essentially the same age grow together. Managed even-aged forests are characterized by a distribution of stands of varying ages (and, therefore, tree sizes) throughout the forest area. The difference in age between trees forming the main canopy level of a stand usually does not exceed 20 percent of the age of the stand at harvest rotation age. Regeneration in a particular stand is obtained during a short period at or near the time that a stand has reached the desired age or size for regeneration and harvested. Clearcut, shelterwood, or seed tree cutting methods produce even-aged stands. (36 CFR 211.3)

existing road system: All existing roads, owned or administered by various agencies, which are wholly or partly within or adjacent to and serving the national forests and other areas administered by the Forest Service, or intermingled private lands (FSM 7705.21). These roads may or may not be included on the current Forest transportation inventory, but are evident on the ground as meeting the definition of a road.

F

federally listed: Any plant or animal species listed as threatened or endangered under the Endangered Species Act.

filter strips: Belts of grass, shrubs, and/or trees maintained along streams to trap sediment and chemicals before they enter waterways.

fire condition class: Based on coarse scale national data, classes measure general wildfire risk:

- **class 1:** 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 2:** 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 3:** 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 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 set of recurring conditions of fire that characterizes a given ecosystem. A specific range of frequency, fire behavior, severity, timing of burn, size of burn, fire spread pattern, and pattern and distribution of burn circumscribe those conditions

flatwoods: Mesic pine communities on the Gulf and Atlantic coastal plains with a well-developed woody shrub or midstory layer.

floodplains: The lowland and relatively flat area adjoining inland waters, including at a minimum, that area subject to a one percent or greater chance of flooding in any given year, and soil inundated by the 100-year flood.

forage: All browse and non-woody plants that are available to livestock or game animals used for grazing or harvested for feeding.

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 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 supervisor: The official responsible for administering the National Forest System lands in a Forest Service administrative unit. This may consist of two or more national forests or all the forests within a state. The forest supervisor reports to the regional forester.

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.

fragmentation: Habitat loss that results in isolated patches of remaining habitat.

fuel loading: The amount of fuel (flammable natural materials) expressed quantitatively in terms of weight of fuel per unit area.

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.

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.

groundwater: Subsurface water in a saturated zone or geologic stratum.

growing-season burn: A prescribed fire that generally occurs during the time period of leaf expansion to leaf off of deciduous tree species. Growing seasons vary depending on local climate and geography. It can also vary by crop, as different plants have different freezing thresholds and leaf retention.

H

habitat: The native environment of an animal or plant in which all the essentials for its development, existence, and reproduction are present.

hydric soils: Soils developed in conditions where soil oxygen is limited by the presence of saturated soil for long periods during the growing season.

hydrologic function: The natural behavioral characteristics (water quality, water quantity, and timing) of surface water and ground water that maintain channel capacity, protect native aquatic organisms, sustain riparian habitats and communities, protect wetlands and other unique or uncommon communities, and provide for recreational, scenic, and research purposes.

hydrologic unit code (HUC): A cataloging system developed by the U.S. Geological Survey and the U.S. Natural Resource Conservation Service to identify watersheds and to standardize hydrological unit delineations for geographic description and data storage purposes. They are typically reported at a large river basin or smaller watershed scale.

I

instream flow: The volume of surface water in a stream system passing a given point at a given time.

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. IPM is a decision-making and action process that includes biological, economic, and environmental valuation of pest-host systems to manage pest populations. IPM strategies apply a comprehensive systems approach to silvicultural, wildlife, range, recreation, and corridor management practices. These strategies consist of a range of practices that include prescribed burning, manual, mechanical, biological, and chemical tools that may be used alone or in combination.

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 (trails, sites, signs): 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.

invasive species: A species that is non-native to the ecosystem under consideration and whose introduction causes or is likely to cause economic or environmental harm or harm to human health.

L

landscape character: Particular attributes, qualities, and traits of a landscape that give it an image and make it more identifiable or unique. Levels include Natural Evolving, Natural Appearing, Pastoral/Agricultural, Historic, Transitional, Suburban, and Urban.

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.

loess: a light-colored fine-grained accumulation of clay and silt particles that have been deposited by the wind; usually yellowish and calcareous, common in the Mississippi Valley.

M

maintenance: The upkeep of facilities, buildings, or roads. Maintenance is not for upgrading a facility, but rather, to bring it to the originally constructed or subsequently reconstructed condition.

management action: A set of management activities applied to a land area to produce a desired output.

management area: An area with similar management objectives and a common management prescription.

management concern: An issue, problem, or a condition that constrains the range of management

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.

mesic: Sites or habitats characterized by moderate moisture conditions; neither decidedly wet nor dry.

midstory: A stratum of smaller trees that occur under the dominant overstory. The midstory can include small pines, but it is usually associated with hardwoods such as oaks and sweetgum.

mineral exploration: The search for valuable minerals on lands open to mineral entry.

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 is currently or potentially feasible.

mineral soil: Weathered rock materials without any vegetative cover.

minerals, leasable: Coal, oil, gas, phosphate, sodium, potassium, oil shale and geothermal steam on public domain and acquired status lands, and hard rock minerals on acquired lands.

minerals, locatable: Hard rock minerals on public domain status land. May include certain nonmetallic minerals and uncommon varieties of mineral materials.

minimum level: The minimum level of management which complies with applicable laws and regulations, including prevention of significant or permanent impairment of the long-term productivity of the land, and which would be needed to maintain the land as a national forest, and to manage uncontrollable outputs, together with associated costs and inputs.

mitigation: Actions to avoid, minimize, reduce, eliminate, or rectify the impact of a management practice.

multiple use: Management of all the various resources of the National Forest System so that they are used in the combination that will best meet needs of the American people; making the most judicious use of the land for some or all of these resources or related services over areas large enough to provide sufficient latitude for periodic adjustments in use to conform to changing needs and conditions; that some lands will be used for less than all of the resources and services; and coordinated management of the various resources, each with the other, without impairment of the productivity of the land, with consideration being given to the relative values of the various resources, and not necessarily the combination of the uses that will give the greatest dollar return or the greatest unit output. (36 CFR 219.3)

N

National Forest System land: Federal land that is within the National Forest System, which is defined at 16 USC 1609.

national historic landmark: Cultural properties designated by the Secretary of the Interior as being nationally significant. These cultural properties may be buildings, historic districts, structures, sites, and objects that possess exceptional value in commemorating or illustrating the history of the United States.

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 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 archaeological resources. Properties listed in the National Register include districts, sites, buildings, structures, and objects that are significant in American history, architecture, archaeology, 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 Visitor Use Monitoring: A systematic process to estimate annual recreation and other uses of National Forest System lands through user surveys.

nonconsumptive use: That use of a resource that does not reduce its supply; for example, nonconsumptive uses of water include hydroelectric power generation, boating, and swimming.

nongame: Species of animals that are not managed as a sport-hunting or trapping resource.

nonmotorized recreation: A recreational opportunity provided without the use of any motorized vehicle. Participation in these activities is accomplished using foot, bicycle, or horseback travel.

O

objective: A concise, time-specific statement of measurable planned results that respond to pre-established goals. An objective forms the basis for further planning to define the precise steps to be taken and the resources to be used in achieving identified goals. (36 CFR 219.3)

off-highway vehicle (OHV): Any vehicles capable of being operated off established roads.

old growth: 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.

overstory: That portion of trees in a two or multi-layered forest stand that provides the upper crown cover.

P

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.

perennial stream: Permanently present surface water. Flows occur throughout the year except during extreme drought or during cold when ice forms.

physiographic province: A region of similar geologic structure and climate that has had a unified geomorphic history.

population: A group of individuals of the same species occupying a given area. Methods of specifying such an area differ according to purpose. A common specification is the area within which gene flow is sufficient to avoid genetic differentiation.

population trend: Rate of change of a wildlife population. In general, populations that are increasing or decreasing by a rate less than 5 percent annually are considered to be stable.

potential breeding group: An adult female and adult male red-cockaded woodpecker that occupy the same cluster, whether or not they are accompanied by a helper, attempt to nest, or successfully fledge young.

precommercial thinning: The selective felling or removal of trees in a young stand primarily to accelerate diameter increment on the remaining stems, maintain a specific stocking or stand density range, and improve the vigor and quality of the trees that remain.

prescribed burning: Controlled application of fire to wildland fuels in either their natural or modified state, under such conditions of weather, fuel moisture, soil moisture, or other factors that allow the fire to be confined to a predetermined area and at the same time to produce the intensity of heat and rate of spread required to further certain planned objectives of silviculture, wildlife management, grazing, fire hazard reduction, etc. NOTE: It seeks to employ fire scientifically to realize maximum net benefits with minimum damage and at acceptable cost.

prescribed fire plan: A written statement defining the objectives to be attained as well as the conditions of temperature, humidity, wind direction and speed, fuel moisture and soil moisture under which a prescribed fire will be allowed to burn.

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.

primary core population: A population identified in recovery criteria that will hold at least 350 potential breeding groups at the time of and after delisting. In Mississippi, the Bienville National Forest and Chickasawhay Ranger District contain primary core populations of red-cockaded woodpeckers.

primitive: A classification of the recreation opportunity spectrum that characterizes an essentially unmodified natural environment of a size or remoteness that provides significant opportunity for isolation from the sights and sounds of man, and a feeling of vastness of scale. Visitors have opportunity to be part of the natural environment, encounter a high degree of challenge and risk, and use a maximum of outdoor skills but have minimum opportunity for social interaction.

program: Sets of activities or projects with specific objectives, defined in terms of specific results and responsibilities for accomplishments.

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.

public access: Usually refers to a road or trail route over which a public agency claims a right-of-way for public use.

R

ranger district: Administrative subdivision of the national forest, supervised by a district ranger who reports to the forest supervisor.

rare communities : Communities that are naturally small in scale or distribution relative to the broader systems they occur within because the sites they occur on are of limited extent or have been reduced due to historical land uses. On the National Forests in Mississippi these systems are: xeric sandhills; rock outcrops; black belt calcareous prairie and woodland; Jackson prairie and woodland; ephemeral ponds and emergent wetlands; cypress dominated wetlands; wet pine savanna; seeps, springs, and seepage swamps; and herbaceous seepage bog and flats.

recreation: Any socially desirable leisure activity in which an individual participates voluntarily and from which he derives satisfaction.

recruitment cluster: A red-cockaded woodpecker recruitment stand that has artificial cavities located in suitable nesting habitat. When possible, recruitment clusters should be located within 1.2 km (0.75 mi) of existing active clusters. Foraging habitat must be provided now and in the future around recruitment clusters. Recruitment clusters will contain at least 4 suitable cavities or 3 suitable cavities and 2 start holes. Recruitment clusters should be provided at the rate of 10 percent of the total active clusters per management unit.

recruitment stand: A stand of pine trees at least 4 ha (10 ac) in size identified and managed as potential nesting habitat for red-cockaded woodpecker. The number required equals the population objective minus the number of active clusters. They are located within ¼ to ¾ mile of an active cluster or another recruitment stand.

regeneration: Young trees (seedlings and saplings) which will grow to become older trees of the future forest (i.e. reproduction). Also, the process of forest replacement or renewal, which may be done artificially by planting or seeding, or through natural seed fall and sprouting.

region: An administrative unit within the National Forest system. The United States is divided into nine geographic regions. Each region has a headquarters office and is supervised by a Regional Forester. Within each region are located National Forests and other lands of the Forest Service.

regional forester: The official responsible for management of National Forest System and within a Forest Service region.

relative abundance: The number of organisms at one location or time relative to the number of organisms at another location or time. Generally reported as an index of abundance.

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.

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 ecosystem: A transition between the aquatic ecosystem and the adjacent terrestrial ecosystem identified by soil characteristics (alluvial soils inundated by a 100-year flood, wetland soils) and distinctive vegetative communities that require free and unbound water.

riparian-dependent species: Species dependent on riparian areas during at least one stage of their life cycle.

roaded natural: A classification of the recreation opportunity spectrum that characterizes a predominantly natural environment with evidence of moderate permanent alternate resources and resource utilization. Evidence of the sights and sounds of man is moderate, but in harmony with the natural environment. Opportunities exist for both social interaction and moderate isolation from sights and sounds of man.

roads analysis process (RAP): Roads analysis is an integrated ecological, social, and economic science based approach to transportation planning that addresses existing and future road management options. The intended effects are to ensure that decisions to construct, reconstruct, or decommission roads will be better informed by using a roads analysis. Roads analysis may be completed at a variety of different scales, but generally begins with a broad forest-scale analysis to provide a context for future analyses.

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.

S

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 vegetation pattern. Classified as A (Distinctive), B (Typical or Common), or C (Undistinguished).

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 that 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 condition.

scenic integrity objectives: A desired level of excellence based on physical and sociological characteristics of an area. Refers to the degree of acceptable alterations to the valued attributes of the characteristic landscape. Objectives include very high, high, moderate, and low. These categories are defined below:

- **Very High** – Generally provides for only ecological changes in natural landscapes and complete intactness of landscape character in cultural landscapes.
- **High** – Human activities are not visually evident to the casual observer. Activities may repeat attributes of form, line, color, and texture found in the existing landscape.
- **Moderate** – Landscapes appear slightly altered. Noticeable human created deviations remain visually subordinate to the landscape character being viewed.

secondary core population: A population identified in recovery criteria that will hold at least 250 potential breeding groups at the time of and after delisting. In Mississippi, the De Soto Ranger District and the Homochitto National Forest contain secondary core populations of red-cockaded woodpeckers.

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.

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.

silviculture: The theory and practice of controlling the establishment, composition, structure, and growth of forests to achieve management objectives.

snag: A standing, dead tree.

seral stage: a developmental, transitory stage in the ecological succession of a biotic community.

soil productivity: The capacity of a soil to produce a specific crop such as fiber, forage, etc., under defined levels of management. It is generally dependent on available soil moisture and nutrients and length of growing season.

Southern Region: The Forest Service organizational unit consisting of thirteen southeastern states and Puerto Rico.

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: An aggregation of trees occupying a specific area and sufficiently uniform in species composition, age, arrangement, and condition so as to be distinguishable from the forest on adjoining areas.

stream: A water course having a distinct natural bed and banks; a permanent source that provides water at least periodically; and at least periodic or seasonal flows at times when other recognized streams in the same area are flowing.

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 for timber production: 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.

suppression (fire suppression): Any act taken to slow, stop or extinguish a fire. Examples of suppression activities include line construction, backfiring, and application of water or chemical fire retardants.

T

terrestrial: Of, or pertaining to, land as distinct from water.

thinning: A silvicultural treatment removing some trees in a stand to reduce tree density.

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 or proposed as a threatened species in the Federal Register by the Secretary of Interior.

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.

topography: The configuration of a land surface including its relief, elevation, and the position of its natural and human-made features.

trail: A general term denoting an access route for purposes of travel by foot, stock or trail vehicle. (A trail vehicle is one that is 40 inches or less in width and is designated for trail use.)

trailheads: The parking, signing, and other facilities available at the terminus of a trail.

U

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.

V

vegetation condition class: The dominant existing vegetation or physical features found on a unit of land. Forested condition classes are described by the dominant existing timber species and size class.

vertical structure: Division of an ecosystem type into distinguishable layers on the basis of height of the vegetation creating understory, midstory, and overstory and divisions within each.

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 waterbody.

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

water rights: Rights given by State or Federal governments for the diversion and use of water.

watershed: The entire area that contributes water to a drainage system or stream.

watershed condition classes: The Forest Service Manuel uses three classes to describe watershed condition (USDA Forest Service 2004, FSM 2521.1).

> **Class 1 watersheds** exhibit high geomorphic, hydrologic, and biotic integrity relative to their natural potential condition.
>
> **Class 2 watersheds** exhibit moderate geomorphic, hydrologic, and biotic integrity relative to their natural potential condition.
>
> **Class 3 watersheds** exhibit low geomorphic, hydrologic, and biotic integrity relative to their natural potential condition.

wetlands: Those areas that are inundated by surface or ground water with a frequency sufficient to support that, and under normal circumstances, do or would support, a prevalence of vegetation

or aquatic life that requires saturated or seasonally saturated soil conditions for growth and reproduction. Wetlands generally include swamps, marshes, bogs, and similar areas such as sloughs, potholes, wet meadows, river overflows, and natural ponds.

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: Any federal land designated by Congress as part of the National Wilderness Preservation System.

wildland fire: Any nonstructural 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 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.

X

xeric: Pertaining to sites or habitats characterized by decidedly dry conditions.

Commonly Used Acronyms

ATV – all terrain vehicle

CFR – Code of Federal Regulations

d.b.h. – diameter at breast height

FEIS – final environmental impact statement

EIS – environmental impact statement

EPA – Environmental Protection Agency

FEIS – final environmental impact statement

IPM – integrated pest management

MDWFP – Mississippi Department of Wildlife Fish and Parks

MIS – management indicator species

MMCF – million cubic feet

MMBF – million board feet

NAAQS – National Ambient Air Quality Standards

NEPA – National Environmental Policy Act

NF – national forest

NFMA – National Forest Management Act

NFS – National Forest System

OHV – off-highway vehicle

RCW – red-cockaded woodpecker

RD – ranger district

SMS – scenery management system

USDA – United States Department of Agriculture

USDI – United States Department of the Interior

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Appendix A. Summary of Analysis of the Management Situation

In preparing for the plan revision process, the National Forests in Mississippi analyzed the current management situation to determine changes and trends over the past two decades that needed to be addressed in the new forest plan. This analysis of the management situation (AMS) helped identify major issues, changing conditions, evolving management direction, new scientific understanding, and shifts in public interest since the 1985 forest plan. The following list summarizes the major issues, continued priorities, and changes identified from this analysis.

- There is a renewed emphasis on restoring and sustaining a diversity of native ecosystems, in contrast to the 1985 forest plan focus on timber commodity production.
- There is a shift in perspective regarding vegetation management; less emphasis has been placed on ensuring timber harvest and production method efficiencies and more emphasis is on using timber management as a tool for carrying out restoration goals and sustaining healthy resilient forests.
- There has been a steadfast emphasis on protection and habitat enhancement for threatened and endangered species on National Forests in Mississippi-administered lands.
- We have a better understanding of the historic role of fire and recognize the need for an aggressive prescribed fire program to maintain fire-dependent native ecosystems, reverse habitat loss of endangered species, reduce fuel hazards, control non-native invasive species, and protect human safety.
- Increased development and population growth adjacent to national forest lands are impacting our ability to conduct effective management practices across the landscape.
- There has been a steady increase in demand for providing recreation opportunities, particularly for developed trails.
- There is a need for a more sustainable infrastructure system for management of roads, trails, and bridges in an environment with anticipated declining budgets and resources.
- There is a need for developing and adaptive natural resource management framework for responding to effects of climate change, with particular concern for potential increases in weather disturbances resulting in windstorm damage from tornadoes and hurricanes.

Several overarching management goals emerged during collaboration efforts that provided a framework for developing the plan and alternatives. Consistent with the natural resource base of the National Forests in Mississippi and with consideration for anticipated staffing and funding capabilities, the final environmental impact statement (FEIS) for the plan evaluated a range of management alternatives that incorporated the overarching management goals. While the FEIS described and analyzed the alternatives in detail, the following goals were common to all alternatives and reflected the AMS findings and collaborative input received during the plan revision process.

Restore Native Ecological Systems – We identified 24 native ecological systems on the National Forests in Mississippi, including 9 unique communities or uncommon local features. Priorities for achieving desired conditions included conversion of loblolly and slash pine stands to longleaf pine and shortleaf pine/oak ecosystems, restoration of floodplain forests, and continued maintenance and enhancement of native hardwood ecosystems and unique communities such as native prairies and bogs.

Promote Diversity of Species – Managing for a diversity of healthy native ecosystems was integral to providing appropriate ecological conditions for a diversity of plant and animal species. Threatened and endangered species protection and habitat enhancement remained important priorities. The needs of threatened and endangered species identified as potentially occurring in the National Forests in Mississippi were emphasized.

Manage for Healthy Forests – Shift resource management focus from commodity production to providing for native ecosystem restoration and enhanced forest health conditions. Vegetation management practices support a variety of integrated resource strategies including converting loblolly and slash pine plantings to native ecosystems, creating a diversity of habitats, improving resilience to natural disturbances and a changing climate, reducing impacts of insects and diseases, controlling nonnative invasive species, and producing quality timber commodities.

Conserve Old-growth Communities – A diversity of tree ages, from regeneration to old growth, are managed to support a sustainable mix of ecological conditions across the landscape. The overall strategy is to establish old-growth stands across all ecological systems on the National Forests in Mississippi.

Restore Historic Fire Conditions – On the National Forests in Mississippi, periodic prescribed burning has become an important tool for recreating historic fire regimes and reducing the risk of catastrophic fires. Restoring fire regimes that favor desirable native ecosystems and improves or maintains habitats for threatened and endangered species is a high resource management priority. The frequency of return intervals for prescribed burns and the percent of burns conducted during the growing season vary, depending on the ecosystem and habitat needs.

Manage for Healthy Watersheds – Productive soils, clean water, and clean air are important desired conditions and essential to sustaining the ecological function and productive capacity of the National Forests in Mississippi. Management strategies focus on using established best management practices for sustaining and improving watersheds within national forest control and promoting an “all lands” approach by working cooperatively with other agencies and landowners to improve statewide watershed health.

Maintain Sustainable Infrastructure and Access – The focus for managing the roads, trails, and facilities that make up the National Forests in Mississippi infrastructure is on user safety and maintenance of existing systems. Infrastructure additions are anticipated to be limited and dependent on funding availability. Attention will be focused on addressing the backlog of repairs and upgrades, improvements for environmental protection, disposal of facilities that are no longer needed, and rehabilitation of user-created trails and roads.

Maintain Sustainable Recreation – Recreation management is focused on maintaining and improving existing dispersed recreation opportunities and developed recreation sites that provide a diverse range of quality natural and cultural-based recreation opportunities. Addition of new facilities and amenities is dependent on establishing reliable public and private partnerships.

Provide Stable Economic Benefits – Vegetation management, minerals development, and recreation use are the principal forest resource management activities that generate the majority of revenues. The proposed action and alternatives evaluated an array of program levels to ensure a steady flow of economic benefits.

Adapt to Changing Climate Conditions – An increase in extreme weather events is the climate change factor most likely to affect the National Forests in Mississippi in the next 10 to 15 years. Strategies include reducing vulnerability by maintaining and restoring resilient native ecosystems, enhancing adaptation by reducing serious disturbances and taking advantage of disruptions, using preventative measures to reduce impacts from forest pests, and mitigating greenhouse emissions by reducing carbon loss from hurricanes.

Appendix B. Timber Analysis

Timber Resource Program, Suitability, and Sustainability Analysis

Introduction

Vegetation management practices envisioned in the revised forest plan for the National Forests in Mississippi support restoration of native ecological systems, improve conditions for threatened and endangered species, and improve forest health. These ecological restoration objectives are based on the desired conditions described in chapter 2 of the plan. The desired conditions of the plan are based on the analysis described in the FEIS appendix G – Ecosystems and Species Diversity Report and FEIS appendix H – By-unit Analysis for various Ecological Systems and Species Associations. An Ecological Sustainability Evaluation Model was used to consider conditions needed for ecological sustainability, and species diversity and sustainability. The approximate ecological system current conditions and desired conditions are displayed as percentages of each administrative unit of the National Forests in Mississippi in Table 14 below. The desired condition for abundance of each system is indicated as a range of ecologically optimum percentages for each unit. The differences between current and desired conditions in Table 14 are what drive the outcomes displayed in chapter 3 of the plan and summarized by unit in Table 15 through Table 18 on the following pages.

The results of the Ecological Sustainability Evaluation Model emphasized restoration of longleaf, shortleaf and hardwoods forestwide on appropriate sites. Restoration of prairies on the Bienville Ranger District was identified as high priority. Restoration of bogs and savannahs in the Near Coast Flatwoods on the De Soto Ranger District were also considered a priority. In areas identified as red-cockaded woodpecker habitat management areas, and suitable soils for gopher tortoise, thinning to achieve optimal habitat conditions was deemed highest priority. As program level allowed, other projects addressing forest health and general habitat conditions were identified to accomplish.

The changes in vegetation species composition, condition and age were modeled using an excel spreadsheet. Formulas that moved 2006 acres in 10-year increments were entered by vegetation type and age. The formulas accounted for acres modeled to change vegetation types due to restoration treatments. Vegetation management treatments of systems in desirable conditions were modeled to include three thinning harvests in pine-dominated systems and two in hardwood systems during the life of the stand. Shortleaf and longleaf systems were modeled to be managed for 120 years. Dry upland hardwood systems were expected to be managed for 130 years. Mesic and alluvial hardwood systems were expected to be managed for 200 years. Loblolly and slash-dominated systems were generally expected to be managed for 80 years. Where loblolly and slash pine stands are being converted to either hardwood, shortleaf, or longleaf then, their harvests were modeled to occur at a rate equivalent to a 60-year rotation (16.67 percent). However, in red-cockaded woodpecker habitat management areas the red-cockaded woodpecker recovery plan guidelines limit restoration harvest to 12.5 percent. Vegetation management within red-cockaded woodpecker habitat management areas follows the most current recovery plan guidance for this species. The assumptions used in the modeling of vegetation treatments and harvest volumes were deemed biologically attainable by the interdisciplinary team developing the plan strategy. Likely program level outcomes for the plan were estimated using a model that reflected treatment priorities and program constraints (such as budget and staffing). The model results were also tempered by the biologically attainable vegetation program capacity. These constraints resulted in effective rotations longer than those stated above. The likely vegetation program should be predominantly thinning and system restoration harvests.

The restoration harvests are likely to be predominantly clearcuts that are artificially regenerated. Other regeneration methods will be predominantly harvest prescriptions aimed at natural regeneration (seed tree and shelterwood).

Table 14. Desired percent of ecological systems by unit on the National Forests in Mississippi

Ecological System		Current and Desired Percent of Ecological System by Unit								
		Bienville	Chickasawhay	De Soto	Homochitto	Delta	Holly Springs	Yalobusha	Ackerman	Trace
Upland Longleaf Pine Forest and Woodland	C	3	40	45	9					
	D	20-30	65-73	64-74	69-78					
Shortleaf Pine-Oak Forest and Woodland	C	3					28	4	12	14
	D	5-15					34-52	34-52	30-47	28-43
Loblolly Pine Forest	C	31	16	13	76		38	65	53	51
	D	0-5	0-5	0-5	0-5		0-5	0-5	0-5	0-5
Southern Loblolly-Hardwood Flatwoods	C	38								
	D	35-45								
Slash Pine Forest	C		26	21				2		
	D		0-5	1-7				0		
Northern Dry Upland Hardwood Forest	C						21	18	20	16
	D						34-51	34-52	30-46	28-43
Southern Dry Upland Hardwood Forest	C	2	1	1	3					
	D	0-5	0-5	0-5	3-12					
Southern Loess Bluff Forest	C				2					
	D				3-10					
Southern Mesic Slope Forest	C	11	2	2	4					
	D	5-15	0-5	1-8	2-10					
Northern Mesic Hardwood Forest	C						10	10	12	15
	D						6-13	1-8	6-12	18-24
Floodplain Forest	C	12	15	6	6		2	2	3	2
	D	10-20	23-32	12-20	9-16		6-13	11-18	16-22	7-13
Lower Mississippi River Bottomland and Floodplain Forest	C					100				
	D					100				
Near-Coast Pine Flatwoods	C			4						
	D			3-9						
Wet Pine Savanna	C									
	D			0.6-7						

C-Current, D-Desired

This appendix provides a summary of analysis of the suitability of National Forests in Mississippi forest lands for timber production and harvest under the revised forest plan. The appendix also provides estimates of the timber sale program quantity (TSPQ) in Table 16, allowable sale quantity (ASQ) in Table 15 and the long-term sustained yield (LTSY) capacity of these lands in Table 16. Timber sale program quantity is the total amount of timber that is likely to be removed, including both the amount scheduled to be removed from lands suitable for timber production and an estimate of the amount of unscheduled timber removed from lands not suitable for timber production. Allowable sale quantity is the maximum amount of timber (over a 10-year period) to be harvested on a planned, scheduled basis from lands suitable for timber production. Long-term sustained yield calculations are based on the amount of timber that could be harvested assuming the desired conditions were achieved and the silvicultural management strategy for the desired condition was being implemented.

Long-term sustained yield, allowable sale quantity, and timber sale program quantity are estimates achieved by use of the excel spreadsheet model mentioned above. Timber sale program quantity is aspirational in nature, rather than being a commitment to offer certain levels of volume at any given time. The timber sale program anticipates silvicultural activities, which are analyzed and selected through National Environmental Policy Act (NEPA) process decisions that implement the revised plan. These timber sale projects apply active management to the vegetation resource to move the forest toward desired conditions (see chapter 2). Silvicultural activities described in this report include commercial timber sales of intermediate timber harvesting (thinning, seed tree removal), and harvest treatments that are even-aged in nature (clearcut, shelterwood, seedtree), two-aged regeneration (shelterwood with reserves or seed tree with reserves), or uneven-aged (group selection). The size of the vegetation management program (acres of management activities) has been determined by the ecological needs of the resource, tempered by the historical budget and personnel levels (physical capability) for the National Forests in Mississippi.

Timber sale program quantity was estimated using the excel spreadsheet developed as a model to reflect the changes in vegetation types, ages and condition through five decades of vegetation management to achieve the plan's desired conditions. This spreadsheet model included format and formulas to calculate acres of treatment and resulting volumes. The volume tables included in this model were based on experienced volume yields and professional judgment. The section below describing anticipated changes and treatments provides likely outcomes in acres for each district and vegetation classification based on this model. The 307 million cubic feet or 1,535 million board feet long-term sustained yield was estimated in the same excel spreadsheet. This estimate was based on the amount of timber that could be removed in perpetuity on a decadal basis. The allowable sale quantity is 179 million cubic feet or 894 million board feet per decade.

Ecological restoration has been the primary management emphasis through the forest plan revision process. Improved forest health will also be achieved by implementing ecological restoration projects. The timber sale activities described above will yield wood products to the commercial markets in the form of pulpwood and sawtimber.

The first decade; allowable sale quantity (Table 15), timber sale program quantity (Table 16), and estimated acres of vegetation management practices (Table 17), are presented as a breakdown by ranger district or unit. However, the breakdown or distributions shown in these tables are not considered a plan allocation by unit. The revised plan developed management visions and strategies on a landscape scale recognizing that ecosystems occur across multiple administrative units (see Table 1. Distribution of ecological systems on the National Forests in Mississippi). The unit distributions shown in the tables reflect a probable scenario of unit distribution based upon current staffing and resource management conditions. During plan implementation, future changes in staffing and/or resource management conditions may result in changes in the actual outputs by unit.

Table 15. Allowable sale quantity for first decade on lands suitable for timber production

Practice	District Totals							National Forests in MS Total
	Bienville	Chickasaw hay	De Soto	Delta	Holly Springs	Homochitto	Tombigbee	
Regeneration Cutting (even- or two-aged)	0	3.5	12.9	1.6	10.6	19.8	3.6	52.0
Uneven-aged Management	0	0	0	0	0	0	0.1	0.1
Commercial Thinning	27.3	20.5	16.2	3.3	9.5	40.2	6.8	123.8
Other Harvest	2.8	0	0	0	0	0	0	2.8
Total (MMBF)	150.5	120.0	145.5	24.5	100.5	300.0	52.5	893.5
Total (MMCF)	30.1	24.0	29.1	4.9	20.1	60.0	10.5	178.7

Table 16. Timber sale program quantity for first decade

Practice	District Totals							National Forests in MS Total
	Bienville	Chickasaw hay	De Soto	Delta	Holly Springs	Homochitto	Tombigbee	
Timber sale program quantity from lands not suited for timber production								
Regeneration Cutting (even- or two-aged)	0	0	0	0	0.3	0	0	0.3
Uneven-aged Management	0	0	0	0	0	0	0	0
Commercial Thinning	0	0	0.1	0	0	0	0	0.1
Other Harvest	0.2	0	1.9	0	0	0	0	2.1
Total (MMBF)	1.0	0	10.0	0	1.5	0	0	12.5
Total (MMCF)	0.2	0	2.0	0	0.3	0	0	2.5
Total Timber Sale Program Quantity on both lands suitable and not suited for timber production								
Grand Totals (MMBF)	151.5	120	155.5	24.5	102.0	300.0	52.5	906.0
Grand Totals (MMCF)	30.3	24.0	31.1	4.9	20.4	60.0	10.5	181.2
Long-term sustained Yield for the National Forests in Mississippi: 1,535 MMBF (307 MMCF)								

Table 17. Estimated acres of vegetation management practices in the first decade

Practice	District Totals							National Forests in MS Total
	Bienville	Chickasawhay	De Soto	Delta	Holly Springs	Homochitto	Tombigbee	
Lands Suited for Timber Production								
Regeneration Cutting (even- or two-aged)	0	1,558	6,530	1,357	5,712	6,898	3,008	25,063
Uneven-aged Management	0	0	0	0	0	0	83	83
Commercial Thinning	27,295	29,786	22,788	6,496	10,626	36,284	7,433	140,708
Other Harvest	799	0	0	0	0	0	0	799
Subtotal Acres	28,094	31,344	29,318	7,853	16,338	43,182	10,524	166,653
Lands Not Suited for Timber Production								
Regeneration Cutting (even- or two-aged)	0	0	0	0	160	0	0	160
Uneven-aged Management	0	0	0	0	0	0	0	0
Commercial Thinning	0	0	408	0	70	0	0	478
Other Harvest	51	0	1,117	0	0	0	0	1,168
Subtotal Acres	51	0	1,525	0	230	0	0	1,806
Grand Total Acres	28,145	31,344	30,843	7,853	16,568	43,182	10,524	168,459

Table 18 displays the anticipated product mix for the timber sale program quantity for the first decade of plan implementation based upon historical program product mix offerings for the National Forests in Mississippi.

Table 18. Estimated product mix for National Forests in Mississippi timber sale program quantity (TSPQ)

Products	Estimated Product Percentage	TSPQ (MMCF)
Pine Sawtimber	46%	83
Pine Pulpwood	41%	74
Hardwood Sawtimber	4%	7
Hardwood Pulpwood	9%	16
	Total TSPQ (MMCF)	181

Suitability

The suitability determinations used in plan revision are based on land classifications contained in the Forest Service FSVeg forest vegetation database as of 2006. These classifications have been updated through inventories and project decisions made over the last several decades. These classifications were reviewed prior to plan revision analysis for accuracy and appropriateness under the plan's desired conditions for the various forest ecosystem vegetation types. Because of this review, acres in the near coast flatwoods system were identified as not suitable for timber production. Timber production is not compatible with the open woodland savanna and bog desired condition of these sites. Most of these areas were classed as suitable for timber production under the 1985 Land and Resource Management Plan for the National Forests in Mississippi. Areas on the National Forests in Mississippi's preliminary list of possible old growth have been identified as not suitable for timber production as well, if they were not already in that category. This was done because there would be no intent to schedule harvesting these stands for regeneration. They may be harvested when project-level decisions identify the areas are not providing desired old-growth character or the sites are more important for restoration than old growth character when the species occurring are not deemed site appropriate.

There have also been areas nominated for special area designation and reviewed for appropriateness for designation. The nominated areas deemed appropriate for further consideration for designation were placed in a Deferred Withdrawn (400) Land Class. The plan moves most of these designations forward to Reserved Withdrawn (300) Land Class. Two of the deferred withdrawn areas were dropped from further consideration (see the FEIS section 3.5.5 discussion of the 186 acre Lee Creek Proposed Research Natural Area and the 80 acre Singleton Prairie Proposed Research Natural Area for rationale). The following tables identify lands that are suitable for timber production and those lands that are not suitable for timber production. There is a timber land classification map included in the project record. This map displays areas where timber-harvesting activities could occur.

Most of the land base (81 percent) on the National Forests in Mississippi is considered suitable for timber production. Exceptions to that include areas administratively or congressionally withdrawn from such practices. Areas have also been identified as not suitable for timber production during past inventories due to site characteristics or red-cockaded woodpecker management guides. In addition, areas have been identified where timber production is not compatible with achieving desired conditions and objectives of the forest plan.

The tables on the following pages summarize acres for the timber land classification categories based on 2006 data. These land classifications are subject to change based on field inventory and subsequent classifications. Each district is displayed followed by a summary for the National Forests in Mississippi.

Table 19. Acres of timber land classifications for the Bienville National Forest

Classification	Approximate Acres
Total National Forest System Land	**178,541**
Nonforest lands	1,603
Lands that have been withdrawn from timber production	242
Lands where technology is not available to ensure timber production would not cause irreversible resource damage	0
Lands where there is no reasonable assurance they can be adequately restocked	0
Lands Tentatively Suitable for Timber Production	**176,696**
Lands where timber production is not compatible with achieving desired conditions and objectives (Lands not appropriate for timber production)	21,748
Lands Suitable for Timber Production	**154,948**
Lands Not Suitable For Timber Production	**23,593**

The acreage of the Bienville National Forest considered not suitable for timber production includes:

- nonforest lands that are administrative sites, wildlife openings, road and utility rights-of-way, water areas, and prairies;
- lands withdrawn from timber production which are research natural areas and botanical areas; and
- areas considered not appropriate for timber production such as recreation sites, scenic areas, red-cockaded woodpecker clusters, areas of possible old growth, and lands with barriers to management.

Table 20. Acres of timber land classifications for the DeSoto National Forest, DeSoto District

Classification	Approximate Acres
Total National Forest System Land	**368,218**
Nonforest lands	9,368
Lands that have been withdrawn from timber production	11,169
Lands where technology is not available to ensure timber production would not cause irreversible resource damage	0
Lands where there is no reasonable assurance they can be adequately restocked	0
Lands Tentatively Suitable for Timber Production	**347,681**
Lands where timber production is not compatible with achieving desired conditions and objectives (Lands not appropriate for timber production)	97,728
Lands Suitable for Timber Production	**249,953**
Lands Not Suitable For Timber Production	**118,265**

The acreage of the DeSoto National Forest, DeSoto Ranger District considered not suitable for timber production includes:

- nonforest lands that are seed orchard buffers, recreation sites, military use areas, wildlife openings, road and utility rights-of-way, water areas, cemeteries, and pitcher plant bogs;
- lands withdrawn from timber production which are wilderness, experimental forest, research natural areas and botanical areas; and
- areas considered not appropriate for timber production such as wild and scenic river corridor, recreation sites, scenic areas, administrative sites, seed orchard, military use areas, red-cockaded woodpecker clusters, areas of possible old growth, sensitive soils or vegetation sites, and lands with barriers to management.

Table 21. Acres of timber land classifications for the DeSoto National Forest, Chickasawhay District

Classification	Approximate Acres
Total National Forest System Land	**150,369**
Nonforest lands	291
Lands that have been withdrawn from timber production	690
Lands where technology is not available to ensure timber production would not cause irreversible resource damage	0
Lands where there is no reasonable assurance they can be adequately restocked	0
Lands Tentatively Suitable for Timber Production	**149,388**
Lands where timber production is not compatible with achieving desired conditions and objectives (Lands not appropriate for timber production)	10,117
Lands Suitable for Timber Production	**139,271**
Lands Not Suitable For Timber Production	**11,098**

The acreage of the DeSoto National Forest, Chickasawhay Ranger District considered not suitable for timber production includes:

- nonforest lands that are wildlife openings, road and utility rights-of-way, water areas, and cemeteries;
- lands withdrawn from timber production which are research natural areas and botanical areas; and
- areas considered not appropriate for timber production such as recreation sites, administrative sites, red-cockaded woodpecker clusters, areas of possible old growth, and sensitive soils or vegetation sites.

Table 22. Acres of timber land classifications for the Homochitto National Forest

Classification	Approximate Acres
Total National Forest System Land	**191,842**
Nonforest lands	2,960
Lands that have been withdrawn from timber production	228
Lands where technology is not available to ensure timber production would not cause irreversible resource damage	0
Lands where there is no reasonable assurance they can be adequately restocked	0
Lands Tentatively Suitable for Timber Production	**188,654**
Lands where timber production is not compatible with achieving desired conditions and objectives (Lands not appropriate for timber production)	16,585
Lands Suitable for Timber Production	**172,069**
Lands Not Suitable For Timber Production	**19,773**

The acreage of the Homochitto National Forest considered not suitable for timber production includes:

- non-forest lands that are wildlife openings, road and utility rights-of-way, water areas, and administrative sites; lands withdrawn from timber production which are research natural areas; and
- areas considered not appropriate for timber production such as recreation sites, red-cockaded woodpecker clusters, and areas of possible old growth.

Table 23. Acres of timber land classifications for the Delta National Forest

Classification	Approximate Acres
Total National Forest System Land	**60,898**
Non-forest lands	1,701
Lands that have been withdrawn from timber production	711
Lands where technology is not available to ensure timber production would not cause irreversible resource damage	0
Lands where there is no reasonable assurance they can be adequately restocked	0
Lands Tentatively Suitable for Timber Production	**58,486**
Lands where timber production is not compatible with achieving desired conditions and objectives (Lands not appropriate for timber production)	21,156
Lands Suitable for Timber Production	**37,330**
Lands Not Suitable For Timber Production	**23,568**

The acreage of the Delta National Forest considered not suitable for timber production includes:

- non-forest lands that are wildlife openings, road and utility rights-of-way, water areas, and administrative sites;
- lands withdrawn from timber production which are research natural areas and historical areas; and
- areas considered not appropriate for timber production such as recreation sites, slough buffers and areas of possible old growth.

Table 24. Acres of timber land classifications for the Holly Springs National Forest

Classification	Approximate Acres
Total National Forest System Land	**155,661**
Non-forest lands	1,979
Lands that have been withdrawn from timber production	186
Lands where technology is not available to ensure timber production would not cause irreversible resource damage	0
Lands where there is no reasonable assurance they can be adequately restocked	0
Lands Tentatively Suitable for Timber Production	**153,496**
Lands where timber production is not compatible with achieving desired conditions and objectives (Lands not appropriate for timber production)	12,056
Lands Suitable for Timber Production	**141,440**
Lands Not Suitable For Timber Production	**14,221**

The acreage of the Holly Springs National Forest, considered not suitable for timber production includes:

- non-forest lands that are wildlife openings, road and utility rights-of-way, and water areas;
- lands withdrawn from timber production which are research natural areas; and
- areas considered not appropriate for timber production such as recreation sites, administrative sites, areas of possible old growth, areas with barriers to management, and sensitive soils or vegetation sites.

Table 25. Acres of timber land classifications for the Tombigbee National Forest

Classification	Approximate Acres
Total National Forest System Land	**67,005**
Non-forest lands	924
Lands that have been withdrawn from timber production	1,200
Lands where technology is not available to ensure timber production would not cause irreversible resource damage	0
Lands where there is no reasonable assurance they can be adequately restocked	0
Lands Tentatively Suitable for Timber Production	**64,881**
Lands where timber production is not compatible with achieving desired conditions and objectives (Lands not appropriate for timber production)	5,627
Lands Suitable for Timber Production	**59,254**
Lands Not Suitable For Timber Production	**7,751**

The acreage of the Tombigbee National Forest, considered not suitable for timber production includes:

- non-forest lands that are wildlife openings, road and utility rights-of-way, cemeteries and water areas;
- lands withdrawn from timber production which are research natural areas; and
- areas considered not appropriate for timber production such as recreation sites, administrative sites, areas of possible old growth, and sensitive soils or vegetation sites.

Table 26. Total acres of timber land classifications for the National Forests in Mississippi

Classification	Approximate Acres
Total National Forest System Land	**1,172,524**
Non-forest lands	18,826
Lands that have been withdrawn from timber production	14,426
Lands where technology is not available to ensure timber production would not cause irreversible resource damage	0
Lands where there is no reasonable assurance they can be adequately restocked	0
Lands Tentatively Suitable for Timber Production	**1,139,282**
Lands where timber production is not compatible with achieving desired conditions and objectives (Lands not appropriate for timber production)	185,017
Lands Suitable for Timber Production	**954,265**
Lands Not Suitable For Timber Production	**218,269**

Appendix C. Possible Actions and Vegetation Management Priorities by Administrative Unit; and Silvicultural Systems and Cultural Practices by Ecosystem or Forest Cover type

Possible Actions by Administrative Unit

This section describes possible actions that may subsequently take place on the districts at the project or activity level to help maintain existing conditions or move toward desired conditions. The lists of possible actions are not intended to be all inclusive nor are they decisions. They are simply projections of what actions may take place in the future (FSH 1909.12, section 11.2). These possible actions meet the requirement of section 6 (f) of the National Forest Management Act 16 USC 1604 (f), and no actions will take place until they are specifically proposed and appropriate NEPA analysis and other project requirements (such as Appeals Reform Act or Healthy Forest Act) are met.

A plan amendment is not required to change or modify this list of possible actions. In accordance with the National Forest System Land Management Planning Rule (36 CFR 219.7(b)), these projections can be updated at any time through an administrative correction of the plan. These possible activities are generally implemented at the unit or ranger district level so proposed and possible actions in this section are identified by geographic areas.

The six proclaimed national forests that make up the National Forests in Mississippi are administratively managed as seven ranger districts distributed across the State of Mississippi. Although each district has unique characteristics and conditions, they all contribute to forestwide desired conditions and are managed under one Land and Resource Management Plan. Recognizing these districts in the plan enables us to better respond to local conditions and situations and provides an opportunity to fine-tune our management objectives to address their unique character. The seven ranger districts are: Bienville, Chickasawhay, Delta, De Soto, Homochitto, Holly Springs and Tombigbee.

Bienville National Forest/Ranger District

The Bienville Ranger District is located in the east-central part of Mississippi and is approximately 180,000 acres. There are extensive acreages of 70-year-old and older loblolly pine and dense hardwood midstory. There are approximately 6,000 acres of longleaf pine forest present. Some broad hardwood bottoms are also present.

Ecological Systems

The Bienville Ranger District has 13 of the 24 ecological community types that are found forestwide. The ecological systems that occur on the district are as follows:

- loblolly pine forest
- southern loblolly-hardwood flatwoods
- floodplain forest
- ponds and emergent wetlands
- seeps, springs, and seepage swamps
- Jackson prairie and woodland
- shortleaf pine-oak forest and woodland
- southern dry upland hardwood forest
- southern mesic slope forest
- upland longleaf pine forest and woodland
- rock outcrops
- rivers and streams
- lakes and ponds

The majority of the Bienville Ranger District is loblolly pine-dominated flatwoods managed for recovery of red-cockaded woodpecker. These areas are synonymous with NatureServe's Southern Loblolly Hardwood Flatwoods ecological system and are expected to be maintained on the landscape throughout the implementation period of this plan. While Jackson Prairies are not represented on the Bienville's ecological systems map (map 2), all acres of potential prairie are expected to be restored to desired condition including conversion from off-site species and restoring the appropriate fire regime.

The following table displays the proposed outcomes for ecological systems on the Bienville Ranger District during the first decade of forest plan implementation. The Bienville program management emphasis is on prairie restoration and management of red-cockaded woodpecker populations and habitat. The conversion acreage reflected below represents acres proposed to be converted to Jackson Prairie based on expected budgets and resource capacity. Structural improvement is the preferred treatment option for the first decade because of the need to restore red-cockaded woodpecker habitat to an optimum condition. Fire is expected to play a vital role in controlling midstory in red-cockaded woodpecker areas and restoration of native prairie.

Table 27. Possible outcomes for ecological systems on the Bienville Ranger District during the first decade of Forest Plan implementation

Ecological System	Structural Improvement (Acres)	Age Structure Improvement (Acres)	Conversion to Appropriate Ecological System (Acres)	Totals (Acres)
Loblolly Pine Forest	0	0	1,000	**1,000**
Southern Loblolly-Hardwood Flatwoods	23,000	0	0	**23,000**
Shortleaf Pine-Oak Forest and Woodland	2,000	0	0	**2,000**
Upland Longleaf Pine Forest and Woodland	2,000	0	0	**2,000**
Southern Dry Upland Hardwood Forest	0	0	50	**50**
Southern Mesic Slope Forest	0	0	0	**0**
Floodplain Forest	0	0	0	**0**
Totals	**27,000**	**0**	**1,050**	**28,050**

The following table displays the percent of acres in regeneration (0 to 10 years) and mature structural condition (60 years old or older) after the first decade of the plan based upon expected treatments conducted within this time frame. Structural objectives focus on regeneration age classes (0 to 10 years old) and mature age classes (over 60 years old) because these groups are key to providing for species diversity. It is assumed that if mature and regenerating age classes are sustainable, so are age classes in between. All of these ecological systems are within the range of desired conditions and expectations as described in the "Species and Ecological System Diversity" report.

Table 28. Percent of acres in regeneration (0 to 10 years) and mature structural condition (60 years old and older) after the first decade of the forest plan implementation

Ecological System	Percent Acres in Regeneration after 1st Decade	Percent Acres in Mature Structural Condition after 1st Decade
Loblolly Pine Forest	0	53
Mesic Loblolly Pine-Hardwood Forest	0	67
Shortleaf Pine-Oak Forest and Woodland	0	95
Upland Longleaf Pine Forest and Woodland	0	65
Southern Dry Upland Hardwood Forest	0	94
Southern Mesic Slope Forest	0	90
Floodplain Forest	0	92

Chickasawhay Ranger District

The Chickasawhay Ranger District is located in the southeastern portion of Mississippi and occupies approximately 150,000 acres of the northern end of De Soto National Forest. The district includes Thompson Creek, a broad hardwood bottom. The Chickasawhay Ranger District has several rare pitcher plant flats and xeric sandhill communities that provide refuge for several species.

Ecological Systems

The Chickasawhay Ranger District has 13 of the 24 ecological community types that are recognized forestwide. The ecological systems that occur on the district are as follows:

- loblolly pine forest
- slash pine forest
- floodplain forest
- ponds and emergent wetlands
- seeps, springs, and seepage swamps
- xeric sandhills
- southern dry upland hardwood forest
- southern mesic slope forest
- upland longleaf pine forest and woodland
- herbaceous seepage bogs and flats
- rock outcrops
- rivers and streams
- lakes and ponds

Map 9 shows that pine is the prevalent forest type on the Chickasawhay Ranger District with longleaf pine being the dominant pine species. The Chickasawhay Ranger District is primarily managed for red-cockaded woodpecker and gopher tortoise recovery, and as such, there is little conversion of loblolly and slash pine expected to occur within the first decade of the plan. The red-cockaded woodpecker recovery plan limits the quantity of regeneration treatments that can occur within a red-cockaded woodpecker habitat management area and emphasizes thinning existing stands as critical to restoration and maintenance of both red-cockaded woodpecker and gopher tortoise habitat management. Creating woodland conditions in existing stands of longleaf pine on gopher tortoise priority soils is also a high priority for the Chickasawhay Ranger District. Riparian areas are excluded from red-cockaded woodpecker habitat management areas, and the emphasis in these areas will be on favoring hardwoods through both natural succession and commercial thinnings. Xeric sandhills and herbaceous seepage bogs and flats are considered rare communities on the Chickasawhay Ranger District and are high priorities for restoration activities.

The following table displays the proposed outcomes for ecological systems on the Chickasawhay Ranger District during the first decade of forest plan implementation. Although conversion of off-site species to longleaf pine is a long-term goal for this ranger district, the focus of treatments during the first decade of plan implementation is on restoring existing red-cockaded woodpecker and gopher tortoise habitat. The Chickasawhay Ranger District's program management emphasis for this plan period is on thinning the canopy structure and restoring the appropriate fire regime to provide more open canopy conditions for their threatened and endangered species. The woodland thins displayed below are targeted for gopher tortoise priority soils. The conversion acreage reflected below represents acres proposed to be converted to longleaf pine, which includes some conversion to xeric sandhills and herbaceous seepage bogs and flats. Fire is expected to play a vital role in controlling midstory in red-cockaded woodpecker areas and restoration of gopher tortoise habitat.

Table 29. Possible outcomes for ecological systems on the Chickasawhay Ranger District during the first decade of Forest Plan implementation

Ecological System	Structural Improvement (Acres)	Gopher Tortoise Habitat Improvement (Acres)	Age Structure Improvement (Acres)	Conversion to Appropriate Ecological System (Acres)	Totals (Acres)
Upland Loblolly Pine Forest	4,000	0	0	300	**4,300**
Mesic Loblolly Pine-Hardwood Forest / Southern Mesic Slope Forest**	1,000	0	0	0	**1,000**
Shortleaf Pine-Oak Forest and Woodland*	100	0	0	0	**100**
Upland Longleaf Pine Forest	13,000	7,000	0	0	**20,000**
Slash	14,000	0	0	1,000	**15,000**
Dry Upland Hardwood Forest	0	0	0	0	**0**
Floodplain Forest	0	0	0	0	**0**
Totals	**32,100**	**7,000**	**0**	**1,300**	**40,400**

* Shortleaf pine acreage is considered part of the Longleaf Pine Forest and Woodland Ecological System; however, it is separated here to show where treatment is expected to occur.

** Southern Mesic Slope Forest is the Ecological System represented by Mesic Loblolly Pine Hardwood Forest in this table.

Table 30 displays the percent of acres in regeneration (0 to 10 years) and mature structural condition (60 years old or older) after the first decade of the plan based upon expected treatments conducted within this timeframe. All of these systems are within our expectations as described in the "Species and Ecological System Diversity" report.

Table 30. Percent of acres in regeneration (0 to 10 years) and mature structural condition (60 years old or older) after the first decade of forest plan implementation

Ecological System	Percent Acres in Regeneration after 1st Decade	Percent Acres in Mature Structural Condition after 1st Decade
Loblolly Pine Forest	0	64
Mesic Loblolly Pine-Hardwood Forest /	0	75
Southern Mesic Slope Forest	0	97
Upland Longleaf Pine Forest and Woodland	2	59
Slash Pine Forest	0	28
Southern Dry Upland Hardwood Forest	0	96
Floodplain Forest	0	93

Delta National Forest/Ranger District

The Delta Ranger District is located in the west-central part of Mississippi and covers approximately 60,000 acres. The Delta Ranger District is the only bottomland hardwood national forest in the nation. The Delta is also critical for recovery efforts of the endangered Pondberry and the threatened Louisiana black bear.

Ecological Systems

The Delta geographic area has 5 of the 24 ecological community types that are recognized forestwide. They are:

- Lower Mississippi river bottomland and floodplain forest
- ponds and emergent wetlands
- cypress dominated wetlands
- rivers and streams
- lakes and ponds

Map 15 shows that the Delta Ranger District is a contiguous tract of lower Mississippi River bottomland and floodplain forest. The Delta Ranger District is primarily managed to improve species composition and canopy structure.

The following table displays the proposed outcomes for ecological systems on the Delta Ranger District during the first decade of forest plan implementation.

Table 31. Proposed outcomes for ecological systems on the Delta Ranger District during the first decade of forest plan implementation

Ecological System	Species Composition Improvement (Acres)	Age Structure Improvement (Acres)	Totals (Acres)
Lower Mississippi River Bottomland and Floodplain Forest	8,000	1,500	9,500
Totals	8,000	1,500	9,500

Improving structural condition in lower Mississippi River bottomland and floodplain forest is important to improve species composition by favoring oak species that provide wildlife benefits. Based on expected outcomes, the percent of acreage in regeneration is anticipated to be less than 3 percent of the total acreage after the first decade of plan implementation. Approximately 70 percent of acreage is proposed to be in a mature structural condition after the first decade. Both are within the range for desired structural condition as described in the "Species and Ecological System Diversity" report.

De Soto National Forest/Ranger District

The De Soto Ranger District is located in the southeastern portion of Mississippi and is approximately 351,000 acres. Soils in the southernmost portion of Mississippi have less fertile, sandy soils compared to the rest of the state. Southern Mississippi is known for its diversity of plant communities such as longleaf pine, pitcher plant flats, and titi swamps. It is characterized by large areas of pine forests, interlaced with blackwater streams. About 117,000 acres are under special use permit to the Mississippi National Guard for Camp Shelby as a military training area. Black Creek is designated as a scenic river under wild and scenic river management in the National Forest System. Black Creek and Leaf Wilderness Areas are both located on the De Soto Ranger District. The district is known for recovery efforts of threatened and endangered species such as red-cockaded woodpeckers, gopher tortoise, and Louisiana quillwort, and is within the historic range of the federally endangered Mississippi sandhill crane and dusky gopher frog.

Ecological Systems

The De Soto Ranger District has 15 of the 24 ecological community types that are recognized forestwide. The ecological systems that occur on the district are as follows:

- loblolly pine forest
- slash pine forest
- floodplain forest
- ponds and emergent wetlands
- seeps, springs, and seepage swamps
- xeric sandhills
- southern dry upland hardwood forest
- southern mesic slope forest
- upland longleaf pine forest and woodland
- herbaceous seepage bogs and flats
- near-coast pine flatwoods
- wet pine savanna
- rock outcrops
- rivers and streams
- lakes and ponds

The De Soto Ranger District is the most ecologically diverse unit on the National Forests in Mississippi and is key to sustaining species diversity forestwide.

Pine is the prevalent forest type on the De Soto Ranger District with longleaf pine dominating the north end of the district and slash pine dominating the southern end (map 22 and map 29). The district is primarily managed for red-cockaded woodpecker and gopher tortoise recovery, and as such, emphasizes thinning existing pine stands for restoration and maintenance of habitat. Thinning existing stands of longleaf pine on gopher tortoise priority soils to woodland condition is another high priority for the De Soto. Restoration of Mississippi sandhill crane habitat is important in that historic breeding ranges will be restored. Restoring fire to areas designated as critical habitat for the dusky gopher frog is crucial to ensuring recovery of this species.

The following table displays the proposed outcomes for ecological systems on the De Soto Ranger District during the first decade of forest plan implementation. Although conversion of off-site species to longleaf pine is a long-term goal for this forest unit, the focus of treatments during the first decade of plan implementation is on restoring existing red-cockaded woodpecker and gopher tortoise habitat. The De Soto Ranger District's proposed program management emphasis for this plan period is on thinning the canopy structure and restoring the appropriate fire regime to provide more open canopy conditions for their threatened and endangered species. The woodland thins displayed below are proposed for gopher tortoise priority soils. Slash and loblolly pine conversion acreage reflected below represents acres converted to longleaf pine, which includes some conversion to xeric sandhills and herbaceous seepage bogs and flats. Flatwoods conversion acreage displayed below reflects acres proposed to be converted to wet pine savanna for restoration of Mississippi sandhill crane habitat. Although not represented in the table, all acres of herbaceous seepage bogs and flats are proposed to be restored to desired condition within the first decade of plan implementation through removal of canopy species, and restoration of fire regime. Fire is expected to play a vital role in controlling midstory in red-cockaded woodpecker areas and restoration of gopher tortoise habitat.

Table 32. Proposed outcomes for ecological systems on the De Soto Ranger District during the first decade of forest plan implementation

Ecological System	Structural Improvement (Acres)	Gopher Tortoise Habitat Improvement (Acres)	Age Structure Improvement (Acres)	Conversion to Appropriate Ecological System (Acres)	Totals (Acres)
Loblolly Pine Forest	2,000	0	0	2,000	**4,000**
Mesic Loblolly Pine-Hardwood Forest**	600	0	0	0	**600**
Shortleaf Pine-Oak Forest and Woodland*	100	0	0	0	**100**
Upland Longleaf Pine Forest and Woodland	12,000	2,000	0	0	**14,000**
Slash Pine Forest	6,000	0	0	6,000	**12,000**
Near-coast pine flatwoods	0	100	0	1,000	**1,100**
Southern Dry Upland Hardwood Forest	0	0	0	0	**0**
Floodplain Forest	0	0	0	0	**0**
Totals	**20,700**	**2,100**	**0**	**9,000**	**31,800**

*Shortleaf pine acreage is considered part of the longleaf pine forest and woodland ecological system; however, it is separated here to show where treatment is expected to occur.

** Southern mesic slope forest is the ecological system represented by mesic loblolly pine hardwood forest in this table.

The following table displays the percent of acres in regeneration (0 to 10 years) and mature structural condition (60 years old or older) after the first decade of the plan based upon expected treatments conducted within this time frame. All of these systems are within our expectations as described in the "Species and Ecological System Diversity" report.

Table 33. Percent of acres in regeneration (0 to 10 years) and mature structural condition (60 years old or older) after the first decade of plan implementation

Ecological System	Percent Acres in Regeneration after 1st Decade	Percent Acres in Mature Structural Condition after 1st Decade
Loblolly Pine Forest	0	57
Upland Longleaf Pine Forest and Woodland	4	62
Slash Pine Forest	0	42
Near-coast Pine Flatwoods	0	60
Southern Dry Upland Hardwood Forest	0	92
Mesic Loblolly Pine-Hardwood Forest	0	68
Southern Mesic Slope Forest	14	82
Floodplain Forest	0	93

Holly Springs National Forest/Ranger District

The Holly Springs Ranger District is located in the north-central part of Mississippi and is approximately 156,000 acres. Soils are moderately to highly erosive, with a number of areas where gullies occurred prior to the establishment of the national forest.

Ecological Systems

The Holly Springs Ranger District has 12 of the 24 ecological community types that are recognized forestwide. They are listed as follows:

- floodplain forest
- loblolly pine forest
- cypress-dominated wetlands
- northern dry upland hardwood forest
- ponds and emergent wetlands
- northern mesic hardwood forest
- seeps, springs, and seepage swamps
- shortleaf pine-oak forest and woodland
- slash pine forest
- rock outcrops
- rivers and streams
- lakes and ponds

The following table displays the proposed outcomes for ecological systems on the Holly Springs Ranger District during the first decade of forest plan implementation. The Holly Springs program management emphasis is on enhancement of forest health to achieve desired structural conditions for ecological systems. Conversion of off-site species to shortleaf pine-oak forest and hardwood-dominated forests is another important aspect of the program.

Table 34. Expected outcomes for ecological systems on the Holly Springs Ranger District during the first decade of forest plan implementation

Ecological System	Species Composition and Structural Improvement (Acres)	Age Structure Improvement (Acres)	Conversion to Appropriate Ecological System (Acres)	Totals (Acres)
Successional and Planted Upland Loblolly Pine Forest	5,000	400	3,000	**8,400**
Mesic Loblolly Pine-Hardwood Forest	500	50	100	**650**
Shortleaf Pine-Oak Forest and Woodland	2,000	1,000	100	**3,100**
Northern Dry Upland Hardwood Forest	1,000	2,000	0	**3,000**
Northern Mesic Hardwood Forest	100	50	0	**150**
Floodplain Forest	500	400	0	**900**
Totals	**9,100**	**3,900**	**3,200**	**16,200**

The following table displays the percent of acres in regeneration (0 to 10 years) and mature structural condition (60 years old or older) after the first decade of the plan based upon expected treatments conducted within this time frame. All of these systems are within our expectations as described in the "Species and Ecological System Diversity" report.

Table 35. Percent of acres in regeneration (0 to 10 years) and mature structural condition (60 years old or older) after the first decade of forest plan implementation

Ecological System	Percent Acres in Regeneration after 1st Decade	Percent Acres in Mature Structural Condition after 1st Decade
Loblolly Pine Forest	>1	14
Mesic Loblolly Pine-Hardwood Forest	>1	19
Shortleaf Pine-Oak Forest and Woodland	8	69
Northern Dry Upland Hardwood Forest	5	84
Northern Mesic Hardwood Forest	3	74
Floodplain Forest	5	84

Homochitto National Forest/Ranger District

The Homochitto Ranger District is located in southwest Mississippi and contains approximately 189,000 acres. There is extensive oil and gas exploration and production on the Homochitto Ranger District. This district provides excellent wildlife habitat with large areas of mixed pine-hardwood forest type. The terrain is very irregular, and the loessial soils are more productive than those found on the other national forests. The Homochitto Ranger District is known for its management of the federally endangered red-cockaded woodpecker. The Homochitto is home to the Natchez and Chukcho stoneflies, both endemic to southwest Mississippi.

Ecological Systems

The Homochitto geographic area has 12 of the 24 ecological community types that are recognized forestwide. They are listed as follows:

- floodplain forest
- loblolly pine forest
- cypress dominated wetlands
- seeps, springs, and seepage swamps
- southern dry upland hardwood forest
- southern loess bluff forest
- southern mesic slope forest
- upland longleaf pine forest and woodland
- rock outcrops
- ponds and emergent wetlands
- rivers and streams
- lakes and ponds

Loblolly pine is the prevalent forest type on the Homochitto Ranger District (map 48 and map 54). The Homochitto Ranger District is primarily managed for restoration of the longleaf pine ecological system and red-cockaded woodpecker recovery. The red-cockaded woodpecker recovery plan emphasizes thinning existing stands and regeneration as critical to restoration and maintenance of red-cockaded woodpecker habitat.

The following table displays the proposed outcomes for ecological systems on the Homochitto Ranger District during the first decade of forest plan implementation. The Homochitto program management emphasis for this plan period is on improving canopy structure and restoring the appropriate fire regime to provide more open canopy conditions for their threatened and endangered species. Restoring longleaf pine on upland sites is another high management priority. Southern mesic slope hardwood restoration by removal of loblolly on mesic sites will be a lower priority. The Homochitto Ranger District has the only loess bluff forest on the National Forests in Mississippi, and its restoration is accomplished primarily through natural processes and some removal of loblolly pine.

Table 36. Expected outcomes for ecological systems on the Homochitto Ranger District during the first decade of forest plan implementation

Ecological System	Species Composition and Structural Improvement (Acres)	Age Structure Improvement (Acres)	Conversion to Appropriate Ecological System (Acres)	Totals (Acres)
Upland Loblolly Pine Forest	36,000	200	5,000	**41,200**
Mesic Loblolly Pine-Hardwood Forest	1,000	0	500	**1,500**
Shortleaf Pine-Oak Forest and Woodland	500	0	0	**500**
Upland Longleaf Pine Forest	2,500	0	0	**2,500**
Dry Upland Hardwood Forest	0	0	0	**0**
Mesic Slope Forest	0	0	0	**0**
Floodplain Forest	0	0	0	**0**
Totals	**40,000**	**200**	**5,500**	**45,700**

The following table displays the percent of acres in regeneration (0 to 10 years) and mature structural condition (60 years old or older) after the first decade of the plan based upon expected treatments conducted within this time frame. All of these systems are within our expectations as described in the "Species and Ecological System Diversity" report.

Table 37. Percent of acres in regeneration (0 to 10 years) and mature structural condition (60 years old or older) after the first decade of forest plan implementation

Ecological System	Percent Acres in Regeneration after 1st Decade	Percent Acres in Mature Structural Condition after 1st Decade
Loblolly Pine Forest	0	49
Mesic Loblolly Pine-Hardwood Forest	0	56
Shortleaf Pine-Oak Forest and Woodland	0	100
Upland Longleaf Pine Forest and Woodland	25	53
Southern Dry Upland Hardwood Forest	3	80
Southern Mesic Slope Forest	9	82
Floodplain Forest	6	82

Tombigbee Geographic Area

The Tombigbee Ranger District is located in northeast Mississippi and encompasses approximately 66,000 acres. This national forest is made up of old farmland that was abandoned and replanted to trees. The Natchez Trace crosses a portion of the Tombigbee Ranger District, making it easily accessible from the north and south. Soils are fragile and erosive with many gullied areas.

Ecological Systems

The Tombigbee geographic area has 12 of the 24 ecological community types that are recognized forestwide. They are listed as follows:

- floodplain forest
- black belt calcareous prairie
- loblolly pine forest
- ponds and emergent wetlands
- northern dry upland hardwood forest
- northern mesic hardwood forest
- seeps, springs, and seepage swamp
- shortleaf pine-oak forest and woodland
- slash pine forest
- rock outcrops
- rivers and streams
- lakes and ponds

Loblolly pine and northern dry upland hardwood forest are the prevalent forest types on the Tombigbee Ranger District (map 60 and map 66). The Tombigbee Ranger District is primarily managed for forest health and restoration of desired structural condition. The Tombigbee Ranger District has several examples of the black belt calcareous prairie and woodland ecological systems, which are in need of restoration.

The following table displays the proposed outcomes for ecological systems on the Tombigbee Ranger District during the first decade of forest plan implementation. The Tombigbee's program management emphasis is on enhancement of forest health to achieve desired structural conditions for ecological

systems. Conversion of off-site species to shortleaf pine-oak forest, black belt calcareous prairie, and hardwood-dominated forests is another important aspect of the program.

Table 38. Expected outcomes for ecological systems on the Tombigbee Ranger District during the first decade of Forest Plan implementation

Ecological System	Species Composition and Structural Improvement (Acres)	Age Structure Improvement (Acres)	Conversion to Appropriate Ecological Systems (Acres)	Totals (Acres)
Upland Loblolly Pine Forest	5,000	50	2,000	**7,050**
Mesic Loblolly Pine-Hardwood Forest	2,000	50	1,000	**3,050**
Shortleaf Pine-Oak Forest and Woodland	1,000	100	0	**1,100**
Dry Upland Hardwood Forest	1,000	200	0	**1,200**
Mesic Slope Forest	100	50	0	**150**
Floodplain Forest	200	50	0	**250**
Totals	**9,300**	**500**	**3,000**	**12,800**

The following table displays the percent of acres in regeneration (0 to 10 years) and mature structural condition (60 years old or older) after the first decade of the plan based upon expected treatments conducted within this time frame. All of these systems are within our expectations as described in the "Species and Ecological System Diversity" report.

Table 39. Percent of acres in regeneration (0-10 years) and mature structural condition (60 years old or older) after the first decade of forest plan implementation

Ecological System	Percent Acres in Regeneration after 1st Decade	Percent Acres in Mature Structural Condition after 1st Decade
Upland Loblolly Pine Forest	0	39
Mesic Loblolly Pine-Hardwood Forest	0	43
Shortleaf Pine-Oak Forest and Woodland	12	85
Northern Dry Upland Hardwood Forest	7	87
Northern Mesic Hardwood Forest	13	79
Floodplain Forest	7	82

Ecosystem Vegetation Management Priorities by District

The interdisciplinary team drafting the revised plan for the National Forests in Mississippi documented the vegetation management priorities that address attaining the desired future conditions of the plan. These priorities were used to guide the modeling which produced the estimates of likely program acres and volumes displayed in appendix B of the final environmental impact statement. These priorities are included here as information that will be helpful in making project level decisions that achieve the desired future conditions included in the revised plan. These treatments are listed in their order of priority to achieve the plan's desired future conditions and likely outcomes on each district. The same priorities apply to the timber harvest program as well as the prescribed burning program.

Bienville District

1. Rare Community Restoration

Restoration of prairie soils types to open conditions is the highest priority for the Bienville District.

2. Threatened and Endangered Species Habitat Improvement

The second most important Bienville vegetation management need would be for threatened and endangered species habitat improvement including second and subsequent thinning. These harvests would be designed to achieve optimal densities for red-cockaded woodpecker. Priority treatments for improving habitat for these species would also include harvest for first thinning of young stands and to restore longleaf, and prescribed burning.

3. Restoration of Vegetative Communities outside Red Cockaded Woodpecker Habitat Management Area

The third priority needs would be restoration of native systems, in particular longleaf in areas not addressed in priority number 2 above.

4. Forest Health

Fourth priority harvests to address identified forest health improvement needs not included in the first three priority items listed above, which include first thinning, even-aged regeneration, second thinning, and uneven-aged management.

De Soto District

1. Threatened and Endangered Species Habitat Improvement

The most important vegetation management needs for threatened and endangered species habitat improvement would be prescribed burning, and second and subsequent thinning (including creation of open woodland). These harvests would be designed to achieve optimal densities for red-cockaded woodpecker, gopher tortoise, and gopher frog habitat. Priority treatments for improving habitat for these species would also include harvest to restore longleaf and first thinning of young stands.

2. Rare Community Restoration

The second level of priority on the De Soto would be timber harvests, prescribed burning and service contract work to restore Near Coastal Flatwoods Savannas and Bogs. This work may include commercial thinning to achieve woodland densities on drier areas of the Smithton, Atmore and Plummer soils of the Flatwoods. Service contracts would be utilized to restore wetter Bogs to nearly treeless conditions.

3. Restoration of Vegetative Communities outside Red Cockaded Woodpecker Habitat Management Areas and Gopher Tortoise Priority Soils

The third priority needs would be restoration of native systems, in particular longleaf in areas not addressed in the Rare Community Restoration priority listed above.

4. Forest Health

Fourth priority harvests to address identified forest health improvement needs not included in the first three priority items listed above, which include first thinning, even-aged regeneration, second thinning, and uneven-aged management.

Homochitto District

1. Threatened and Endangered Species Habitat Improvement

The most important vegetation management needs for threatened and endangered species habitat improvement would be prescribed burning, and second and subsequent thinning. These harvests would be designed to achieve optimal densities for red-cockaded woodpecker. Priority treatments for improving habitat for these species would also include harvest to restore longleaf and first thinning of young stands.

2. Restoration of Vegetative Communities outside Red Cockaded Woodpecker Habitat Management Area

The second priority needs would be restoration of native systems, in particular longleaf in areas not addressed in the first priority item listed above.

3. Forest Health

Third priority harvests to address identified forest health improvement needs not included in the first two priority items listed above, which include first thinning, even-aged regeneration, second thinning, and uneven-aged management.

Chickasawhay District

1. Threatened and Endangered Species Habitat Improvement

The most important vegetation management needs for threatened and endangered species habitat improvement would be prescribed burning, and second and subsequent thinning. These harvests would be designed to achieve optimal densities for red-cockaded woodpecker and gopher tortoise. Priority treatments for improving habitat for these species would also include harvest to restore longleaf and first thinning of young stands.

2. Forest Health

Harvests to address identified forest health improvement needs not included in the first priority item listed above, which includes first thinning, even-aged regeneration, second thinning, and uneven-aged management.

Delta District

1. Forest Health

Harvests to address identified forest health improvement needs would include thinning, even-aged regeneration, and uneven-aged management.

Holly Springs District

1. Restoration of Vegetative Communities

The most important vegetation management treatments for the Holly Springs are prescribed burning, and harvests to restore native vegetation in particular shortleaf pine, but would also include Dry Upland and Mesic Hardwood.

2. Forest Health

Harvests to address identified forest health improvement needs not included in the first priority item listed above, which includes first thinning, even-aged regeneration, second thinning, and uneven-aged management.

Tombigbee District

1. Rare Community restoration

Restoration of prairie soils types to open conditions is the highest priority for the Tombigbee District.

2. Restoration of Vegetative Communities

The second most important vegetation management treatments for the Tombigbee are prescribed burning, and harvests to restore native vegetation in particular shortleaf pine, but would also include Dry Upland and Mesic Hardwood.

3. Forest Health

Harvests to address identified forest health improvement needs not included in the first two priority items listed above, which include first thinning, even-aged regeneration, second thinning, and uneven-aged management.

Silvicultural Systems and Cultural Practices by Ecosystem

Silvicultural Systems

Implementation of the ecosystem priorities in the section above may be accomplished using even aged, two aged and uneven-aged silvicultural systems. However, the requirements of the ecosystems and conditions occurring on project areas will drive the choice of system.

An important consideration on the use of the uneven-aged system is that even though implementation of an uneven-aged system is found to be sustainable, its application is more labor intensive to implement and monitor. Implementation of an uneven-aged silvicultural system will not provide for native ecosystem restoration, where off-site species occur. Also, threatened and endangered species habitat improvement or wildlife habitat benefits are generally not attainable using uneven-aged or two-aged system harvest methods.

The National Forests in Mississippi Plan allows but expects very minor amounts of uneven-aged management. The primary uses will be where project area considerations indicate the need to maintain constant overstory presence with very limited opening sizes. This is envisioned to be mostly areas with high visual values. Also, the ecosystems occurring on the National Forests in Mississippi require more light for successful regeneration than can be provided using single tree selection uneven-aged harvest methods. Where tree removal using the uneven-aged system is intended to facilitate regeneration to sustain the ecosystem, only the group selection harvest method should be used. Because low intensity management was anticipated for areas managed using the uneven-aged

system, modeling to estimate long term sustained yield was calculated for four age classes evenly spread over the same number of years the ecosystem was modeled for even-aged management. Regulation is normally a forestwide mathematical consideration. However, with the very limited use anticipated, it is expected that individual projects with uneven-aged harvest plans will document the regulation considerations for the stands involved.

Use of the two-aged silvicultural system is expected under habitat management area guidelines to provide optimal habitat for red cockaded woodpecker recovery. Also plan guidance expects the use of overstory retention for hardwood management. The guidelines for both these uses expect lower levels of overstory than retained in classical two-aged management. Therefore, two-aged harvest methods were modeled as even-aged with lower yields.

Cultural Practices by Ecosystem or Forest Cover Type

Longleaf Pine

Management Objectives

Restore functioning longleaf pine ecosystems on historically suitable sites. Manage existing longleaf for endangered species habitat where appropriate.

Cultural Tools

Prescribed burning is a key managerial tool used to establish and maintain the longleaf pine ecosystem. It is used during establishment to favor development of fire-dependent vegetation, prevent disease, and reduce competition and fuels. Fire should be used throughout the life of a longleaf stand from establishment through old growth or final harvest stages to maintain desired conditions. Accomplishment of many of these goals requires the use of growing season timing of fire application and frequent reoccurrence.

Commercial harvest may be used to address a variety of overstory conditions. Intermediate treatments may begin when the stands age enough to be commercially operable for thinning to reduce density, improve species composition, and remove low quality or diseased individuals. Commercial thinning may include first thinning for primarily pulp or chip products and subsequent multi-product silvicultural thinning. Woodland thinning to 40-60 percent canopy closure may also be applied on xeric sites for low density habitat needs of gopher tortoise on the DeSoto National Forest. Regeneration harvests for longleaf are not a high priority for many decades because new age classes of longleaf will be produced by harvesting upland loblolly and slash and converting to longleaf. Salvage, sanitation and harvests to suppress southern pine beetle may also be necessary due to wind, fire, disease, insect and other natural mortality events. When natural disturbances happen, the restoration activities implemented will be designed to attain the management objectives for longleaf pine and the desired future conditions of the Land and Resource Management Plan for the National Forests in Mississippi.

Non-commercial treatments may also be appropriate to manage density and species composition. These projects may be thinning or release accomplished by mechanical, manual, fire or chemical. In some areas, herbicide or mechanical understory treatments will be necessary to restore system function or reduce fuels.

Shortleaf Pine

Management Objectives

Restore functioning shortleaf pine ecosystems on historically suitable sites. Manage existing shortleaf for forest health where appropriate.

Cultural Tools

Prescribed burning is a key managerial tool used to establish and maintain the shortleaf pine ecosystem. It is used during establishment to favor development of fire-dependent vegetation, and reduce competition and fuels. Fire should be used throughout the life of a shortleaf stand from sapling through old growth or final harvest stages to maintain desired conditions. Accomplishment of many of these goals requires the use of growing season timing of fire application and frequent reoccurrence.

Commercial harvest may be used to address a variety of overstory conditions. Intermediate treatments may begin when the stands age enough to be commercially operable for thinning to reduce density, improve species composition, and remove low quality or diseased individuals. Commercial thinning may include first thinning for primarily pulp or chip products and subsequent multi-product silvicultural thinning. Woodland thinning to 40-60 percent canopy closure may also be applied on xeric sites but is not a priority treatment. Regeneration harvests for shortleaf are not a high priority for many decades because new age classes of shortleaf will be produced by harvesting upland loblolly and converting to shortleaf. Salvage, sanitation and harvests to suppress southern pine beetle may also be necessary due to wind, fire, disease, insect and other natural mortality events. When natural disturbances happen, the restoration activities implemented will be designed to attain the management objectives for shortleaf pine and the desired future conditions of the Land and Resource Management Plan for the National Forests in Mississippi.

Non-commercial treatments may also be appropriate to manage density and species composition. These projects may be thinning or release accomplished by mechanical, manual, fire or chemical. Fire should be used throughout the life of a shortleaf stand from sapling through old growth or final harvest stages. In some areas, herbicide or mechanical understory treatments will be necessary to restore system function or reduce fuels.

Hardwood Systems

Management Objectives

Restore functioning hardwood ecosystems on historically suitable sites. Manage existing hardwood for forest health where appropriate.

Cultural Tools

Commercial harvest may be used to address a variety of overstory conditions. Hardwood harvests on the DeSoto, Homochitto and Bienville National Forests are of low priority for many decades except for the restoration to other systems where appropriate. The Delta, Holly Springs and Tombigbee hardwood systems have greater need for forest health treatments in the near term. Intermediate treatments may begin when the stands age enough to be commercially operable for thinning to reduce density, improve species composition, and remove low quality or diseased individuals. Commercial thinning may include first thinning for primarily pulp or chip products and subsequent multi-product silvicultural thinning. Woodland thinning to 40-60 percent canopy closure may also be applied on xeric sites but is not a priority treatment. Thinning of mesic and alluvial hardwood systems may include gap creation. These canopy gaps could be one to several large canopy dominant trees. Regeneration harvests will typically be clearcuts or shelterwood harvests with 5 to 20 percent reserves. These reserves may be retained well into or throughout the next rotation. Harvests may also

be a cluster of 3 to 5 acre patch clearcuts. These may be managed as two aged stands, uneven-aged or separately as individual stands. Salvage or sanitation harvests may also be necessary due to wind, fire, disease, insect and other natural mortality events. When natural disturbances happen, the restoration activities implemented will be designed to attain the management objectives for the hardwood systems affected and the desired future conditions of the Land and Resource Management Plan for the National Forests in Mississippi.

Non-commercial treatments may also be appropriate to manage density and species composition. These projects may be thinning or release accomplished by mechanical, manual, or chemical. In some areas, herbicide or mechanical understory treatments will be necessary to restore system function or encourage advanced regeneration. Site preparation treatments using mechanical, manual or herbicides may be used to facilitate regeneration to desirable species. Planting may also be used to supplement natural regeneration.

Loblolly Pine

Management Objectives

Restore dry upland loblolly to functioning longleaf pine, shortleaf pine and hardwood ecosystems on historically suitable sites. Restore mesic and riparian loblolly to functioning hardwood or mixed hardwood pine ecosystems on historically suitable sites. Manage existing loblolly for endangered species habitat where appropriate prior to restoration. An estimated 95 percent of upland loblolly will be restored to historically occurring systems. This will possibly take as long as a century to accomplish. Mesic Loblolly on the Bienville will be managed for the recovery of the red cockaded woodpecker and is considered the appropriate system for these mesic sites.

Cultural Tools

Prescribed burning is a key tool used in managing existing loblolly pine forests. It is used to favor development of fire dependent vegetation, and reduce competition and fuels. Fire should be used throughout the life of a loblolly stand from sapling through old growth or final harvest stages to maintain desired conditions. Accomplishment of many of these goals requires the use of growing season timing of fire application and frequent reoccurrence.

Commercial harvest may be used to address a variety of overstory conditions. Intermediate treatments may begin when the stands age enough to be commercially operable for thinning to reduce density, improve species composition, and remove low quality or diseased individuals. Commercial thinning may include first thinning for primarily pulp or chip products and subsequent multi-product silvicultural thinning. Regeneration harvests for loblolly conversion to the appropriate systems described in the management objectives above will be a high priority. Salvage, sanitation and harvests to suppress southern pine beetle may also be necessary due to wind, fire, disease, insect and other natural mortality events. When natural disturbances happen, the restoration activities implemented will be designed to attain the management objectives for the ecological system in which they occur and the desired future conditions of the Land and Resource Management Plan for the National Forests in Mississippi.

Non-commercial treatments may also be appropriate to manage density and species composition. These projects may be thinning or release accomplished by mechanical, manual, fire or chemical. Fire should be used throughout the life of a loblolly stand from sapling through old growth or final harvest stages. In some areas, herbicide or mechanical understory treatments will be necessary to restore system function or reduce fuels. Site preparation treatments using mechanical, manual or herbicides may be used to facilitate regeneration to desirable species. Planting will also be used to restore appropriate species.

Slash Pine

Management Objectives

Restore upland slash to functioning longleaf pine. Slash occurring on mesic sites may be restored to longleaf or Mesic Hardwood as appropriate on historically suitable sites. Manage existing slash for endangered species habitat where appropriate prior to restoration. An estimated 90 percent of upland and mesic slash will be restored to historically occurring systems. This will possibly take as long as a century to accomplish.

Cultural Tools

Prescribed burning is a key tool used in managing existing slash pine forests. It is used to favor development of fire dependent vegetation, and reduce competition and fuels. Fire should be used throughout the life of a slash stand from sapling through old growth or final harvest stages to maintain desired conditions. Accomplishment of many of these goals requires the use of growing season timing of fire application and frequent reoccurrence.

Commercial harvest may be used to address a variety of overstory conditions. Intermediate treatments may begin when the stands age enough to be commercially operable for thinning to reduce density, improve species composition, and remove low quality or diseased individuals. Commercial thinning may include first thinning for primarily pulp or chip products and subsequent multi-product silvicultural thinning. Regeneration harvests for slash conversion to the appropriate systems described in the management objectives above will be a high priority. Salvage, sanitation and harvests to suppress southern pine beetle may also be necessary due to wind, fire, disease, insect and other natural mortality events. When natural disturbances happen, the restoration activities implemented will be designed to attain the management objectives for the ecological system in which they occur and the desired future conditions of the Land and Resource Management Plan for the National Forests in Mississippi.

Non-commercial treatments may also be appropriate to manage density and species composition. These projects may be thinning or release accomplished by mechanical, manual, fire or chemical. Fire should be used throughout the life of a slash stand from sapling through old growth or final harvest stages. In some areas, herbicide or mechanical understory treatments will be necessary to restore system function or reduce fuels. Site preparation treatments using mechanical, manual or herbicides may be used to facilitate regeneration to desirable species. Planting will also be used to restore appropriate species.

Coastal Flatwoods, Wet Pine Savanna and Seepage Bogs

Management Objectives

Restore flatwoods sites to functioning savannas and bogs. Pine occurring on flatwoods sites should be removed to restore low density or open conditions on historically suitable sites.

Cultural Tools

Prescribed burning is a key tool used in managing coastal flatwoods, savannas and bogs. It is used to favor development of fire dependent vegetation, and reduce competition and fuels. Fire should be used regularly on flatwoods sites. Accomplishment of many of these goals requires the use of growing season timing of fire application and frequent reoccurrence.

Commercial harvest may be used to address a variety of overstory conditions. Commercial harvests will only be used where soils and sensitive species can be protected. Harvest treatments may begin when the stands age enough to be commercially operable for thinning to reduce density or completely

remove overstory. Commercial thinning will generally be to low density woodland conditions. Harvests for pine reduction or complete removal are for restoration of savannas. Regeneration to pine is not anticipated. Salvage, sanitation and harvests to suppress southern pine beetle may also be necessary due to wind, fire, disease, insect and other natural mortality events. When natural disturbances happen, the restoration activities implemented will be designed to attain the management objectives for the ecological system in which they occur and the desired future conditions of the Land and Resource Management Plan for the National Forests in Mississippi.

Non-commercial treatments may also be appropriate to manage density and species composition. These projects may be thinning or removal accomplished by mechanical, manual, fire or chemical. In some areas, herbicide or mechanical understory treatments will be necessary to restore system function or reduce fuels. Some flatwood sites have been bedded and or fertilized in the past. Mechanical treatments may be necessary to reduce the bedding effects. Biomass removals may be necessary to remove the added nutrients from the sites.

Jackson and Black Belt Prairie

Management Objectives

Restore prairies sites to proper condition and function. Trees occurring on prairie sites should be removed to restore low density or open conditions on historical prairie sites.

Cultural Tools

Prescribed burning is a key tool used in managing prairie sites. It is used to favor development of fire dependent vegetation, and reduce competition and fuels. Fire should be used regularly on prairie sites. Accomplishment of many of these goals requires the use of growing season timing of fire application and frequent reoccurrence.

Commercial harvest may be used to address a variety of overstory conditions. Commercial harvests will only be used where soils and sensitive species can be protected. Harvest treatments may begin when the stands age enough to be commercially operable for thinning to reduce density or completely remove overstory. Commercial thinning will generally be to low density woodland conditions. Harvests for tree reduction or complete removal are for restoration of prairie. Regeneration to trees is not anticipated. Salvage, sanitation and harvests to suppress southern pine beetle may also be necessary due to wind, fire, disease, insect and other natural mortality events. When natural disturbances happen, the restoration activities implemented will be designed to attain the management objectives for the ecological system in which they occur and the desired future conditions of the Land and Resource Management Plan for the National Forests in Mississippi.

Non-commercial treatments may also be appropriate to manage density and species composition. These projects may be thinning or removal accomplished by mechanical, manual, fire or chemical. In some areas, herbicide or mechanical treatments will be necessary to restore system function or reduce fuels.

Appendix D. Old Growth Management Strategy

"Guidance for Conserving and Restoring Old-Growth Forest Communities on National Forests in Mississippi"

Introduction

This document supplements the *Guidance for Conserving and Restoring Old-Growth Forest Communities on National Forests in the Southern Region, Report of the Region 8 Old-Growth Team, June 1997* and the *Revised Land and Resource Management Plan, National Forests in Mississippi.* This document's primary purpose is to facilitate implementation of Southern Region and National Forests in Mississippi old-growth management strategies contained in those documents. This document does not repeat all the regional guidance, but extends it to National Forests in Mississippi circumstances. Detailed information is provided on old-growth status, the desired conditions, management strategy, implementation guidelines and monitoring sufficient to implement the plan.

Old-Growth Status

In 2005, we assessed the status of possible old-growth forest acreage for the National Forests in Mississippi. We developed a preliminary inventory of possible old growth based on the Southern Region's old growth guidance. This inventory was completed and provided to interested members of the public on August 25, 2005. Since that time, this preliminary list has been maintained by coding in the Forest Service vegetation database (FSVeg).

A number of selection criteria were used to identify stands for this preliminary list of possible old growth. These included lands withdrawn from timber production, red-cockaded woodpecker clusters, late-seral designations, stands at or above Southern Region minimum old growth age, and rare community types (see Table 40). The areas identified were grouped based on their forest type into twelve old-growth community types.

Table 40. Forest types included in the rare community type selection criteria

Region 8 Forest Type	Forest Type Code	Acres Estimate
Bald Cypress	24	165
Spruce Pine	37	179
Chestnut Oak – Scarlet Oak – Yellow Pine	45	258
Northern Red Oak – Hickory – Yellow Pine	48	271
Bear Oak – Southern Scrub Oak – Yellow Pine	49	337
Post Oak – Black Oak	51	302
Northern Red Oak	55	47
Scrub Oak	57	41
Bald Cypress – Water Tupelo	67	682
Beech – Magnolia	69	1,300
Black Walnut	82	13

The old-growth community types are defined in the Southern Region old-growth guide. This inventory information is summarized in Table 41 by district and old-growth community type. Table 42 summarizes the same acres by district and selection criteria.

Stands were identified as rare communities for several reasons. These include forest types with limited acreages identified, forest types containing species not common in Mississippi, forest types that are late successional by definition, and in some cases, regulated management of regeneration was not likely. Future project-level analysis may add additional stands that are rare community types that were not identified by the 2005 FSVeg data. Or, field examination may reveal that stands included in the preliminary list were not appropriate for old-growth management.

Table 41. National Forests in Mississippi preliminary inventory of possible old-growth acreage summarized by ranger district and old-growth community type (July 8, 2005)

Old Growth Community Types	Bienville	De Soto	Homochitto	Chickasawhay	Delta	Holly Springs	Tombigbee	Forestwide Totals
Coastal plain upland mesic hardwood (6)	436	394	325	66			42	**1,263**
Hardwood wetland (10)	28	3,988		642				**4,658**
River floodplain hardwood (13)	2,944	9,210	1,965	3,642	20,189	448	103	**38,501**
Cypress-tupelo swamp (14)		260	399			204		**863**
Dry-mesic oak (21)	5,663	2,355	1,362	481		4,976	4,300	**19,137**
Dry and xeric oak (22)		206				441		**647**
Xeric pine and pine-oak (24)	823	1,130	1,485	11		5,244	192	**8,885**
Dry and dry-mesic oak-pine (25)	10,656	7,769	6,996	1,657		1,398	732	**29,208**
Upland longleaf (26)	346	5,062	607	1,828				**7,843**
Seasonally wet oak-hardwood (27)	771	1,311	92	1,601				**3,775**
Eastern riverfront (28)					55			**55**
Southern wet pine (29)		3,192		456				**3,648**
Unclassified		14			75		20	**109**
Totals	**21,667**	**34,891**	**13,231**	**10,384**	**20,319**	**12,711**	**5,389**	**118,592**

Table 42. National Forests in Mississippi preliminary inventory of possible old-growth acreage summarized by ranger district and selection criteria (July 8, 2005)

Selection Criteria	Bienville	De Soto	Homochitto	Chickasawhay	Delta	Holly Springs	Tombigbee	Forestwide Totals
Wilderness (3)		6,466						**6,466**
Research natural areas (4)	189	1,820	230	539	670	186	803	**4,437**
Other administratively designated unregulated areas (5)	568	5,585	84	451	3,122	235	72	**10,117**
Red-cockaded woodpecker clusters (6)	8,505	3,236	4,230	2,007				**17,978**
Late seral (7)	10,770	14,578	7,300	7,239	5,138	5,138	3,004	**50,975**
R8 old growth minimum age (8)	698	2,031	580	14	13,581	6,393	958	**24,255**
Rare community Types (9)	937	1,175	807	134	759	759	552	**4,364**
Totals	**21,667**	**34,891**	**13,231**	**10,384**	**20,319**	**12,711**	**5,389**	**118,592**

The stands in this preliminary list of possible old growth are identified in the FSVeg database tables (user defined data code 3 old growth field) using the numeric code in parenthesis following the selection criteria in Table 42.

The areas on the preliminary list of possible old growth range from small to large-sized patches. The Southern Region Guide establishes minimum size criteria for small, medium, and large-sized areas. Medium sized areas are 100 to 2,499 acres. Small old-growth patches are less than 100 acres. Large sized areas are larger than 2,499 acres. The Black Creek Wilderness and the connected wild and scenic river corridor constitute the only large possible old growth area on the National Forests in Mississippi. Some research natural areas and other administratively designated unregulated areas provide medium-sized possible old-growth patches. The remainder of the preliminary list of possible old growth is made up of small-sized possible old-growth patches. Table 43 displays the acreage of possible old growth by district and size class.

The current percentage of forested acres on each district included in the preliminary list of possible old growth varies from 6 to 32 percent. The overall forestwide average is 10 percent. The current percentage of forested acres on each district included as medium-sized or larger possible old-growth ranges from 0.001 to 4 percent. The overall Forest average of medium-sized or larger possible old growth is 0.005 percent.

Table 43. National Forests in Mississippi preliminary inventory of possible old-growth acreage summarized by district and size class (July 8, 2005)

Size Class	Bienville	De Soto	Homochitto	Chickasawhay	Delta	Holly Springs	Tombigbee	Forestwide Totals
Small	21,044	19,846	12,931	10,275	20,021	12,423	3,740	10,0280
Medium	623	2,885	300	109	298	288	1,649	6,152
Large		12,160						12,160
Total possible old growth	21,667	34,891	13,231	10,384	20,319	12,711	5,389	118,592
Total forested	201,899	382,060	206,595	156,913	63,456	169,608	67,331	1,247,862
% possible old growth	11	9	6	7	32	7	8	10
% medium +	0.3	4	0.1	0.1	0.5	0.2	2	0.5

Implementation of the Forest Plan Strategy and Guidelines for Forest Plan Old Growth Desired Condition

The revised forest plan contains desired old-growth conditions, strategy, and guidance for old growth that was the result of the ecological sustainability evaluation. Each ecological system will contribute to a network of well-distributed old growth. The plan establishes a forestwide strategy to accomplish this network that cuts across all ecological systems to maintain, or where necessary identify for restoration, 10 percent of all forested lands to an old growth condition. As the revised plan is implemented, each unit's identified old-growth management acres should increase from the preliminary percentages in Table 4 to at least 10 percent.

The old-growth network will consist of both small and medium-sized areas. The Southern Region Guide defines what constitutes a network. The regional guide does not require large-size old-growth areas for the National Forests in Mississippi and does not establish a required acreage of small or medium-sized old growth. The revised forest plan strategy of managing for a network of small to medium-sized old-growth areas is based on an evaluation of the distribution of old growth necessary to ensure the integrity of ecological functions. In addition to the 10 percent goal stated above, each ranger district should evaluate current medium-sized possible old growth and the ecological need for medium-sized old-growth areas, and designate a minimum of 1 percent of the unit's forested acres to manage as medium-sized old growth.

Areas selected to be managed for old growth will be classified as not suitable for timber production. However, harvests can be planned for these designations if needed to protect and promote old-growth values. If a determination is made that an area no longer has old growth character, or should be harvested and restored to a more ecologically suitable forest type, areas may be regenerated in an unregulated fashion for these reasons. Old-growth designations regenerated in a way that eliminates their old growth character based on the Southern Region Old Growth Guide definitions of old growth should be replaced with a new designation if necessary to meet the forest plan objectives.

Old-Growth Data Management

The stands in the preliminary list of possible old growth are identified in the FSVeg database tables (user defined data code 3 old growth field) using the numeric code shown in Table 44. These codes indicate the selection criteria used to place the stand on the preliminary list of possible old growth. In addition, upon implementation of the revised forest plan, stands in this preliminary list of possible old growth and areas selected by project decisions to provide old growth will be given a land class code of 820 in the FSVeg database tables identifiers National Forest System land class field. Project areas inventoried for decisions under the revised plan will be coded in the database tables (user defined data code 3 old growth field) as current old growth or future old growth as shown in Table 44. The selection criteria codes for the original preliminary list of possible old growth will gradually be replaced as these determinations are made.

Table 44. FSVeg database tables user defined data code 3 old growth field coding

Old Growth Code	Description	Land Class	Forest Type
1	Current old growth (use after plan revision.)	820	As appropriate
2	Future old growth (use after plan revision.)	820	As appropriate
3	Officially designated wilderness area, RCW in wilderness – Active, RCW in wilderness – Inactive, wilderness area pending.	350, 351, 352, 450	As appropriate
4	Officially designated research natural areas, research natural area pending	330, 430	As appropriate
5	Other administratively designated unregulated areas: officially designated scenic area, historic area, geological/archeological area, wild and scenic river; pending scenic area, historic area, geological/archeological area, roadless area; MIN Level - riparian area (buffer zone around slough), developed recreation site, RARE II lands under study.	310, 320, 340, 360, 370, 410, 420, 440, 470, 828, 850, 880	As appropriate
6	RCW Clusters: RCW cluster active, RCW cluster inactive, RCW recruitment stand, RCW replacement stand, RCW inactive recruitment cluster	840, 841, 842, 843, 844	As appropriate
7	Late Seral Stands: Use 600 land class code in FSVeg to identify late-seral designations until plan is revised. After plan revision, use 820.	600; 820 after plan revision	As appropriate
8	Age based on minimum stand age listed in the regional guidance for the 16 forest communities, Table 1, p. 10 (See the Old Growth Community / NFs in MS R8 Forest Type Crosswalk in Table 6. below.) Apply the regional guide to age as determined for standard stand inventory for FSVeg Summary Database R8 protocols.	As appropriate; 820 after plan revision	As appropriate
9	Rare community type (based on FSVeg forest types and Forest Service staff and field expertise)	As appropriate; 820 after plan revision	See Table 1.
10	Areas identified by stakeholders	As appropriate; 820 after plan revision	As appropriate

RCW = red-cockaded woodpecker

Table 45 contains a crosswalk between Southern Region forest types and the old-growth community types occurring on the National Forests in Mississippi. Table 45 also contains the minimum age from the regional guide. Old-growth community type codes will not be entered in FSVeg summary data. The crosswalk will be used to summarize forest types to old-growth communities if needed.

Old Growth Monitoring

After the revised land and resource management plan for the national forests in Mississippi is approved, FSVeg data will be queried annually for acreage identified for old-growth management within each ecological system. This data will be summarized by ecological system, ranger district and for the Forests. This data will be used to assess progress toward the plan goal of 10 percent old growth by ecological system.

A GIS query will also be done annually to assess total acres by district in old-growth management polygons (or contiguous polygons) of 100 acres or larger. This data will be used to assess progress toward the plan goal of 1 percent old-growth in medium-sized or larger areas.

Table 45. National Forests in Mississippi crosswalk between Southern Region forest type codes and old growth community type codes

R8 Old Growth Community Type	R8 Comm. Type Code	Minimum Age	R8 Forest Types
Coastal plain upland mesic hardwood	6	120	50 - Yellow Poplar 69 – Beech - Magnolia
Hardwood wetland forest	10	120	14 – Slash Pine-Hardwood 68– Sweet Bay-Swamp Tupelo-Red Maple
River floodplain hardwood forest	13	100	37 – Spruce Pine 46 – Bottomland Hardwood-Yellow Pine 61– Swamp Chestnut Oak-Cherrybark Oak 62 – Sweet Gum-Nuttall Oak-Willow Oak 63 – Sugarberry-American Elm-Green Ash 65 – Overcup Oak-Water Hickory 72 – River Birch-Sycamore 75 – Sycamore-Pecan-American Elm
Cypress-tupelo swamp forest	14	Pond Cypress: 120 Bald Cypress: 200	23 – Pond Cypress 24 – Bald Cypress 67 – Bald Cypress-Water Tupelo
Dry-mesic oak forest	21	130	43 – Oak-Eastern Red Cedar 51 – Post Oak-Black Oak 53 – White Oak-Red Oak-Hickory 54 – White Oak 55 – Northern Red Oak 56 – Yellow Poplar-White Oak-Red Oak 58 – Sweet Gum-Yellow Poplar 82 – Black Walnut
Dry and xeric oak forest, woodland and savanna	22	Widespread Subtype: 110 Southern Subtype: 90	45 – Chestnut Oak-Scarlet Oak-Yellow Pine 49 – Southern Scrub Oak-Yellow Pine 57 – Scrub Oak
Xeric pine and pine-oak forest and woodland	24	Shortleaf: 100 Other pine and mixed: 100	12 – Shortleaf Pine-Oak 25 – Yellow Pine 26 – Longleaf Pine Hardwood 32 – Shortleaf Pine
Dry and Dry-mesic oak-pine forest	25	120	13 – Loblolly Pine-Hardwood 31 – Loblolly Pine 44 – Southern Red Oak-Yellow Pine 47 - White Oak-Black Oak-Yellow Pine 48 – Northern Red Oak-Hickory-Yellow Pine
Upland longleaf and south Florida slash pine forest, woodland and savanna	26	Longleaf: 110	21 – Longleaf Pine
Seasonally wet oak-hardwood	27	100	64 – Laurel Oak-Willow Oak 71 – American Elm-Red Maple
Eastern Riverfront forest	28	100	73 - Cottonwood 74 – Willow
Southern wet pine forest, woodland and savanna	29	Slash: 80	22 – Slash Pine

Appendix E. Climate Change Strategies

Periods of climate change in Mississippi are not new as evidenced by the Forest's use of heritage resources to study past changes and man's adaptation to such change (Brookes and Twaroski 1996; Brookes 1996). The archaeological record for Mississippi delineates several past periods of major climate shifts that may provide an indication of the future including:

- the Pleistocene period, which marked the end of the Ice Age and the entry of man into Mississippi along with the extinction of many large mammals;
- the Hypsitermal event of 6500-3000 BC, which was a period of warming associated with an expansion of prairie environments into Mississippi, lowered water levels in rivers and streams, and siltation of gravel bars; and
- the Little Ice Age of AD 1400-1880, which was a period of intense cold.

Although the future direction of climate change may be somewhat different, the past is an indication that this has been a region of continuing disturbances and adaptations over time. The potential management approaches described below relate to the principal climate change-related disturbance factors (hurricanes; other extreme water events; outbreaks of insects, diseases, and nonnative invasive species; and fire) that are most likely to be a potential concern for the National Forests in Mississippi while moving toward the desired conditions in the forest plan. These strategies focus on ways to incorporate changes from disturbances into managed forests and enhance ecosystem resilience.

When developing strategies for managing future changes, the range of possible approaches could be quite broad. The strategies that follow are focused on recommendations from recent research studies that appear to be appropriate for Mississippi and balance effectiveness, feasibility, and available resources. Although some strategies are new ideas, most of these management options include practices that are already in effect, can serve multiple needs, and may just need to be adjusted or expanded to respond to climate changes during the next 10 to 15 years. Using an adaptive management approach would allow forest managers to adopt and adjust strategies as new information is available, conditions change, and staff and resources are available.

Climate Change Strategies for the National Forests in Mississippi:

1. Reduce vulnerability by maintaining and restoring resilient native ecosystems.

One of the basic elements of forestwide desired conditions for ecosystem diversity is that native ecological systems occupy appropriate sites. Conversion of loblolly pine stands that are not on appropriate sites to longleaf pine forests is one of the key restoration steps in this effort. As noted in the forest plan, loblolly pine historically grew along streams and moist sites where fire frequency was limited. Early reforestation efforts after national forest establishment and subsequent fire suppression led to widespread plantings of loblolly on sites that were dryer and more susceptible to fire. Restoration of longleaf pine, which is better adapted to fire and dominated these dryer sites before European settlement would not only be a step toward desired conditions, but also a step toward reducing vulnerability to anticipated disturbances. Recent studies following Hurricane Katrina indicate that longleaf is less damaged from storms than loblolly, appears to have less insect and pathogen problems, has greater fire resistance, can grow as fast as or faster than loblolly pine after the grass stage, and as a result, may sequester more

carbon (Johnsen and Nelson 2008). Based on native site conditions, longleaf pine would be expected to have higher resilience to a changing climate that is warmer, dryer, and likely to have higher fire hazards. Future reforestation efforts could also take advantage of storm damage events to advance conversions of loblolly pine sites to longleaf pines. Restoration of other native ecosystems such as shortleaf pines, oaks, bogs, savannas, and prairies would also move the forest toward desired conditions while enhancing resilience.

2. Prepare for disturbances prior to extreme events.

Removal of trees susceptible to wind or ice storms and altered spacing or thinning of dense forest stands to reduce vulnerability to drought or windthrow are potential management options for improving resilience to more frequent and intense disturbance events. Wind is the weather feature associated with the majority of damage from hurricanes, as well as tornadoes and other storms. Vulnerability could be lessened by converting to species that are less susceptible to wind breakage and uprooting and to subsequent deterioration from insects and diseases. Maintaining wind buffers around high value resources like red-cockaded woodpecker clusters would be an appropriate management objective. Simulations of hurricane damage have indicated that altering planting densities along stand edges and around red-cockaded woodpecker cavity trees may provide buffers and reduce losses due to wind damage (Stanturf et al. 2007), and continued research could provide more definitive recommendations.

Prescribed fires are a current management tool that can serve multiple purposes, from sustaining desired conditions for fire-dependent ecosystems and threatened and endangered species to reducing fuel loads. They are also a management strategy that will be important for maintaining desired habitats in a changing climate with more natural disturbances. The impacts from Hurricane Katrina would have been much worse without the aggressive prescribed burning program in effect for many years. Since 2002 (with the exception of 2006 right after Katrina), ranger districts within the National Forests in Mississippi have burned over 235,000 acres per year out of a total of approximately 1 million acres of “burnable” national forest land and are on a consistent 3- to 5-year rotation (Bryant and Boykin 2007). The De Soto and Chickasawhay Ranger Districts took the brunt of Hurricane Katrina but also have had the largest burn programs, especially in recent years. While Hurricane Katrina created a serious fuel loading condition that will continue to be a concern for many years, the regular burning program prevented the problem from being exacerbated even more. With projections of more frequent hurricanes and other more extreme weather events plus the potential for increased stresses from forest pests in a warmer, dryer climate, continued prescribed burning will be an important management strategy for the future.

3. Plan for disturbances in order to protect resource values.

Although occurrences of storms and hurricanes cannot be precisely predicted, advanced planning can anticipate impacts and have guidelines in place to protect sensitive areas. Areas such as riparian zones, endangered species habitats, and designated wilderness may require different approaches for reducing disturbances or recovering from damaging events. Management responses from previous events can provide guidance for similar situations and take advantage of prior learning experiences. Advance planning can anticipate future impacts, introduce appropriate mitigation measures, establish response protocols, and reduce assessment and response time following disturbances while ensuring sensitive resources that require special responses are protected.

4. Use preventative measures to reduce opportunities for forest pests.

Although current programs and guidance are already in place to limit introduction of nonnative species, treat invasive species, and control insects and diseases, these efforts are likely to become more critical to maintaining desired conditions for healthy forests under a changing climate. Due to the fragmented land ownership patterns, success in reducing forest pests requires going beyond national forest boundaries, and we will need continued work with partners. In addition, management practices (such as thinning and age class diversity) that sustain healthy forests and provide adequate nutrients, soil productivity, and hydrologic function can promote resilience and reduce opportunities for disturbance and damage.

5. Monitor storm impacts and climate change influences.

Climate change is a challenge to address in our annual monitoring program at the local forest level because there are multiple influences that are not well understood and many of the indicators are observable only at a very broad level over extended periods. However, forest disturbance has been identified as an indicator that can be observed (Dale et al. 2001). Although direct cause-effect relationships of individual disturbance events may not always be evident, it should be possible to see changes over time and determine whether they may be related to climate change factors. While current monitoring looks at disturbances such as insect and disease infestations, broadening these efforts to track damage from storm events and weather extremes could help predict threats to desired conditions and cope with changes.

6. Minimize carbon loss from hurricanes.

The potential for increasing hurricane frequency and intensity is a concern in regard to loss of carbon storage as well as ecosystem damage. Studies have shown that a single hurricane can convert the equivalent of 10 percent of the total annual carbon sequestered by U.S. forests into dead and downed biomass (McNulty 2002). Since it may take 15 years to recover from a severe storm, a significant amount of carbon is lost either directly through reduction of biomass or indirectly through loss of sequestration capacity. Other studies have found that for large hurricanes like Katrina, the effect of tree damage and mortality on carbon storage is even more significant. Although forests typically act as a carbon sink, recent analysis of Hurricane Katrina's carbon impact on Gulf Coast forests found that the disturbance caused a total biomass loss that is equivalent to a 50 to 140 percent reduction in the net annual U.S. contribution of forest trees to the terrestrial carbon sink (Chambers et al. 2007).

As noted above, reduction of carbon loss from hurricanes is an important climate change role for the National Forests in Mississippi, and some of the previously mentioned strategies for reducing vegetation susceptibility to severe storms may help with carbon impact mitigation. Shifting a greater proportion of the forest to more hurricane-resistant species such as longleaf pines, baldcypress, sweetgum, water tupelo, and magnolia on appropriate sites may reduce carbon loss while supporting the restoration of desired native ecosystems. Recent research indicates that longleaf pines appear to outgrow other pine species beyond 25 years, may capture more carbon below ground, and may have higher wood specific gravity—all of which potentially increase carbon sequestration (Johnsen and Nelson 2008). Longleaf pine restoration on appropriate sites may serve multiple useful strategies for achieving desired ecosystem and species diversity conditions, enhancing resilience to climate change, and mitigating carbon loss. Salvaging and converting downed biomass into boards and other wood products can also help reduce carbon loss after severe storms.

Monitoring and Future Research Directions

As noted in the previous section, many current management strategies can be used or adjusted to address changing climate conditions. As researchers develop more localized projections of anticipated climate changes and ecosystem responses are better understood, more specific management practices and strategies can be incorporated in the future.

Part of better understanding the interactions among the many climate change factors that could affect the National Forests in Mississippi will be monitoring how natural disturbances are affecting the forest. In addition to including disturbances in the monitoring questions that are part of the monitoring program for the forest plan, the Forest Service's Southern Research Station is a key partner in developing approaches for monitoring climate change and associated disturbances, and monitoring direction will be well coordinated with climate change scientists. Some initial ideas for monitoring and adapting to climate change-related disturbances include:

- consistently reporting disturbance events and tracking whether they are increasing in frequency (see chapter 5, section 5.3.1, Table 12, monitoring question D.2),
- evaluating changes in condition caused by disturbances (see chapter 5, section 5.3.1, Table 12, monitoring question D.3),
- evaluating impacts these disturbances and management responses have on advancing or deterring progress toward desired future conditions in forest plans (see chapter 5, section 5.3.1, Table 12, monitoring question D.3),
- evaluating the need to modify desired conditions and objectives in forest plans in light of the impacts of disturbances (see chapter 5, section 5.3.1, Table 12, monitoring question D.5),
- evaluating our organizational capacity to respond to disturbances (see chapter 5, section 5.3.1, Table 12, monitoring question D.5), and
- standardizing our monitoring questions and measures regionally to allow cumulative effect evaluations of climate change across the Southern Region.

The Southern Research Station and other national and regional researchers are actively working on numerous projects to assess anticipated effects and appropriate actions in regard to climate change. Over the next 2 years, the Southern Research Station will be working on regional climate scenarios that start with global circulation models and then use regional climate models to scale down to a finer resolution that is useful to local forest managers. Southern Research Station scientists will also be continuing studies on increasing the resilience and carbon sequestration of Gulf Coast forests, particularly longleaf pine in Mississippi. Other future research needs include recommendations on how to mitigate hurricane impacts, expanded management options for coping with extended droughts and more extreme storms, appropriate carbon mitigation measures, and a better understanding of the likely ecological effects of anticipated disturbances.

Appendix F. Administrative Unit Maps

If you are viewing this document electronically, click on the links under the each geographic area listed below to view individual maps. If you are viewing a printed copy of this document, you can find each map online at the following land management planning Web site for the National Forests in Mississippi: http://www.fs.usda.gov/land/mississippi/landmanagement.

Bienville Geographic Area Maps

Map 1 – Bienville Geographic Area RCW Habitat Management Area

Map 2 – Bienville Geographic Area Ecological Systems

Map 3 – Bienville Geographic Area Fire Use Suitability Classification

Map 4 – Bienville Geographic Area Minerals Suitability Classification

Map 5 – Bienville Geographic Area Recreation Suitability Classification

Map 6 – Bienville Geographic Area Special Uses Suitability Classification

Map 7 – Bienville Geographic Area Timber Suitability Classification

Map 8 – Bienville Pines Scenic Area, Bienville NF

Map 8v – Bienville Pines Scenic Area Vicinity Map, Bienville NF

Map 9 – Harrell Prairie Botanical Area, Bienville NF

Map 9v – Harrell Prairie Botanical Area Vicinity Map, Bienville NF

Map 10 –Nutmeg Hickory Research Natural Area, Bienville NF

Map 10v –Nutmeg Hickory Research Natural Area Vicinity Map, Bienville NF

Chickasawhay Geographic Area Maps

Map 11 – Chickasawhay Geographic Area RCW Habitat Management Area

Map 12 – Chickasawhay Geographic Area Ecological Systems

Map 13 – Chickasawhay Fire Use Suitability Classification

Map 14 – Chickasawhay Minerals Suitability Classification

Map 15 – Chickasawhay Recreation Suitability Classification

Map 16 – Chickasawhay Geographic Area Special Uses Suitability Classification

Map 17 – Chickasawhay Timber Suitability Classification

Map 18 – Unmanaged Forty Scenic Area, Chickasawhay RD, De Soto NF

Map 18v – Unmanaged Forty Scenic Area Vicinity Map, Chickasawhay RD, De Soto NF

Map 19 – Tiger Creek Botanical Area, Chickasawhay RD, De Soto NF

Map 19v – Tiger Creek Botanical Area Vicinity Map, Chickasawhay RD, De Soto NF

Map 20 –Laurel Oak Botanical Area, Chickasawhay RD, De Soto NF

Map 20v –Laurel Oak Botanical Area Vicinity Map, Chickasawhay RD, De Soto NF

Delta Geographic Area Maps

De Soto Geographic Area Maps

De Soto Geographic Area Maps, North

De Soto Geographic Area Maps, South

Map 44 – De Soto Geographic Area Special Uses Suitability Classification, South

Map 45 – De Soto Geographic Area Timber Suitability Classification, South

Other Maps

Map 46 – Red Hills Botanical Area, De Soto RD, De Soto NF

Map 46v – Red Hills Botanical Area Vicinity Map, De Soto RD, De Soto NF

Map 47 – Harrison Experimental Forest, De Soto RD, De Soto NF

Map 47L – Harrison Experimental Forest Legend, De Soto RD, De Soto NF

Map 47v – Harrison Experimental Forest Vicinity Map, De Soto RD, De Soto NF

Map 48 – Black Creek Corridor Page 1 of 8, De Soto RD, De Soto NF

Map 48v – Black Creek Corridor Vicinity Map, De Soto RD, De Soto NF

Map 49 – Black Creek Corridor Page 2 of 8, De Soto RD, De Soto NF

Map 50 – Black Creek Corridor Page 3 of 8, De Soto RD, De Soto NF

Map 51 – Black Creek Corridor Page 4 of 8, De Soto RD, De Soto NF

Map 52 – Black Creek Corridor Page 5 of 8, De Soto RD, De Soto NF

Map 53 – Black Creek Corridor Page 6 of 8, De Soto RD, De Soto NF

Map 54 – Black Creek Corridor Page 7 of 8, De Soto RD, De Soto NF

Map 55 – Black Creek Corridor Page 8 of 8, De Soto RD, De Soto NF

Map 56 – Black Creek Wild and Scenic River, Page 1 of 5, De Soto RD, De Soto NF

Map 56L – Black Creek Wild and Scenic River Legend, De Soto RD, De Soto NF

Map 56v – Black Creek Wild and Scenic River Vicinity Map, De Soto RD, De Soto NF

Map 57 – Black Creek Wild and Scenic River, Page 2 of 5, De Soto RD, De Soto NF

Map 58 – Black Creek Wild and Scenic River, Page 3 of 5, De Soto RD, De Soto NF

Map 59 – Black Creek Wild and Scenic River, Page 4 of 5, De Soto RD, De Soto NF

Map 60 – Black Creek Wild and Scenic River, Page 5 of 5, De Soto RD, De Soto NF

Map 61 – Harrison Research Natural Area, De Soto RD, De Soto NF

Map 61v – Harrison Research Natural Area Vicinity Map, De Soto RD, De Soto NF

Map 62 – Black Creek Wilderness Area, De Soto RD, De Soto NF

Map 62v – Black Creek Wilderness Area Vicinity Map, De Soto RD, De Soto NF

Map 63 – Leaf River Wilderness Area, De Soto RD, De Soto NF

Map 63v – Leaf River Wilderness Area Vicinity Map, De Soto RD, De Soto NF

Map 64 –Railroad Creek Titi Botanical Area, De Soto RD, De Soto NF

Map 64v –Railroad Creek Titi Botanical Area Vicinity Map, De Soto RD, De Soto NF

Map 65 –Little Florida Botanical Area, De Soto RD, De Soto NF

Map 65v –Little Florida Botanical Area Vicinity Map, De Soto RD, De Soto NF

Map 66 –Pitcher Plant Botanical Area, De Soto RD, De Soto NF

Holly Springs Geographic Area Maps

Geographic Area Maps, Holly Springs Unit

Geographic Area Maps, Yalobusha Unit

Map 86 – Holly springs Southern Unit Timber Suitability Classification, Yalobusha Unit

Other Maps

Map 87 – Tallahatchie Experimental Forest, Holly Springs NF

Map 87L – Tallahatchie Experimental Forest Legend, Holly Springs NF

Map 87v – Tallahatchie Experimental Forest Vicinity Map, Holly Springs NF

Map 88 –LA-2 Botanical Area, Holly Springs NF

Map 88v –LA-2 Botanical Area Vicinity Map, Holly Springs NF

Map 89 –LA-6 Botanical Area, Holly Springs NF

Map 89v –LA-6 Botanical Area Vicinity Area, Holly Springs NF

Map 90 –Jamie L Whitten Plan Materials Center, Holly Springs NF

Map 90v –Jamie L Whitten Plan Materials Center Vicinity Map, Holly Springs NF

Homochitto Geographic Area Maps

Map 91 – Homochitto Geographic Area RCW Habitat Management Area

Homochitto Geographic Area Maps, North

Map 92 – Homochitto Geographic Area Ecological Systems, North

Map 93 – Homochitto Geographic Area Fire Use Suitability Classification, North

Map 94 – Homochitto Geographic Area Minerals Suitability Classification, North

Map 95 – Homochitto Geographic Area Recreation Suitability Classification, North

Map 96 – Homochitto Geographic Area Special Uses Suitability Classification, North

Map 97 – Homochitto Geographic Area Timber Suitability Classification, North

Homochitto Geographic Area Maps, South

Map 98 – Homochitto Geographic Area Ecological Systems, South

Map 99 – Homochitto Geographic Area Fire Use Suitability Classification, South

Map 100 – Homochitto Geographic Area Minerals Suitability Classification, South

Map 101 – Homochitto Geographic Area Recreation Suitability Classification, South

Map 102 – Homochitto Geographic Area Special Uses Suitability Classification, South

Map 103 – Homochitto Geographic Area Timber Suitability Classification, South

Other Maps

Map 104 –Sandy Creek Botanical Area, Homochitto NF

Map 104v –Sandy Creek Botanical Area Vicinity Map, Homochitto NF

Map 105 –Sandy Creek RARE II Further Study Area / Inventoried Roadless Area

Tombigbee Geographic Area Maps

Tombigbee Geographic Area Maps, Ackerman Unit

Map 106 – Tombigbee Geographic Area Ecological Systems, Ackerman Unit

Map 107 – Tombigbee Geographic Area Fire Use Suitability Classification, Ackerman Unit

Map 108 – Tombigbee Geographic Area Minerals Suitability Classification, Ackerman Unit

Map 109 – Tombigbee Geographic Area Recreation Suitability Classification, Ackerman Unit

Map 110 – Tombigbee Geographic Area Special Uses Suitability Classification, Ackerman Unit

Map 111 – Tombigbee Geographic Area Timber Suitability Classification, Ackerman Unit

Map 112 – Tombigbee Geographic Area Hawk's Nest Backcountry Area, Ackerman Unit

Map 112L – Tombigbee Geographic Area Hawk's Nest Backcountry Area Legend, Ackerman Unit

Map 112v – Tombigbee Geographic Area Hawk's Nest Backcountry Area Vicinity Map, Ackerman Unit

Tombigbee Geographic Area Maps, Trace Unit

Map 113 – Tombigbee Geographic Area Ecological Systems, Trace Unit

Map 114 – Tombigbee Geographic Area Fire Use Suitability Classification, Trace Unit

Map 115 – Tombigbee Geographic Area Minerals Suitability Classification, Trace Unit

Map 116 – Tombigbee Geographic Area Recreation Suitability Classification, Trace Unit

Map 117 – Tombigbee Geographic Area Special Uses Suitability Classification, Trace Unit

Map 118 – Tombigbee Geographic Area Timber Suitability Classification, Trace Unit

Other Maps

Map 119 – Owl Creek Mounds Archaeological Site, Tombigbee NF

Map 119v – Owl Creek Mounds Archaeological Site Vicinity Map, Tombigbee NF

Map 120 – Noxubee Crest Research Natural Area, Tombigbee NF

Map 120v – Noxubee Crest Research Natural Area Vicinity Map, Tombigbee NF

Map 121 – Chuquatonchee Bluffs Research Natural Area, Tombigbee NF

Map 121v – Chuquatonchee Bluffs Research Natural Area Vicinity Map, Tombigbee NF

Map 122 –Shagbark Hickory Botanical Area, Tombigbee NF

Map 122v –Shagbark Hickory Botanical Area Vicinity Map, Tombigbee NF

Map 123 –Choctaw #4 Botanical Area, Tombigbee NF

Map 123v –Choctaw #4 Botanical Area Vicinity Map, Tombigbee NF

Map 124 –Prairie Mount Botanical Area, Tombigbee NF

Map 124v –Prairie Mount Botanical Area Vicinity Map, Tombigbee NF

Map 125 –Bogue Cully Botanical Area, Tombigbee NF

Map 125v –Bogue Cully Botanical Area Vicinity Map, Tombigbee NF

Appendix G. Biological Opinion – Incidental Take Statement

Source: Extracted from the United States Department of Interior Fish and Wildlife Service's Biological Opinion (BO), dated April 14, 2014, issued for the National Forests in Mississippi's Revised Land and Resource Management Plan.

Incidental Take Statement (ITS)

Section 9 of the Act and Federal regulation under section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behaviors which include, but are not limited to, breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered a prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The measures described below are non-discretionary, and must be implemented by the USFS *[USDA Forest Service]*[1] so that they become binding conditions of any grant, permit, agreement, or contract issued to, for the exemption in section 7(o)(2) to apply. The USFS has a continuing duty to regulate the activity covered by this incidental take statement. If the USFS: (1) fails to assume and implement the terms and conditions or (2) fails to require the contractor to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grand document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the USFS must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement (ITS). [50 CFR §402.14(I)(3)]

Relationship of Program-level ITS to Project-level ITS

Any future actions completed under the Forest Plan that may adversely affect the Indiana bat and dusky gopher frog will require section 7 formal consultation. These consultations will proceed using the procedures outlined in the "Programmatic Consultation Approach" section. A Level 2 biological opinion will be written and appended to this biological opinion for each project that may adversely affect the Indiana bat. During this Level 2 consultation, project-specific incidental take, as well as the cumulative amount of take pursuant to implementation of the Forest Plan that has occurred, will be assessed. In these future ITSs, reasonable and prudent measures and terms

[1] *Text in [italicized brackets] was added to the extracted BO text to clarify meaning of acronyms' used by the Service.*

and conditions to minimize the effect of any incidental take that may result will be developed and applied, as appropriate.

Amount or Extent of Take Anticipated

Indiana Bat

The Service anticipates that incidental take of Indiana bats as a result of the proposed Forest Plan will be difficult to quantify and detect due to the bat's small body size, widely dispersed individuals under loose bark or in cavities of trees, and unknown areal extent and density of their roosting populations within the HSNF *[Holly Springs National Forest]*. However, any incidental take of Indiana bats is expected to be in the form of killing, harming, or harassing. Tree removal during the non-hibernation season period may result in harm or mortality to roosting Indiana bats. Smoke and fire generated during prescribed fires that occur during the non-hibernation period could also cause roosting bats distress or death. Burning may cause an individual roosting bat to abandon a traditionally used roost tree.

Monitoring to determine take of individual bats within an expansive area of forested habitat is a complex and arduous task. Unless every individual tree that contains suitable roosting habitat is inspected by a knowledgeable biologist before management practices begin, it would be impossible to know if a roosting Indiana bat is present in an area proposed for harvest or burning. It would also be impossible to evaluate the amount of incidental take of Indiana bats unless a post-harvest inspection is immediately made of every tree that has been removed or disturbed. Inspecting individual trees is not considered by the Service to be a practical survey method and is not recommended as means to determine incidental take. However, the areal extent of potential roosting habitat affected can be used as a surrogate to monitor the level of take. Although, to the best of our knowledge, no individually-roosting Indiana bats have been incidentally taken during tree removal or other habitat-modifying activities on the HSNF, the possible removal of occupied roost tree (s) that are not recognized as such may result in incidental take of this species. If roosting individuals are present in an area proposed for timber harvest or other disturbance, incidental take of Indiana bats could occur. However, implementation of the terms and conditions associated with the reasonable and prudent measures provided below by the Service will significantly reduce the potential for incidental take.

This incidental take statement anticipates the taking of a presently unquantifiable number of Indiana bats from timber harvest and prescribed fires occurring during the non- hibernation season (April 1 to November 14). The HSNF proposes to conduct non- commercial and commercial timber management practices on a total of 16,000 acres over the next 10 years. In addition, the HSNF proposes to ignite up to 155,661 acres of prescribed fire over the next 10 years.

Therefore, the incidental take statement is based on forest management practices occurring on a maximum of 16,000 acres over a 10 year period, and a maximum of prescribed fire on 155, 661 acres over a 10 year period.

With regards to herbicide applications, recreational activities, mineral management, and infrastructure activities, no incidental take is anticipated from these activities; therefore, no incidental take is authorized for these activities covered in the Forest Plan.

Dusky Gopher Frog

In this ITS, we are evaluating the incidental take of dusky gopher frogs that may result from implementation of the Forest Plan. A Forest Plan is a permissive plan level document that allows and guides, but does not authorize specific actions to occur. As explained within the accompanying biological opinion, the Forest Plan allows for actions that are likely to adversely affect the dusky gopher frog. As such, specific actions conducted under the Forest Plan may result in adverse effects to individual dusky gopher frogs that rise to the level of take. The standards and guidelines proposed as part of the Forest Plan, however, substantively reduce the potential for adverse effects and incidental take to occur. Therefore, projects completed under the Forest Plan that comply with the standards and guidelines in many cases will not adversely affect dusky gopher frog. There may be situations, however, in which incidental take is likely regardless of whether the standards and guidelines are adhered to.

Incidental take of dusky gopher frogs could result from affirmative conservation and recovery actions proposed in the Forest Plan such as ground-disturbing activities associated with habitat management and/or prescribed burning. However, the Service anticipates that incidental take will be difficult to quantify and detect due to the fact that the frogs spend most of their lives underground, and finding a dead or injured individual is unlikely. In addition, the projects that will result from the plan that may result in take of dusky gopher frogs are not (and likely cannot at this time) be described in a specific enough manner that the level of take can be accurately estimated.

However, the Forest Plan does estimate the amount of acreage that will receive forest management actions. The DNF *[De Soto National Forest – De Soto Ranger District]* proposes to manage timber on approximately 30,843 acres over the next 10 years. Vegetation management practices will include 6,530 acres of regeneration cutting, and 22,788 acres of commercial thinning. In addition, the DeSoto Ranger District proposed to prescribe burn approximately 84,000 acres per year.

Based on the assumption that all currently occupied and unoccupied critical habitat (assuming it will eventually become occupied) will receive some form of ecosystem restoration activity during implementation of the Forest Plan, this incidental take statement anticipates the taking of a presently unquantifiable number of dusky gopher frogs from timber management activities and prescribed fire (on a 1-3 year burning regimen) on 3,084 acres.

Therefore, the incidental take statement is based on forest management practices occurring on a maximum of 3,084 acres of dusky gopher frog critical habitat over a 10 year period, and a maximum of prescribed fire on 3,084 acres of critical habitat annually.

However, due to the broad nature of the Forest Plan, and the uncertainty of what specific types of future timber management activities may be needed within dusky gopher frog habitat, this anticipated incidental take will be exempted during the Level 2 consultation on a project-by-project basis

Effect of the Take

Indiana Bat

In the accompanying BO, the Service determined that this level of expected take is not likely to result in jeopardy to the Indiana bat or destroy or adversely modify its critical habitat. Therefore, we have determined that the level of anticipated incidental take associated with the actions completed under the Forest Plan is not likely to jeopardize the Indiana bat.

Dusky Gopher Frog

Although the level of expected take cannot be accurately determined, in the accompanying biological opinion the Service determined that the actions conducted under the Forest Plan will support the survival and recovery of the dusky gopher frog and are not likely to result in jeopardy to the species or destruction or adversely modification of its critical habitat

Reasonable and Prudent Measures

The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize impacts of incidental take of Indiana bat and dusky gopher frog. Additional reasonable and prudent measures may be applied to some project level consultations (Level 2) in the future to minimize the effect of incidental take that may result from such projects, where appropriate on a project-by-project basis.

Indiana Bat

1. The NFM *[National Forests in Mississippi]* will plan, evaluate, and implement forest management practices (vegetation management activities and prescribed fire) on the HSNF (Holly Springs Unit) in a manner consistent with the conservation measures for the Indiana bat described in the Forest Plan as further clarified in the Terms and Conditions of this Incidental Take Statement.

2. The NFM will engage in Level 2 consultation for all site-specific actions that may affect the Indiana bat.

Dusky Gopher Frog

1. The NFM will minimize potential impacts to the dusky gopher frog to the maximum extent practical.

2. The NFM will engage in Level 2 consultation for all ground disturbing activities that may affect the dusky gopher frog.

We believe that, where appropriate on a project-by-project basis, the reasonable and prudent measure outlined above will significantly reduce the impacts of incidental take of the Indiana bat and dusky gopher frog.

Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the Act, the NFM must comply with the following terms and conditions, which carry out the reasonable and prudent measures, described above and outline required reporting/monitoring requirements. These terms and conditions are non-discretionary.

The applicability of each term and condition will be determined based on the technical requirements and biological characteristics associated with the specific action being analyzed.

Indiana Bat

1. The NFM shall conduct all vegetation management activities and commercial timber sales consistent with the standards and guidelines outlined in the Forest Plan and BA *[Biological Assessment]*. Additional clarification is provided for the following measures:

- Establish a maternity roosting buffer zone (75 feet) around all known Indiana bat roost sites. No ground disturbing activities will take place within this buffer other than activities specifically designed to enhance/improve roosting habitat (i.e. removal of shade trees) and only when bats have left maternity roost (i.e. September 1 to March 31). Prescribed burning will also only take place during the non-maternity roosting season (September 1 to March 31).
- Establish a maternity foraging buffer zone (2.5 miles) around all known Indiana bat roost sites. No timber removal will take place during the non- hibernation/maternity season (April 1 and August 31), unless specifically designed to enhance foraging habitat.
- For all vegetation management activities and commercial timber sales on the Holly Springs Unit, retain at least three (3) live trees per acre greater than 20 inches d.b.h. of these preferred species (Shagbark, Shellbark, and Bitternut hickory; white and green ash; white, northern red, and post oak; American and slippery elm; eastern cottonwood, black locust, and silver maple).
- For all vegetation management activities and commercial timber sales on the Holly Springs Unit, retain at least 5 snags per acre greater than 9 inches d.b.h. and 1 snag per acre over 19 inches d.b.h.. Oaks, hickories, and ashes will be favored for retention of snags. During timber harvests, snags will not be removed except where they constitute a human safety hazard. Snags will be retained in groups with live trees to prevent snag loss to wind throw.
- To protect foraging habitat and travel corridors along rivers and streams, a forested stream buffer strip will be maintained in all areas receiving vegetation management activities. The buffer will be a minimum of 50 feet on each side of perennial streams or rivers and 25 feet on both sides of intermittent streams.
- Ensure that all Forest Service employees and contractors working within Indiana bat habitat are educated to recognize and avoid potential Indiana bat roost trees and the required habitat components for a complete Indiana bat home range.

2. The NFM shall consult with the Service on all future site-specific actions on the HSNF (Holly Springs Unit) covered under the Forest Plan.

- Project-specific biological evaluations submitted to the Service will include a description of the proposed action, results of any Indiana bat surveys, conservation measures to protect Indiana bats, and reasons why and if standards and guidelines outlined in the Forest Plan are not feasible or prudent.
- The NFM shall monitor the number of acres of non-commercial and commercial forest management practices and prescribed fires implemented on an annual basis to ensure the total acreages do not exceed the authorized incidental take. The NFM shall provide a summary of annual fiscal year activities and acreages to the Service's MSFO *[Mississippi Ecological Services Field Office]* no later than December 15 each year the BO is in effect.

Dusky Gopher Frog

1. The NFM will conduct prescribed burning within occupied dusky gopher frog habitat following the Burn Matrix, as described in the Forest Plan.

2. Project-specific biological evaluations submitted to the Service will include a description of the proposed action, results of any dusky gopher frog surveys, conservation measures to protect

dusky gopher frogs, and reasons why and if standards and guidelines outlined in the Forest Plan are not feasible or prudent.

This incidental take statement is based on full implementation of the proposed project as described in the DESCRIPTION OF THE ACTION section and inclusion of the TERMS AND CONDITIONS section of this biological opinion. Failure to implement the project as proposed (including any relevant conservation measures), or implementation of the project in a manner that causes an effect to listed species not adequately considered in this opinion, may cause coverage of section 7(o)(2) to lapse and require re-initiation of consultation to ensure compliance with section 7(a)(2) of the ESA.