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Southern Region

Appendix G - Ecosystems and Species Diversity Report

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G.1 Introduction

National Forest Management Act (NFMA) regulations (1982) require that habitat be managed to support viable populations of native and desirable non-native vertebrates within the planning area (36 CFR 219.19). Additionally, USDA regulation 9500-004 (1983) reinforces the NFMA viability regulation by requiring that habitats on national forests be managed to support viable populations of native and desired non-native plants, fisheries, and wildlife. These regulations focus on the role of habitat management in providing for species viability. Supporting viable populations involves the proper distribution of habitat capable of maintaining interacting populations at levels that result in continued existence of the species.

The National Forests in Mississippi (Forests) support high levels of biological diversity relative to other regions. Viewed at both national and global scales, a large number of species are present for which population viability may be of concern. A detailed demographic or habitat capability analysis is not practical for all of these species. Therefore, our goal for this evaluation is to use a clearly defined, transparent process to identify species for which there are substantive risks to maintenance of viable populations, and to ensure consideration of appropriate habitat management strategies to reduce those risks to acceptable levels where feasible.

The ecological sustainability framework used to support forest plan revision for the National Forests in Mississippi is built on a foundation of ecological system diversity. By restoring and maintaining the key characteristics, conditions, and functionality of native ecological systems, the National Forests in Mississippi should be able to not only improve ecological system diversity but also provide for the needs of diverse plant and animal species on the forest. This report describes the analysis process used to identify, evaluate, and develop guidance for sustaining ecological diversity. This report and the ecological sustainability evaluation database from which it was derived not only provide the overall framework for many of the forest plan components and the systems-based direction in the revised forest plan, but are also expected to be an important source of data and guidance for sustaining native ecological systems and species when implementing the forest plan.

Because NFMA regulations require providing habitat for species viability within the planning area, the focus of this evaluation is on habitat provided on national forest land. Although surrounding private lands may either contribute to or hinder the maintenance of species viability on national forest land, private lands are not relied upon to meet regulation requirements. For this reason, habitat abundance was assessed based on conditions found on national forest land. Habitat distribution was assessed considering the condition of intermixed ownerships and conditions, which in turn may affect the interactions of species among suitable habitat patches on national forest land. While most plant and animal species needs are expected to be met by sustaining ecosystem diversity, a species-specific analysis was conducted to evaluate whether additional provisions were needed for federally listed species, regional forester's sensitive species, and locally rare species.

Much of the information used in this evaluation was compiled by NatureServe under a participating agreement with the Forest Service. NatureServe is an international non-profit organization, formerly part of the Nature Conservancy. Its mission is to develop, manage, and distribute authoritative information critical to conservation of the world's biological diversity. Partnership with NatureServe was sought as a means to ensure that the best available information on species status and habitat relationships was used in this evaluation. Under this agreement, NatureServe staff engaged numerous species experts and state heritage programs to develop a relational database that includes relevant information on species' status, habitat relationships, and threats to viability.

G.1.1 Viability Evaluation Process

Viability risk over the next 50 years was assessed for each species in relation to its principle habitat relationships by forest plan revision alternative. Risk assessment was based on three factors: 1) current species abundance, 2) expected habitat abundance in 50 years, and 3) expected habitat distribution in 50 years (Figure G 1). Once risk ratings were developed, management strategies were assessed to estimate how well alternatives provide for species viability.

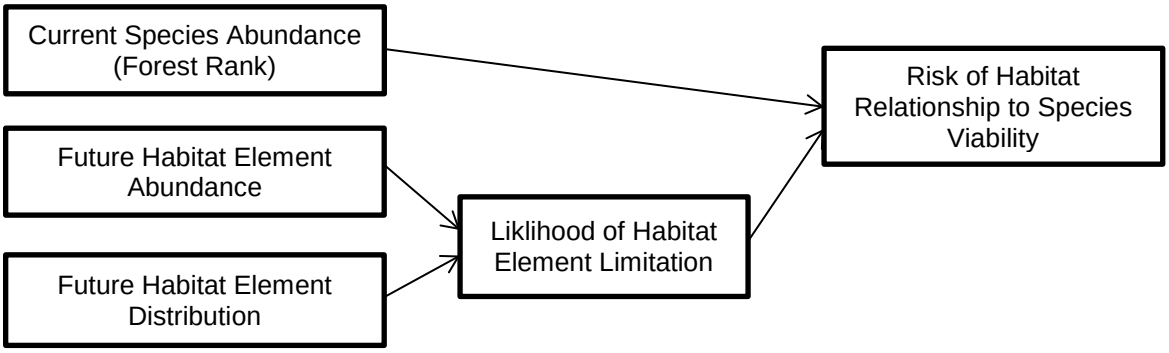

Figure G 1. Relationship of variables used to rate risk to species viability

A comprehensive list of species with potential viability concerns was compiled for the National Forests in Mississippi. The list includes those species found, or potentially found, on the Forests from the following categories:

- species listed as proposed, threatened, or endangered under the federal Endangered Species Act,
- species listed on the regional forester's sensitive species list,
- species identified as locally rare on the national forest by Forest Service biologists,
- birds of conservation concern as identified by the US Fish and Wildlife Service, declining species of high public interest, and
- species suggested by panels consisting of local experts.

Unless otherwise indicated throughout this document, the evaluation of migratory birds focuses on breeding populations only. Wintering and migrating populations were considered during planning, but viability evaluation is most accurate when viewed in terms of relative stability of breeding populations.

G.1.2 Forestwide Ecological System Sustainability

The species and ecological system sustainability evaluation framework for the National Forests in Mississippi was built around principles developed by the Nature Conservancy in their Conservation Action Planning Workbook (Nature Conservancy 2005). Although built on the Nature Conservancy structure, this document generally uses Forest Service terminology rather than the Nature Conservancy terms to refer to parts of the framework. Table G 1 provides a crosswalk between relevant Forest Service and Nature Conservancy terminology.

Table G 1. Crosswalk between planning terms of the National Forests in Mississippi and the Nature Conservancy

Forest Service Terms	The Nature Conservancy Terms
Native ecological systems, threatened and endangered species, regional forester's sensitive species locally rare species	Conservation targets
Characteristics of ecological system sustainability (key characteristics), appropriate ecological conditions for specific [species]	Key ecological attributes
Performance measures	Indicators
[no equivalent]	Indicator ratings
Forest plan components	Strategies

The Forest Service developed a relational database, the ecological sustainability evaluation tool, based on the structure of the Nature Conservancy planning tool. The ecological sustainability evaluation tool served as the primary process record for the species and ecosystem diversity analysis. This tool includes documentation of scientific and other sources consulted, uncertainties encountered, and strategic choices made during development of the database. Additionally, the tool documented the many relationships among parts of the framework. For example, species were often related to one or more characteristics of ecological systems, and a given forest plan component frequently affected multiple ecological systems or species.

The following steps were used to build an ecological sustainability framework, with each step documented within the ecological sustainability evaluation tool. This iterative process was methodical and utilized sequential steps, as described below.

1. Identify and define ecological systems

To define terrestrial ecological system sustainability, all terrestrial ecological systems on the National Forests in Mississippi were identified using NatureServe's International Ecological Classification Standards (NatureServe 2004a, 2004b). Through coordination with NatureServe, systems were added, removed, or renamed (as needed) to ensure all systems on national forest land were represented. Each system was defined in terms of existing Forest Service forest types and Natural Resources Conservation Service (NRCS) soil drainage types (sections G.1 and G.2). All identified terrestrial ecological systems were included in the ecological sustainability framework. Current acreage of each system was calculated using Forest Service geographic information system (GIS) data.

2. Identify species

To assess species diversity, a comprehensive list of plant and animal species was compiled by combining species lists from a variety of sources, including: federally-listed threatened and endangered species obtained from the US Fish and Wildlife Service, State Species of Conservation obtained from the Mississippi Natural Heritage Program, State Comprehensive Wildlife Conservation Strategy, the Birds of Conservation Concern list compiled by the US Fish and Wildlife Service, and the Forest Service's list of sensitive species. Additional species were added based on input from recognized conservation experts within the state. Species were then screened for inclusion in the framework and designated as threatened and endangered, regional forester's sensitive species, or locally rare species.

3. Identify and define characteristics of ecological system sustainability and related performance measures

To identify key characteristics and performance measures for terrestrial ecological systems, a series of 8 meetings with experts knowledgeable about ecological conditions and species in Mississippi were held in January 2005. Experts reviewed lists and definitions of ecological systems and suggested important ecological characteristics and performance measures to be addressed during planning. Final determinations of ecological sustainability components were based on expert input, subsequent additional information from a variety of sources, and habitat needs of associated species.

The framework for sustainability of aquatic ecological systems was based on watersheds. Included in the ecological sustainability evaluation database were all 5th level hydrologic/watershed units (HUCs) that contained national forest land (Clingenpeel and Leftwich 2006). The framework for addressing characteristics and performance measures for watersheds was developed by regional Forest Service staff for use during national forest planning across the Southern Region. It involved use of standard GIS datasets to assess watersheds in terms of sediment loads, pollution point sources, flow modification by dams and road crossings, and riparian land use.

As performance measures were identified for both terrestrial and aquatic systems, criteria were set for rating each performance measure as poor, fair, good, and very good relative to ecological sustainability. In general, poor and fair ratings indicated areas of concern for ecological system sustainability (Table G 2). Rationale and sources used in making choices were recorded in the ecological sustainability evaluation tool.

Table G 2. Element condition scores

Range of Condition Score	Condition	Definition of ecological sustainability evaluation Score Applied To Planning Elements
3.51 - 4.0	Very Good	Element conditions are optimal; associated species' populations should remain robust and potentially even expand.
2.51 - 3.50	Good	Element conditions are acceptable; associated species' populations should remain stable.
1.51 - 2.50	Fair	Element conditions are slightly inadequate; although associated species' populations may persist for some time, they may be subject to gradual decline.
1.00 - 1.50	Poor	Element conditions are severely inadequate. Associated species' populations are expected to severely decline; localized extirpations are occurring or are imminent.

4. Link species to the ecological systems and watersheds and identify any additional needs of species

In the January 2005 meetings, experts helped link terrestrial and aquatic species to ecological systems and watersheds in which they occur. It was determined that species' needs were best met when species were grouped before linking them to systems and, in particular, characteristics (key attributes) of systems that specifically address a given species groups needs. This linkage allowed us to assess how well the ecological system and watershed frameworks covered needs of these species. Where ecological conditions for these species were not covered by the ecological sustainability framework, additional characteristics, performance measures, and rating criteria were added so these species would be covered. Therefore, all species have their needs covered by ecological sustainability framework, or a combination of the ecological sustainability framework and other additional forest plan components.

5. Assess current condition of performance measures

Current values and ratings of all performance measures were estimated using a variety of methods. Many current values were derived through analysis of existing GIS databases. Assumptions and methods for determining current values and ratings are recorded in the ecological sustainability evaluation tool.

6. Develop Forest Plan components

Forest plan components were proposed with the goal of providing ecological system sustainability and ecological conditions for identified species based on the ecological sustainability evaluation tool. In some cases, current requirements and processes outside of the planning process were identified that address this goal. All elements of the ecological sustainability framework will be addressed by appropriate management direction in the forest plan.

7. Assess future outcomes

To assess the adequacy of proposed management direction under different alternatives, values and ratings of performance measures were projected 10 and 50 years into the future. Many of these projected values were derived from a series of spreadsheets that were developed to predict ecological system type heterogeneity and vegetation structural conditions that would result from implementing proposed management activities. For some watershed performance measures, a model was used to predict changes in sediment load resulting from the estimated levels of activities. Where projected outcomes were rated as poor or fair, adjustments to forest plan components were made (where possible) to improve these outcomes. In some cases, improving expected outcomes to good and very good ratings was not possible due to factors beyond Forest Service control (i.e., limits to expected budgets and program levels, and trade-offs with other uses).

This report serves as a description of background, current status, and desired conditions for ecological systems on the National Forests in Mississippi. Current conditions for ecological system characteristics reported here are based on a “snapshot in time.” Conditions on the Forests are constantly changing and new techniques improve how data can be used to measure progress. Data should be updated in 5-year intervals to measure progress towards achieving desired conditions.

G.1.3 Ecological System Sustainability Characteristics

In order to evaluate ecological sustainability, it is important to assess the ecological processes, ecological system composition, and structural characteristics important to the long-term persistence of ecological systems on the Forests. The following characteristics are important to all ecological systems, and are grouped here because they have forestwide optimal conditions that cross ecological system boundaries and support long term sustainability of the landscape as a whole.

Relative Abundance

Relative abundance is defined as the percentage of each ecological site type covered by the appropriate ecological system. Ensuring that native ecological systems occur on appropriate sites is important in sustaining ecological and species diversity in Mississippi. This key component will be covered in the revised forest plan by the forestwide and individual ecological system desired condition statements and objectives. Section G.5.1 lists each national forest and the desired condition for relative abundance.

Non-native Invasive Species

Non-native invasive species, including both flora and fauna, can have severe detrimental effects on native species and are problematic across the Forests. Preliminary, current, and projected data all indicate non-native invasive species are widespread on all units and will continue to persist despite any aggressive

efforts to treat non-native invasive species by the Forests. The desired target for control of non-native invasive species is to maintain or reduce the percent coverage of invasive exotic plants to three percent or less across the Forests. Special emphasis for achieving this target should be placed on threatened and endangered habitat and rare communities that are most likely to have negative impacts from invasive plant and animal species. This issue will be addressed in the revised forest plan under forestwide desired conditions, objectives for eradication and treatment of non-native invasive species, and guidelines to help control non-native invasive species at the project level.

Structure (old-growth forest)

Old-growth forest is an important structural component of the forest and is vital to sustaining species diversity. The desired condition is to maintain a minimum of 10 percent of forested lands in old-growth condition across the Forests. This percentage of old-growth should represent a mix of forested ecological systems with emphasis on rare systems.

Structure and Tree Age Diversity

Structure and age diversity are both important characteristics of forested ecological systems. Every forested community consists of a mixture of age-classes and a diversity of vertical structure (Table G 3), with young growth replacing losses due to natural decadence, storm events, pest infestations, and wildfires. Structure is also important to non-forested systems such as grasslands and shrub/scrub habitats.

Table G 3. Definitions of structural classes

Structural Class	Definition
Mature Closed Canopy Forest	Forest over a certain size or age with overall canopy closure (all layers) greater than 80 percent. (Our typical undisturbed second growth forest). Includes natural canopy gaps.
Mature Open Canopy Forest	Forest over a certain size or age with overall canopy closure of 60-80 percent. (typical of thinned forests)
Mature Woodland	Forest over a certain size or age with overall canopy closure of 10-60 percent. (typical of ecologically restored woodland and savannas)
Mixed-age Forest	Forest with two or more dominant tree ages, typical of natural regeneration after seedtree or shelterwood harvests.
Young / Mid-aged Forest	Even-aged stands of small to medium size or aged trees (pole timber or immature sawtimber).
Regenerating Forest Shrubland	Even-aged stands less than 5-10 years of age (shrub stage).
Regenerating Forest Grassland	Even-aged stands less than 5 years of age (grass/forb/seedling stage).
Open	Land with less than 10 percent canopy cover in permanent or long-term open condition (grasslands, barrens, etc.; not newly cut forest regeneration.)

An appropriate balance of vertical structure within each community provides critical habitat for associated species that require either early seral (grass/forb-seedling/shrub), mid-seral (poletimber – hardwoods 5-11 inches diameter breast height (d.b.h.); pines 5-9 inches d.b.h.), and late seral (sawtimber-hardwoods greater than 11 inches d.b.h.; pines greater than 9 inches d.b.h.). The overall quantity and distribution of vertical structure contributes to the sustainability and diversity of the ecological communities by providing a mix of early seral, immature, and mature stands. Early seral was designated as all known acres of each system in regeneration, seedling, or non-stocked condition. Immature stands were defined as all known acres of each system in the poletimber condition. Mature stands were defined as all known acres of each ecological system in the sawtimber condition.

Canopy closure, as a surrogate for horizontal structure, was measured as a combination of stem density, basal area and extent of canopy cover. This measure was used primarily to delineate forested (closed canopy) from open canopy conditions.

Fire Regime

Fire regime performance measures include landscape-scale fire in surrounding/adjacent habitats allowing for distribution and dispersal of fire-dependent species, and encompass Fire frequency and seasonality. Fire frequency was measured as the average percent of all known community occurrences plus 100 meter buffer burned at the appropriate interval. Seasonality was measured as the percent of each community burned during the period of growth from leaf-expansion to leaf-fall, depending on project-level goals. In some but not all cases, seasonality is an accurate surrogate for intensity. Since intensity goals will vary from burn to burn it is difficult to pre-quantify ideal intensity objectives at a forestwide scale. It is presumed that restoration, maintenance, fuel-reduction and other prescribed fire goals will be considered at the project level when planning burn intensity. The revised forest plan will provide guidance on desired conditions for each ecological system.

Remoteness (road and trail density)

Remoteness, referred to as “distance from roads” in the ecological sustainability evaluation database, is a measure of the average density of roads and trails (miles per square mile) within a community type at the landscape scale, and is an important characteristic of ecological system sustainability. High road density can cause habitat fragmentation, increase the spread of invasive vectors, and negatively impact species which are susceptible to direct mortality from vehicles. The desired condition is to maintain or restore where necessary road and trail density to no more than 1.0 mile per square mile across the forest. As a general rule, roads should not bisect or be located within rare communities and should not alter the hydrologic function of ecological systems. However, many roads that bisect national forest lands are outside of Forest Service jurisdiction and, therefore, cannot be unilaterally closed without cooperation from local, state and other federal agencies. Forest plan guidance will provide for aquatic organism passage and provides guidelines to protect rare and wetland communities from negative effects of roads.

G.2 Ecological Systems

The following sections describe the 22 ecological systems identified for the National Forests in Mississippi. Each description includes appropriate background material on the historic range and composition of the ecological system, desired ecological conditions, recommended management strategies, principal ecological system characteristics, performance measures, and potential threats.

G.2.1 Upland Longleaf Pine Forest and Woodland

Upland Longleaf Pine Forest and Woodland Ecological System Characteristics

Abundance of the longleaf pine forest ecological system on the landscape is the most important characteristic of this system due to its widespread conversion to other forest types over the past century as a result of agricultural clearing, forest management, and fire suppression. Restoration of the longleaf pine forest ecological system to appropriate sites is the highest priority for long-term sustainability of this ecological system.

Herbaceous Groundcover is an ecologically essential characteristic of the pine-dominated ecosystems in the southeastern coastal plain ecoregions of the United States.

Understory Composition Guidance: This ecosystem includes midstories that are sparse and typically dominated by scrub oaks and other fire-tolerant hardwoods. The understory should be open and dominated by dense native grasses and forbs, the density of which are dependent on local soil conditions

Fire regime is a process fundamental to long-term sustainability of this ecological system. Many species associated with it are dependent upon fire to maintain open canopy conditions. Under historical reference conditions, fire is believed to have been frequent enough to limit development of fire-intolerant hardwoods and both loblolly and shortleaf pines. Fire also stimulated rich understories of grasses and forbs. Fire suppression has led to increases in overstory canopy and shrub densities, reducing densities of grass-forb understories. Plant species diversity in these understories also has been adversely affected by intensive grazing and mechanical site preparation in some places. Management activities are frequently needed to restore longleaf pine overstories, open canopies, historical fire regimes, and characteristic grass-forb understories.

Canopy structure is an attribute essential to species diversity and long-term sustainability of this ecological system and its associated components. Open longleaf pine forests provide foraging and nesting opportunities for many species, including the federally threatened gopher tortoise and associated species.

Tree age diversity is a characteristic important to the longleaf pine ecological system. Mature 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 important to long-term stability of the ecological system.

Upland Longleaf Pine Forest and Woodland Desired Ecological Condition

Overstories are typically dominated by longleaf pine with relatively low frequencies of oaks, other hardwoods, and other yellow pines. Scattered clumps of hardwoods occur on xeric sites in this ecological system. 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 Mississippi gopher frog. Where conditions are appropriate, several rare communities are typically embedded within this larger system including herbaceous seepage bogs, xeric sandhills, and depression ponds.

The longleaf pine forests and woodlands are composed of a wide range of age classes, from regeneration to old-growth. Regenerating, young, and mid-aged forest and woodlands may occur in small scattered patches (less than 2 acres), but typically occur in even-aged patches of 3-25 acres. Regenerating longleaf pine forest and woodland (0-10 years old) comprise 1-10 percent of system acreage once conversion from non-target species has occurred, with the proportion of regenerating forest possibly exceeding 10 percent during the conversion. Individual and small patches of snags and live overstory trees provide diversity to the vegetation structure within the regenerating forest and woodland. Residual snags and live overstory trees may form a sparse overstory resulting in a two-aged forest. Mature forest and woodland (60 years old or older) comprise approximately 65 percent of system acreage, which includes 10 percent of system acreage in old-growth.

Forests and woodlands are open to very open, with canopy closure in mature examples of this system being less than 80 percent (often less than 60 percent), especially within gopher tortoise habitat. Open conditions are maintained with fire, which occurs on an average return interval of 1-3 years; approximately 40 percent of fires occur during the growing season.

Upland Longleaf Pine Forest and Woodland Management Strategy

Strategies for restoring, maintaining, and enhancing the longleaf pine ecological system should emphasize the appropriate fire regime, thinnings, and gap creation to promote and maintain the desired ecological system structure. Some restoration is expected to occur during the first decade of implementation; however the primary focus is on improving existing stands to manage for federally threatened and endangered species. Restoration remains a long-term goal for longleaf pine forests on the Forests, but the rate of progress will be slow given current program levels and competing Forest plan needs. Tools such as stewardship programs and collaboration with partners offer opportunities to foster longleaf restoration.

Restoring the Canopy: Where longleaf is still present, appropriate fire frequency, seasonality, and intensity may be sufficient to encourage the gradual return of longleaf dominance. Where longleaf is absent, manual or mechanical plantings may be required and should be executed in ways that minimize disturbance of the already-restored groundcover in high-function loblolly and slash occurrences.

Most upland sites dominated by slash or loblolly pine on National Forest lands in Mississippi are artifacts of reforestation activities of the twentieth century. During the early and mid twentieth century, the science and technology of the time did not allow for replanting of longleaf pine after virgin longleaf forests were harvested. As a result, slash and loblolly pines were introduced under different management-emphasis regimes that focused on reforestation, game species and fire suppression. While the restoration of more ecologically rich and sustainable longleaf systems can be a decades- or centuries-long long, labor-intensive and expensive process, much of the ecological function associated with longleaf systems can be restored relatively quickly and easily by first transitioning existing slash and loblolly occurrences through "high-function" slash and loblolly phases.

For the purposes of this planning process, high-function loblolly and slash pine phases are defined as those in which the fire and canopy regimes are sufficient to restore all or most of the understory/groundcover composition and structure normally associated with healthy, sustainable longleaf pine-dominated systems despite the differences in overstory composition. The presence of mature dominate canopy trees capable of supporting, or already supporting, the endangered red-cockaded woodpecker is an additional indicator of high-function and takes precedence over longleaf restoration activities. Thinning cuts and some reseeding may be required to assure the proper groundcover assemblages but, with appropriate fire regimes, these activities should be fairly easy to accomplish in order to achieve high-function loblolly and slash phases in a relatively short period of time when compared to other restoration methods.

We recognize that groundcover vegetation is the primary attribute required to support much of the biodiversity normally associated with healthy longleaf systems. We also simultaneously acknowledge that there are subtle and, in many cases, poorly understood ecological functions that require longleaf-dominated canopies for these systems to be considered fully restored. Accordingly, high-function loblolly and slash occurrences should be considered only partially restored and restoration efforts should continue until both the overstories and understories meet the criteria for fully restored longleaf systems.

Upland Longleaf Pine Forest and Woodland Key Ecological Attributes

Using the ecological sustainability evaluation process previously described in section G.1.1, indicators of ecosystem health were identified as described in Table G 4. These indicators are iterative and can be amended or supplemented as new information becomes available.

Table G 4. Upland longleaf pine forest and woodland key attributes and indicator metrics of ecosystem sustainability

Key Ecological Attribute	Indicator	Poor	Fair	Good	Very Good
Ecological System Abundance at Desired Condition	Percent of potential acres with Appropriate System	<50	50-74	75-89	>90
Distance from Roads	Paved Open Road Density (Road miles per sq. mile)	>2.0	1.26-2	0.26-1.25	<0.25
	Total Road and Trail Density (Road miles per sq. mile)	>2.0	1.26-2	0.26-1.25	<0.25
	Unpaved Gated Road Density (Road miles per sq. mile)	>2.0	1.26-2	0.26-1.25	<0.25
	Unpaved Open Road Density (Road miles per sq. mile)	>2.0	1.26-2	0.26-1.25	<0.25
Fire Regime	Percent of System Acres Burned at Desired Return Interval	<25	25-50	51-75	>75
	Percent of System Acres Burned During the Growing Season	<21	21-40 or >80	41-60	61-80
Forest Age Diversity	% Mature Forest	<45 or >75	45-49 or 71-75	50-54 or 66-70	55-65
	% Regenerating Forest	0 or >15	11-15	1-5	6-10
Invasive Species Abundance	Compliance with Invasive Species Guidelines	Non-compliant	Not Used (Pass/Fail)	Not Used (Pass/Fail)	Compliant
	Percent of Invasive Species Occupying System	>6	4-6	1-3	<1
	Reduction of Fire Ants	<30	30-69	70-89	>90
Understory Composition	Compliance with Understory Composition Guidance	Non-compliant	Not Used (Pass/Fail)	Not Used (Pass/Fail)	Compliant
Vegetation Structure	% Mature Open Canopy	<65	65-74	75-85	>85

G.2.2 Shortleaf Pine-Oak Forest and Woodland

Shortleaf Pine-Oak Forest and Woodland Ecological System Characteristics

Abundance of the shortleaf pine-oak forest and woodland ecological system on the landscape is the most important characteristic of this system, due to its widespread conversion to other forest types over the past century as a result of agricultural clearing, forest management, and fire suppression. Restoration of the shortleaf pine-oak forest and woodland ecological system to appropriate sites is the highest priority for long-term sustainability of this ecological system.

Fire regime is another characteristic fundamental to long-term sustainability of this ecological system. Species diversity and richness are dependent upon fire to maintain open canopy conditions and floristic composition.

Canopy structure is a characteristic important to species diversity and long-term sustainability of this ecological system and its associated components. Open shortleaf pine forests provide foraging and nesting opportunities for many species.

Tree age diversity is another characteristic important to the shortleaf pine ecological system. Mature 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.

Shortleaf Pine-Oak Forest and Woodland Desired Ecological Condition

Over-stories are typically dominated by shortleaf pine grading into stands with a mixture of upland hardwoods and other yellow pines. More typical are areas in which oaks, hickories, sweetgum, yellow poplar, maples, and blackgum have become prominent in the mid-story and overstory and herbaceous patches are rare. Under-stories are dominated by dense growth of grasses and forbs. This system supports populations of associated rare species, including Bachman's sparrow and the northern bob-white. Where suitable site conditions exist, several rare habitats 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 habitats are present and functioning within the larger system.

Ages of diagnostic tree species are diverse, providing a sustained availability of forests and woodlands across age classes, from regeneration to old-growth. Regenerating, young, and mid-aged forest and woodland may occur in small scattered patches (less than 2 acres), but typically occur in even-aged patches of 3-25 acres. Regenerating forest and woodland (0-10 years old) comprise approximately 1-10 percent of system acreage. Individual and small patches of snags and live overstory trees provide diversity to the vegetation structure within the regenerating forest and woodlands, and in some areas snags and live overstory trees form a two-aged forest. Mature forest and woodland (60 years old or older) comprise approximately 65 percent of system acreage, which includes 10 percent of system acreage in old-growth. Forests and woodlands are open to very open, with canopy closure in mature examples of this system being less than 80 percent. Open conditions are maintained with fire, which occurs on an average return interval of 1-3 years with approximately 40 percent of fires occurring during the growing season.

Shortleaf Pine-Oak Forest and Woodland Management Strategy

Forest strategies for restoring, maintaining, and enhancing the shortleaf pine-oak forest and woodland ecological system should emphasize restoring the appropriate fire regime and using thinnings and even-aged and uneven-aged regeneration activities during the first decade of Forest plan implementation. Restoration of this ecological system remains a long-term goal for shortleaf pine-oak forests on the Forests, but not one that will be immediately implemented given current program levels and competing needs. Tools such as stewardship programs and collaboration with partners offer opportunities to foster shortleaf pine-oak forest and woodland restoration.

Shortleaf Pine-Oak Forest and Woodland Key Ecological Attributes

Using the ecological sustainability evaluation process previously described in section G.1.1, indicators of ecosystem health were identified as described in Table G 5. These indicators are iterative and can be amended or supplemented as new information becomes available.

Table G 5. Shortleaf pine-oak forest and woodland key attributes and indicator metrics of ecosystem sustainability

Key Ecological Attribute	Indicator	Poor	Fair	Good	Very Good
Ecological System Abundance at Desired Condition	Percent of potential acres with Appropriate System	<50	50-74	75-89	>90
Distance from Roads	ORV Trail Density	>2.0	1.26-2	0.26-1.25	<0.25
	Paved Open Road Density	>2.0	1.26-2	0.26-1.25	<0.25
	Total Road and Trail Density	>2.0	1.26-2	0.26-1.25	<0.25
	Unpaved Gated Road Density	>2.0	1.26-2	0.26-1.25	<0.25
	Unpaved Open Road Density	>2.0	1.26-2	0.26-1.25	<0.25
Fire Regime	Percent of System Acres Burned at Desired Return Interval	<25	25-50	51-75	>75
	Percent of System Acres Burned During the Growing Season	<21	21-40 or >80	41-60	61-80
Forest Age Diversity	% Mature Forest	<45 or >75	45-49 or 71-75	50-54 or 66-70	55-65
	% Regenerating Forest	0 or >15	11-15	1-5	6-10
Invasive Species Abundance	Compliance with Invasive Species Guidelines	Non-compliant	Not Used (Pass/Fail)	Not Used (Pass/Fail)	Compliant
	Percent of Invasive Species Occupying System	>6	4-6	1-3	<1
	Reduction of Fire Ants	<30	30-69	70-89	>90
Vegetation Structure	% Mature Open Canopy	<65	65-74	75-85	>85

G.2.3 Loblolly Forest

Loblolly Forest Ecological System Characteristics

Abundance of the loblolly pine forest ecological system on the landscape is the most important characteristic of this system. Loblolly pine forest is widespread throughout the National Forests in Mississippi and occupies sites which historically supported other forest types. Conversion of the loblolly pine forest ecological system to appropriate ecological systems is the highest priority for long-term sustainability of the forest. However, loblolly pine and loblolly pine-hardwood forests should be retained on site types where it is native.

Loblolly Forest Desired Ecological Condition

This system is a predominately mature or old-growth forest with a diversity of vertical and age structure on sites with suitable habitat for this species and in areas where it historically occurred. Sites on which this association occurs that are not of historical occurrence are converted to the desired historical type as described in the ecological system sustainability characteristics (section G.1.3). Until restoration to

appropriate historical condition is completed, loblolly pine forests and woodlands are managed toward the desired condition for the appropriate ecological system.

Loblolly Forest Management Strategy

Restoring Native Ecosystems is a high priority across the National Forests in Mississippi. On sites where loblolly pine is not native, restoration of Upland Longleaf Pine Forest and Woodland can be enhanced by transitioning loblolly through the high-function phases described previously. Outside of the native range of longleaf, restoration to other native ecosystem types such as shortleaf-oak, hardwoods, and prairies among others, is desired.

The management strategy for loblolly pine is to restore this species to appropriate ecological diversity systems over time. Until restoration to historical forest types is completed, loblolly pine forests and woodlands should be managed toward the desired condition for the appropriate ecological system and to sustain species diversity and threatened and endangered species. Thinnings, gap creations, and even-aged and uneven-aged regeneration are important management activities to promote and maintain the desired ecological system structural conditions. Appropriate fire regimes for the future ecological system should be implemented. Restoration of appropriate ecological systems remains a long-term goal for loblolly pine forests on the National Forests in Mississippi. Tools such as stewardship programs and collaboration with partners offer opportunities to foster restoration of the appropriate ecological systems.

Loblolly Forest Key Ecological Attributes

Using the ecological sustainability evaluation process previously described in section G.1.1, indicators of ecosystem health were identified as described in Table G 6. In most cases, these indicators are intended to address the restoration of this ecosystem to appropriate native systems. These indicators are iterative and can be amended or supplemented as new information becomes available.

Table G 6. Loblolly forest key attributes and indicator metrics of ecosystem sustainability

Key Ecological Attribute	Indicator	Poor	Fair	Good	Very Good
Fire Regime	Percent of System Acres Burned at Desired Return Interval	<25	25-50	51-75	>75
	Percent of System Acres Burned During the Growing Season	<21	21-40 or >80	41-60	61-80
Distance from Roads	ORV Trail Density	>2.0	1.26-2	0.26-1.25	<0.25
	Paved Open Road Density	>2.0	1.26-2	0.26-1.25	<0.25
	Total Road and Trail Density	>2.0	1.26-2	0.26-1.25	<0.25
	Unpaved Gated Road Density	>2.0	1.26-2	0.26-1.25	<0.25
	Unpaved Open Road Density	>2.0	1.26-2	0.26-1.25	<0.25
Ecological System Abundance at Desired Condition	Percent of Ecological System Acres at Desired Condition	<50	50-70	71-90	>90
Invasive Species Abundance	Percent of Invasive Species Occupying System	>6	4-6	1-3	<1
Vegetation Structure	% Mature Open Canopy	<65	65-74	75-85	>85
Invasive Species Abundance	Compliance with Invasive Species Guidelines	Non-compliant	Not Used (Pass/Fail)	Not Used (Pass/Fail)	Compliant
	Reduction of Fire Ants	<30	30-69	70-89	>90

G.2.4 Southern Loblolly-Hardwood Flatwoods

Southern Loblolly-Hardwood Flatwoods Ecological System Characteristics

Abundance of the southern loblolly-hardwood flatwoods ecological system on the landscape is the most important characteristic of this system. This ecological system has remained largely intact with most maintenance work related to restoration of the species diversity component.

Fire regime is believed to be another characteristic fundamental to long-term sustainability of this ecological system. Species diversity and richness may be dependent upon fire to maintain open canopy conditions and floristic composition.

Canopy structure is a characteristic important to species diversity and long-term sustainability of this ecological system and its associated components. Open southern loblolly-hardwood flatwoods provide foraging and nesting opportunities for many species, but especially for the red-cockaded woodpecker.

Tree age diversity is another characteristic important to the southern loblolly-hardwood flatwoods ecological system. Mature forest and woodland (including old-growth) in this system provide a variety of nesting and foraging opportunities for many species and provides 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.

Southern Loblolly-Hardwood Flatwoods Desired Ecological Condition

Southern loblolly-hardwood flatwood overstories are typically dominated by loblolly pine and associated hardwoods, especially water oak. This system supports populations of the federally endangered red-cockaded woodpeckers. Where suitable site conditions exist, several rare communities are typically embedded within this larger system including Jackson prairie, rock outcrops, and seeps, springs, and seepage swamps.

This system is dominated by mature and mid-aged forest, and 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 1-3 years with approximately 40 percent of fires occurring in the growing season.

Southern Loblolly-Hardwood Flatwoods Management Strategy

Forest strategies for maintaining and enhancing the southern loblolly-hardwood flatwoods ecological system should emphasize restoring the appropriate fire regime and using thinnings and even-aged regeneration activities during the first decade of forest plan implementation. The goal of the Bienville NF is the maintenance of this ecological system on the Forests. Management of this system for recovery of the red-cockaded woodpecker and restoration of any embedded endemic Jackson prairie are important objectives for management of this ecological system. Tools such as stewardship programs and partnerships offer opportunities to foster these objectives.

Southern Loblolly-Hardwood Flatwoods Key Ecological Attributes

Using the ecological sustainability evaluation process previously described in section G.1.1, indicators of ecosystem health were identified as described in Table G 7. In most cases, these indicators are intended to address the restoration of this ecosystem to appropriate native systems. These indicators are iterative and can be amended or supplemented as new information becomes available.

Table G 7. Southern loblolly-hardwood flatwoods key attributes and indicator metrics of ecosystem sustainability

Key Ecological Attribute	Indicator	Poor	Fair	Good	Very Good
Forest Age Diversity	% Mature Forest	<45 or >75	45-49 or 71-75	50-54 or 66-70	55-65
Vegetation Structure	% Mature Open Canopy	<65	65-74	75-85	>85
Invasive Species Abundance	Compliance with Invasive Species Guidelines	Non-compliant	Not Used (Pass/Fail)	Not Used (Pass/Fail)	Compliant
	Percent of Invasive Species Occupying System	>6	4-6	1-3	<1
	Reduction of Fire Ants	<30	30-69	70-89	>90
Fire Regime	Percent of System Acres Burned at Desired Return Interval	<25	25-50	51-75	>75
	Percent of System Acres Burned During the Growing Season	<21	21-40 or >80	41-60	61-80
Distance from Roads	ORV Trail Density	>2.0	1.26-2	0.26-1.25	<0.25
	Paved Open Road Density	>2.0	1.26-2	0.26-1.25	<0.25
	Total Road and Trail Density	>2.0	1.26-2	0.26-1.25	<0.25
	Unpaved Gated Road Density	>2.0	1.26-2	0.26-1.25	<0.25
	Unpaved Open Road Density	>2.0	1.26-2	0.26-1.25	<0.25
Ecological System Abundance at Desired Condition	Percent of potential acres with Appropriate System	<50	50-74	75-89	>90
Vegetation Structure	% Mature Open Canopy	<65	65-74	75-85	>85

G.2.5 Slash Pine Forest

Slash Pine Forest Ecological System Characteristics

Abundance of the slash pine forest ecological system on the landscape is the most important characteristic of this system. Slash pine forest occurs in four units of the Forests and may occupy sites which historically supported other forest types. Restoration of the slash pine forest ecological system to appropriate ecological systems is the highest priority for long-term sustainability of the forest.

Slash Pine Forest Desired Ecological Condition

This system is a predominately mature or old-growth forest with a diversity of age and vertical structure on sites where this species is appropriate and historically occurred. Areas where this association has been introduced via planting are restored to the desired historical type as described in the ecological sustainability evaluation database. Until restoration to appropriate historical condition is completed, slash pine forests and woodlands should be managed toward the desired condition for the appropriate ecological system.

Slash Pine Forest Management Strategy

The management strategy for slash pine is to regenerate it on appropriate sites over time. Slash pine is of natural occurrence on some alluvial soil sites on the De Soto NF and should be retained according to ecologically sustainable amounts. On other units, restoration to historical ecological systems from slash pine is necessary. Until restoration to appropriate historical condition is completed, slash pine forests and woodlands should be managed toward the desired condition for the appropriate ecological system. Thinnings, gap creation, and even-aged and uneven-aged regeneration are important management activities to promote and maintain the desired ecological system structural conditions. Appropriate fire regimes for the future ecological system should be restored to slash pine forests. Restoration of appropriate ecological systems remains a long-term goal for slash pine forests on the Forests. Tools such as stewardship programs and collaboration with partners offer opportunities to foster restoration of the appropriate ecological systems.

Slash Pine Forest Key Ecological Attributes

Using the ecological sustainability evaluation process previously described in section G.1.1, indicators of ecosystem health were identified as described in Table G 8. In most cases, these indicators are intended to address the restoration of this ecosystem to appropriate native systems. These indicators are iterative and can be amended or supplemented as new information becomes available.

Table G 8. Slash pine forest key attributes and indicator metrics of ecosystem sustainability

Key Ecological Attribute	Indicator	Poor	Fair	Good	Very Good
Fire Regime	Percent of System Acres Burned at Desired Return Interval	<25	25-50	51-75	>75
	Percent of System Acres Burned During the Growing Season	<21	21-40 or >80	41-60	61-80
Distance from Roads	ORV Trail Density	>2.0	1.26-2	0.26-1.25	<0.25
	Paved Open Road Density	>2.0	1.26-2	0.26-1.25	<0.25
	Total Road and Trail Density	>2.0	1.26-2	0.26-1.25	<0.25
	Unpaved Gated Road Density	>2.0	1.26-2	0.26-1.25	<0.25
	Unpaved Open Road Density	>2.0	1.26-2	0.26-1.25	<0.25
Ecological System Abundance at Desired Condition	Percent of Ecological System Acres at Desired Condition	<50	50-70	71-90	>90
Vegetation Structure	% Mature Open Canopy	<65	65-74	75-85	>85
Invasive Species Abundance	Percent of Invasive Species Occupying System	>6	4-6	1-3	<1
	Reduction of Fire Ants	<30	30-69	70-89	>90
	Compliance with Invasive Species Guidelines	Non-compliant	Not Used (Pass/Fail)	Not Used (Pass/Fail)	Compliant

G.2.6 Northern Dry Upland Hardwood Forest

Northern Dry Upland Hardwood Forest Ecological System Characteristics

Abundance of the northern dry upland hardwood forest on the landscape is the most important characteristic of this system due to its widespread conversion to other forest types over the past century as a result of agricultural clearing, forest management, and fire suppression. Restoration of the northern dry upland hardwood forest ecological system to appropriate sites is the highest priority for long-term sustainability of this ecological system.

Fire regime is another characteristic fundamental to long-term sustainability of this ecological system. Fire is important to achieve regeneration of desired hardwood species and maintain community function.

Canopy structure is an important characteristic for species diversity and long-term sustainability of this ecological system and its associated components. Closed canopy hardwood forests provide foraging and nesting opportunities for many species.

Tree age diversity is another characteristic important to the northern dry upland hardwood ecological system. Maintaining a sustainable mix of tree ages is vital to long-term stability of the ecological system.

Northern Dry Upland Hardwood Forest Desired Ecological Condition

Overstories are typically dominated by upland oaks (post, southern red, blackjack, and white) and hickories (mockernut and sand). Often loblolly and shortleaf pines are intermingled with hardwoods. Midstories are sparse and typically dominated by dogwood, persimmon, and other hardwoods. Understories are also sparse and dominated by seedling hardwoods, shrubs and forbs. This system supports populations of associated rare species, including the worm-eating warbler and the yellow lady's-slipper. Where suitable site conditions exist, several rare habitats are typically imbedded within this larger system including rock outcrops, seeps, springs, and depression pondshores.

Ages of diagnostic tree species are diverse, providing a sustained availability of forests across age classes, from regeneration to old-growth. Regenerating, young, and mid-aged forests may occur in small scattered patches (less than 2 acres), but typically occur in even-aged patches of 3-5 acres. Regenerating forests (0-10 years old) comprise no more than 7 percent of system acreage. Individual and small patches of snags and live overstory trees provide diversity to the vegetation structure within the regenerating forest and woodlands, and in some areas snags and live overstory trees form a two-aged forest. Mature forest (60 years old or older) comprises approximately 70 percent of system acreage, which includes 10 percent of system acreage in old-growth. Forests are closed, with canopy closure in mature examples of this system being greater than 80 percent. Low intensity fire creeps into this system from the surrounding upland community and occurs on an average return interval of 1-6 years.

Northern Dry Upland Hardwood Forest Management Strategy

Forest strategies for restoring, maintaining, and enhancing the northern dry upland hardwood forests should emphasize restoring the appropriate fire regime and using thinnings, gap creation, and irregular even-aged regeneration activities. Return of relative abundance to approach historical levels is a long-term goal for upland hardwood forests on the National Forests in Mississippi, but not one that will be immediately implemented given current program levels and competing needs. Tools such as stewardship programs and collaboration with partners offer opportunities to foster upland hardwood forest and woodland restoration.

Northern Dry Upland Hardwood Forest Key Ecological Attributes

Using the ecological sustainability evaluation process previously described in section G.1.1, indicators of ecosystem health were identified as described in Table G 9. In most cases, these indicators are intended to address the restoration of this ecosystem to appropriate native systems. These indicators are iterative and can be amended or supplemented as new information becomes available.

Table G 9. Northern dry upland hardwood forest key attributes and indicator metrics of ecosystem sustainability

Key Ecological Attribute	Indicator	Poor	Fair	Good	Very Good
Forest Age Diversity	% Regenerating Forest	<3 or >7	3 or 7	6	4-5
	% Mature Forest	<55 or >75	55-59 or 71-75	60-65	66-70
Vegetation Structure	% Mature Very-Closed Canopy	<65	65-74	75-85	>85
Fire Regime	Percent of System Acres Burned at Desired Return Interval	<25	25-50	51-75	>75
	Percent of System Acres Burned During the Growing Season	<21	21-40 or >80	41-60	61-80
Distance from Roads	ORV Trail Density	>2.0	1.26-2	0.26-1.25	<0.25
	Paved Open Road Density	>2.0	1.26-2	0.26-1.25	<0.25
	Total Road and Trail Density	>2.0	1.26-2	0.26-1.25	<0.25
	Unpaved Gated Road Density	>2.0	1.26-2	0.26-1.25	<0.25
	Unpaved Open Road Density	>2.0	1.26-2	0.26-1.25	<0.25
Ecological System Abundance at Desired Condition	Percent of potential acres with Appropriate System	<50	50-74	75-89	>90
Invasive Species Abundance	Percent of Invasive Species Occupying System	>6	4-6	1-3	<1
	Reduction of Fire Ants	<30	30-69	70-89	>90
	Compliance with Invasive Species Guidelines	Non-compliant	Not Used (Pass/Fail)	Not Used (Pass/Fail)	Compliant

G.2.7 Southern Dry Upland Hardwood Forest

Southern Dry Upland Hardwood Forest Ecological System Characteristics

Abundance of the southern dry upland hardwood forest on the landscape is an important characteristic of this system due to its conversion to other forest types over the past century as a result of agricultural clearing, forest management, and frequent intense burns. Maintenance of the southern dry upland hardwood forest ecological system where it occurs is the highest priority for long-term sustainability of this ecological system.

Fire regime is another characteristic fundamental to long-term sustainability of this ecological system. While the system did not burn frequently, it does exist within the matrix of a fire-maintained ecological system.

Canopy structure is a characteristic important to species diversity and long-term sustainability of this ecological system and its associated components. Closed canopy hardwood forests provide foraging and nesting opportunities for many species.

Tree age diversity is another characteristic important to the southern dry upland hardwood ecological system. Maintaining a sustainable mix of tree ages is vital to long-term stability of the ecological system.

Southern Dry Upland Hardwood Forest Desired Ecological Condition

Southern dry upland hardwood forest overstories are typically dominated by upland oaks (post, southern red, and white) and hickories (mockernut and sand). Pines (longleaf, loblolly, and shortleaf) may be a significant species component but are not dominant. Midstories are typically dominated by dogwood and other hardwoods. Understories are sparse and dominated by seedling hardwoods, shrubs and forbs. This system supports populations of associated uncommon species, including the worm-eating warbler and the mimic glass lizard. Where site conditions are suitable, several rare communities are typically imbedded within this larger system including seeps, springs, and seepage swamps and emergent ponds and wetlands. Ages of diagnostic tree species are diverse, providing a sustained availability of forests across age classes, from regeneration to old-growth. Regenerating, young, and mid-aged forest may occur in small scattered patches (less than 2 acres), but typically occur in even-aged patches of 3-5 acres. Regenerating forests (0-10 years old) comprise no more than 3 percent of system acreage. Individual and small patches of snags and live overstory trees provide diversity to the vegetation structure within the regenerating forest and woodlands, and in some areas snags and live overstory trees form a two-aged forest. Mature forest (60 years old or older) comprises approximately 80 percent of system acreage, which includes 10 percent of system acreage in old-growth. Forests are closed, with canopy closure in mature examples of this system being greater than 80 percent. Low intensity fire creeps into this system from the surrounding upland community and occurs on an average return interval of 1-6 years.

Southern Dry Upland Hardwood Forest Management Strategy

Forest strategy for restoring, maintaining, and enhancing the southern dry upland hardwood forest ecological system emphasizes using natural processes to reach the desired conditions. Southern dry upland hardwoods are generally intermingled among the dominant pine ecosystems. As a result, this system will be exposed to prescribed fire with the same frequency and seasonality/intensity. Because this system burns less readily than the surrounding pine dominated systems, it is difficult to predict whether or not upland hardwoods will actually burn when exposed to fire. While it is fairly easy to predict interval of fire exposure, the actual burn rates may vary. It is especially difficult to predict seasonality/intensity due to the differences in ground cover moisture regimes between upland hardwoods and surrounding pine systems. It is considered natural and an ecologically appropriate attribute of fire behavior for embedded hardwood communities to burn at rates lower than fire exposure rates. No management activities were identified to promote and maintain the desired ecological system structural conditions other than maintaining it at its current abundance across the Forests over time.

Southern Dry Upland Hardwood Forest Key Ecological Attributes

Using the ecological sustainability evaluation process previously described in section G.1.1, indicators of ecosystem health were identified as described in Table G 10. In most cases, these indicators are intended to address the restoration of this ecosystem to appropriate native systems. These indicators are iterative and can be amended or supplemented as new information becomes available.

Table G 10. Southern dry upland hardwood forest key attributes and indicator metrics of ecosystem sustainability

Key Ecological Attribute	Indicator	Poor	Fair	Good	Very Good
Distance from Roads	ORV Trail Density	>2.0	1.26-2	0.26-1.25	<0.25
	Paved Open Road Density	>2.0	1.26-2	0.26-1.25	<0.25
	Total Road and Trail Density	>2.0	1.26-2	0.26-1.25	<0.25
	Unpaved Gated Road Density	>2.0	1.26-2	0.26-1.25	<0.25
	Unpaved Open Road Density	>2.0	1.26-2	0.26-1.25	<0.25
Ecological System Abundance at Desired Condition	Percent of potential acres with Appropriate System	<50	50-74	75-89	>90
Fire Regime	Percent of System Acres Burned at Desired Return Interval	<25	25-50	51-75	>75
	Percent of System Acres Burned During the Growing Season	<21	21-40 or >80	41-60	61-80
Forest Age Diversity	% Mature Forest	<61	61-70 or >90	71-80	81-90
Invasive Species Abundance	Compliance with Invasive Species Guidelines	Non-compliant	Not Used (Pass/Fail)	Not Used (Pass/Fail)	Compliant
	Percent of Invasive Species Occupying System	>6	4-6	1-3	<1
	Reduction of Fire Ants	<30	30-69	70-89	>90
Vegetation Structure	% Mature Very-Closed Canopy	<65	65-74	75-85	>85

G.2.8 Southern Loess Bluff Forest

Southern Loess Bluff Forest Ecological System Characteristics

Abundance of the southern loess bluff forest on loessal soils is the most important characteristic of this system due to its conversion to other forest types over the past century as a result of agricultural clearing and forest management. Restoration of the southern loess bluff forest ecological system on appropriate sites is the highest priority for long-term sustainability of this ecological system.

Fire regime is another characteristic of long-term sustainability of this ecological system. While the system did not burn frequently, it does exist within the matrix of a fire-maintained ecological system.

Canopy structure is a characteristic important to species diversity and long-term sustainability of this ecological system and its associated components. Closed canopy hardwood forests provide foraging and nesting opportunities for many species.

Tree age diversity is another characteristic important to the southern loess bluff forest ecological system. Maintaining a sustainable mix of tree ages is vital to long-term stability of the ecological system.

Southern Loess Bluff Forest Desired Ecological Condition

Overstories are typically dominated by many types of hardwoods, especially cherrybark oak, water oak, swamp chestnut oak, tulip poplar, Florida sugar maple and pignut hickory, with beech and magnolia present but not numerous. The more-or-less open subcanopy contains magnolia, hornbeam, tulip poplar, red maple, and dogwood. The understory is relatively sparse and consists of shrubs and woody vines. Switchcane is a prevalent member of the shrub layer and may dominate in places. This system supports populations of associated rare species, including Webster's salamander, Swainson's warbler, and fetid trillium. Where site conditions are suitable, several rare habitats are typically imbedded within this larger system including rock outcrops, seeps, and springs.

Ages of diagnostic tree species are diverse, providing a sustained availability of forests across age classes, from regeneration to old-growth. Regenerating, young, and mid-aged forest may occur in small scattered patches (less than 2 acres), but typically occur in even-aged patches of 3-9 acres. Regenerating forest (0-10 years old) comprise no more than 5 percent of system acreage. Individual and small patches of snags and live overstory trees provide diversity to the vegetation structure within the regenerating forest and woodlands, and in some areas snags and live overstory trees form a two-aged forest. Mature forest (60 years old or older) comprises approximately 80 percent of system acreage, which includes 10 percent of system acreage in old-growth. Forests are closed, with canopy closure in mature examples of this system being greater than 80 percent. Fire creeps into this system from the surrounding upland community and on an average return interval of 6-20 years.

Table G 11. Southern loess bluff forest key attributes and indicator metrics of ecosystem sustainability

Key Ecological Attribute	Indicator	Poor	Fair	Good	Very Good
Distance from Roads	ORV Trail Density	>2.0	1.26-2	0.26-1.25	<0.25
	Paved Open Road Density	>2.0	1.26-2	0.26-1.25	<0.25
	Total Road and Trail Density	>2.0	1.26-2	0.26-1.25	<0.25
	Unpaved Gated Road Density	>2.0	1.26-2	0.26-1.25	<0.25
	Unpaved Open Road Density	>2.0	1.26-2	0.26-1.25	<0.25
Ecological System Abundance at Desired Condition	Percent of potential acres with Appropriate System	<60	60-79	80-89	>90
Fire Regime	Percent of System Acres Burned at Desired Return Interval	<25	25-50	51-75	>75
	Percent of System Acres Burned During the Growing Season	<21	21-40 or >80	41-60	61-80
Invasive Species Abundance	Compliance with Invasive Species Guidelines	Non-compliant	Not Used (Pass/Fail)	Not Used (Pass/Fail)	Compliant
	Percent of Invasive Species Occupying System	>6	4-6	1-3	<1
	Reduction of Fire Ants	<30	30-69	70-89	>90
Vegetation Structure	% Mature Very-Closed Canopy	<65	65-74	75-85	>85

Southern Loess Bluff Forest Management Strategy

Forest strategy for maintaining and enhancing the southern loess bluff forest ecological system emphasizes using natural processes to reach the desired conditions. No management activities were

identified to promote and maintain the desired ecological system structural conditions other than maintaining it at its current abundance across the Forests over time. Restoration of this ecosystem to its appropriate system will be accomplished through conversion of loblolly pine forest.

Southern Loess Bluff Forest Key Ecological Attributes

Using the ecological sustainability evaluation process previously described in section G.1.1, indicators of ecosystem health were identified as described in Table G 11. In most cases, these indicators are intended to address the restoration of this ecosystem to appropriate native systems. These indicators are iterative and can be amended or supplemented as new information becomes available.

G.2.9 Southern Mesic Slope Forest

Southern Mesic Slope Forest Ecological System Characteristics

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 as a result of agricultural clearing and forest management. 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 is another characteristic fundamental to long-term sustainability of this ecological system. Low intensity fire is important to achieve regeneration of desired hardwood species and maintain community function.

Canopy structure is a characteristic important to species diversity and long-term sustainability of this ecological system and its associated components. Closed canopy hardwood forests provide foraging and nesting opportunities for many species.

Tree age diversity is another characteristic important to the southern mesic slope forest ecological system. Maintaining a sustainable mix of tree ages is vital to long-term stability of the ecological system.

Southern Mesic Slope Forest Desired Ecological Condition

Overstories are typically dominated by hardwoods (beech, white oak, cherrybark oak, southern magnolia), although mixed loblolly pine-hardwood conditions also exist within this system. Subcanopies are more or less open and typically contain magnolia, hornbeam, tulip 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 rare species, including Webster’s salamander, bay star vine, and ravine sedge. Where site conditions are suitable, several rare habitats are typically imbedded within this larger system including rock outcrop, seeps, and springs. Ages of diagnostic tree species are diverse, providing a sustained availability of forests across age classes, from regeneration to old-growth. Regenerating, young, and mid-aged forest may occur in small scattered patches (less than 2 acres), but typically occur in even-aged patches of 3-9 acres. Regenerating forest (0-10 years old) comprise no more than 5 percent of system acreage. Individual and small patches of snags and live overstory trees provide diversity to the vegetation structure within the regenerating forest and woodlands, and in some areas snags and live overstory trees form a two-aged forest. Mature forest (60 years old or older) comprises approximately 80 percent of system acreage, which includes 10 percent of system acreage in old-growth. Forests are closed, with canopy closure in mature examples of this system being greater than 80 percent. Low intensity fire creeps into this system from the surrounding upland community and occurs on an average return interval of 1-6 years. Loblolly pine dominated associations on the Bienville NF are burned on an average return interval of 1-3 years.

Southern Mesic Slope Forest Management Strategy

Restoration to this ecological system will involve conversion from slash pine forest on the Chickasawhay and De Soto units and mesic loblolly pine on the Homochitto and Bienville units to historic forest types, along with thinning loblolly and slash pine throughout the Forests. Both managed and natural thinning of pines will favor establishment of mesic hardwoods over time. No additional management activities were identified to promote and maintain the desired ecological system structural conditions; rather this system should use natural processes to reach the desired condition.

Table G 12. Southern mesic slope forest key attributes and indicator metrics of ecosystem sustainability

Key Ecological Attribute	Indicator	Poor	Fair	Good	Very Good
Distance from Roads	ORV Trail Density	>2.0	1.26-2	0.26-1.25	<0.25
	Paved Open Road Density	>2.0	1.26-2	0.26-1.25	<0.25
	Total Road and Trail Density	>2.0	1.26-2	0.26-1.25	<0.25
	Unpaved Gated Road Density	>2.0	1.26-2	0.26-1.25	<0.25
	Unpaved Open Road Density	>2.0	1.26-2	0.26-1.25	<0.25
Ecological System Abundance at Desired Condition	Percent of potential acres with Appropriate System	<50	50-74	75-89	>90
Fire Regime	Percent of System Acres Burned at Desired Return Interval	<25	25-50	51-75	>75
	Percent of System Acres Burned During the Growing Season	<21	21-40 or >80	41-60	61-80
Forest Age Diversity	% Mature Forest	<61	61-70 or >90	71-80	81-90
Invasive Species Abundance	Compliance with Invasive Species Guidelines	Non-compliant	Not Used (Pass/Fail)	Not Used (Pass/Fail)	Compliant
	Percent of Invasive Species Occupying System	>6	4-6	1-3	<1
	Reduction of Fire Ants	<30	30-69	70-89	>90
Vegetation Structure	% Mature Very-Closed Canopy	<65	65-74	75-85	>85

Southern Mesic Slope Forest Key Ecological Attributes

Using the ecological sustainability evaluation process previously described in section G.1.1, indicators of ecosystem health were identified as described in Table G 12. In most cases, these indicators are intended to address the restoration of this ecosystem to appropriate native systems. These indicators are iterative and can be amended or supplemented as new information becomes available.

G.2.10 Northern Mesic Hardwood Forest

Northern Mesic Hardwood Forest Ecological System Characteristics

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 as a result of agricultural clearing and forest

management. Restoration of the northern mesic hardwood forest ecological system on appropriate sites is the highest priority for long-term sustainability of this ecological system.

Fire regime is another characteristic fundamental to long-term sustainability of this ecological system. Low intensity fire is important to achieve regeneration of desired hardwood species and maintain community function.

Canopy structure is a characteristic important to species diversity and long-term sustainability of this ecological system and its associated components. Closed canopy hardwood forests provide foraging and nesting opportunities for many species

Tree age diversity is another characteristic important to the northern mesic hardwood forest ecological system. Maintaining a sustainable mix of tree ages is vital to long-term stability of the ecological system.

Northern Mesic Hardwood Forest Desired Ecological Condition

Overstories are typically dominated by hardwoods (beech, white oak, cherrybark oak, southern magnolia, etc). Mixed loblolly pine-hardwood conditions may exist within this system in the southern portion of the range. Subcanopies are more or less open and typically contain magnolia, hornbeam, tulip 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 rare species, including Webster's salamander, American ginseng, and Turk's-cap lily. Where suitable site conditions exist, several rare habitats are typically imbedded within this larger system including rock outcrops, seeps, and springs.

Ages of diagnostic tree species are diverse, providing a sustained availability of forests across age classes, from regeneration to old-growth. Regenerating, young, and mid-aged forest may occur in small scattered patches (less than 2 acres), but typically occur in even-aged patches of 3-9 acres. Regenerating forests (0-10 years old) comprise no more than 5 percent of system acreage. Individual and small patches of snags and live overstory trees provide diversity to the vegetation structure within the regenerating forest and woodlands, and in some areas snags and live overstory trees form a two-aged forest. Mature forest (60 years old or older) comprises approximately 80 percent of system acreage, which includes 10 percent of system acreage in old-growth. Forests are closed, with canopy closure in mature examples of this system being greater than 80 percent. Low intensity fire creeps into this system from the surrounding upland community and occurs on an average return interval of 1-6 years.

Northern Mesic Hardwood Forest Management Strategy

Restoration to this ecological system is expected to use conversion from loblolly pine forest and be accomplished through thinning loblolly throughout the Forests. Both managed and natural thinning of pines should favor mesic hardwoods over time. First thinnings, subsequent thinning and gap creation were identified as important management activities to promote and maintain the desired ecological system structural conditions.

Northern Mesic Hardwood Forest Key Ecological Attributes

Using the ecological sustainability evaluation process previously described in section G.1.1, indicators of ecosystem health were identified as described in Table G 13. In most cases, these indicators are intended to address the restoration of this ecosystem to appropriate native systems. These indicators are iterative and can be amended or supplemented as new information becomes available.

Table G 13. Northern mesic hardwood forest key attributes and indicator metrics of ecosystem sustainability

Key Ecological Attribute	Indicator	Poor	Fair	Good	Very Good
Distance from Roads	ORV Trail Density	>2.0	1.26-2	0.26-1.25	<0.25
	Paved Open Road Density	>2.0	1.26-2	0.26-1.25	<0.25
	Total Road and Trail Density	>2.0	1.26-2	0.26-1.25	<0.25
	Unpaved Gated Road Density	>2.0	1.26-2	0.26-1.25	<0.25
	Unpaved Open Road Density	>2.0	1.26-2	0.26-1.25	<0.25
Ecological System Abundance at Desired Condition	Percent of potential acres with Appropriate System	<50	50-74	75-89	>90
Fire Regime	Percent of System Acres Burned at Desired Return Interval	<25	25-50	51-75	>75
	Percent of System Acres Burned During the Growing Season	<21	21-40 or >80	41-60	61-80
Forest Age Diversity	% Mature Forest	<61	61-70 or >90	71-80	81-90
Invasive Species Abundance	Percent of Invasive Species Occupying System	>6	4-6	1-3	<1
	Reduction of Fire Ants	<30	30-69	70-89	>90
Vegetation Structure	% Mature Very-Closed Canopy	<65	65-74	75-85	>85

G.2.11 Floodplain Forest

Floodplain Forest Ecological System Characteristics

Abundance of the floodplain forest is an important characteristic of this system due to its conversion to other forest types over the past century as a result of agricultural clearing and forest management. Maintenance and improvement of species composition of the floodplain forest ecological system on appropriate sites is the highest priority for long-term sustainability of this ecological system.

Canopy structure is a characteristic important to species diversity and long-term sustainability of this ecological system and its associated components. Closed canopy hardwood forests provide foraging and nesting opportunities for many species.

Tree age diversity is another characteristic important to the floodplain forest ecological system. Maintaining a sustainable mix of tree ages is important to long-term stability of the ecological system.

Species composition is another characteristic important to the floodplain forest ecological system. Wildlife species associated with this ecological system rely on a varied mix of mast-producing hardwood species to survive. The current databases are not designed to track the improvement of species composition. Forest plan direction emphasizes having species appropriate to the site across the landscape, and it is assumed that removing off-site species and allowing natural succession to occur will be sufficient to sustain populations of a variety of mast-producing trees and associated species. As new data becomes available, it should be incorporated into the corporate database to ensure that species can be sustained.

Floodplain Forest Desired Ecological Condition

Bottomland hardwood tree species such as beech, white oak, cherrybark oak and southern magnolia are present in the canopy, although mesic hardwood species are present in areas less frequently flooded. Mixed loblolly pine-hardwood conditions may exist within this system. Midstories are sparse and typically dominated by upper canopy species, although hornbeam, yellow poplar, red maple, and flowering dogwood are also present. 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. Understories are generally open with sparse grass, forb and woody vine species. Drift piles and standing dead trees decompose naturally on the ground. The forest floor typically has a rich organic layer with abundant leaf litter. Canebrakes are scattered along streams in appropriate sites. This system is shaped by healthy hydrologic functions and processes. Several populations of rare species are associated with this system, including the endangered Louisiana quillwort, Rafinesque's big-eared bat, southeastern myotis, American ginseng, and Turk's cap lily. It also supports demand species such as the eastern wild turkey, river otter, and mink. Where suitable site conditions exit, several rare habitats are typically imbedded within this larger system including canebrakes, beaver ponds, seeps, springs, and cypress dominated wetlands.

This system is dominated by mature forest and woodland (60 years old or older), and a network of well-distributed old-growth is present. Early seral components exist in sufficient quantities to sustain this system over time. Ages of diagnostic tree species are diverse, providing a sustained availability of forests across age classes, from regeneration to old-growth. Regenerating, young, and mid-aged forest occur in small scattered patches (less than 2 acres). Regenerating forest (0-10 years old) comprise no more than 5 percent of system acreage. Woody debris and snags are abundant throughout the forest. Mature forest (60 years old or older) comprises approximately 90 percent of system acreage, with 10 percent of the mature forest in old-growth. Forests are closed, with canopy closure in mature examples of this system being greater than 80 percent. Low intensity fire occasionally creeps into the system from the surrounding upland community.

Floodplain Forest Management Strategy

Forest strategy for restoring, maintaining, and enhancing the floodplain forest ecological system emphasizes using natural processes to reach the desired conditions. However, an integrated vegetation management approach for restoration to this ecological system should emphasize thinnings of loblolly pine and mixed pine hardwoods to promote hardwood regeneration and conversion to floodplain forest over time. Both managed and natural thinning of pines will favor mesic hardwoods over time. Thinnings and gap creation were identified as important management activities to promote and maintain the desired ecological system structural conditions.

Floodplain Forest Key Ecological Attributes

Using the ecological sustainability evaluation process previously described in section G.1.1, indicators of ecosystem health were identified as described in Table G 14. In most cases, these indicators are intended to address the restoration of this ecosystem to appropriate native systems. These indicators are iterative and can be amended or supplemented as new information becomes available.

Table G 14. Floodplain forest key attributes and indicator metrics of ecosystem sustainability

Key Ecological Attribute	Indicator	Poor	Fair	Good	Very Good
Distance from Roads	ORV Trail Density	>2.0	1.26-2	0.26-1.25	<0.25
	Paved Open Road Density	>2.0	1.26-2	0.26-1.25	<0.25
	Total Road and Trail Density	>2.0	1.26-2	0.26-1.25	<0.25
	Unpaved Gated Road Density	>2.0	1.26-2	0.26-1.25	<0.25
	Unpaved Open Road Density	>2.0	1.26-2	0.26-1.25	<0.25
Ecological System Abundance at Desired Condition	Percent of potential acres with Appropriate System	<50	50-74	75-89	>90
Forest Age Diversity	% Mature Forest	<64	64-74 or >95	75-84	85-95
Hydrologic Function	Compliance with Hydrologic Function Guidelines	Non-compliant	Not Used (Pass/Fail)	Not Used (Pass/Fail)	Compliant
Invasive Species Abundance	Percent of Invasive Species Occupying System	>6	4-6	1-3	<1
	Reduction of Fire Ants	<30	30-69	70-89	>90
Vegetation Structure	% Mature Very-Closed Canopy	<65	65-74	75-85	>85

G.2.12 Lower Mississippi River Bottomland and Floodplain Forest

Lower Mississippi River Bottomland and Floodplain Forest Ecological System Characteristics

Canopy structure is a characteristic important to species diversity and long-term sustainability of this ecological system and its associated components. Closed canopy hardwood forests provide foraging and nesting opportunities for many species.

Tree age diversity is another characteristic important to the lower Mississippi River bottomland and floodplain forest ecological system. Maintaining a sustainable mix of tree ages is important to long-term stability of the ecological system.

Lower Mississippi River Bottomland and Floodplain Forest Desired Ecological Condition

Bottomland hardwood tree species, such as Nuttall oak, overcup oak, honey locust, and American elm, are present and diagnostic in the canopy. Midstories are sparse and typically dominated by upper canopy species. Understories are generally open with sparse grass, forb 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 rare species, including the endangered pondberry, the threatened Louisiana black bear, Rafinesque's big-eared bat, southeastern myotis, and the red milk snake. It also supports demand species such as waterfowl and white-tailed deer, and the unique black Delta fox squirrel. Where

site conditions are suitable, several rare communities are typically embedded within this larger system including canebrakes, beaver ponds, seeps, springs, and cypress dominated wetlands. 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), and a network of well-distributed old-growth is present. Early seral components exist in sufficient quantities to sustain this system over time. Ages of diagnostic tree species are diverse, providing a sustained availability of forests across age classes, from regeneration to old-growth. Regenerating, young, and mid-aged forest occur in small scattered patches (less than 3 acres). Regenerating forest (0-10 years old) comprises approximately 5 percent of system acreage. Woody debris and snags are abundant throughout the forest. Mature forest (60 years old or older) comprises approximately 90 percent of system acreage, with 10 percent of the mature forest in old-growth. Forests are closed, with canopy closure in mature examples of this system being greater than 80 percent.

Lower Mississippi River Bottomland and Floodplain Forest Management Strategy

Forest strategy for restoring, maintaining, and enhancing the lower Mississippi river bottomland and floodplain forest emphasizes using natural processes to reach the desired conditions. However, an integrated vegetation management approach should emphasize improvement of species composition and maintenance of mature structural condition. Natural processes are expected to contribute significantly to attaining the desired conditions within this system. Thinnings, gap creation, irregular even-aged regeneration, and uneven-aged management regeneration were identified as important management activities to promote and maintain the desired ecological system structural conditions.

Table G 15. Lower Mississippi River bottomland and floodplain forest key attributes and indicator metrics of ecosystem sustainability

Key Ecological Attribute	Indicator	Poor	Fair	Good	Very Good
Distance from Roads	ORV Trail Density	>2.0	1.26-2	0.26-1.25	<0.25
	Paved Open Road Density	>2.0	1.26-2	0.26-1.25	<0.25
	Total Road and Trail Density	>2.0	1.26-2	0.26-1.25	<0.25
	Unpaved Gated Road Density	>2.0	1.26-2	0.26-1.25	<0.25
	Unpaved Open Road Density	>2.0	1.26-2	0.26-1.25	<0.25
Ecological System Abundance at Desired Condition	Percent of potential acres with Appropriate System	<100	<100	100	100
Forest Age Diversity	% Mature Forest	<40 or >95	40-69	70-84	85-95
	% Regenerating Forest	0 or >10	6-10	1 or 5	2-4
Hydrologic Function	Compliance with Hydrologic Function Guidelines	Non-compliant	Not Used (Pass/Fail)	Not Used (Pass/Fail)	Compliant
Invasive Species Abundance	Compliance with Invasive Species Guidelines	Non-compliant	Not Used (Pass/Fail)	Not Used (Pass/Fail)	Compliant
	Percent of Invasive Species Occupying System	>6	4-6	1-3	<1
	Reduction of Fire Ants	<30	30-69	70-89	>90
Vegetation Structure	% Mature Closed Canopy	<65	65-74	75-85	>85

Lower Mississippi River Bottomland and Floodplain Forest Key Ecological Attributes

Using the ecological sustainability evaluation process previously described in section G.1.1, indicators of ecosystem health were identified as described in Table G 15. In most cases, these indicators are intended to address the restoration of this ecosystem to appropriate native systems. These indicators are iterative and can be amended or supplemented as new information becomes available.

G.2.13 Near-coast Pine Flatwoods

Near-coast Pine Flatwoods Ecological System Characteristics

Abundance of the near-coast pine flatwoods ecological system on the landscape is an important characteristic of this system due to the past conversion of this forest type to slash pine. Planting slash pine involved the use of fertilization and bedding, resulting in an altered hydrologic regime and species composition.

Fire regime is a major characteristic fundamental to long-term sustainability of this ecological system. Many species associated with this system are dependent upon fire to maintain open conditions.

Canopy structure is the most important characteristic to species diversity and long-term sustainability of this ecological system. Structure in this system has been greatly altered by past forest management practices.

Near-coast Pine Flatwoods Desired Ecological Condition

The amount of woody vegetation is variable, but canopy closure is generally less than 60 percent. Vegetative condition is characterized by widely scattered longleaf or loblolly pine and in mesic sites by scattered slash pine. Understory conditions range from densely shrubby to open and herbaceous-dominated, based largely upon fire regime. Fire occurs at an interval of 1-3 years with no less than 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 rare species, including the endangered red-cockaded woodpecker and the rare flame flower. Where site conditions are appropriate, herbaceous seepage bogs and flats are imbedded within this larger system.

Near-coast Pine Flatwoods Management Strategy

Forest strategy for restoring, maintaining, and enhancing the near-coast pine flatwoods ecological system emphasizes using natural processes to reach the desired conditions. Additionally, integrated fire and vegetation management programs should emphasize restoring this system to open conditions and neutralizing the effects of past management practices. Woodland thinning was identified as an important management activity to promote and maintain the desired ecosystem structural conditions. Many of the acres of this system cannot be treated commercially due to the wet environment; however, non-commercial treatments can be applied as opportunities arise (stewardships and partnerships). Natural processes also should contribute to achieving desired conditions.

Near-coast Pine Flatwoods Key Ecological Attributes

Using the ecological sustainability evaluation process previously described in section G.1.1, indicators of ecosystem health were identified as described in Table G 16. In most cases, these indicators are intended to address the restoration of this ecosystem to appropriate native systems. These indicators are iterative and can be amended or supplemented as new information becomes available.

Table G 16. Near-coast pine flatwoods key attributes and indicator metrics of ecosystem sustainability

Key Ecological Attribute	Indicator	Poor	Fair	Good	Very Good
Distance from Roads	ORV Trail Density	>2.0	1.26-2	0.26-1.25	<0.25
	Paved Open Road Density	>2.0	1.26-2	0.26-1.25	<0.25
	Total Road and Trail Density	>2.0	1.26-2	0.26-1.25	<0.25
	Unpaved Gated Road Density	>2.0	1.26-2	0.26-1.25	<0.25
	Unpaved Open Road Density	>2.0	1.26-2	0.26-1.25	<0.25
Ecological System Abundance at Desired Condition	Percent of potential acres with Appropriate System	<50	50-74	75-89	>90
Fire Regime	Percent of System Acres Burned at Desired Return Interval	<25	25-50	51-75	>75
	Percent of System Acres Burned During the Growing Season	<21	21-40 or >80	41-60	61-80
Invasive Species Abundance	Compliance with Invasive Species Guidelines	Non-compliant	Not Used (Pass/Fail)	Not Used (Pass/Fail)	Compliant
	Percent of Invasive Species Occupying System	>6	4-6	1-3	<1
	Reduction of Fire Ants	<30	30-69	70-89	>90
Vegetation Structure	% Open	<70	70-79	80-89	90-100

G.2.14 Xeric Sandhills

Xeric Sandhills Ecological System Characteristics

Abundance of the xeric sandhill ecological system on the landscape is an important characteristic of this system, due to its widespread conversion to other forest types as a result of agricultural clearing, forest management, and fire suppression. Restoration of the xeric sandhill ecological system to appropriate sites is a high priority for long-term sustainability of this system.

Fire regime is another characteristic necessary for the long-term sustainability of this ecological system. Many species associated with this system are dependent upon fire to maintain open canopy conditions.

Canopy structure is a characteristic important to species diversity and long-term sustainability of this ecological system and its associated components. Open and woodland conditions provide foraging and nesting opportunities for many species. Woodlands are ideal habitat for the federally threatened gopher tortoise and associated species.

Xeric Sandhills Desired Ecological Condition

This ecological system is managed primarily for 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.

Groundcover is sparse and open conditions and fire occurs at an interval of 1-3 years with approximately 40 percent of the 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.

Xeric Sandhills Management Strategy

Forest strategy for restoring, maintaining, and enhancing the xeric sandhills ecological system emphasizes using fire and woodland thinning to restore habitat suitable for use by the federally threatened gopher tortoise and its associated species. Xeric sandhills are embedded in the surrounding longleaf pine matrix and is therefore subject to treatments, particularly fire, applied at the landscape level to the surrounding matrix. While some xeric sandhill occurrences are well mapped by soil type, additional soil and site types supporting xeric sandhill ecosystems remain unmapped. More thorough mapping of this ecosystem is an important data need.

Xeric Sandhills Key Ecological Attributes

Using the ecological sustainability evaluation process previously described in section G.1.1, indicators of ecosystem health were identified as described in Table G 17. These indicators are iterative and can be amended or supplemented as new information becomes available.

Table G 17. Xeric sandhills key attributes and indicator metrics of ecosystem sustainability

Key Ecological Attribute	Indicator	Poor	Fair	Good	Very Good
Fire Regime	Percent of System Acres Burned at Desired Return Interval	<25	25-50	51-75	>75
	Percent of System Acres Burned During the Growing Season	<21	21-40 or >80	41-60	61-80
Forest Age Diversity	% Mature Forest	<45 or >75	45-49 or 71-75	50-54 or 66-70	55-65
	% Regenerating Forest	0 or >15	11-15	1-5	6-10
Invasive Species Abundance	Compliance with Invasive Species Guidelines	Non-compliant	Not Used (Pass/Fail)	Not Used (Pass/Fail)	Compliant
	Percent of Invasive Species Occupying System	>6	4-6	1-3	<1
	Reduction of Fire Ants	<30	30-69	70-89	>90
Understory Composition	Compliance with Understory Composition Guidelines	Non-compliant	Not Used (Pass/Fail)	Not Used (Pass/Fail)	Compliant

G.2.15 Rock Outcrops

Rock Outcrops Ecological System Characteristics

Rock outcrops are limited in occurrence on the Forests. Characteristics important to sustaining this ecological niche include structure of the surrounding forest matrix and protection from human disturbance.

Rock Outcrops Desired Ecological Condition

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

Rock Outcrops Management Strategy

Human interaction such as littering, graffiti, and traffic can cause negative impacts to species associated with rock outcrops. Therefore, these areas should be buffered with mature closed canopy hardwoods and management activities should be limited in areas where rock outcrops occur. Rock outcrops should be inventoried with effort made to determine moisture regime and community diversity for each outcrop.

Rock Outcrops Key Ecological Attributes

Using the ecological sustainability evaluation process previously described in section G.1.1, indicators of ecosystem health were identified as described in Table G 18. These indicators are iterative and can be amended or supplemented as new information becomes available.

Table G 18. Rock outcrops key attributes and indicator metrics of ecosystem sustainability

Key Ecological Attribute	Indicator	Poor	Fair	Good	Very Good
Invasive Species Abundance	Compliance with Invasive Species Guidelines	Non-compliant	Not Used (Pass/Fail)	Not Used (Pass/Fail)	Compliant
Physical Structure	Compliance with Rare Community Physical Structure Guidelines	Non-compliant	Not Used (Pass/Fail)	Not Used (Pass/Fail)	Compliant

G.2.16 Black Belt Calcareous Prairie and Woodland

Black Belt Calcareous Prairie and Woodland Ecological System Characteristics

Abundance of the black belt calcareous prairie and woodland ecological system on the landscape is the most important characteristic of this system due to nearly total conversion to other forest types over the past century as a result of agricultural clearing, forest management, and fire suppression. Restoration of the black belt calcareous prairie and woodland ecological system to appropriate sites is the highest priority for long-term sustainability of this ecological system.

Fire regime is another characteristic fundamental to long-term sustainability of this ecological system. Many species associated with it are dependent upon fire to maintain open conditions.

Canopy structure is a characteristic important to species diversity and long-term sustainability of this ecological system and its associated components. Open prairie provides ideal habitat for many rare species.

Black Belt Calcareous Prairie and Woodland Desired Ecological Condition

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 scattered and consists of characteristic prairie species such as post oak, rock chestnut oak, blackjack oak, and some eastern red cedar. Sparse woody vegetation surrounds the prairie and allows distribution and dispersal of

prairie obligate species. Fire occurs at an interval of 1-3 years with no less than 40 percent of fires occurring in the growing season. This system supports populations of associated rare species, including the prairie kingsnake, white-flowered beardtongue, Mead's sedge, and rough rattlesnake-root.

Black Belt Calcareous Prairie and Woodland Management Strategy

The most important aspect for continued survival of prairie species is that all prairie soils are restored to and maintained at an open prairie condition. Since the soils are limited in occurrence, new prairie soil sites cannot be created; however, existing sites can be restored through removal of canopy species and return of appropriate fire regimes. Program strategies should emphasize removal of non-native invasive species, retention of native hardwood species mentioned above (as appropriate), and improvement of fire regimes. Reintroduction of prairie species may be necessary but should only be considered as a last resort if species are not naturally repopulating the prairie. Program strategy supports the development of rapid assessment protocols to ensure protection and sustainability of the system.

Black Belt Calcareous Prairie and Woodland Key Ecological Attributes

Using the ecological sustainability evaluation process previously described in section G.1.1, indicators of ecosystem health were identified as described in Table G 19. These indicators are iterative and can be amended or supplemented as new information becomes available.

Table G 19. Black belt calcareous prairie and woodland key attributes and indicator metrics of ecosystem sustainability

Key Ecological Attribute	Indicator	Poor	Fair	Good	Very Good
Distance from Roads	ORV Trail Density	>2.0	1.26-2	0.26-1.25	<0.25
	Paved Open Road Density	>2.0	1.26-2	0.26-1.25	<0.25
	Total Road and Trail Density	>2.0	1.26-2	0.26-1.25	<0.25
	Unpaved Gated Road Density	>2.0	1.26-2	0.26-1.25	<0.25
	Unpaved Open Road Density	>2.0	1.26-2	0.26-1.25	<0.25
Ecological System Abundance at Desired Condition	Percent of potential acres with Appropriate System	<75	75-89	90-94	>95
Fire Regime	Percent of System Acres Burned at Desired Return Interval	<25	25-50	51-75	>75
	Percent of System Acres Burned During the Growing Season	<21	21-40 or >80	41-60	61-80
Invasive Species Abundance	Compliance with Invasive Species Guidelines	Non-compliant	Not Used (Pass/Fail)	Not Used (Pass/Fail)	Compliant
	Percent of Invasive Species Occupying System	>6	4-6	1-3	<1
	Reduction of Fire Ants	<30	30-69	70-89	>90
Vegetation Structure	% Open	<85	85-89	90-94	>94

G.2.17 Jackson Prairie and Woodland

Jackson Prairie and Woodland Ecological System Characteristics

Abundance of the Jackson prairie and woodland ecological system on the landscape is the most important characteristic of this system, due to its almost total conversion to other forest types over the past century as a result of agricultural clearing, forest management, and fire suppression. Restoration of the Jackson prairie and woodland ecological system to appropriate sites is the highest priority for long-term sustainability of this ecological system.

Fire regime is another characteristic fundamental to long-term sustainability of this ecological system. Many species associated with it are dependent upon fire to maintain open conditions.

Canopy structure is a characteristic important to species diversity and long-term sustainability of this ecological system and its associated components. Open prairie provides ideal habitat for many rare species.

Jackson Prairie and Woodland Desired Ecological Condition

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

Jackson Prairie and Woodland Management Strategy

The most important aspect for continued survival of prairie species is that all prairie soils are restored to and maintained in an open prairie condition. Since the soils are limited in occurrence, new prairie soil sites cannot be created; however, existing sites can be restored through removal of canopy species and return of appropriate fire regimes. Program strategies should emphasize removal of non-native invasive species, closure of roads occurring within the system, and improving fire regimes. Retention of native hardwood species such as nutmeg hickory, Durand oak, and post oak should be considered where appropriate. Reintroduction of prairie species may be necessary but should only be considered as a last resort if species are not naturally repopulating the prairie. Program strategy supports the development of rapid assessment protocols to ensure protection and sustainability of the system.

Jackson Prairie and Woodland Key Ecological Attributes

Using the ecological sustainability evaluation process previously described in section G.1.1, indicators of ecosystem health were identified as described in Table G 20. These indicators are iterative and can be amended or supplemented as new information becomes available.

Table G 20. Jackson prairie and woodland key attributes and indicator metrics of ecosystem sustainability

Key Ecological Attribute	Indicator	Poor	Fair	Good	Very Good
Distance from Roads	ORV Trail Density	>0.75	0.51-0.75	0.26-0.5	<0.25
	Paved Open Road Density	>0.75	0.51-0.75	0.26-0.5	<0.25
	Total Road and Trail Density	>2.0	1.0-2.0	0.5-1.0	<0.5
	Unpaved Gated Road Density	>2.0	1.0-2.0	0.5-1.0	<0.5
	Unpaved Open Road Density	>1.5	0.9-1.5	0.4-0.8	<0.4
Ecological System Abundance at Desired Condition	Percent of potential acres with Appropriate System	<75	75-89	90-94	>95
Fire Regime	Percent of System Acres Burned at Desired Return Interval	<25	25-50	51-75	>75
	Percent of System Acres Burned During the Growing Season	<21	21-40 or >80	41-60	61-80
Invasive Species Abundance	Compliance with Invasive Species Guidelines	Non-compliant	Not Used (Pass/Fail)	Not Used (Pass/Fail)	Compliant
	Percent of Invasive Species Occupying System	>6	4-6	1-3	<1
	Reduction of Fire Ants	<30	30-69	70-89	>90

G.2.18 Ephemeral ponds and emergent wetlands

Ephemeral ponds and emergent wetlands Ecological System Characteristics

Ephemeral ponds and emergent wetlands are dispersed throughout other ecological systems on the National Forests in Mississippi and are limited in scope. Characteristics important to sustaining this ecological niche include protection of hydrologic function, fire regime, structure of the surrounding forest matrix, and protection from human disturbance.

Ephemeral ponds and emergent wetlands Desired Ecological Condition

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. Hydrologic function remains intact. Ephemeral ponds are present and functioning across the landscape in appropriate sites and provide habitat for a diversity of native species. Naturally fish-free isolated wetlands and ponds exist on the landscape. Freshwater emergent 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 ornate chorus frog, tiger salamander, and the crayfish snake. The most critical example of this habitat is the “Grady” pond which provides breeding habitat for the endangered Mississippi gopher frog and Mississippi sandhill crane.

Ephemeral ponds and emergent wetlands Management Strategy

Management activities are frequently needed to restore examples which have been ditched or drained and filled. There is a major need for an inventory in order to identify and map remaining and degraded examples needing protection and/or restoration. Program emphasis for this rare community type is on project level inventories to identify extant examples and identify historical examples which are priority candidates for restoration. Projects should incorporate creation of new ponds where appropriate.

Ephemeral ponds and emergent wetlands Key Ecological Attributes

Using the ecological sustainability evaluation process previously described in section G.1.1, indicators of ecosystem health were identified as described in Table G 21. These indicators are iterative and can be amended or supplemented as new information becomes available.

Table G 21. Ephemeral ponds and emergent wetlands key attributes and indicator metrics of ecosystem sustainability

Key Ecological Attribute	Indicator	Poor	Fair	Good	Very Good
Distance from Roads	ORV Trail Density	>0.75	0.51-0.75	0.26-0.5	<0.25
	Paved Open Road Density	>0.75	0.51-0.75	0.26-0.5	<0.25
	Total Road and Trail Density	>2.0	1.0-2.0	0.5-1.0	<0.5
	Unpaved Gated Road Density	>2.0	1.0-2.0	0.5-1.0	<0.5
	Unpaved Open Road Density	>1.5	0.9-1.5	0.4-0.8	<0.4
Fire Regime	Percent of System Acres Burned at Desired Return Interval	<25	25-50	51-75	>75
	Percent of System Acres Burned During the Growing Season	<21	21-40 or >80	41-60	61-80
Hydrologic Function	Compliance with Hydrologic Function Guidelines	Non-compliant	Not Used (Pass/Fail)	Not Used (Pass/Fail)	Compliant
Invasive Species Abundance	Compliance with Invasive Species Guidelines	Non-compliant	Not Used (Pass/Fail)	Not Used (Pass/Fail)	Compliant
	Percent of Invasive Species Occupying System	>6	4-6	1-3	<1
	Reduction of Fire Ants	<30	30-69	70-89	>90

G.2.19 Cypress Dominated Wetlands

Cypress Dominated Wetlands Ecological System Characteristics

Cypress dominated wetlands are dispersed throughout other ecological systems on the Forests and are limited in scope. Characteristics important to sustaining this ecological system include protection of hydrologic function, relative abundance of this system on the landscape, structure of the surrounding forest matrix, and protection from human disturbance. Restoration of appropriate sites to cypress is a high priority for long-term sustainability of this system.

Cypress Dominated Wetlands Desired Ecological Condition

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

Cypress Dominated Wetlands Management Strategy

Management activities are frequently needed to restore cypress dominated wetlands where appropriate. Restoration of the hydrologic integrity to prevent drainage is a key component to the management strategy of this system. Program emphasis should be on inventory and mapping on a project basis to document all remaining examples and identify those needing restoration. All examples of this community should be managed for old-growth.

Cypress Dominated Wetlands Key Ecological Attributes

Using the ecological sustainability evaluation process previously described in section G.1.1, indicators of ecosystem health were identified as described in Table G 22. These indicators are iterative and can be amended or supplemented as new information becomes available.

Table G 22. Cypress dominated wetlands key attributes and indicator metrics of ecosystem sustainability

Key Ecological Attribute	Indicator	Poor	Fair	Good	Very Good
Distance from Roads	ORV Trail Density	>2.0	1.26-2	0.26-1.25	<0.25
	Paved Open Road Density	>2.0	1.26-2	0.26-1.25	<0.25
	Total Road and Trail Density	>2.0	1.26-2	0.26-1.25	<0.25
	Unpaved Gated Road Density	>2.0	1.26-2	0.26-1.25	<0.25
	Unpaved Open Road Density	>2.0	1.26-2	0.26-1.25	<0.25
Ecological System Abundance at Desired Condition	Percent of potential acres with Appropriate System	<50	50-84	85-94	>95
Hydrologic Function	Compliance with Hydrologic Function Guidelines	Non-compliant	Not Used (Pass/Fail)	Not Used (Pass/Fail)	Compliant
Invasive Species Abundance	Compliance with Invasive Species Guidelines	Non-compliant	Not Used (Pass/Fail)	Not Used (Pass/Fail)	Compliant
	Percent of Invasive Species Occupying System	>6	4-6	1-3	<1
	Reduction of Fire Ants	<30	30-69	70-89	>90

G.2.20 Wet Pine Savanna

Wet Pine Savanna Ecological System Characteristics

Abundance of the wet pine savanna ecological system on the landscape is an important characteristic of this system due to the effects of past land use practices including fire suppression, system drainage, and conversion to other forest types.

Fire regime is a major factor fundamental to long-term sustainability of this ecological system. Many species associated with wet pine savannas are dependent upon fire to maintain open conditions.

Canopy structure is an important characteristic for species diversity and long-term sustainability of this ecological system. Structure in this system has been greatly altered by past land management practices.

Wet Pine Savanna Desired Ecological Condition

This rare wetland system has a scattered canopy (typically 5-10 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 1-3 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.

Table G 23. Wet pine savanna key attributes and indicator metrics of ecosystem sustainability

Key Ecological Attribute	Indicator	Poor	Fair	Good	Very Good
Distance from Roads	ORV Trail Density	>0.75	0.51-0.75	0.26-0.5	<0.25
	Paved Open Road Density	>0.75	0.51-0.75	0.26-0.5	<0.25
	Total Road and Trail Density	>2.0	1.0-2.0	0.5-1.0	<0.5
	Unpaved Gated Road Density	>2.0	1.0-2.0	0.5-1.0	<0.5
	Unpaved Open Road Density	>1.5	0.9-1.5	0.4-0.8	<0.4
Ecological System Abundance at Desired Condition	Percent of potential acres with Appropriate System	<60	60-89	90-94	>95
Fire Regime	Percent of System Acres Burned at Desired Return Interval	<25	25-50	51-75	>75
	Percent of System Acres Burned During the Growing Season	<21	21-40 or >80	41-60	61-80
Invasive Species Abundance	Compliance with Invasive Species Guidelines	Non-compliant	Not Used (Pass/Fail)	Not Used (Pass/Fail)	Compliant
	Percent of Invasive Species Occupying System	>6	4-6	1-3	<1
	Reduction of Fire Ants	<30	30-69	70-89	>90

Wet Pine Savanna Management Strategy

This system as described by desired condition does not currently exist on the National Forests in Mississippi, and the management strategy for this system is to convert 1,000 acres of what is now near coast pine flatwoods to wet pine savanna. Removal of canopy species to create open conditions and restoration of ephemeral ponds will support habitats used by the federally endangered Mississippi Sandhill Crane. Frequent growing season burns will reduce woody vegetation in the understory and promote the herbaceous component which is integral to this system.

Wet Pine Savanna Key Ecological Attributes

Using the ecological sustainability evaluation process previously described in section G.1.1, indicators of ecosystem health were identified as described in Table G 23. These indicators are iterative and can be amended or supplemented as new information becomes available.

G.2.21 Seeps, Springs, and Seepage Swamps

Seeps, Springs, and Seepage Swamps Ecological System Characteristics

Seeps, springs, and seepage swamps are dispersed throughout other ecological systems on the National Forests in Mississippi and are limited in scope. Factors important to sustaining this ecological niche include protection of hydrologic function, fire regime, structure of the surrounding forest matrix, and protection from human disturbance.

Seeps, Springs, and Seepage Swamps Desired Ecological Condition

Mature forest (60 years old or older) comprises approximately 80 percent of system acreage, with 10 percent of mature forest in old-growth. Forests are closed, with canopy closure often greater than 80 percent. In the northern part of the state, this system is a deciduous forest typically characterized by black gum, water tupelo, and red maple, while 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, seeps, springs and seepage swamps typically only burn during extreme droughty periods. This system is largely undisturbed and hydrologic function is intact.

Seeps, Springs, and Seepage Swamps Management Strategy

Program emphasis should be on inventory and mapping on a project basis to identify all remaining examples and those needing restoration. Seeps, springs, and seepage swamps should be protected from hydrologic degradation and restored to desired conditions where appropriate.

Seeps, Springs, and Seepage Swamps Alternatives and Effects

Using the ecological sustainability evaluation process previously described in section G.1.1, indicators of ecosystem health were identified as described in Table G 24. These indicators are iterative and can be amended or supplemented as new information becomes available.

Table G 24. Seeps, springs, and seepage swamps key attributes and indicator metrics of ecosystem sustainability

Key Ecological Attribute	Indicator	Poor	Fair	Good	Very Good
Distance from Roads	ORV Trail Density	>0.75	0.51-0.75	0.26-0.5	<0.25
	Paved Open Road Density	>0.75	0.51-0.75	0.26-0.5	<0.25
	Total Road and Trail Density	>2.0	1.0-2.0	0.5-1.0	<0.5
	Unpaved Gated Road Density	>2.0	1.0-2.0	0.5-1.0	<0.5
	Unpaved Open Road Density	>1.5	0.9-1.5	0.4-0.8	<0.4
Fire Regime	Percent of System Acres Burned at Desired Return Interval	<25	25-50	51-75	>75
	Percent of System Acres Burned During the Growing Season	<21	21-40 or >80	41-60	61-80
Invasive Species Abundance	Compliance with Invasive Species Guidelines	Non-compliant	Not Used (Pass/Fail)	Not Used (Pass/Fail)	Compliant
	Percent of Invasive Species Occupying System	>6	4-6	1-3	<1
	Reduction of Fire Ants	<30	30-69	70-89	>90

G.2.22 Herbaceous Seepage Bogs and Flats

Herbaceous Seepage Bogs and Flats Ecological System Characteristics

Abundance of the herbaceous seepage bog and flats ecological system on the landscape is an important characteristic of this system due to the effects of past forest management including fire suppression, system drainage, and conversion to other forest types.

Fire regime is a major factor fundamental to long-term sustainability of this ecological system. Many species associated with it are dependent upon fire to maintain open conditions.

Canopy structure is an important characteristic to species diversity and long-term sustainability of this ecological system. Structure in this system has been greatly altered by past forest management practices.

Herbaceous Seepage Bogs and Flats Desired Ecological Condition

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 1-3 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.

Herbaceous Seepage Bogs and Flats Management Strategy

Program emphasis should be on inventory and mapping on a project basis to identify all remaining examples and those areas needing restoration. Known examples of this system should be given priority when applying fire to ensure suitable return intervals and seasonality. The system should be protected from hydrologic disturbance during all project work, including restoration and maintenance. Removal of canopy trees may be necessary to restore open conditions and should be done in accordance with all appropriate guidelines and to foster desired conditions.

Herbaceous Seepage Bogs and Flats Key Ecological Attributes

Using the ecological sustainability evaluation process previously described in section G.1.1, indicators of ecosystem health were identified as described in Table G 25. These indicators are iterative and can be amended or supplemented as new information becomes available.

Table G 25. Herbaceous seepage bogs and flats key attributes and indicator metrics of ecosystem sustainability

Key Ecological Attribute	Indicator	Poor	Fair	Good	Very Good
Distance from Roads	ORV Trail Density	>0.75	0.51-0.75	0.26-0.5	<0.25
	Paved Open Road Density	>0.75	0.51-0.75	0.26-0.5	<0.25
	Total Road and Trail Density	>2.0	1.0-2.0	0.5-1.0	<0.5
	Unpaved Gated Road Density	>2.0	1.0-2.0	0.5-1.0	<0.5
	Unpaved Open Road Density	>1.5	0.9-1.5	0.4-0.8	<0.4
Fire Regime	Percent of System Acres Burned at Desired Return Interval	<25	25-50	51-75	>75
	Percent of System Acres Burned During the Growing Season	<21	21-40 or >80	41-60	61-80
Hydrologic Function	Compliance with Hydrologic Function Guidelines	Non-compliant	Not Used (Pass/Fail)	Not Used (Pass/Fail)	Compliant
Persistence of Species Occurrences	Compliance with Species Occurrence Guidelines	Non-compliant	Not Used (Pass/Fail)	Not Used (Pass/Fail)	Compliant
Physical Structure	Compliance with Rare Community Physical Structure Guidelines	Non-compliant	Not Used (Pass/Fail)	Not Used (Pass/Fail)	Compliant

G.3 Species Selection Process

G.3.1 Species Selection Process Introduction

Planning for ecological system sustainability is an iterative process that involves first providing for a diversity of ecosystems across the landscape and then developing additional components to meet the biological needs of specific species or species groups. Management of most plant and animal species will coincide with the management for ecological system sustainability in the forest plan area. However, additional provisions may be needed to provide for specific species.

Ecological system characteristics were evaluated through collaborative development of an ecological sustainability evaluation database, best available science, consideration of data and trends documented in the Analysis of Management Situation, annual monitoring evaluations, and reviews. A similar analysis process was also used to assess species diversity. This report describes the species evaluation process and uses the understanding gained from analysis of ecological system sustainability to develop additional forest plan components for species diversity.

Ecological System Context for Species

Twenty-two native ecological systems were identified for the National Forests in Mississippi using NatureServe's International Ecological Classification Standards (NatureServe 2004a, 2004b). Through coordination with NatureServe, systems were added, removed, or renamed as needed to ensure all conditions on National Forest System land were represented. Each system was defined in terms of existing USDA Forest Service forest types and Natural Resources Conservation Service (NRCS) soil drainage types. Current acreage of each system was determined using Forest Service GIS data. All identified terrestrial and aquatic ecological systems were documented in a relational database referred to as the ecological sustainability evaluation tool, which was based on the structure of the Nature Conservancy planning tool. The ecological sustainability evaluation tool served as the primary process record for ecological sustainability analysis. It included documentation of scientific and other sources consulted, uncertainties encountered, and strategic choices made during development of the database.

Descriptions of ecological conditions that provide for ecological system sustainability were incorporated into forest plan components. These ecological conditions were further analyzed to understand the environmental context and ability for National Forest System (NFS) lands to contribute to the diversity of plant and animal species. The following analysis process was used to determine if further species-specific forest plan components were necessary to sustain species diversity.

Identification and Screening of Species

The National Forests in Mississippi started with a statewide species list compiled from a variety of sources including threatened and endangered, regional forester's sensitive species, Birds of Conservation Concern list, Mississippi Natural Heritage Program plant and animal lists, Mississippi State Comprehensive Wildlife Strategy species of greatest conservation need list, expert panel nominations, and demand species (Figure G 2). The original list consisted of 562 plant and animal species with ranges occurring throughout the state. Input was then sought from a panel of taxonomic experts including biologists from Mississippi Department of Wildlife, Fisheries, and Parks, the US Fish and Wildlife Service, universities in Mississippi, private conservation organizations, and other Forest Service personnel. Discussions included threats, local trends, and whether forest plan components developed for ecosystem diversity were sufficient to conserve the species. Data from these meetings was used during species evaluations and species screenings. Throughout the process, species were both added and delete as new information became available.

Sections G.6 and G.7 list the species which were removed from consideration because they did not occur or have potential to occur on NFS land based upon suitable habitat, range, or expert taxonomic consensus. If these species are found to occur on the Forests, they will be re-considered and carried through the evaluation process.

The remaining species were classified into the following three categories: threatened and endangered, regional forester's sensitive species, and locally rare species. The process for categorizing threatened and endangered species was based on lists maintained under the Endangered Species Act. Potential regional forester's sensitive species included plant and animal species on the region 8 sensitive species lists, those species with a Rounded Global Rank less than or equal to G3, and/or sub specific taxa with a TRANK

less than or equal to T3. Inclusion as locally rare species was based on recommendation of a panel of experts and included species not categorized as regional forester's sensitive species or threatened and endangered with a State Rank (SRANK) less than or equal to S3. These species may be common elsewhere in their range but are rare on the periphery resulting in concerns with genetic diversity of the species. For a full explanation of the species ranking system, please see the Natureserve website at http://www.natureserve.org/explorer/ranking.htm (11/16/2012).

Some species were identified as demand species. There are no population viability concerns for demand species, but the economic and /or recreational value of these species to the public make them an important component of some ecological diversity systems; therefore these species are included in appropriate ecosystem diversity analyses.

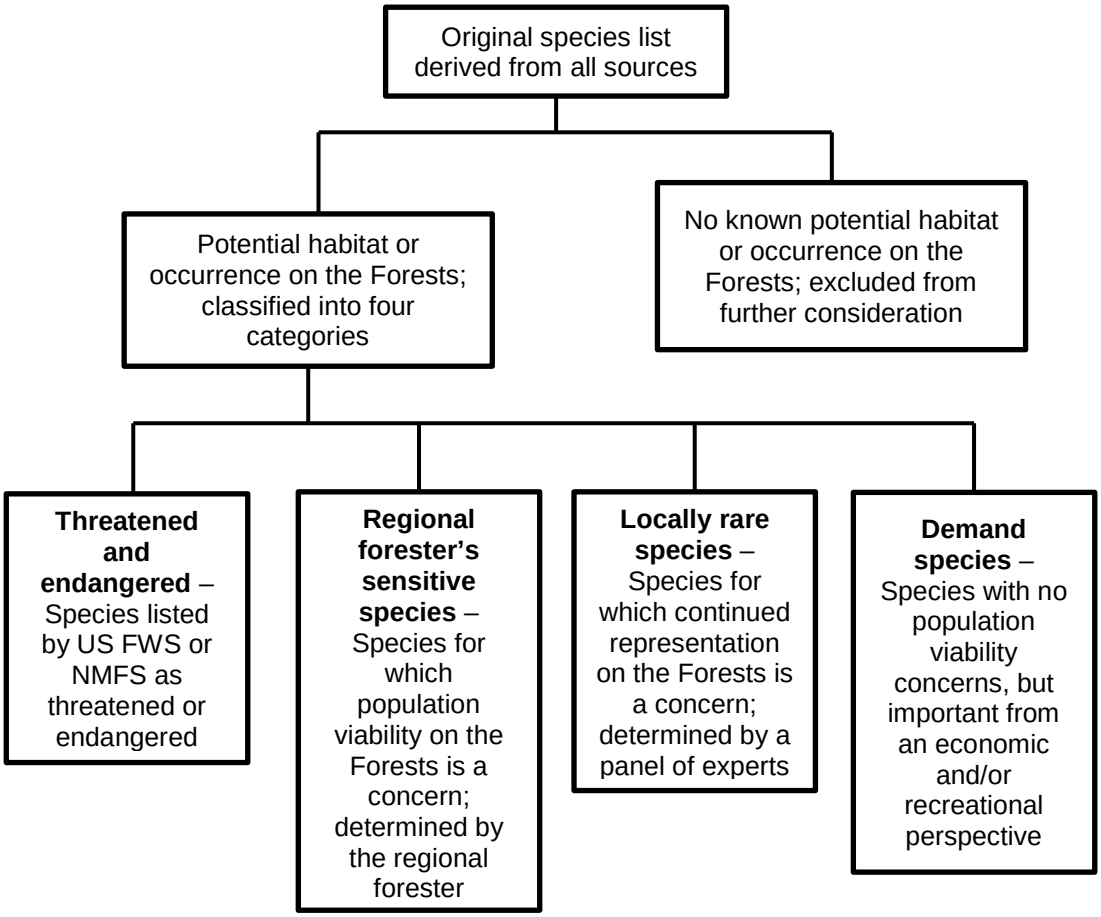

Figure G 2. Species screening and selection process overview

Species Methodology

Species sustainability and habitat condition scores were derived using the most current science, literature and expert opinion best reflecting natural processes at work within the natural diversity of plant and animal communities and best supporting the viability of associated species and their habitat needs. The effects of each alternative were analyzed using the ecological sustainability evaluation model in terms of sustainability scores of the species which were determined as a reflection of the condition scores of the combined associated species groups and habitat scores, as well as weighted by how important that the

associated group is to that species (very high, high, moderate, low). Ranges and definitions of species ecological sustainability evaluation scores are shown in Table G 26.

Table G 26. Ecological sustainability evaluation score ranges and definitions

Range of Condition Score	Condition	Definition of ecological sustainability evaluation Score Applied To Planning Elements
3.51 - 4.0	Very Good	Habitat and/or population conditions are optimal; species populations should remain robust and potentially even expand.
2.51 - 3.50	Good	Habitat and/or population conditions are acceptable; species populations should remain stable.
1.51 - 2.50	Fair	Habitat and/or population conditions are slightly inadequate; although species populations may persist for some time, they may be subject to gradual decline.
1.00 - 1.50	Poor	Habitat and/or population conditions are severely inadequate; species populations are expected to severely decline; localized extirpations are occurring or are imminent.

G.3.2 Threatened and Endangered Species

This section covers threatened and endangered species which management actions may be necessary to protect species under the Endangered Species Act (36 CFR 219.16). Ecological conditions that are needed to conserve threatened and endangered species are provided by the forest plan components for ecosystem diversity.

Threatened and Endangered Species List

The list of threatened and endangered species in Mississippi is maintained by the US Fish and Wildlife Service and can be found at: http://ecos.fws.gov/tess_public/StateListing.do?state=MS&status=listed

Developing the Forests list of threatened and endangered species was completed cooperatively with the US Fish and Wildlife Service. Some categories of occurrence raised questions about which species should and should not be retained on the list. The following direction provided the Forests the means to determine which species would remain on the list:

If an occurrence is thought to be an “accidental”, i.e., an occurrence of a species well outside its normal range, then consideration of the species in the forest plan revision process may not be warranted as determined by the responsible official. However, only if there is general consensus about the accidental nature of the occurrence.

In some situations, a threatened and endangered species occurred on the forest historically but there are no current occurrences. In this case, for a species which has been absent from a forest for a long period of time, and there is no expectation that it would be reestablished, consideration of the species in the forest plan revision process may not be warranted.

Both of these circumstances occurred with threatened and endangered species on the Forests. Forty-five threatened and endangered plant and animal species with ranges occurring throughout the state were included and evaluated in the ecological sustainability evaluation process. Thirty-six species were removed from our list (section G.7) because they did not occur or have potential to occur on National Forest System land based upon suitable habitat, range, or expert taxonomic consensus (FSH 1909.12, Chap. 40, Sec. 43.22d). If these species are found to occur on the National Forests in Mississippi, they

will be re-evaluated and carried through the evaluation process. Nine threatened and endangered species remained and were further evaluated in the ecological sustainability evaluation process (Table G 27).

Table G 27. Federally listed threatened and endangered species included in the forest plan revision process

Taxa	Species	District Most Likely to Occur	Status
Amphibian	Mississippi Gopher Frog (*Rana sevosa*)	De Soto	Endangered
Bird	Mississippi Sandhill Crane (*Grus canadensis pulla*)	De Soto	Endangered
Bird	Red-cockaded Woodpecker (*Picoides borealis*)	Bienville Chickasawhay De Soto Homochitto	Endangered
Fish	Gulf Sturgeon (*Acipenser oxyrinchus desotoi*)	Bienville Chickasawhay De Soto	Threatened
Fish	Pallid Sturgeon (*Scaphirhynchus albus*)	Delta	Endangered
Mammal	Louisiana Black Bear (*Ursus americanus luteolus*)	Chickasawhay, Delta, De Soto, Homochitto	Threatened
Reptile	Gopher Tortoise (*Gopherus polyphemus*)	Chickasawhay De Soto	Threatened
Vascular Plant	Louisiana Quillwort (*Isoetes louisianensis*)	Chickasawhay De Soto	Endangered
Vascular Plant	Pondberry (*Lindera melissifolia*)	Delta	Endangered

Threatened and Endangered Species Forest Plan Components

Throughout the National Forests in Mississippi, threatened and endangered species protection and threatened and endangered habitat enhancement is a priority, so their needs are particularly emphasized. Many of the forest plan components developed integrates multiple resource areas or systems for the National Forests in Mississippi to maintain or improve threatened and endangered species habitat and/or distribution in order to protect and conserve these species. Other forest plan components are more specific to species needs and management. Habitats for all threatened and endangered species are provided through forestwide emphasis in management prescriptions in associated forest communities and in compliance with US Fish and Wildlife Service recovery plans and the Forests implementation guides.

Desired conditions in land management planning reflect a broad vision that characterizes the desired outcome of land management. In some cases the desired conditions already exist, and our intent is to maintain them. In other cases they may be achievable in the relatively near future or may only be achievable over a long period of time. Desired conditions for threatened and endangered species for the National Forests in Mississippi will be included in the ecosystem diversity and species diversity sections of the forest plan.

Objectives for maintaining species diversity for the national forests in Mississippi will be included in the forest plan. Restoration, maintenance, and enhancement of all ecological systems generally provides for a diverse and sustainable population of species throughout the Forest. Species objectives for some threatened and endangered species are located within their respective ecological system while others require additional objectives to ensure their long-term sustainability.

Guidelines are the sideboards that frame our management activities on the Forest. They ensure the protection of resources as we implement projects that move toward the desired conditions. Some guidelines in the forest plan (chapter 4) will be specific to threatened and endangered species while most encompass needs and protections of threatened and endangered species along with other species and their associated ecosystems found on the Forests.

Regional Forester's Sensitive Species

regional forester's sensitive species are defined as "plant and animal species identified by the regional forester for which population viability is a concern as evidenced by: (a) significant current or predicted downward trends in population numbers or density, and/or (b) significant current or predicted downward trends in habitat capability that would reduce a species' existing distribution." (FSM 2670.5).

Regional Forester's Sensitive Species list

Regional foresters identify regional forester's sensitive species occurring in a region by examining up-to-date sources of information pertaining to the population status and viability as well as habitat conditions and threats to species. These sources include the US 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 regional forester's sensitive species habitat. Population viability objectives must be established when making decisions that would significantly reduce sensitive species numbers. Section G.8 lists the regional forester's sensitive species analyzed in the ecological sustainability evaluation process.

Regional forester's sensitive species requiring additional forest plan components

Specific forest plan components were developed for certain regional forester's sensitive species in which the ecological system sustainability components did not sufficiently address the needs of the species or there was desire to have additional forest plan direction for the species. These groups consist of species that may have a very limited distribution, have declining populations, are potentially impacted by management activities, or for which additional forest plan direction is desired and we have adequate information about their life histories and habitats. Species groupings were used to identify commonly shared conservation needs and develop appropriate forest plan provisions. Additionally, species were grouped by their threats and limiting factors where possible. As a result, some species required multiple groups to cover their needs.

Locally Rare Species

Locally rare species are species for which 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 range wide scale. Forest plan components may or may not be necessary to achieve management goals for these species.

Locally Rare Species List

All species identified as of management concern during meetings with taxonomic experts that were not classified as threatened, endangered or sensitive species were considered eligible for consideration as locally rare species. The potential locally rare species list for the Forests included species that were known to exist or have habitat on NFS lands. Using data collected from meetings with taxonomic experts and the species screening process, some species were then eliminated from further consideration according to the following criteria:

- Species secure in the forest plan area based on knowledge of its occurrence, distribution, availability of habitat, and responses to any management of natural disturbances that might occur.
- Species not affected by any current or potential form of management or lack of management in the planning area.
- Species for which there is too little information known to complete a reliable assessment. In these cases, the lack of critical information should be disclosed and actions towards acquiring that information should be highlighted.
- Species with suitable habitat, but no confirmed occurrence on the Forests (these species will be re-evaluated if found to occur on the National Forests in Mississippi).
- Species state rank is S3 or above.
- Species designation in SWG Forest plan is Tier 3 or below (http://www.natureserve.org/explorer/ranking.htm 11/16/2012).

Species that met these screening criteria were eliminated from further detailed consideration in the planning process. Documentation of this step was essential and reasons for eliminating species based upon taxonomic expert panel consensus were recorded in detail in our ecological sustainability evaluation tool. Potential locally rare species will be reviewed periodically for changes in status or when new information is available, and these species will be re-evaluated if warranted.

The locally rare species remaining for further consideration were screened again to determine whether ecosystem diversity forest plan components fully covered their sustainability needs or if they required development of additional forest plan components to support species sustainability. Section G.9 lists the locally rare species analyzed in the ecological sustainability evaluation process.

Locally rare species requiring additional forest plan components

Specific forest plan components will be developed for some locally rare species. For these species, the ecosystem diversity components did not adequately address the needs of the species or there was a desire to have additional forest plan direction for the species and they were combined into groups. These groups include species that may have a very limited distribution, have declining populations, are potentially impacted by management activities, or for which additional forest plan direction is desired and we have adequate information about their life histories and habitats to create forest plan components. Species groupings were used to identify commonly shared conservation needs and develop appropriate forest plan provisions. Additionally, species were grouped by threats and limiting factors where possible; therefore, some species required multiple groups to cover their needs.

G.3.3 Terrestrial Species Groups Covered by Ecological System Sustainability Forest Plan Components

The Forests used species groups as an evaluation and analysis tool to improve planning efficiency and for development of management strategies. Species were grouped according to their habitat needs, limiting factors, threats, and specific habitat elements (snags, den trees, woody debris, etc.). All federally listed

threatened and endangered species are included in species groups because although they have individual species requirements for management, their management is connected with ecosystem and species diversity. Many threatened and endangered, regional forester's sensitive species, locally rare species, and demand species occurred in multiple groups.

Table G 28. Species to group relationship weights

Species to Group Weights	Group Weight Description
Very High	All or nearly all of the species' needs are covered by the needs of this group for at least one phase of this species' life history.
High	A high proportion of the species' needs are covered by the needs of this group for at least one phase of this species' life history.
Moderate	A moderate proportion of the species' needs are covered by the needs of this group for at least one phase of this species' life history.
Low	A low proportion of the species' needs are covered by the needs of this group for at least one phase of this species' life history.

Table G 29. Terrestrial species groups and associated ecological system(s)

Species Group	Associated Ecological System(s) and Other Forest plan Components
Cypress Dominated Wetlands Associates	Cypress Dominated Wetlands, Rare and Wetland Communities
Herbaceous Seepage Bogs and Flats Associates	Herbaceous Seepage Bog and Flats, Rare and Wetland Communities
Mature Mesic Deciduous Forest Associates	Northern Mesic Hardwood Forest, Southern Mesic Slope Forest
Mature Open Pine-Grass Associates	Loblolly Pine Forest Shortleaf Pine-Oak Forest and Woodland, Slash Pine Forest, Upland Longleaf Pine Forest and Woodland
Mature Riparian Forest Associates	Lower Mississippi River Bottomland and Floodplain Forest, Floodplain Forest
Mature Upland Pine-Hardwood Associates	Northern Dry Upland Hardwood Forest, Southern Dry Upland Hardwood Forest
Pine Flatwoods Associates	Near-Coast Pine Flatwoods, Rare and Wetland Communities
Ponds and Emergent Wetlands Associates	Ephemeral Ponds and Emergent Wetlands
Prairie Associates	Black Belt Calcareous Prairie and Woodland, Jackson Prairie and Woodland, Rare Communities
Rock Outcrop Associates	Rock Outcrops
Seeps, Springs, and Seepage Swamps Associates	Seeps, Springs, and Seepage Swamps
Wet Pine Savanna Associates	Wet Pine Savanna, Rare and Wetland Communities
Xeric Sandhill Associates	Xeric Sandhills

Initial groupings of species were at a broad spatial scale and were based on similar habitats associated with ecological systems. Each group was analyzed by species, and determinations made on whether species needs were fully met by forest plan components for the associated ecological systems. These groups and the ecological system(s) with which they are associated are listed in Table G 29. Species to group relationships were weighted from very high to low with higher ratings indicative of indispensable relationships between species and the habitat attributes targeted by a given group (Table G 28).

Cypress Dominated Wetlands Associates

These species are generally associated with swamps that are dominated by cypress and require intact hydrologic function of this system. A list of targeted species associated with this species group can be found in Table G 30. Of the listed species, only the cypress-knee sedge is dependent on the presence of cypress trees. Headcutting is threatening hydrologic integrity of two of the better known examples on the National Forests in Mississippi (Holly Springs and Homochitto NFs). It is assumed that sustainable populations will continue as long as there is permanently flooded cypress-gum forest with hydrologic integrity. Headcutting or other events leading to drainage and sedimentation from adjacent uplands may prevent management for sustainable populations of these species, and rapid assessment protocols should be designed to measure sustainability of cypress dominated wetland associates. Relative abundance of cypress dominated wetland ecological systems and restoration and maintenance of hydrologic integrity are key characteristics for this species group. Planting of cypress may be necessary to restore some of these sites. Forest plan components include desired conditions for cypress dominated wetlands and guidelines for vegetation/wildlife; soil and water; roads; herbicides; and administration, facilities, and recreation.

Table G 30. Species in cypress dominated wetlands associates

Species Name	Common Name	Species-to-Group Weight
Aix sponsa	Wood Duck	Moderate
Anas platyrhynchos	Northern Mallard	Moderate
Anas rubripes	American Black Duck	Moderate
Carex decomposita	Cypress-knee Sedge	Very High
Corynorhinus rafinesquii	Rafinesque's Big-eared Bat	High
Hemidactylium scutatum	Four-toed Salamander	Moderate
Myotis austroriparius	Southeastern Myotis	High
Elanoides forficatus	Swallow-Tailed Kite	High

Depending on past history of disturbance and other factors, bald cypress may occur with other species such as black gum, water tupelo, green ash, ironwood and red maple. Cypress dominated wetlands may be found throughout the Forests, but due to inconsistencies in past mapping practices there is no current accurate estimate of the amount of acreage in this type. Current condition of this type on the forest is probably relatively young forest growing back from harvest in the early part of this century. Several key locations are at risk due to headcutting of streams threatening to drain the wetland, while other locations have been harvested without successful cypress regeneration and await restoration.

The desired condition for species in this group is occurrence within a mature or old-growth forest or woodland dominated by this system, with a varying degree of canopy closure shaped by healthy hydrologic functions and processes. Historical sites on hydric soils are restored to this ecological system. Conditions of the surrounding vegetation types allow distribution and dispersal of cypress dominated wetland obligate species.

Management activities are frequently needed to restore cypress dominated wetlands where appropriate. Restoration of the hydrologic integrity to prevent drainage is a key component to the management strategy of this system. Program emphasis should be on inventory and mapping on a project basis to document all remaining examples and identify those needing restoration. All examples of this community should be managed as old-growth.

Using the ecological sustainability evaluation process, key attributes and indicator metrics were identified as described in Table G 31. These attributes and indicators are iterative and can be amended or supplemented as new information becomes available.

Table G 31. Cypress dominated wetlands associates key attributes and indicator metrics

Key Attribute	Indicator	Line Item-to-Group Weight
Distance from Roads	ORV Trail Density	Very High
Distance from Roads	Paved Open Road Density	Moderate
Distance from Roads	Total Road and Trail Density	High
Distance from Roads	Unpaved Gated Road Density	Moderate
Distance from Roads	Unpaved Open Road Density	Moderate
Hydrologic Function	Compliance with Hydrologic Function Guidelines	Very High
Ecological System Abundance at Desired Condition	Percent of potential acres with Appropriate System	Very High
Forest Age Diversity	% Mature Forest	Very High
Forest Age Diversity	% Old Forest	Very High
Vegetation Structure	% Old-growth	Very High
Invasive Species Abundance	Compliance with Invasive Species Guidelines	Very High
Invasive Species Abundance	Percent of Invasive Species Occupying System	Very High
Ecological System Abundance at Desired Condition	Compliance with Rare Ecological System / Rare Community Guidelines	Very High

Herbaceous Seepage Bogs and Flats Associates

Herbaceous seepage bogs and flats are rare communities and provide unique habitats for many species. A list of targeted species associated with this species group can be found in Table G 32. Various species of pitcher-plants are often dominant in these areas. Inventory and mapping of herbaceous seepage bogs are important to help understand and manage these species. It is assumed that sustainable populations of the associated species will continue in conjunction with maintenance of hydrologic regime, regular prescribed burning, and protection from human disturbance (vehicular and foot traffic). Some of these areas have grown up in woody vegetation and may require mechanical clearing. Although guidelines generally prohibit management activities within rare communities, exceptions can be made for restoration of the system. When management activities occur within a rare community, the species associated with it should be considered at the project level.

The key attributes and indicators for this group can be tied directly back to the ecological system herbaceous seepage bogs and flats (Table G 33). Rapid assessment protocols which measure effects of fire, hydrologic integrity, species composition, human disturbance, structure, and relative abundance are important to monitoring long-term sustainability of this community and its associated species. Planning components include desired conditions and objectives for the ecological system herbaceous seepage bogs and flats, desired conditions for species diversity, and guidelines for vegetation/wildlife; soil and water; roads; herbicides; and administration, facilities, and recreation.

Table G 32. Species in herbaceous seepage bogs and flats associates

Species Name	Common Name	Species-to-Group Weight
Agalinis aphylla	Coastal Plain False-foxglove	Very High
Agalinis filicaulis	Thin Stemmed False-foxglove	Very High
Agalinis pseudaphylla	Shinner's False-foxglove	High
Aristida simpliciflora	Southern Three-awned Grass	Very High
Calopogon barbatus	Bearded Grass-pink	Very High
Carex exilis	Coast Sedge	Very High
Cleistes bifaria (=divaricata)	Small Spreading Pogonia	Very High
Eriocaulon texense	Texas Pipewort	Very High
Fallicambarus danielae	Speckled Burrowing Crayfish	High
Fallicambarus gordoni	Camp Shelby Burrowing Crayfish	Very High
Gaylussacia frondosa	Dangleberry	High
Lachnocaulon digynum	Pineland Bogbutton	Very High
Lindera subcoriacea	Bog Spicebush	Very High
Linum macrocarpum	Spring Hill flax	Very High
Macranthera flammea	Flame Flower	High
Panicum nudicaule	Naked-stemmed Panic Grass	Very High
Parnassia grandifolia	Large-leaved Grass-of-Parnassus	Very High
Peltandra sagittifolia	White Arum	Moderate
Pinguicula planifolia	Chapman's Butterwort	Very High
Pinguicula primuliflora	Southern Butterwort	High
Platanthera blephariglottis	Large White Fringed Orchid	Very High
Platanthera integra	Yellow Fringeless orchid	Very High
Polygala hookeri	Hooker's Milkwort	Very High
Procambarus fitzpatricki	Spiny-tailed Crayfish	High
Pteroglossaspis ecristata (=Eulophia ecristata)	Giant Orchid	Very High
Rhynchospora macra	Large Beakrush	Very High
Rhynchospora stenophylla	Chapman Beakrush	Very High
Ruellia noctiflora	Night Flowering Ruellia	Very High
Spiranthes brevilabris var floridana	Florida Ladies'-tresses	Very High
Spiranthes longilabris	Giant Spiral Ladies'-tresses	Very High
Stylisma aquatica	Water Southern Morning-glory	Moderate
Syngonanthus flavidulus	Yellow Pipewort	Moderate
Utricularia olivacea	Piedmont Bladderwort	Moderate
Utricularia purpurea	Purple Bladderwort	Moderate
Xyris drummondii	Drummond's Yellow-eyed Grass	Very High
Xyris scabrifolia	Harper's Yellow-eyed Grass	Very High

Table G 33. Herbaceous seepage bogs and flats associates key attributes and indicator metrics

Key Attribute	Indicator	Line Item-to-Group Weight
Fire Regime	Percent of System Acres Burned at Desired Return Interval	Very High
	Percent of System Acres Burned During the Growing Season	Very High
Distance from Roads	ORV Trail Density	Very High
	Paved Open Road Density	Moderate
	Total Road and Trail Density	High
	Unpaved Gated Road Density	Low
	Unpaved Open Road Density	Moderate
Ecological System Abundance at Desired Condition	Percent of potential acres with Appropriate System	Very High
Vegetation Structure	% Open	Very High
Invasive Species Abundance	Compliance with Invasive Species Guidelines	Very High
	Percent of Invasive Species Occupying System	Very High
	Reduction of Fire Ants	High
Hydrologic Function	Compliance with Hydroligic Function Guidelines	Very High
	Road Crossings Rating	Very High
Indicator Species Status	Population Trend of yellow trumpets (*Sarracenia alata* Alph. Wood)	High
Ecological System Abundance at Desired Condition	Compliance with Rare Ecological System / Rare Community Guidelines	Very High
Persistence of Species Occurrences	Compliance with Species Occurrence Guidelines	Very High
Physical Structure	Compliance with Rare Community Physical Structure Guidelines	Very High

Mature Mesic Deciduous Forest Associates

Mature mesic deciduous forest communities are located on cool north-facing slopes with rich soils and thick layers of fertile leaf litter. They can be considered to be patches within a matrix of more xeric forest types. Each patch is only a small portion of the overall landscape and is generally removed from other mesic deciduous forest by over 100m or more. A list of targeted species associated with this species group can be found in Table G 34. Species dependent upon this forest type generally require closed canopy forest with moist organic soils and thick leaf litter. Abundance of mast-producing trees provides food for many species and downed wood, snags, and other refuge are a key requirement within this group Table G 35. Species should remain sustainable if a mature, closed canopy mesic deciduous forest is maintained on the landscape and appropriate guidelines are followed. It is important that only low intensity fire creep into these areas to maintain the duff/ organic layer.

The key characteristics and performance measures for this group are the same as for the ecological systems southern mesic slope forest, southern loess bluff forest, and northern mesic hardwood forest. The key factors for increasing relative abundance are retention of existing mature examples of these systems and restoration through conversion of off-site pine species. Forestwide desired conditions as well as desired conditions for both mesic forest ecological system and species diversity serve as forest plan components for these species.

Table G 34. Species in mature mesic deciduous forest associates

Species Name	Common Name	Species-to-Group Weight
Antennaria solitaria	Single-headed Pussytoes	High
Aralia racemosa	American Spikenard	High
Asarum canadense	Canada Wild-ginger	Very High
Carex impressinervia	Ravine Sedge	Very High
Carex picta	Painted Sedge	Moderate
Celastrus scandens	Climbing Bittersweet	Moderate
Cornus alternifolia	Alternate-leaf Dogwood	High
Cypripedium parviflorum	Small Yellow Lady's-slipper	Very High
Cypripedium pubescens	Yellow Lady's-slipper	Very High
Desmodium ochroleucum	Cream Tick-trefoil	Moderate
Echinacea purpurea	Eastern Purple Coneflower	Moderate
Erythronium albidum	White Dog's Tooth Violet	Very High
Euonymus atropurpureus	Burning Bush	Moderate
Frasera caroliniensis	American Colombo	Moderate
Galearis spectabilis	Showy Orchis	Very High
Goodyera pubescens	Downy Rattlesnake-plantain	Very High
Hexalectris spicata	Crested Coralroot	Very High
Juglans cinerea	Butternut	Very High
Lycopodium digitatum = flabelliforme	Fan Club Moss	Moderate
Matelea obliqua	Climbing Milkweed	High
Pachysandra procumbens	Allegheny-spurge	Very High
Panax quinquefolius	American Ginseng	Very High
Physalis carpenteri	Carpenter's Ground-cherry	Very High
Plethodon websteri	Webster's Salamander	Very High
Polemonium reptans	Jacob's Ladder	Very High
Polytaenia nuttallii	Prairie Parsley	Low
Salvia urticifolia	Nettle-leaf Sage	Moderate
Schisandra glabra	Bay Starvine	Very High
Silene ovata	Ovate Catchfly	Moderate
Solidago auriculata	Eared Goldenrod	Very High
Solidago flaccidifolia	Appalachian Goldenrod	High
Trillium foetidissimum	Fetid Trillium	High
Triphora trianthophora	Three Birds Orchid	Very High
Uvularia floridana	Florida Bellwort	High

Table G 35. Mature mesic deciduous forest associates key attributes and indicator metrics

Key Attribute	Indicator	Line Item-to-Group Weight
Distance from Roads	ORV Trail Density	Very High
	Paved Open Road Density	High
	Total Road and Trail Density	High
	Unpaved Gated Road Density	Low
	Unpaved Open Road Density	Moderate
Ecological System Abundance at Desired Condition	Percent of potential acres with Appropriate System	Very High
Fire Regime	Percent of System Acres Burned at Desired Return Interval	Moderate
	Percent of System Acres Burned During the Growing Season	Moderate
Forest Age Diversity	% Mature Forest	High
	% Old Forest	High
	% Regenerating Forest	High
Habitat Element Abundance	Compliance with Bat Roost Structure Guidelines	Low
	Compliance with Den Tree Guidelines	Very High
	Compliance with Downed Wood Guidelines	Very High
	Compliance with Hard Mast Guidelines	Very High
	Compliance with Snag Guidelines	Very High
	Compliance with Stump and Stump-hole Guidelines	Very High
Invasive Species Abundance	Compliance with Invasive Species Guidelines	Very High
	Percent of Invasive Species Occupying System	Very High
	Reduction of Fire Ants	High
Understory Composition	Compliance with Understory Composition Guidelines	Very High
Vegetation Structure	% Mature Very-Closed Canopy	Very High
	% Old-growth	High

Mature Open Pine-Grass Associates

Mature upland pine forests and woodlands support a diversity of species and provide critical habitat for several rare and endangered species. A list of targeted species associated with this species group can be found in Table G 36. Pine-grass associated species are dependent on mature open canopy, fire-maintained forests or woodlands across multiple ecosystem types. Frequent fire is critical to maintaining these systems, and in the absence of fire, chemical or mechanical means may be needed to maintain the herbaceous grass/forb layer. Abundant, diverse ground cover provides food and shelter for a variety of wildlife species. By providing for healthy and abundant upland pine forests, species in this group should continue to thrive on the National Forests in Mississippi.

Table G 36. Species in mature open pine-grass associates

Species Name	Common Name	Species-to-Group Weight
Agalinis pseudaphylla	Shinner's False-foxglove	Moderate
Aimophila aestivalis	Bachman's Sparrow	Very High
Ammodramus henslowii	Henslow's Sparrow	Moderate
Botrychium jenmanii	Dixie Grapefern	High
Colinus virginianus	Northern Bobwhite	Very High
Crotalus adamanteus	Eastern Diamondback Rattlesnake	High
Dalea carnea var. gracilis	Pine Barrens Prairie Clover	Moderate
Falco sparverius paulus	Southeastern American Kestrel	Very High
Gopherus polyphemus	Gopher Tortoise	Very High
Heterodon simus	Southern Hognose Snake	Very High
Lobelia appendiculata	Appendaged Lobelia	High
Marshallia graminifolia var. cynanthera	Broadleaf Barbara's Buttons	Low
Ophisaurus mimicus	Mimic Glass Lizard	Very High
Picoides borealis	Red-cockaded Woodpecker	Very High
Pituophis melanoleucus lodingi	Black Pine Snake	Very High
Polygala leptostachys	Slender Spike Milkwort	Moderate
Pycnanthemum muticum	Blunt Mountainmint	Moderate
Rana sevosa	Mississippi Gopher Frog	Very High
Rhadinaea flavilata	Pine Woods Snake	Moderate

The key attributes and indicator metrics for this group are the same as for the ecological systems upland longleaf pine forest and woodland, shortleaf pine-oak forest and woodland, loblolly pine forest, and slash pine forest (Table G 37). Relative abundance of mature upland pine forests as well as canopy structure, fire regime, and the resulting herbaceous groundcover are the most important factors in sustaining this species group. Forestwide desired conditions as well as desired conditions for each upland pine ecological system serve as forest plan components for these species. Objectives are to restore or maintain mature open canopy pine forests with appropriate fire regimes help to sustain these species, along with guidelines for vegetation/wildlife and fire.

Table G 37. Mature open pine-grass associates key attributes and indicator metrics

Key Attribute	Indicator	Line Item-to-Group Weight
Distance from Roads	ORV Trail Density	Very High
	Paved Open Road Density	High
	Total Road and Trail Density	Very High
	Unpaved Gated Road Density	Low
	Unpaved Open Road Density	High
Ecological System Abundance at Desired Condition	Percent of Ecological System Acres at Desired Condition	Very High
	Percent of potential acres with Appropriate System	Very High
Fire Regime	Percent of System Acres Burned at Desired Return Interval	Very High
	Percent of System Acres Burned During the Growing Season	Very High
Forest Age Diversity	% Mature Forest	High
	% Old Forest	High
	% Regenerating Forest	Moderate
Habitat Element Abundance	Compliance with Den Tree Guidelines	Very High
	Compliance with Downed Wood Guidelines	Very High
	Compliance with Snag Guidelines	Very High
	Compliance with Stump and Stump-hole Guidelines	Very High
Invasive Species Abundance	Compliance with Invasive Species Guidelines	Very High
	Percent of Invasive Species Occupying System	Very High
	Reduction of Fire Ants	Very High
Understory Composition	Compliance with Understory Composition Guidelines	High
Vegetation Structure	% Mature Open and Sparse Canopy	Low
	% Mature Open Canopy	Very High
	% Old-growth	Very High
	% Open	Very High
	Compliance with Canopy Cover Sensitivity Guidelines	Very High

Mature Riparian Forest Associates

These species are dependent upon adequate soil moisture and closed canopy deciduous forest in riparian areas. An abundance of mast producing trees and shelter in the form of downed wood, snags, and tree cavities must be available for species occurring within this system. A list of targeted species associated with this species group can be found in Table G 38. It is assumed that sustainable populations will persist if the riparian areas contain a mature, closed canopy forest with little or no unnatural disturbance, and the hydrologic function remains intact.

Table G 38. Species in mature riparian forest associates

Species Name	Common Name	Species-to-Group Weight
Aix sponsa	Wood Duck	Very High
Alisma subcordatum	Broad-leaved Water-platain	High
Chamaecyparis thyoides	Atlantic White Cedar	Very High
Corynorhinus rafinesquii	Rafinesque's Big-eared Bat	Very High
Dryopteris ludoviciana	Southern Shield Woodfern	Very High
Elanoides forficatus	Swallow-tailed Kite	Very High
Epidendrum magnoliae = conopseum	Green-fly Orchid	High
Goodyera pubescens	Downy Rattlesnake-plantain	Moderate
Haliaeetus leucocephalus	Bald Eagle	Moderate
Isoetes louisianensis	Louisiana Quillwort	High
Isoetes melanopoda	Blackfoot Quillwort	High
Lasiurus intermedius	Northern Yellow Bat	Very High
Limnothlypis swainsonii	Swainson's Warbler	High
Lindera melissifolia	Pondberry	Very High
Lycopodium cernuum = L. palhinhaea cernua	Nodding Clubmoss	Low
Mimulus ringens	Square-stem Monkey Flower	High
Myotis austroriparius	Southeastern Myotis	Very High
Penstemon tenuis	Sharp-sepal Beardtongue	High
Platanthera peramoena	Purple Fringeless Orchid	Moderate
Polytaenia nuttallii	Prairie Parsley	Low
Pycnanthemum muticum	Blunt Mountainmint	Moderate
Quercus oglethorpensis	Oglethorpe Oak	High
Rhynchospora crinipes	Hairy Peduncled Beakrush	Very High
Schisandra glabra	Bay Starvine	Moderate
Trillium foetidissimum	Fetid Trillium	High
Triphora trianthophora	Three Birds Orchid	High
Ursus americanus	Black Bear	High
Ursus americanus luteolus	Louisiana Black Bear	High
Uvularia floridana	Florida Bellwort	High

The key characteristics and performance measures for this group are the same as for the ecological systems floodplain forest and lower Mississippi River bottomland and floodplain forest (Table G 39). The key factor relative abundance represents retention of existing mature examples and restoration involving conversion of off-site pine species to mature riparian forest gradually over time. Forestwide desired conditions as well as desired conditions for each floodplain ecological system and species diversity serve as forest plan components for these species. Objectives to restore or maintain floodplain forest will help to sustain these species, along with guidelines for vegetation/wildlife and soil and water.

Table G 39. Mature riparian forest associates key attributes and indicator metrics

Key Attribute	Indicator	Line Item-to-Group Weight
Distance from Roads	ORV Trail Density	Very High
	Paved Open Road Density	Very High
	Total Road and Trail Density	Very High
	Unpaved Gated Road Density	Moderate
	Unpaved Open Road Density	Moderate
Ecological System Abundance at Desired Condition	Percent of potential acres with Appropriate System	Very High
Forest Age Diversity	% Mature Forest	Moderate
	% Old Forest	High
Habitat Element Abundance	Compliance with Den Tree Guidelines	Very High
	Compliance with Downed Wood Guidelines	Very High
	Compliance with Hard Mast Guidelines	Very High
	Compliance with Snag Guidelines	Very High
Hydrologic Function	Compliance with Hydroligic Function Guidelines	Very High
	Road Crossings Rating	High
Invasive Species Abundance	Compliance with Invasive Species Guidelines	Very High
	Percent of Invasive Species Occupying System	Very High
	Reduction of Fire Ants	Moderate
Vegetation Structure	% Mature Very-Closed Canopy	Moderate
	Compliance with Canopy Cover Sensitivity Guidelines	High

Mature Upland Pine-Hardwood Associates

These species are associated with xeric stands of hardwood although pine may be intermingled with the oaks. A list of targeted species associated with this species group can be found in Table G 40. These forests occur on sandy, porous, nutrient-poor soils typically found on southern and western slopes or on hilltops dominated by oaks and hickories. The irregular canopy creates openings for sunlight to penetrate to the forest floor, where a variety of saplings develop, opening the way for succession. Oak leaves are low in nutrients, high in acid and slow to decay. Oaks stump-sprout following a fire further perpetuating their species. Shrub diversity is highly variable throughout this extensive landscape area, providing a variety of food sources and habitat for animal species. The ground layer under this relatively sunny canopy tends to bloom in mid-summer. Some of the native flowers that occur in this community include orchids, rattlesnake plantain, smooth bedstraw, wild geranium, and false Solomon's seal.

Table G 40. Species in mature upland pine-hardwood associates

Species Name	Common Name	Species-to-Group Weight
Arabis canadensis	Sicklepod	Moderate
Carex picta	Painted Sedge	Moderate
Colinus virginianus	Northern Bobwhite	Low
Crataegus triflora	Three-flower Hawthorn	Moderate
Cypripedium pubescens	Yellow Lady's-slipper	Moderate
Desmodium ochroleucum	Cream Tick-trefoil	Moderate
Echinacea purpurea	Eastern Purple Coneflower	Low
Frasera caroliniensis	American Colombo	Low
Hamemalis ovalis	Big-leaf witch-hazel	High
Hexalectris spicata	Crested Coralroot	Moderate
Lycopodium digitatum = flabelliforme	Fan Club Moss	High
Ponthieva racemosa	Shadow-witch Orchid	Low
Prenanthes aspera	Rough Rattlesnake-root	Low
Quercus oglethorpensis	Oglethorpe Oak	Moderate
Rhadinaea flavilata	Pine Woods Snake	High
Salvia urticifolia	Nettle-leaf Sage	High
Silene ovata	Ovate Catchfly	High
Solidago flaccidifolia	Appalachian Goldenrod	Moderate
Triphora trianthophora	Three Birds Orchid	Low
Uvularia floridana	Florida Bellwort	Low

The key attributes and indicator metrics for this group are the same as for the ecological systems northern dry upland hardwood forest and southern dry upland forest (Table G 41). Forestwide desired conditions as well as desired conditions for each upland ecological system and species diversity serve as forest plan components for these species. Objectives to restore or maintain upland hardwood forest help to sustain these species, along with guidelines for vegetation/wildlife.

Table G 41. Mature upland pine-hardwood associates key attributes and indicator metrics

Key Attribute	Indicator	Line Item-to-Group Weight
Distance from Roads	ORV Trail Density	High
	Paved Open Road Density	High
	Total Road and Trail Density	High
	Unpaved Gated Road Density	Moderate
	Unpaved Open Road Density	Moderate
Ecological System Abundance at Desired Condition	% potential acres with Appropriate System	Very High
Fire Regime	% System Acres Burned at Desired Return Interval	Moderate
	% System Acres Burned During the Growing Season	Moderate
Forest Age Diversity	% Mature Forest	High
	% Old Forest	High
	% Regenerating Forest	Moderate
Habitat Element Abundance	Compliance with Bat Roost Structure Guidelines	Very High
	Compliance with Den Tree Guidelines	Very High
	Compliance with Downed Wood Guidelines	Very High
	Compliance with Hard Mast Guidelines	Very High
	Compliance with Snag Guidelines	Very High
	Compliance with Stump and Stump-hole Guidelines	Very High
Invasive Species Abundance	Compliance with Invasive Species Guidelines	Very High
	Percent of Invasive Species Occupying System	Very High
	Reduction of Fire Ants	High
Vegetation Structure	% Mature Closed Canopy	High

Pine Flatwoods Associates

Species in this group inhabit sparse woodlands dominated by longleaf and slash pine with scattered loblolly pine, located predominately on non-riverine hydric soil site types. A list of targeted species associated with this species group can be found in Table G 42. Fire is necessary to maintain this habitat as well as intact hydrologic regimes. Past agricultural practices have altered the habitat and efforts should be made to restore it to its original form. Management activities are frequently needed to restore near-coast pine flatwood forests, historical fire regimes, and characteristic grass-forb understories.

Table G 42. Species in pine flatwoods associates

Species Name	Common Name	Species-to-Group Weight
Agalinis aphylla	Coastal Plain False-foxglove	Moderate
Agalinis filicaulis	Thin Stemmed False-foxglove	Moderate
Calopogon barbatus	Bearded Grass-pink	Moderate
Cirsium lecontei	LeConte's Thistle	Moderate
Cleistes bifaria (=divaricata)	Small Spreading Pogonia	Moderate
Dalea carnea var. gracilis	Pine Barrens Prairie Clover	Moderate
Hemidactylium scutatum	Four-toed Salamander	Low
Isoetes louisianensis	Louisiana Quillwort	High
Isoetes valida	Strong Quillwort	Moderate
Lachnocaulon digynum	Pineland Bogbutton	Moderate
Lycopodium cernuum = L. palhinhaea cernua	Nodding Clubmoss	Moderate
Macranthera flammea	Flame Flower	High
Polygala hookeri	Hooker's Milkwort	Moderate
Polygala leptostachys	Slender Spike Milkwort	Moderate
Procambarus fitzpatricki	Spiny-tailed Crayfish	Moderate
Rhadinaea flavilata	Pine Woods Snake	High
Ruellia noctiflora	Night Flowering Ruellia	Moderate
Spiranthes brevilabris var floridana	Florida Ladies'-tresses	Moderate
Spiranthes longilabris	Giant Spiral Ladies'-tresses	Moderate
Stylisma aquatica	Water Southern Morning-glory	Moderate
Syngonanthus flavidulus	Yellow Pipewort	Moderate
Utricularia olivacea	Piedmont Bladderwort	High
Utricularia purpurea	Purple Bladderwort	High
Xyris drummondii	Drummond's Yellow-eyed Grass	Moderate

The key attributes and indicator metrics for this group are the same as for the ecological system near coast pine flatwoods (Table G 43). Forestwide desired conditions as well as desired conditions for near coast pine flatwoods and species diversity serve as forest plan components for these species. Objectives to restore or maintain pine flatwoods help to sustain these species, along with guidelines for vegetation/wildlife; soil and water; roads; invasive species; herbicides; and administration, facilities, and recreation.

Table G 43. Pine flatwoods associates key attributes and indicator metrics

Key Attribute	Indicator	Line Item-to-Group Weight
Fire Regime	Percent of System Acres Burned at Desired Return Interval	Very High
	Percent of System Acres Burned During the Growing Season	Very High
Distance from Roads	ORV Trail Density	Very High
	Paved Open Road Density	High
	Total Road and Trail Density	High
	Unpaved Gated Road Density	Moderate
	Unpaved Open Road Density	Moderate
Ecological System Abundance at Desired Condition	Percent of potential acres with Appropriate System	Very High
Forest Age Diversity	Percent of Ecological System Acres in Mid-Aged Trees	High
	% Mature Forest	High
	% Regenerating Forest	Moderate
Vegetation Structure	% Open	High
Invasive Species Abundance	Compliance with Invasive Species Guidelines	Very High
	Percent of Invasive Species Occupying System	Very High
	Reduction of Fire Ants	Very High
Habitat Element Abundance	Compliance with Den Tree Guidelines	Very High
	Compliance with Downed Wood Guidelines	Very High
	Compliance with Snag Guidelines	Very High
	Compliance with Stump and Stump-hole Guidelines	Very High
Hydrologic Function	Compliance with Hydroligic Function Guidelines	Very High
Soil Productivity	Compliance with Soil Productivity Guidelines	Moderate
Understory Composition	Compliance with Understory Composition Guidelines	Moderate

Ponds and Emergent Wetlands Associates

The species associated with this wetland system utilize a wide array of seasonally flooded depression wetlands, freshwater marshes, and ephemeral ponds. A list of targeted species associated with this species group can be found in Table G 44. 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. Many of these have been altered or destroyed as a result of agricultural practices or erosion from disturbance on adjacent uplands. Past management actions in these areas may have resulted in woody plant encroachment and drainage of the wetlands. The few remaining examples are vulnerable to OHV use, ditching and drainage, and invasion by non-native plants and animals. Information on location and size of this community type is not well known or documented.

Since they are of small size and often dry up during the year, they are valuable as breeding sites for amphibians and are invaluable for Mississippi sandhill crane breeding on the De Soto NF. These habitats are also important for Mississippi gopher frog breeding and survival. Many of the species in this group thrive in a fishless environment as fish are known predators of larval amphibians. Species in this group generally migrate to ponds and emergent wetlands for breeding and are susceptible to hazards caused by crossing roads. Species in this group are also susceptible to damage caused by trampling and hydrologic modification cause by OHVs or other human disturbance.

Table G 44. Species in ponds and emergent wetlands associates

Species Name	Common Name	Species-to-Group Weight
Alisma subcordatum	Broad-leaved Water-platain	High
Anas platyrhynchos	Northern Mallard	High
Anas rubripes	American Black Duck	High
Elanoides forficatus	Swallow-tailed Kite	Moderate
Eleocharis melanocarpa	Black-fruited Spikerush	High
Eleocharis robbinsii	Robbins Spikerush	High
Eleocharis tricostata	Three-angled Spikerush	High
Grus canadensis pulla	Mississippi Sandhill Crane	Very High
Macranthera flammea	Flame Flower	High
Mimulus ringens	Square-stem Monkey Flower	High
Myriophyllum laxum	Loose Watermilfoil	Moderate
Nymphoides aquatica	Big Floating Heart	High
Nymphoides cordata	Floating Heart	High
Peltandra sagittifolia	White Arum	High
Polygala hookeri	Hooker's Milkwort	Moderate
Pseudacris ornata	Ornate Chorus Frog	Very High
Rana sevosa	Mississippi Gopher Frog	Very High
Sagittaria isoetiformis	Slender Arrow-head	High
Stylisma aquatica	Water Southern Morning-glory	High
Utricularia olivacea	Piedmont Bladderwort	High
Utricularia purpurea	Purple Bladderwort	High

Management activities are frequently needed to restore sites that have been ditched, drained, and/or filled. Program emphasis for ponds and emergent wetlands is on project level inventory to identify extant examples and identify historical examples which are priority candidates for restoration of species composition and community structure to reflect the natural range of variation for this community. Creation of new ponds can help sustain species in this group.

The key attributes and indicator metrics for this group are the same as for the ecological system ephemeral ponds and emergent wetlands (Table G 45). Forestwide desired conditions as well as desired conditions for ponds and emergent wetlands and species diversity serve as forest plan components for these species. Guidelines include vegetation/wildlife; soil and water; roads; invasive species; herbicides; and administration, facilities, and recreation.

Table G 45. Ponds and emergent wetlands associates key attributes and indicator metrics

Key Attribute	Indicator	Line Item-to-Group Weight
Fire Regime	Percent of System Acres Burned at Desired Return Interval	Moderate
	Percent of System Acres Burned During the Growing Season	Moderate
Distance from Roads	ORV Trail Density	Very High
	Paved Open Road Density	Moderate
	Total Road and Trail Density	High
	Unpaved Gated Road Density	Moderate
	Unpaved Open Road Density	Moderate
Hydrologic Function	Compliance with Hydroligic Function Guidelines	Very High
Ecological System Abundance at Desired Condition	Percent of potential acres with Appropriate System	Very High
Invasive Species Abundance	Compliance with Invasive Species Guidelines	Very High
	Percent of Invasive Species Occupying System	High
	Reduction of Fire Ants	Moderate
Hydrologic Function	Road Crossings Rating	High
Physical Structure	Compliance with Rare Community Physical Structure Guidelines	Very High

Prairie Associates

These species are associated with two rare ecological systems (Jackson prairie and black belt) and occupy open grassy areas with highly calcareous, high pH soils. The herbaceous and grass species are dominated by characteristic prairie species. A list of targeted species associated with this species group can be found in Table G 46. Known sites are now in woodland or sparsely forested due to past land use practices. Many may show signs of erosion such as gullies. Plant species diversity in these understories has likely been adversely affected by past intensive grazing, and use of the prairie openings as wildlife food plots, roads and log landings. Management activities are frequently needed to restore prairie vegetation, enlarge present openings, and restore damage done by past management actions (remove food plots, log landings, etc.), historical fire regimes. Locations of this rare community should be identified and mapped on the Forests. Rapid assessment protocols should be developed to determine sustainability of these species, and species in this group should be protected from ground disturbance, human disturbance, and habitat loss.

Table G 46. Species in prairie associates

Species Name	Common Name	Species-to-Group Weight
Agalinis auriculata	Earleaf False-foxglove	Very High
Agalinis pseudaphylla	Shinner's False-foxglove	Moderate
Asclepias hirtella	Prairie Milkweed	High
Aster ericoides	White Heath Aster	High
Carex microdonta	Small-Toothed Sedge	High
Carya laciniosa	Big Shellbark Hickory	High
Colinus virginianus	Northern Bobwhite	High
Crataegus harbisonii (=C. ashei)	Ashe Hawthorn	High
Crataegus triflora	Three-flower Hawthorn	High
Desmodium ochroleucum	Cream Tick-trefoil	High
Dodecatheon meadia	Shootingstar	High
Echinacea purpurea	Eastern Purple Coneflower	High
Erythronium albidum	White Dog's Tooth Violet	High
Euonymus atropurpureus	Burning Bush	High
Frasera caroliniensis	American Colombo	Moderate
Hexalectris spicata	Crested Coralroot	High
Juglans cinerea	Butternut	Moderate
Marshallia graminifolia var. cynanthera	Broadleaf Barbara's Buttons	Moderate
Polytaenia nuttallii	Prairie Parsley	High
Ponthieva racemosa	Shadow-witch Orchid	High
Prenanthes aspera	Rough Rattlesnake-root	High
Procambarus barbiger	Jackson Prairie Crayfish	Very High
Quercus oglethorpensis	Oglethorpe Oak	Moderate
Rhamnus lanceolata	Lance-leaved Buckthorn	High
Spiranthes magnicamporum	Great Plains Ladies'-tresses	Very High

The key attributes and indicator metrics for this group are the same as for the ecological systems Jackson prairie and woodland and black belt prairie and woodland (Table G 47). The key factor for this ecological system is relative abundance on the landscape and is a vital step in providing for species sustainability. Forestwide desired conditions as well as desired conditions for prairies and species diversity serve as forest plan components for these species. Objectives to restore or maintain prairies help to sustain these species, along with guidelines for vegetation/wildlife; soil and water; roads; fire; and administration, facilities, and recreation.

Table G 47. Prairie associates key attributes and indicator metrics

Key Attribute	Indicator	Line Item-to-Group Weight
Fire Regime	Percent of System Acres Burned at Desired Return Interval	Very High
	Percent of System Acres Burned During the Growing Season	Very High
Distance from Roads	ORV Trail Density	Very High
	Paved Open Road Density	Moderate
	Total Road and Trail Density	High
	Unpaved Gated Road Density	Low
	Unpaved Open Road Density	Moderate
Ecological System Abundance at Desired Condition	Percent of potential acres with appropriate system	Very High
Vegetation Structure	% Open	Very High
Indicator Species Status	Population Trend of purple prairie clover (*Dalea purpurea* Vent.)	Very High
Invasive Species Abundance	Compliance with Invasive Species Guidelines	Very High
	Percent of Invasive Species Occupying System	Very High
	Reduction of Fire Ants	High
Physical Structure	Compliance with Rare Community Physical Structure Guidelines	Very High

Rock Outcrop Associates

Rock outcrops are rare, localized features of the landscape which mainly occur along steep hill slopes, ravines, or river channels where soils have eroded away. They 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 Forests except the De Soto Chickasawhay and Delta units. Although of minor aerial extent, the rock outcrops provide unique quality habitat for several species of animals and plants including Webster's salamander and hairy lipfern.

The primary species associated with rock outcrops on the Forests is Webster's salamander. A list of targeted species associated with this species group can be found in Table G 48. Webster's salamander is found in association with this system and is dependent upon it for thermal refuge. Webster's salamanders are not considered fully covered by ecological diversity forest plan components as they have needs in addition to those covered by their associated ecological systems. Many other herpetofaunal and plant species also depend upon this rare habitat as rock outcrops provide thermal refuge and foraging opportunities for associated species. General management strategy for this species group includes completion of inventory and mapping of the ecological system as part of project planning, training on recognition and ecological function of rare ecosystems, and development of rapid assessment criteria. Management activities are frequently needed to restore hardwood overstories and healthy hydrologic regimes such as springs and seeps that often co-occur with rock outcrops. The inclusion of rock outcrops in designated old-growth or botanical areas should be a priority of the Forests.

Table G 48. Species in rock outcrop associates

Species Name	Common Name	Species-to-Group Weight
Plethodon websteri	Webster's Salamander	High
Cheilanthes lanosa	Hairy lipfern	Very High

The key attributes and indicator metrics for this group are the same as for the ecological systems rock outcrops Table G 49. Implementation monitoring and rapid assessment protocols are the tools used to measure sustainability of both the system and its associated species. Desired conditions and guidelines for the ecological system rock outcrops should cover the sustainability of these species, along with guidelines for vegetation/wildlife.

Table G 49. Rock outcrop associates key attributes and indicator metrics

Key Attribute	Indicator	Line Item-to-Group Weight
Physical Structure	Compliance with Rare Community Physical Structure Guidelines	Very High
Invasive Species Abundance	Compliance with Invasive Species Guidelines	Very High
Invasive Species Abundance	Reduction of Fire Ants	Very High

Seeps, Springs, and Seepage Swamps Associates

Species occurring in this group require forested wetlands in acidic, seepage-influenced habitats. These habitats are usually in deciduous forests or herbaceous communities and are generally found at the base of slopes where seepage flow is concentrated and resulting moisture conditions are saturated or inundated. A list of targeted species associated with this species group can be found in Table G 50. The vegetation is characterized by black gum, tupelo gum, and red maple. Due to excessive wetness, historically these sites have not been as highly disturbed as adjacent upland areas and are protected from fire except during extreme droughty periods. Currently, they are susceptible to damage caused by hydrologic modification, canopy cover reduction, and human disturbance. Local lowering of water tables has caused many seeps and springs to dry during part of the year. Maintenance of saturated to inundated soil conditions are essential to maintenance of the unique forb, grass, and sedge community dependent upon these sites. Without wet conditions, the site would soon be dominated by more xeric species from surrounding habitats. Management activities are frequently needed to maintain canopy closure as appropriate over these communities and to ensure maintenance of the water table. Current information on location and size of this community type is not well documented.

The key characteristics and performance measures for this group are the same as for the ecological system seeps, springs, and seepage swamps Table G 51. Forestwide desired conditions as well as desired conditions for seeps, springs, and seepage swamps serve as forest plan components for these species. Guidelines include vegetation/wildlife; soil and water; roads; invasive species; herbicides; and administration, facilities, and recreation.

Table G 50. Species in seeps, springs and seepage swamps associates

Species Name	Common Name	Species-to-Group Weight
Aster puniceus	Purple-stemmed Aster	Very High
Carex exilis	Coast Sedge	Moderate
Carex stricta	Uptight Sedge	Very High
Chamaecyparis thyoides	Atlantic White Cedar	Very High
Dryopteris ludoviciana	Southern Shield Woodfern	Very High
Dryopteris X australis	Small's Woodfern	Very High
Epidendrum magnoliae = conopseum	Green-fly Orchid	High
Isoetes louisianensis	Louisiana Quillwort	Very High
Isoetes melanopoda	Blackfoot Quillwort	Very High
Isoetes valida	Strong Quillwort	Very High
Lindera subcoriacea	Bog Spicebush	High
Lycopodium cernuum = L. palhinhaea cernua	Nodding Clubmoss	Low
Macranthera flammea	Flame Flower	High
Mimulus ringens	Square-stem Monkey Flower	High
Panicum nudicaule	Naked-stemmed Panic Grass	High
Parnassia grandifolia	Large-leaved Grass-of-Parnassus	Very High
Peltandra sagittifolia	White Arum	Very High
Pinguicula planifolia	Chapman's Butterwort	High
Pinguicula primuliflora	Southern Butterwort	Very High
Platanthera blephariglottis	Large White Fringed Orchid	High
Platanthera integra	Yellow Fringeless orchid	High
Polygala hookeri	Hooker's Milkwort	Moderate
Pseudotriton montanus	Mud Salamander	Very High
Solidago flaccidifolia	Appalachian Goldenrod	Moderate
Spiranthes brevilabris var floridana	Florida Ladies'-tresses	Moderate
Spiranthes longilabris	Giant Spiral Ladies'-tresses	Low
Stylisma aquatica	Water Southern Morning-glory	High
Syngonanthus flavidulus	Yellow Pipewort	Moderate
Trachyxiphium heteroicum (Hookeriopsis heteroica)	Trachyxiphium Moss	Very High
Utricularia olivacea	Piedmont Bladderwort	Moderate
Utricularia purpurea	Purple Bladderwort	Moderate
Uvularia floridana	Florida Bellwort	Low
Xyris drummondii	Drummond's Yellow-eyed Grass	Low

Table G 51. Species in seeps, springs and seepage swamps associates key attributes and indicator metrics

Key Attribute	Indicator	Line Item-to-Group Weight
Fire Regime	Percent of System Acres Burned at Desired Return Interval	Moderate
	Percent of System Acres Burned During the Growing Season	Moderate
Distance from Roads	ORV Trail Density	Very High
	Paved Open Road Density	Moderate
	Total Road and Trail Density	High
	Unpaved Gated Road Density	Low
	Unpaved Open Road Density	High
Ecological System Abundance at Desired Condition	Percent of potential acres with Appropriate System	Very High
Invasive Species Abundance	Compliance with Invasive Species Guidelines	Very High
	Percent of Invasive Species Occupying System	Very High
	Reduction of Fire Ants	High
Hydrologic Function	Compliance with Hydroligic Function Guidelines	Very High
	Road Crossings Rating	High
Persistence of Species Occurrences	Compliance with Species Occurrence Guidelines	Very High
Physical Structure	Compliance with Rare Community Physical Structure Guidelines	Very High

Wet Pine Savanna Associates

These species occupy rare wetland systems of open savannas dominated by grasses, sedges, orchids, and carnivorous plants. A list of targeted species associated with this species group can be found in Table G 52. Occurrences on the Forests typically have too much canopy closure with resultant negative impacts on hydrologic regime.

Carnivorous plants are diagnostic, especially pitcher plants. Pitcher plants range from dominant or co-dominant to sparse, and several species may be present. Where ephemeral ponds and emergent wetlands are interspersed, this is habitat for the endangered Mississippi sandhill crane. Frequent fires, including growing-season burns, are essential for stimulating rich understories of grasses and forbs. Inventory, mapping, and developing rapid assessment protocols are priorities for species sustainability.

Many wet pine savanna sites have been converted to forest or support only depauperate communities due to a long history of exploitation, system drainage and fire suppression. Management activities are frequently needed to restore healthy hydrologic function, historical fire regimes, and characteristic grass-forb understories.

Table G 52. Species in wet pine savanna associates

Species Name	Common Name	Species-to-Group Weight
Agalinis aphylla	Coastal Plain False-foxglove	Very High
Agalinis filicaulis	Thin Stemmed False-foxglove	Very High
Ammodramus henslowii	Henslow's Sparrow	High
Atrytone arogos arogos	Arogos Skipper	High
Calopogon barbatus	Bearded Grass-pink	Very High
Cirsium lecontei	LeConte's Thistle	Very High
Cleistes bifaria (=divaricata)	Small Spreading Pogonia	Very High
Colinus virginianus	Northern Bobwhite	Low
Dalea carnea var. gracilis	Pine Barrens Prairie Clover	High
Eriocaulon texense	Texas Pipewort	Very High
Fallicambarus danielae	Speckled Burrowing Crayfish	High
Gaylussacia frondosa	Dangleberry	High
Grus canadensis pulla	Mississippi Sandhill Crane	Very High
Lachnocaulon digynum	Pineland Bogbutton	Very High
Lycopodium cernuum = L. palhinhaea cernua	Nodding Clubmoss	Moderate
Marshallia graminifolia var. cynanthera	Broadleaf Barbara's Buttons	Moderate
Pinguicula planifolia	Chapman's Butterwort	Very High
Pinguicula primuliflora	Southern Butterwort	Very High
Platanthera blephariglottis	Large White Fringed Orchid	Very High
Platanthera integra	Yellow Fringeless orchid	Very High
Procambarus fitzpatricki	Spiny-tailed Crayfish	High
Pteroglossaspis ecristata (=Eulophia ecristata)	Giant Orchid	High
Rhadinaea flavilata	Pine Woods Snake	High
Rhynchospora macra	Large Beakrush	Very High
Ruellia noctiflora	Night Flowering Ruellia	High
Spiranthes brevilabris var floridana	Florida Ladies'-tresses	High
Spiranthes longilabris	Giant Spiral Ladies'-tresses	Very High
Stylisma aquatica	Water Southern Morning-glory	High
Xyris drummondii	Drummond's Yellow-eyed Grass	High

The key attributes and indicator metrics for this group are the same as for the ecological system wet pine savanna (Table G 53). Relative abundance is the key factor for restoration of this ecological system and is a vital in providing for species sustainability. Forestwide desired conditions as well as desired conditions for wet pine savannas and species diversity serve as forest plan components for these species. Objectives for restoration of wet pine savanna also sustain this species group; along with guidelines for vegetation/wildlife; soil and water; roads; herbicides; and administration, facilities, and recreation.

Table G 53. Wet pine savanna associates key attributes and indicator metrics

Target Type	Target Name	Key Attribute	Indicator	Line Item-to-Group Weight
ES	Wet Pine Savanna	Fire Regime	Percent of System Acres Burned at Desired Return Interval	Very High
ES			Percent of System Acres Burned During the Growing Season	Very High
ES		Distance from Roads	ORV Trail Density	Very High
ES			Paved Open Road Density	Moderate
ES			Total Road and Trail Density	High
ES			Unpaved Gated Road Density	Low
ES			Unpaved Open Road Density	Moderate
ES		Ecological System Abundance at Desired Condition	Percent of potential acres with Appropriate System	Very High
ES		Vegetation Structure	% Open	Very High
ES		Indicator Species Status	Population Trend of yellow trumpets (*Sarracenia alata* Alph. Wood)	High
ES		Invasive Species Abundance	Compliance with Invasive Species Guidelines	Very High
ES			Percent of Invasive Species Occupying System	Very High
ES			Reduction of Fire Ants	Very High
SG	Wet Pine Savanna Associates	Habitat Element Abundance	Compliance with Den Tree Guidelines	Very High
SG			Compliance with Downed Wood Guidelines	Very High
SG			Compliance with Snag Guidelines	Very High
SG			Compliance with Stump and Stump-hole Guidelines	Very High
SG		Hydrologic Function	Compliance with Hydroligic Function Guidelines	Very High

Xeric Sandhill Associates

Xeric sandhills are a unique habitat type in Mississippi and are a vital component of many species ecological needs. For planning purposes, they have been defined as gopher tortoise priority soils and are the driest of the upland sites occurring on the Chickasawhay and De Soto NFs. All management decisions made within these areas should focus on sustainability of the federally threatened gopher tortoise. A list of all targeted species associated with this species group can be found in Table G 54. The tortoise serves as a keystone species for many species on this list. Its burrows provide habitat otherwise unavailable for many of these species.

The key attributes and indicator metrics for this group are the same as for the ecological system xeric sandhills (Table G 55). Forestwide desired conditions as well as desired conditions for longleaf pine, xeric sandhills, and species diversity serve as forest plan components for these species. Objectives to restore or

maintain xeric sandhills and woodland condition in longleaf pine forest help to sustain these species, along with guidelines for vegetation/wildlife; roads; fire; and administration, facilities, and recreation.

Table G 54. Species in xeric sandhills associates

Species Name	Common Name	Species-to-Group Weight
Colinus virginianus	Northern Bobwhite	Moderate
Crotalus adamanteus	Eastern Diamondback Rattlesnake	High
Gopherus polyphemus	Gopher Tortoise	Very High
Heterodon simus	Southern Hognose Snake	Very High
Ophisaurus mimicus	Mimic Glass Lizard	High
Peromyscus polionotus	Oldfield Mouse	Very High
Picoides borealis	Red-cockaded Woodpecker	Moderate
Pituophis melanoleucus lodingi	Black Pine Snake	High
Quercus minima	Dwarf Live Oak	Very High
Stylisma pickeringii var pattersonii	Patterson's Bindweed	Very High

Table G 55. Xeric sandhills associates key attributes and indicator metrics

Target Type	Target Name	Key Attribute	Indicator	Line Item-to-Group Weight
ES	Xeric Sandhills	Fire Regime	% System Acres Burned at Desired Return Interval	Very High
ES			% System Acres Burned During the Growing Season	Very High
ES		Distance from Roads	Total Road and Trail Density	High
ES		Ecological System Abundance at Desired Condition	% Ecological System Acres at Desired Condition	Very High
ES			% potential acres with Appropriate System	Very High
ES		Forest Age Diversity	% Mature Forest	Moderate
ES			% Old Forest	Moderate
ES			% Regenerating Forest	Moderate
ES		Vegetation Structure	% Mature Open and Sparse Canopy	Very High
ES			% Old-growth	Moderate
ES		Invasive Species Abundance	Compliance with Invasive Species Guidelines	Very High
ES			% Invasive Species Occupying System	Very High
ES			Reduction of Fire Ants	Very High
ES		Understory Composition	Compliance with Understory Composition Guidelines	Very High
SG	Xeric Sandhill Associates	Habitat Element Abundance	Compliance with Den Tree Guidelines	Very High
SG			Compliance with Downed Wood Guidelines	Very High
SG			Compliance with Snag Guidelines	Very High
SG			Compliance with Stump and Stump-hole Guidelines	Very High

G.3.4 Terrestrial Species Groups Requiring Additional Forest Plan Components

This section provides details on groups of species that require further forest plan components in addition to those already provided by ecological diversity. Management strategies and appropriate forest plan components are described for each group. Species groups contain threatened and endangered, regional forester's sensitive species, and locally rare species arranged together for analysis purposes. These groups represent small spatial scales and groups of species associated with localized conditions and features that cross ecosystem boundaries. A list of targeted species groups needing additional forest plan components can be found in Table G 56. Targeted species within each group are in a table as each group is discussed.

Table G 56. Species groups requiring additional forest plan components

Species Group	Species Group
Bat Roost Structure Group	Species Sensitive to Hydrologic Modification of Wetlands
Den Tree Associates	Species Sensitive to Recreational Traffic (Terrestrial and Non-riverine Aquatic)
Downed Wood Associates	Species Needing Occurrence Protection
Forest Interior Birds	Stump and Stump-hole Associates
Species Sensitive to Fire Injury	Calciphiles
Snag Associates	Species Sensitive to Canopy Cover Modifications
Species Dependant on Fire to Maintain Habitat	Species Sensitive to Soil Disturbance

Bat Roost Structure Group

Bat species generally live in mature riparian areas on the Forests. They utilize bridges, cisterns, culverts, old abandoned houses, leaf litter, snags, and branches, bark, and cavities of live trees as roosts. They are insectivores and require some proximity to water. A list of targeted species associated with this species group can be found in Table G 57.

Table G 57. Species in bat roost structure group

Species Name	Common Name	Species-to-Group Weight
Corynorhinus rafinesquii	Rafinesque's Big-eared Bat	Very High
Lasiurus intermedius	Northern Yellow Bat	Very High
Myotis austroriparius	Southeastern Myotis	Very High

Forest Plan Components

It is assumed that if the surrounding riparian area contains mature to old-growth closed-canopy forest with little or no unnatural disturbance, a sustainable amount of roost and hibernacula should be present. Ecological system sustainability forest plan components include desired conditions for floodplain forests, ephemeral ponds and emergent wetlands, and species diversity; and objectives for floodplain forests (Table G 58).

Table G 58. Bat roost structure key attributes and indicator metrics

Target Type	Target Name	Key Attribute	Indicator	Line Item-to-Group Weight
SG	Bat Roost Structure Group	Bat Roost Structure Availability	Compliance with Den Tree Protection Guidelines	Very High
SG			Compliance with Man-made Roost Structure Guidelines	Moderate
SG			Compliance with Snag Protection Guidelines	Very High
SG		Habitat Element Abundance	Compliance with Bat Roost Structure Guidelines	Very High
SG			Compliance with Den Tree Guidelines	Very High
SG			Compliance with Snag Guidelines	Very High
ES	Upland Longleaf Pine Forest and Woodland	Forest Age Diversity	% Mature Forest	High
ES			% Old Forest	Very High
ES	Southern Dry Upland Hardwood Forest	Forest Age Diversity	% Mature Forest	High
ES			% Old Forest	Very High
ES	Southern Mesic Slope Forest	Forest Age Diversity	% Mature Forest	High
ES			% Old Forest	Very High
ES	Floodplain Forest	Forest Age Diversity	% Mature Forest	High
ES			% Old Forest	Very High
ES	Loblolly Pine Forest	Forest Age Diversity	% Mature Forest	High
ES	Slash Pine Forest	Forest Age Diversity	% Mature Forest	High
ES	Shortleaf Pine-Oak Forest and Woodland	Forest Age Diversity	% Mature Forest	High
ES			% Old Forest	High

Although ecological system forest plan components should supply ample amounts of suitable habitat for bats, there are additional needs for this group. It is necessary to retain snags and cavity trees for potential roosting by bats. Forest plan provisions to retain this habitat element help to insure sustainability of these species. In addition, human disturbance can interfere with roosting behavior and removal of existing artificial habitat can limit reproductive and foraging activity. Bridges, cisterns, and culverts should be checked for presence of bats before removal or modification of structure and alternative habitat should be provided when necessary.

The following guidelines were developed specifically for species in this group or address specific needs for this group:

- 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 alternate roosts suitable for the species and colony size should be provided prior to adverse modification or destruction when feasible.
- New road bridge construction should include bat friendly technology and construction materials to provide roosting habitat for bat species-of-concern and species-of-interest.

- Planning and implementation of road construction, fireline construction, wildlife pond and opening construction, timber harvests, and other ground disturbing projects should include appropriate measures to provide protection for known occurrences of rare species.

Management Strategies

Beyond providing natural habitat, opportunities exist to enhance habitat by utilizing bat friendly bridge panels in future bridge reconstruction on the National Forests in Mississippi. Artificial roost installation can also improve bat habitat. Retention of snags and cavity trees during project implementation should create natural roosting structure for bats, and creation of vernal ponds should increase foraging areas for bats. Partnerships may foster bat habitat improvement projects.

Den Tree Associates

Den trees include cavities in both dead and live trees that are found in a variety of hardwood and softwood tree species. The species in this group require cavities or den trees for reproduction, shelter, and/or hibernation. A list of targeted species associated with this species group can be found in Table G 59. Large diameter hollow trees provide important denning habitat for the federally threatened black bear in Mississippi. Den trees are also important for sustaining the red-cockaded woodpecker and provide refuge for many other species including bats, small mammals, and amphibians and reptiles. It is necessary to recruit and retain these trees in areas where those species occur (Table G 60). Several bat species that are regional forester's sensitive species or locally rare species are included under the bat roost structure group description.

Table G 59. Species in den tree associates

Species Name	Common Name	Species-to-Group Weight
Aix sponsa	Wood Duck	High
Corynorhinus rafinesquii	Rafinesque's Big-eared Bat	High
Falco sparverius paulus	Southeastern American Kestrel	High
Myotis austroriparius	Southeastern Myotis	High
Picoides borealis	Red-cockaded Woodpecker	Very High
Ursus americanus	Black Bear	Very High
Ursus americanus luteolus	Louisiana Black Bear	Very High

Table G 60. Den tree associates key attributes and indicator metrics

Target Type	Target Name	Key Attribute	Indicator	Line Item-to-Group Weight
ES	Upland Longleaf Pine Forest and Woodland	Forest Age Diversity	% Mature Forest	High
ES			% Old Forest	Very High
ES		Vegetation Structure	% Old-growth	Very High
ES	Southern Dry Upland Hardwood Forest	Forest Age Diversity	% Mature Forest	High
ES			% Old Forest	Very High
ES	Southern Mesic Slope Forest	Forest Age Diversity	% Mature Forest	High
ES			% Old Forest	Very High
ES	Floodplain Forest	Forest Age Diversity	% Mature Forest	High
ES			% Old Forest	Very High
ES		Vegetation Structure	% Old-growth	Very High
ES	Loblolly Pine Forest	Forest Age Diversity	% Mature Forest	High
ES		Vegetation Structure	% Old-growth	Very High
ES	Slash Pine Forest	Forest Age Diversity	% Mature Forest	High
ES		Vegetation Structure	% Old-growth	Very High
SG	Den Tree Associates	Habitat Element Abundance	Compliance with Den Tree Guidelines	Very High

Forest Plan Components

It is assumed that sustainable populations of this species group will persist if intact mature riparian areas are maintained through filter strips, enhanced stream management zones, and protection of bottomland hardwood forests. Relative abundance of cavity trees would increase during this process. Assuming that mature forests and woodlands are present on the landscape and the additional forest plan components (guidelines) listed below are followed during vegetation management treatments, cavities available for nesting should remain abundant. Tree age diversity and presence of old-growth for all forested ecological systems is a surrogate measure for den tree associates. Ecological system sustainability forest plan components include desired conditions for forestwide ecosystem diversity, all forested ecological systems, streams and rivers, old-growth, and species diversity; objectives include those for floodplain forests and old-growth; and guidelines are those for soil and water sustainability.

Although ecosystem diversity forest plan components should supply ample amounts of suitable habitat for den tree associates, there are additional needs for this group. It is necessary to retain snags and cavity trees for potential use by species in this group. Forest plan provisions to retain this habitat element help to insure species sustainability.

The following guidelines would apply to den tree associates:

- Stumps, standing snags, and den trees should generally be retained to maintain structural diversity during vegetation management treatments. Exceptions may be made when necessary for insect or disease control or to provide for public and employee safety. Distribution of retained snags may be clumped.
- For as long as they remain suitable, known black bear den sites should be protected by prohibiting vegetation management and ground disturbing activities within a minimum of 100 feet around the den.

- 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 d.b.h. containing visible cavities.
- Planning and implementation of road construction, fireline construction, wildlife pond and opening construction, timber harvests, and other ground disturbing projects should include appropriate measures to provide protection for known occurrences of rare species.

Management Strategies

The key factors for sustainability of this group are recruitment of new den/cavity trees and retention of existing trees. Both of these can be measured through implementation monitoring using guidelines. Artificial cavity installation may be necessary for some of these species. Partnerships may enhance improvement of den tree species sustainability on the Forests.

Downed Wood Associates

Species in this association require downed and decaying wood for some vital part of their life history. A list of targeted species associated with this species group can be found in Table G 61. Downed wood provides shelter for many species and their prey items. Mississippi gopher frog, Webster's salamander, ornate chorus frog, mud salamander, and pine woods snake are all tied to downed wood for some portion of their life cycle. The Trachyxiphium moss grows on permanently wet downed wood and cannot survive without it. Past forestry practices in Mississippi included removing stumps during vegetative management treatments. Retention of downed wood is essential for these species which is why retention guidelines are vital (Table G 62).

Table G 61. Species in downed wood associates

Species Name	Common Name	Species-to-Group Weight
Crotalus adamanteus	Eastern Diamondback Rattlesnake	Low
Hemidactylium scutatum	Four-toed Salamander	Low
Heterodon simus	Southern Hognose Snake	Moderate
Ophisaurus mimicus	Mimic Glass Lizard	Moderate
Pituophis melanoleucus lodingi	Black Pine Snake	Moderate
Plethodon websteri	Webster's Salamander	High
Pseudacris ornata	Ornate Chorus Frog	Moderate
Pseudotriton montanus	Mud Salamander	Moderate
Rana sevosa	Mississippi Gopher Frog	Very High
Rhadinaea flavilata	Pine Woods Snake	High
Trachyxiphium heteroicum (Hookeriopsis heteroica)	Trachyxiphium Moss	High

Table G 62. Downed wood associates key attributes and indicator metrics

Target Type	Target Name	Key Attribute	Indicator	Line Item-to-Group Weight
SG	Downed Wood Associates	Habitat Element Abundance	Compliance with Downed Wood Guidelines	Very High

Forest Plan Components

Forestwide desired conditions as well as desired conditions for each forested ecological system and species diversity serve as ecological system sustainability forest plan components for these species. Objectives to restore or maintain mature and old-growth forest help to sustain these species.

Although ecological system sustainability forest plan components should supply ample amounts of suitable habitat, there are additional needs for this group. Given that past management practices have allowed for the removal of stumps, it is necessary to create additional forest plan components for their retention. Forest plan provisions to retain these habitat elements help to insure species sustainability.

The following guidelines would apply to this species group:

- 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.
- Planning and implementation of road construction, fireline construction, wildlife pond and opening construction, timber harvests, and other ground disturbing projects should include appropriate measures to provide protection for known occurrences of rare species.
- Historical skid roads, haul roads, log landings, and mechanical firelines should be reused.

Management Strategies

The major strategy for this group is the recruitment of new downed wood, stumps, and stump holes and retention of existing ones at the project level. Retention and recruitment can be measured through implementation monitoring and guidelines. It is assumed that the abundance of these habitat elements can be indirectly measured by the presence of mature and old-growth forest and woodland. Sustainable amounts of mature and old-growth forest in combination with retention guidelines provide downed wood into ecological systems. Guidelines for stump retention and minimization of ground disturbance are essential when considering the sustainability of species within this group. Although fire can destroy downed wood on the ground, it should not be excluded from use. The mud salamander and pine woods snakes occur in areas sufficiently moist to prevent fire from destroying downed wood in all but the driest of times. Forest plan guidance would limit direct firing and suggest that only low intensity flames should be used in these areas. The ornate chorus frog is an upland species and fire is critical to sustaining its habitat. Although fire may destroy some downed wood used by this species, having a sustainable supply of downed wood recruited into the system by a mature forest should be sufficient to sustain the species.

Forest Interior Birds

Forest interior birds require intact mature forests with no permanent fragmentation by agricultural or urban development. A list of targeted species associated with this species group can be found in Table G 63. Some fragmentation may be present as a result of timber harvesting, however this may only cause a temporary reduction in habitat for forest interior species. In most large landscapes, the needs of early successional species can be met quickly through various sources of disturbance, including timber harvesting. Much more time, however, is required to develop suitable habitat for species that require mature forest and other attributes (Table G 64). Effective conservation strategies must focus on maintaining adequate amounts of mature forest at any point in time.

Table G 63. Species in forest interior birds group

Species Name	Common Name	Species-to-Group Weight
Limnothlypis swainsonii	Swainson's Warbler	High
Hylocichla mustelina	Wood Thrush	High

Table G 64. Forest interior birds group key attributes and indicator metrics

Target Type	Target Name	Key Attribute	Indicator	Line Item-to-Group Weight
ES	Shortleaf Pine-Oak Forest and Woodland	Distance from Roads	ORV Trail Density	Moderate
ES			Paved Open Road Density	High
ES			Total Road and Trail Density	High
ES			Unpaved Gated Road Density	Moderate
ES			Unpaved Open Road Density	High
ES		Forest Age Diversity	% Mature Forest	High
ES	Northern Dry Upland Hardwood Forest	Distance from Roads	ORV Trail Density	Moderate
ES			Paved Open Road Density	High
ES			Total Road and Trail Density	High
ES			Unpaved Gated Road Density	Moderate
ES			Unpaved Open Road Density	High
ES		Forest Age Diversity	% Mature Forest	High
ES	Northern Mesic Hardwood Forest	Distance from Roads	ORV Trail Density	Moderate
ES			Paved Open Road Density	High
ES			Total Road and Trail Density	High
ES			Unpaved Gated Road Density	Moderate
ES			Unpaved Open Road Density	High
ES		Forest Age Diversity	% Mature Forest	High
ES	Floodplain Forest	Distance from Roads	ORV Trail Density	Moderate
ES			Paved Open Road Density	High
ES			Total Road and Trail Density	High
ES			Unpaved Gated Road Density	Moderate
ES			Unpaved Open Road Density	High
ES		Forest Age Diversity	% Mature Forest	High
SG	Forest Interior Birds	Forest Interior Abundance	Compliance with Forest Interior Guidelines	Very High
SG		Habitat Element Abundance	Compliance with Hard Mast Guidelines	High
SG			Compliance with Snag Guidelines	High
SG		Landscape Composition	% in Predominately Forested Landscapes	Very High

Forest Plan Components

Relative abundance of mature forest is a key factor for this species group, as is tree age diversity for all forested ecological systems. Forestwide desired conditions for ecosystem diversity, desired conditions for each forested ecological system, and species diversity desired conditions serve as forest plan components for these species. Objectives to restore or maintain mature and old-growth forest help to sustain these species.

Although ecological system sustainability forest plan components help to sustain these species, more guidance is needed for sustainability of forest interior species on the National Forests in Mississippi. Planning forest regeneration in a matrix designed to sustain contiguous mature forest over time is of critical importance to these species.

The following guidelines would apply to forest interior bird associates:

- When planning stand regeneration, priority should be placed on locating new stands adjacent to existing young or regenerating stands to maximize the amount of contiguous forest. In accomplishing this, maximum regeneration opening sizes should be considered.
- 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. Openings should be considered regeneration for 10 years.
- New communication tower installation and ridge-top developments should be designed to mitigate collision impacts to migratory birds through coordination of project planning and implementation with the US Fish and Wildlife Service.
- When considering regeneration timber harvests, openings should be shaped and blended to the extent practicable with the natural terrain.

Management Strategies

Emphasis should be placed on maintaining contiguous blocks of mature forest to sustain these species. New treatments should be placed adjacent to young stands to allow for a sustained future of mature contiguous forest. This will temporarily increase the percentage of young forest, but it will contribute to the overall sustainability of interior species in the future and the effects should be minimized by not having more than 10 percent of the forest in young or regenerating condition at any given time.

Species Sensitive to Fire Injury

Individuals of these species are sensitive to fire injury. A list of targeted species associated with this species group can be found in Table G 65. Gopher frogs can be injured by effects of direct fire and fire can harm red-cockaded woodpecker cavity trees and fledglings. Atlantic white cedar has no fire tolerance and should be protected from fire. Oglethorpe oak, butternut, and big shellbark hickory have thin bark which makes them susceptible to negative effects from fire. Arogos skippers are both dependent upon fire to maintain their habitat and sensitive to injury of individuals and populations caused by fire. The rest of the species in this group occur in areas where only low intensity fires should occur, however, fires can occur in these areas resulting in death of individuals.

Table G 65. Species sensitive to fire injury

Species Name	Common Name	Species-to-Group Weight
Atrytone arogos arogos	Arogos Skipper	Very High
Carex impressinervia	Ravine Sedge	Very High
Carya laciniosa	Big Shellbark Hickory	High
Celastrus scandens	Climbing Bittersweet	High
Chamaecyparis thyoides	Atlantic White Cedar	Very High
Cornus alternifolia	Alternate-leaf Dogwood	High
Cypripedium parviflorum	Small Yellow Lady's-slipper	Very High
Cypripedium pubescens	Yellow Lady's-slipper	Very High
Galearis spectabilis	Showy Orchis	Very High
Juglans cinerea	Butternut	Very High
Matelea oblique	Climbing Milkweed	High
Pachysandra procumbens	Allegheny-spurge	Very High
Panax quinquefolius	American Ginseng	Very High
Physalis carpenter	Carpenter's Ground-cherry	Very High
Picoides borealis	Red-cockaded Woodpecker	Low
Quercus oglethorpensis	Ogelthorpe Oak	Very High
Rana sevosa	Missisippi Gopher Frog	Low
Schisandra glabra	Bay Starvine	High
Trillium foetidissimum	Fetid Trillium	Moderate
Triphora trianthophora	Three Birds Orchid	Very High
Uvularia floridana	Florida Bellwort	High

Forest Plan Components

These species would be partially covered by forest plan components for mesic ecological systems, including those related to fire, which indicates only low intensity fire should be used (Table G 66). However, species in this group are especially sensitive to the direct effects of fire, and care should be taken whenever fire is used in areas where they are known to occur. There are no direct key characteristics for this group, however project monitoring can determine if damage is occurring to species. These species are limited in occurrence on the Forests; therefore implementation of special provisions at the project level should not interfere with completion of work.

The following guidelines specific to these species should be used:

- Planning and implementation of prescribed burns should include measures to provide protection for known occurrences of threatened and endangered, regional forester's sensitive species, 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.
- Planning and implementation of road construction, fireline construction, wildlife pond and opening construction, timber harvests, and other ground disturbing projects should include appropriate measures to provide protection for known occurrences of rare species.

Table G 66. Species sensitive to fire injury key attributes and indicators

Key Attribute	Indicator	Line Item-to-Group Weight
Fire Regime	Percent of System Acres Burned at Desired Return Interval	Very High
Fire Regime	Percent of System Acres Burned During the Growing Season	Very High
Fire Regime	Compliance with Prescribed Fire Guidelines	Very High

Management Strategies

When developing burn plans, the following should be considered at a minimum for all species in this group:

- Are any species from this group present or have potential to be present in project area?
- Is species habitat present in project area?
- What are the negative effects of fire to species?
- What protective measures can be performed to reduce impacts to species, i.e. burning during specific part of life-cycle (hibernation, non-breeding, dormancy, etc); protecting individuals from direct effects of fire; protecting duff layer in mesic areas; etc.?
- Are there sufficient populations of this species adjacent to the project area to re-populate after the project?
- Are there any additional techniques that can be used to reduce impacts?

Consideration of these questions and guidelines should provide for species in this group.

Snag Associates

Species in this association require standing snags for some vital part of their life history. A list of targeted species associated with this species group can be found in Table G 67. Standing snags provide shelter for many species and their prey items. Past forestry practices in Mississippi included removing standing snags during vegetative management treatments.

If retention / recruitment guidelines and other guidelines pertinent to creation of snags are followed, and there is a forestwide level of 30 percent mature and 10 percent old-growth forest that is within good or very good rating criteria, then we assume that we are adequately providing enough snags to sustain dependent species (Table G 68). Ecological system sustainability forest plan components include desired conditions for all associated ecological systems and specific guidelines.

Table G 67. Snag associates

Species Name	Common Name	Species-to-Group Weight
Aix sponsa	Wood Duck	Moderate
Falco sparverius paulus	Southeastern American Kestrel	Moderate
Drycopus pileatus	Pileated Woodpecker	Very High

Table G 68. Snag associates key attributes and indicator metrics

Target Type	Target Name	Key Attribute	Indicator	Line Item-to-Group Weight
SG	Snag Associates	Habitat Element Abundance	% of Benchmark Acres of Mature Forest Systems	High
SG			% of Benchmark Acres of Old Forest Systems	High
SG			Compliance with Snag Guidelines	Very High

Forest Plan Components

Forestwide desired conditions as well as desired conditions for each forested ecological system and species diversity serve as ecological system sustainability forest plan components for these species. Objectives to restore or maintain mature and old-growth forest help to sustain these species.

Although ecological system sustainability forest plan components should supply ample amounts of suitable habitat, there are additional needs for this group. Given that past management practices have allowed for the removal of stumps, it is necessary to create additional forest plan components for their retention. Forest plan provisions to retain these habitat elements help to insure species sustainability.

The following guidelines would apply to this species group:

- Stumps, standing snags, and den trees should generally be retained to maintain structural diversity during vegetation management treatments. Exceptions may be made when necessary for insect or disease control or to provide for public and employee safety. Distribution of retained snags may be clumped.
- Planning and implementation of road construction, fireline construction, wildlife pond and opening construction, timber harvests, and other ground disturbing projects should include appropriate measures to provide protection for known occurrences of rare species.
- Historical skid roads, haul roads, log landings, and mechanical firelines should be reused.

Management Strategies

The major strategy for this group is the recruitment of new snags and retention of existing ones at the project level. Retention and recruitment can be measured through implementation monitoring and guidelines. It is assumed that the abundance of these habitat elements can be indirectly measured by the presence of mature and old-growth forest and woodland. Sustainable amounts of mature and old-growth forest in combination with retention guidelines provide snags into ecological systems. Guidelines for snag retention and minimization of ground disturbance are essential when considering the sustainability of species within this group. Although fire can destroy snags, it should not be excluded from use.

Species Dependent on Fire to Maintain Habitat

Many species of the southeastern forest depend on fire to maintain the health and wellbeing of their habitat. Prescribed burning is an important management tool in a healthy fire-adapted ecosystem by recycling nutrients back to the soil and increasing plant diversity and growth patterns. The season, frequency, frequency, and intensity of fire are critical variables that should be used based on the existing and desired vegetative communities and featured species. A list of targeted species associated with this species group can be found in Table G 69.

Table G 69. Species dependent on fire to maintain habitat

Species Name	Common Name	Species-to-Group Weight
Agalinis aphylla	Coastal Plain False-foxglove	Very High
Agalinis auriculata	Earleaf False-foxglove	Very High
Agalinis filicaulis	Thin Stemmed False-foxglove	Very High
Agalinis pseudaphylla	Shinner's False-foxglove	Very High
Aimophila aestivalis	Bachman's Sparrow	Very High
Ammodramus henslowii	Henslow's Sparrow	High
Aristida simpliciflora	Southern Three-awned Grass	Very High
Asclepias hirtella	Prairie Milkweed	Very High
Aster ericoides	White Heath Aster	Very High
Atrytone arogos arogos	Arogos Skipper	Very High
Calopogon barbatus	Bearded Grass-pink	Very High
Carex exilis	Coast Sedge	Very High
Carex microdonta	Small-Toothed Sedge	High
Cirsium lecontei	LeConte's Thistle	Very High
Cleistes bifaria (=divaricata)	Small Spreading Pogonia	Very High
Colinus virginianus	Northern Bobwhite	Very High
Crataegus harbisonii (=C. ashei)	Ashe Hawthorn	Very High
Crataegus triflora	Three-flower Hawthorn	Very High
Crotalus adamanteus	Eastern Diamondback Rattlesnake	High
Dalea carnea var. gracilis	Pine Barrens Prairie Clover	Very High
Desmodium ochroleucum	Cream Tick-trefoil	Very High
Echinacea purpurea	Eastern Purple Coneflower	High
Eleocharis melanocarpa	Black-fruited Spikerush	High
Eleocharis robbinsii	Robbins Spikerush	Moderate
Eleocharis tricostata	Three-angled Spikerush	Moderate
Eriocaulon texense	Texas Pipewort	Very High
Falco sparverius paulus	Southeastern American Kestrel	Moderate
Fallicambarus danielae	Speckled Burrowing Crayfish	Very High
Fallicambarus gordoni	Camp Shelby Burrowing Crayfish	Very High
Gaylussacia frondosa	Dangleberry	Very High
Grus canadensis pulla	Mississippi Sandhill Crane	Very High
Heterodon simus	Southern Hognose Snake	High
Isoetes louisianensis	Louisiana Quillwort	High
Lachnocaulon digynum	Pineland Bogbutton	Very High
Lindera subcoriacea	Bog Spicebush	High
Linum macrocarpum	Spring Hill flax	Very High
Lobelia appendiculata	Appendaged Lobelia	High
Lycopodium cernuum = L. palhinhaea cernua	Nodding Clubmoss	High
Macranthera flammea	Flame Flower	High
Marshallia graminifolia var. cynanthera	Broadleaf Barbara's Buttons	High
Ophisaurus mimicus	Mimic Glass Lizard	Very High

Species Name	Common Name	Species-to-Group Weight
Panicum nudicaule	Naked-stemmed Panic Grass	Very High
Parnassia grandifolia	Large-leaved Grass-of-Parnassus	High
Peltandra sagittifolia	White Arum	High
Peromyscus polionotus	Oldfield Mouse	Very High
Picoides borealis	Red-cockaded Woodpecker	Very High
Pinguicula planifolia	Chapman's Butterwort	Very High
Pinguicula primuliflora	Southern Butterwort	High
Pituophis melanoleucus lodingi	Black Pine Snake	Very High
Platanthera blephariglottis	Large White Fringed Orchid	Very High
Platanthera integra	Yellow Fringeless orchid	Very High
Polygala hookeri	Hooker's Milkwort	Very High
Polygala leptostachys	Slender Spike Milkwort	Very High
Polytaenia nuttallii	Prairie Parsley	Very High
Prenanthes aspera	Rough Rattlesnake-root	High
Procambarus barbiger	Jackson Prairie Crayfish	Very High
Procambarus fitzpatricki	Spiny-tailed Crayfish	Very High
Pteroglossaspis ecristata (=Eulophia ecristata)	Giant Orchid	Very High
Quercus minima	Dwarf Live Oak	Very High
Rhadinaea flavilata	Pine Woods Snake	Moderate
Rhamnus lanceolata	Lance-leaved Buckthorn	High
Rhynchospora crinipes	Hairy Peduncled Beakrush	High
Rhynchospora macra	Large Beakrush	Very High
Rhynchospora stenophylla	Chapman Beakrush	Very High
Ruellia noctiflora	Night Flowering Ruellia	High
Spiranthes brevilabris var floridana	Florida Ladies'-tresses	High
Spiranthes longilabris	Giant Spiral Ladies'-tresses	Very High
Spiranthes magnicamporum	Great Plains Ladies'-tresses	Very High
Syngonanthus flavidulus	Yellow Pipewort	Very High
Xyris drummondii	Drummond's Yellow-eyed Grass	Very High
Xyris scabrifolia	Harper's Yellow-eyed Grass	Very High

Forest plan Components

Ecological system sustainability components include desired conditions for forestwide ecosystem diversity, all ecological systems, old-growth, and guidelines for prescribed burning (Table G 70).

The following guidelines would apply to this species group:

- Planning and implementation of prescribed burns should include measures to provide protection for known occurrences of threatened and 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.

- 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.
- Existing barriers (e.g., streams, lakes, wetlands, roads, and trails) should be used whenever possible to reduce the need for fireline construction and to minimize resource impacts.

Table G 70. Species dependent on fire to maintain habitat sample performance measures, may vary by location and unit

Target Type	Target Name	Key Attribute	Indicator	Line Item-to-Group Weight
ES	Upland Longleaf Pine Forest and Woodland	Fire Regime	Percent of System Acres Burned at Desired Return Interval	Very High
ES			Percent of System Acres Burned During the Growing Season	Very High
ES		Ecological System Abundance at Desired Condition	Percent of potential acres with Appropriate System	Very High
ES		Invasive Species Abundance	Compliance with Invasive Species Guidelines	Very High
ES			Percent of Invasive Species Occupying System	Very High
ES			Reduction of Fire Ants	Very High
ES	Southern Dry Upland Hardwood Forest	Fire Regime	Percent of System Acres Burned at Desired Return Interval	Moderate
ES			Percent of System Acres Burned During the Growing Season	Moderate
ES		Ecological System Abundance at Desired Condition	Percent of potential acres with Appropriate System	Moderate
ES		Invasive Species Abundance	Compliance with Invasive Species Guidelines	Moderate
ES			Percent of Invasive Species Occupying System	Moderate
ES			Reduction of Fire Ants	Moderate
ES	Near-coast Pine Flatwoods	Fire Regime	Percent of System Acres Burned at Desired Return Interval	Very High
ES			Percent of System Acres Burned During the Growing Season	Very High
ES		Ecological System Abundance at Desired Condition	Percent of potential acres with Appropriate System	Very High
ES		Invasive Species Abundance	Compliance with Invasive Species Guidelines	Very High
ES			Percent of Invasive Species Occupying System	Very High
ES			Reduction of Fire Ants	Very High

Target Type	Target Name	Key Attribute	Indicator	Line Item-to-Group Weight
ES	Xeric Sandhills	Fire Regime	Percent of System Acres Burned at Desired Return Interval	Very High
ES			Percent of System Acres Burned During the Growing Season	Very High
ES		Ecological System Abundance at Desired Condition	Percent of potential acres with Appropriate System	Very High
ES		Invasive Species Abundance	Compliance with Invasive Species Guidelines	Very High
ES			Percent of Invasive Species Occupying System	Very High
ES			Reduction of Fire Ants	Very High
ES	Wet Pine Savanna	Fire Regime	Percent of System Acres Burned at Desired Return Interval	Very High
ES			Percent of System Acres Burned During the Growing Season	Very High
ES		Ecological System Abundance at Desired Condition	Percent of potential acres with Appropriate System	Very High
ES		Invasive Species Abundance	Compliance with Invasive Species Guidelines	Very High
ES			Percent of Invasive Species Occupying System	Very High
ES			Reduction of Fire Ants	Very High
ES	Herbaceous Seepage Bogs and Flats	Fire Regime	Percent of System Acres Burned at Desired Return Interval	Very High
ES			Percent of System Acres Burned During the Growing Season	Very High
ES		Ecological System Abundance at Desired Condition	Percent of potential acres with Appropriate System	Very High
ES		Invasive Species Abundance	Compliance with Invasive Species Guidelines	Very High
ES			Percent of Invasive Species Occupying System	Very High
ES			Reduction of Fire Ants	Very High
ES	Loblolly Pine Forest	Fire Regime	Percent of System Acres Burned at Desired Return Interval	Very High
ES			Percent of System Acres Burned During the Growing Season	Very High
ES		Ecological System Abundance at Desired Condition	Percent of Ecological System Acres at Desired Condition	Very High
ES		Invasive Species Abundance	Compliance with Invasive Species Guidelines	Very High
ES			Percent of Invasive Species Occupying System	Very High
ES			Reduction of Fire Ants	Very High

Target Type	Target Name	Key Attribute	Indicator	Line Item-to-Group Weight
ES	Slash Pine Forest	Fire Regime	Percent of System Acres Burned at Desired Return Interval	Very High
ES			Percent of System Acres Burned During the Growing Season	Very High
ES		Ecological System Abundance at Desired Condition	Percent of Ecological System Acres at Desired Condition	Very High
ES		Invasive Species Abundance	Compliance with Invasive Species Guidelines	Very High
ES			Percent of Invasive Species Occupying System	Very High
ES			Reduction of Fire Ants	Very High

Management Strategies

Varying the season, frequency, and intensity of prescribed fire is critical to sustainability of species in this group. Prescribed burns occurring in the dormant season provide vastly different results from prescribed burns occurring in the growing season. Every effort should be made to increase the use of fall burns after growth of native warm season grasses has ceased for the year.

Species Sensitive to Hydrologic Modification of Wetlands

Species in this group (Table G 71) are associated with wetlands, including, but not limited to seeps, springs, bogs, swamps, wet flatwoods and ephemeral ponds and are dependent on hydrological integrity in these habitats.

Table G 71. Species sensitive to hydrologic modification of wetlands

Species Name	Common Name	Species-to-Group Weight
Agalinis aphylla	Coastal Plain False-foxglove	Very High
Agalinis filicaulis	Thin Stemmed False-foxglove	Very High
Alisma subcordatum	Broad-leaved Water-platain	High
Alloperla natchez	Natchez Stonefly	Very High
Aristida simpliciflora	Southern Three-awned Grass	Very High
Aster puniceus	Purple-stemmed Aster	Very High
Calopogon barbatus	Bearded Grass-pink	Very High
Carex decomposita	Cypress-knee Sedge	Very High
Carex exilis	Coast Sedge	Very High
Carex stricta	Uptight Sedge	High
Chamaecyparis thyoides	Atlantic White Cedar	Very High
Cirsium lecontei	LeConte's Thistle	Very High
Cleistes bifaria (=divaricata)	Small Spreading Pogonia	Very High
Dalea carnea var. gracilis	Pine Barrens Prairie Clover	Very High
Dryopteris ludoviciana	Southern Shield Woodfern	Very High
Dryopteris X australis	Small's Woodfern	Very High
Eleocharis melanocarpa	Black-fruited Spikerush	Very High

Species Name	Common Name	Species-to-Group Weight
Eleocharis robbinsii	Robbins Spikerush	Very High
Eleocharis tricostata	Three-angled Spikerush	Very High
Epidendrum magnoliae = conopseum	Green-fly Orchid	Very High
Eriocaulon texense	Texas Pipewort	Very High
Fallicambarus danielae	Speckled Burrowing Crayfish	Very High
Fallicambarus gordoni	Camp Shelby Burrowing Crayfish	Very High
Gaylussacia frondosa	Dangleberry	Very High
Grus canadensis pulla	Mississippi Sandhill Crane	Very High
Haploperla chukcho	Chukcho Stonefly	Very High
Hemidactylium scutatum	Four-toed Salamander	Very High
Isoetes louisianensis	Louisiana Quillwort	Very High
Isoetes melanopoda	Blackfoot Quillwort	Very High
Isoetes valida	Strong Quillwort	Very High
Lachnocaulon digynum	Pineland Bogbutton	Very High
Lindera melissifolia	Pondberry	Very High
Lindera subcoriacea	Bog Spicebush	Very High
Linum macrocarpum	Spring Hill flax	Very High
Lycopodium cernuum = L. palhinhaea cernua	Nodding Clubmoss	Very High
Macranthera flammea	Flame Flower	Very High
Marshallia graminifolia var. cynanthera	Broadleaf Barbara's Buttons	High
Mimulus ringens	Square-stem Monkey Flower	Very High
Myriophyllum laxum	Loose Watermilfoil	Very High
Panicum nudicaule	Naked-stemmed Panic Grass	Very High
Parnassia grandifolia	Large-leaved Grass-of-Parnassus	Very High
Peltandra sagittifolia	White Arum	Very High
Pinguicula planifolia	Chapman's Butterwort	Very High
Pinguicula primuliflora	Southern Butterwort	Very High
Platanthera blephariglottis	Large White Fringed Orchid	Very High
Platanthera integra	Yellow Fringeless orchid	Very High
Platanthera peramoena	Purple Fringeless Orchid	Very High
Polygala hookeri	Hooker's Milkwort	Very High
Pseudotriton montanus	Mud Salamander	Very High
Pteroglossaspis ecristata (=Eulophia ecristata)	Giant Orchid	Very High
Pycnanthemum muticum	Blunt Mountainmint	High
Rana sevosa	Mississippi Gopher Frog	Very High
Rhynchospora crinipes	Hairy Peduncled Beakrush	Very High
Rhynchospora macra	Large Beakrush	Very High
Rhynchospora stenophylla	Chapman Beakrush	Very High
Ruellia noctiflora	Night Flowering Ruellia	High
Sagittaria isoetiformis	Slender Arrow-head	Very High
Spiranthes brevilabris var floridana	Florida Ladies'-tresses	High
Spiranthes longilabris	Giant Spiral Ladies'-tresses	Very High

Species Name	Common Name	Species-to-Group Weight
Stylisma aquatica	Water Southern Morning-glory	High
Syngonanthus flavidulus	Yellow Pipewort	Very High
Trachyxiphium heteroicum (Hookeriopsis heteroica)	Trachyxiphium Moss	Very High
Utricularia olivacea	Piedmont Bladderwort	Very High
Utricularia purpurea	Purple Bladderwort	Very High
Xyris drummondii	Drummond's Yellow-eyed Grass	Very High
Xyris scabrifolia	Harper's Yellow-eyed Grass	Very High

Forest plan Components

Ecological system sustainability components include desired conditions for forestwide ecosystem diversity, all ecological systems, old-growth, and guidelines for maintaining the integrity of hydrologic function (Table G 72).

Table G 72. Species sensitive to hydrologic modification of wetlands sample performance measures, may vary by location and unit

Target Type	Target Name	Key Attribute	Indicator	Line Item-to-Group Weight
ES	Near-coast Pine Flatwoods	Fire Regime	Percent of System Acres Burned at Desired Return Interval	Very High
ES			Percent of System Acres Burned During the Growing Season	Very High
ES		Distance from Roads	ORV Trail Density	High
ES			Paved Open Road Density	High
ES			Total Road and Trail Density	High
ES			Unpaved Gated Road Density	High
ES			Unpaved Open Road Density	High
ES		Ecological System Abundance at Desired Condition	Percent of potential acres with Appropriate System	High
ES	Ephemeral Ponds and Emergent Wetlands	Fire Regime	Percent of System Acres Burned at Desired Return Interval	Very High
ES			Percent of System Acres Burned During the Growing Season	Very High
ES		Distance from Roads	ORV Trail Density	Very High
ES			Paved Open Road Density	Very High
ES			Total Road and Trail Density	Very High
ES			Unpaved Gated Road Density	Very High
ES			Unpaved Open Road Density	Very High
ES		Hydrologic Function	Compliance with Hydroligic Function Guidelines	Very High
ES		Ecological System Abundance at Desired Condition	Percent of potential acres with Appropriate System	Very High

Target Type	Target Name	Key Attribute	Indicator	Line Item-to-Group Weight
ES	Wet Pine Savanna	Fire Regime	Percent of System Acres Burned at Desired Return Interval	Very High
ES			Percent of System Acres Burned During the Growing Season	Very High
ES		Distance from Roads	ORV Trail Density	Very High
ES			Paved Open Road Density	Very High
ES			Total Road and Trail Density	Very High
ES			Unpaved Gated Road Density	Very High
ES			Unpaved Open Road Density	Very High
ES		Ecological System Abundance at Desired Condition	Percent of potential acres with Appropriate System	Very High
ES	Seeps, Springs, and Seepage Swamps	Fire Regime	Percent of System Acres Burned at Desired Return Interval	High
ES			Percent of System Acres Burned During the Growing Season	High
ES		Distance from Roads	ORV Trail Density	Very High
ES			Paved Open Road Density	Very High
ES			Total Road and Trail Density	Very High
ES			Unpaved Gated Road Density	Very High
ES			Unpaved Open Road Density	Very High
ES		Ecological System Abundance at Desired Condition	Percent of potential acres with Appropriate System	Very High
ES	Herbaceous Seepage Bogs and Flats	Fire Regime	Percent of System Acres Burned at Desired Return Interval	Very High
ES			Percent of System Acres Burned During the Growing Season	Very High
ES		Distance from Roads	ORV Trail Density	Very High
ES			Paved Open Road Density	Very High
ES			Total Road and Trail Density	Very High
ES			Unpaved Gated Road Density	Very High
ES			Unpaved Open Road Density	Very High
ES		Ecological System Abundance at Desired Condition	Percent of potential acres with Appropriate System	Very High
SG	Species Sensitive to Hydrologic Modification of Wetlands	Hydrologic Function	Compliance with Hydroligic Function Guidelines	Very High

The following guidelines would apply to this species group:

- Best management practices (BMPs) should be used during ground disturbing activities.
- Activities that could result in sedimentation or other changes in water quantity and quality should have project level design criteria that maintained or improved the hydrologic function of wetland communities.
- 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 water bodies. Appropriate erosion control measures (install water diversion, re-vegetation, mulch, silt fence, etc.) should be implemented as promptly as practical.
- 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 BMPs needed to protect water quality.
- 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.
- Plowed firelines are not located within savannahs except when needed to protect facilities or threatened, endangered, proposed, or sensitive species.
- 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.

Management Strategies

The vast majority of wetland communities and the species dependent on them have been degraded to a greater or lesser extent by past management activities that have served to drain away water, retain water to an unacceptable level (create ponds where they did not occur), or speed up runoff. Each affected example must be examined on a case by case basis to determine the best method to restore the desired community.

Species Sensitive to Recreational Traffic (Terrestrial and Non-riverine Aquatic)

Species in this group are sensitive to excessive human disturbance such as trampling, harassment, vehicular mortality, and direct mortality. Reptile species are especially sensitive to being harmed, harassed, and killed by humans. This interaction with humans can have long-term negative effects on population sizes and sustainability. The black bear is sensitive to high road densities. Mississippi gopher frog, gopher tortoise, and snake and plant species on this list are especially sensitive to harm due to off-road vehicles, heavy equipment, horses, and human traffic. Some species are collected commercially and used for a variety of purposes including but not limited to food, medicinal, decorative, gardening/landscaping, pet trade. A list of targeted species associated with this species group can be found in Table G 73.

Direct effects of mortality for this species group could be limited by the implementation of guidelines which protect species from direct take, intentional killing or harassment, and limit access to sensitive populations of these species. Providing habitat for these species is not enough to ensure long-term sustainability of populations. The correlation between occurrence and distance to roads is an important

attribute for these species' sustainability (Table G 74). The following actions could be implemented to reduce impacts to these species by adopting them as Forest policy; design roads to avoid highly populated areas of these species; design roads to include safe passage for these species; provide educational materials to the public to increase knowledge and awareness of species needs; work collaboratively with state agencies to limit take of fish species in this group on NFS lands; limit recreational access to sensitive habitats associated with species on this list; require regulations on collecting permits to limit collections to approved scientific purposes only. Includes but not limited to direct impacts from ORVs, horses, mountain bikes, and other conveyances as well as direct impacts caused by the activities of persons utilizing said conveyances.

Table G 73. Species sensitive to recreational traffic

Species Name	Common Name	Species-to-Group Weight
Agalinis aphylla	Coastal Plain False-foxglove	Very High
Agalinis auriculata	Earleaf False-foxglove	Very High
Agalinis filicaulis	Thin Stemmed False-foxglove	Very High
Agalinis pseudaphylla	Shinner's False-foxglove	Very High
Alisma subcordatum	Broad-leaved Water-platain	High
Antennaria solitaria	Single-headed Pussytoes	High
Arabis canadensis	Sicklepod	Very High
Aralia racemosa	American Spikenard	Very High
Aristida simpliciflora	Southern Three-awned Grass	Very High
Asarum canadense	Canada Wild-ginger	Very High
Asclepias hirtella	Prairie Milkweed	High
Aster ericoides	White Heath Aster	High
Aster puniceus	Purple-stemmed Aster	High
Calopogon barbatus	Bearded Grass-pink	Very High
Carex decomposita	Cypress-knee Sedge	High
Carex exilis	Coast Sedge	Very High
Carex impressinervia	Ravine Sedge	Very High
Carex microdonta	Small-Toothed Sedge	Very High
Carex picta	Painted Sedge	High
Celastrus scandens	Climbing Bittersweet	High
Cirsium lecontei	LeConte's Thistle	Very High
Cleistes bifaria (=divaricata)	Small Spreading Pogonia	High
Cornus alternifolia	Alternate-leaf Dogwood	Moderate
Corynorhinus rafinesquii	Rafinesque's Big-eared Bat	Low
Crataegus harbisonii (=C. ashei)	Ashe Hawthorn	Moderate
Crataegus triflora	Three-flower Hawthorn	Very High
Crotalus adamanteus	Eastern Diamondback Rattlesnake	Very High
Cypripedium parviflorum	Small Yellow Lady's-slipper	Very High
Cypripedium pubescens	Yellow Lady's-slipper	Very High
Dalea carnea var. gracilis	Pine Barrens Prairie Clover	Very High
Desmodium ochroleucum	Cream Tick-trefoil	High

Species Name	Common Name	Species-to-Group Weight
Dodecatheon meadia	Shootingstar	Very High
Dryopteris ludoviciana	Southern Shield Woodfern	Very High
Dryopteris X australis	Small's Woodfern	Very High
Echinacea purpurea	Eastern Purple Coneflower	Very High
Eleocharis melanocarpa	Black-fruited Spikerush	High
Eleocharis robbinsii	Robbins Spikerush	High
Eleocharis tricostata	Three-angled Spikerush	High
Eriocaulon texense	Texas Pipewort	Very High
Erythronium albidum	White Dog's Tooth Violet	Very High
Euonymus atropurpureus	Burning Bush	Very High
Fallicambarus byersi	Lavender Burrowing Crayfish	Very High
Fallicambarus danielae	Speckled Burrowing Crayfish	Very High
Farancia erytrogramma	Rainbow Snake	Very High
Galearis spectabilis	Showy Orchis	Very High
Gaylussacia frondosa	Dangleberry	High
Goodyera pubescens	Downy Rattlesnake-plantain	Very High
Gopherus polyphemus	Gopher Tortoise	Very High
Grus canadensis pulla	Mississippi Sandhill Crane	Very High
Haliaeetus leucocephalus	Bald Eagle	Moderate
Heterodon simus	Southern Hognose Snake	Very High
Hexalectris spicata	Crested Coralroot	Very High
Isoetes louisianensis	Louisiana Quillwort	Very High
Isoetes melanopoda	Blackfoot Quillwort	Very High
Isoetes valida	Strong Quillwort	Very High
Lachnocaulon digynum	Pineland Bogbutton	Very High
Lindera melissifolia	Pondberry	Very High
Lindera subcoriacea	Bog Spicebush	Very High
Linum macrocarpum	Spring Hill flax	Very High
Lycopodium cernuum = L. palhinhaea cernua	Nodding Clubmoss	Moderate
Lycopodium digitatum = flabelliforme	Fan Club Moss	Moderate
Macranthera flammea	Flame Flower	High
Matelea obliqua	Climbing Milkweed	Moderate
Mimulus ringens	Square-stem Monkey Flower	Moderate
Myotis austroriparius	Southeastern Myotis	Low
Myriophyllum laxum	Loose Watermilfoil	Low
Ophisaurus mimicus	Mimic Glass Lizard	Very High
Pachysandra procumbens	Allegheny-spurge	Very High
Panax quinquefolius	American Ginseng	Very High
Panicum nudicaule	Naked-stemmed Panic Grass	Very High
Parnassia grandifolia	Large-leaved Grass-of-Parnassus	Very High
Peltandra sagittifolia	White Arum	High

Species Name	Common Name	Species-to-Group Weight
Physalis carpenteri	Carpenter's Ground-cherry	Very High
Picoides borealis	Red-cockaded Woodpecker	Moderate
Pinguicula planifolia	Chapman's Butterwort	Very High
Pinguicula primuliflora	Southern Butterwort	Very High
Pituophis melanoleucus lodingi	Black Pine Snake	Very High
Platanthera blephariglottis	Large White Fringed Orchid	Very High
Platanthera integra	Yellow Fringeless orchid	Very High
Platanthera peramoena	Purple Fringeless Orchid	High
Polemonium reptans	Jacob's Ladder	Very High
Polygala hookeri	Hooker's Milkwort	Very High
Polygala leptostachys	Slender Spike Milkwort	Very High
Polytaenia nuttallii	Prairie Parsley	Very High
Ponthieva racemosa	Shadow-witch Orchid	Very High
Prenanthes aspera	Rough Rattlesnake-root	Very High
Procambarus barbiger	Jackson Prairie Crayfish	Very High
Pteroglossaspis ecristata (=Eulophia ecristata)	Giant Orchid	Very High
Rana sevosa	Mississippi Gopher Frog	Very High
Rhynchospora macra	Large Beakrush	Very High
Rhynchospora stenophylla	Chapman Beakrush	Very High
Ruellia noctiflora	Night Flowering Ruellia	High
Salvia urticifolia	Nettle-leaf Sage	High
Schisandra glabra	Bay Starvine	High
Solidago auriculata	Eared Goldenrod	Very High
Spiranthes brevilabris var floridana	Florida Ladies'-tresses	Very High
Spiranthes longilabris	Giant Spiral Ladies'-tresses	Very High
Syngonanthus flavidulus	Yellow Pipewort	Very High
Triphora trianthophora	Three Birds Orchid	Very High
Ursus americanus	Black Bear	Very High
Ursus americanus luteolus	Louisiana Black Bear	Very High
Uvularia floridana	Florida Bellwort	High
Xyris drummondii	Drummond's Yellow-eyed Grass	Very High
Xyris scabrifolia	Harper's Yellow-eyed Grass	Very High

Table G 74. Species sensitive to recreational traffic key attributes and indicators

Target Type	Target Name	Key Attribute	Indicator	Line Item-to-Group Weight
ES	Upland Longleaf Pine Forest and Woodland	Distance from Roads	ORV Trail Density	Very High
ES			Paved Open Road Density	Very High
ES			Total Road and Trail Density	Very High
ES			Unpaved Gated Road Density	High
ES			Unpaved Open Road Density	Very High
ES	Southern Dry Upland Hardwood Forest	Distance from Roads	ORV Trail Density	Very High
ES			Paved Open Road Density	Very High
ES			Total Road and Trail Density	Very High
ES			Unpaved Gated Road Density	High
ES			Unpaved Open Road Density	Very High
ES	Southern Mesic Slope Forest	Distance from Roads	ORV Trail Density	Very High
ES			Paved Open Road Density	Very High
ES			Total Road and Trail Density	Very High
ES			Unpaved Gated Road Density	High
ES			Unpaved Open Road Density	Very High
ES	Floodplain Forest	Distance from Roads	ORV Trail Density	Very High
ES			Paved Open Road Density	Very High
ES			Total Road and Trail Density	Very High
ES			Unpaved Gated Road Density	High
ES			Unpaved Open Road Density	Very High
ES	Near-coast Pine Flatwoods	Distance from Roads	ORV Trail Density	Very High
ES			Paved Open Road Density	Very High
ES			Total Road and Trail Density	Very High
ES			Unpaved Gated Road Density	High
ES			Unpaved Open Road Density	Very High
ES	Xeric Sandhills	Distance from Roads	Total Road and Trail Density	Very High
ES	Ephemeral Ponds and Emergent Wetlands	Distance from Roads	ORV Trail Density	Very High
ES			Paved Open Road Density	Very High
ES			Total Road and Trail Density	Very High
ES			Unpaved Gated Road Density	High
ES			Unpaved Open Road Density	Very High
ES	Wet Pine Savanna	Distance from Roads	ORV Trail Density	Very High
ES			Paved Open Road Density	Very High
ES			Total Road and Trail Density	Very High
ES			Unpaved Gated Road Density	High
ES			Unpaved Open Road Density	Very High

Target Type	Target Name	Key Attribute	Indicator	Line Item-to-Group Weight
ES	Seeps, Springs, and Seepage Swamps	Distance from Roads	ORV Trail Density	Very High
ES			Paved Open Road Density	Very High
ES			Total Road and Trail Density	Very High
ES			Unpaved Gated Road Density	High
ES			Unpaved Open Road Density	Very High
ES	Herbaceous Seepage Bogs and Flats	Distance from Roads	ORV Trail Density	Very High
ES			Paved Open Road Density	Very High
ES			Total Road and Trail Density	Very High
ES			Unpaved Gated Road Density	High
ES			Unpaved Open Road Density	Very High
ES	Canebrake	Distance from Roads	ORV Trail Density	Very High
ES			Paved Open Road Density	Very High
ES			Total Road and Trail Density	Very High
ES			Unpaved Gated Road Density	High
ES			Unpaved Open Road Density	Very High
ES	Loblolly Pine Forest	Distance from Roads	ORV Trail Density	Very High
ES			Paved Open Road Density	Very High
ES			Total Road and Trail Density	Very High
ES			Unpaved Gated Road Density	High
ES			Unpaved Open Road Density	Very High
ES	Slash Pine Forest	Distance from Roads	ORV Trail Density	Very High
ES			Paved Open Road Density	Very High
ES			Total Road and Trail Density	Very High
ES			Unpaved Gated Road Density	High
ES			Unpaved Open Road Density	Very High

Forest plan Components

Collection limits for fishable/huntable and non-game species are set by Mississippi Department of Wildlife, Fisheries, and Parks; therefore issues of excessive take are beyond Forest Service control. However, issues pertaining to illegal collection and vegetation collections on the Forests can be regulated. Forest plan components include species diversity desired conditions and the following guidelines to limit collection of species occurring within rare communities to approved scientific purposes only:

- Collection of flora and fauna from rare communities, wetland systems, and species sensitive to over-collection group should generally be limited to approved scientific purposes.
- Where necessary and consistent with other uses, consideration should be given to seasonal closure of NFS roads during critical periods for wildlife species known to be sensitive to human disturbance.
- If unacceptable resource damage is identified in a section of any trail, that section should be closed for mitigation, rerouted and/or obliterated.
- 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 and endangered, regional forester's sensitive species, 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.

Management Strategies

The strategy for these species is to continue to educate the public on species needs, restrict access to rare or sensitive populations, increase road ecopassage, and implement guidelines to protect these species where they occur during projects that involve heavy equipment or ground disturbance. New roads and trails should be located so as to avoid populations of these species and existing roads and trails should be evaluated for closure if they are causing declines to populations. Implementation of the Travel Management Rule should assist in reducing ORV impacts to these species by closing user created trails. Many roads on the Forests are not under our control, so partnerships and collaborative efforts may be required to help sustain species in this group.

As stated above, collection limits for fishable/ huntable and non-game species are set by Mississippi Department of Wildlife, Fisheries, and Parks, so issues of excessive take are beyond Forest Service control. However, we should explore opportunities to limit access to areas with sensitive populations of these species when feasible. The strategy for these species is to continue to educate the public on species needs, restrict access to known populations, and limit approval of collections of these species to scientific purposes only.

Species Needing Occurrence Protection

Species in this group (Table G 75) are rare in occurrence on the National Forests in Mississippi although habitat is widespread. Habitat assessments cannot accurately predict the presence of these species. Most of these species occur in less than five populations on the Forests and are sensitive to management actions. Those species which have more than five known occurrences represent populations which are critical to the survival of the species and have limited occurrence outside of the National Forests in Mississippi. Threatened and endangered species are not included in this group because they require species-specific protection and guidance.

Table G 75. Species needing occurrence protection

Species Name	Common Name	Species-to-Group Weight
Agalinis auriculata	Earleaf False-foxglove	Very High
Aralia racemosa	American Spikenard	Very High
Atrytone arogos arogos	Arogos Skipper	Very High
Carex decomposita	Cypress-knee Sedge	Very High
Carex exilis	Coast Sedge	Very High
Carex impressinervia	Ravine Sedge	Very High
Chamaecyparis thyoides	Atlantic White Cedar	Very High
Crataegus harbisonii (=C. ashei)	Ashe Hawthorn	Very High
Crataegus triflora	Three-flower Hawthorn	Very High
Dalea carnea var. gracilis	Pine Barrens Prairie Clover	Very High
Dryopteris ludoviciana	Southern Shield Woodfern	Very High
Dryopteris X australis	Small's Woodfern	Very High
Fallicambarus gordoni	Camp Shelby Burrowing Crayfish	Very High
Galearis spectabilis	Showy Orchis	Very High
Goodyera pubescens	Downy Rattlesnake-plantain	Very High

Species Name	Common Name	Species-to-Group Weight
Gopherus polyphemus	Gopher Tortoise	Very High
Grus canadensis pulla	Mississippi Sandhill Crane	Very High
Haliaeetus leucocephalus	Bald Eagle	Very High
Isoetes louisianensis	Louisiana Quillwort	Very High
Juglans cinerea	Butternut	Very High
Lindera melissifolia	Pondberry	Very High
Lindera subcoriacea	Bog Spicebush	Very High
Mimulus ringens	Square-stem Monkey Flower	Very High
Myriophyllum laxum	Loose Watermilfoil	Very High
Nymphoides aquatica	Big Floating Heart	Very High
Nymphoides cordata	Floating Heart	Very High
Pachysandra procumbens	Allegheny-spurge	Very High
Parnassia grandifolia	Large-leaved Grass-of-Parnassus	Very High
Picoides borealis	Red-cockaded Woodpecker	Very High
Procambarus fitzpatricki	Spiny-tailed Crayfish	Very High
Pteroglossaspis ecristata (=Eulophia ecristata)	Giant Orchid	Very High
Rana sevosa	Mississippi Gopher Frog	Very High
Solidago auriculata	Eared Goldenrod	Very High
Spiranthes brevilabris var floridana	Florida Ladies'-tresses	Very High
Triphora trianthophora	Three Birds Orchid	Very High
Uvularia floridana	Florida Bellwort	Very High
Xyris scabrifolia	Harper's Yellow-eyed Grass	Very High

Forest plan Components

Because these species are low in occurrence across the National Forests in Mississippi and cannot be accurately predicted by availability of habitat, ecosystem and species diversity forest plan components should provide some protection for these species; however additional provisions are needed due to their rarity and sensitivity to management. The following guideline was created to protect these species:

- Project planning and implementation should include measures to provide protection for the “species need occurrence protection” group.

Management Strategies

These species are rare in occurrence across the forest and known populations should be protected. Protection of habitat alone does not ensure protection of these species in most cases, and protection should be given to individuals when work is performed at known locations. The key strategy for members of this group is the use of “ecological life-boats” to conserve “the last of the least and the best of the rest”. A coordinated forest plan will be implemented to insure these species are protected in designated sites in sufficient numbers to insure sustainability. Existing reserves such as research natural areas, botanical areas, etc. should be utilized to the extent possible. Multiple species will occur in the same reserve.

Stump and Stump-hole Associates

Stumps and stump holes provide a network of underground chambers that support many species (Table G 76) throughout their life cycle. Past forestry practices in Mississippi included removing stumps during vegetative management treatments. Species associated with decaying stumps and stump-holes.

Table G 76. Stump and stump-hole associates

Species Name	Common Name	Species-to-Group Weight
Crotalus adamanteus	Eastern Diamondback Rattlesnake	High
Heterodon simus	Southern Hognose Snake	High
Ophisaurus mimicus	Mimic Glass Lizard	High
Pituophis melanoleucus lodingi	Black Pine Snake	Very High
Rana sevosa	Mississippi Gopher Frog	High
Rhadinaea flavilata	Pine Woods Snake	Moderate

Forest plan Components

Forestwide desired conditions as well as desired conditions for each forested ecological system and species diversity serve as ecological system diversity forest plan components for these species. Objectives to restore or maintain mature and old-growth forest help to sustain these species.

Although ecological system diversity forest plan components should supply ample amounts of suitable habitat, there are additional needs for this group. Given that past management practices have allowed for the removal of stumps, it is necessary to create additional forest plan components for their retention. Forest plan provisions to retain these habitat elements help to insure species sustainability.

The following guidelines would apply to this species group:

- 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.
- Planning and implementation of road construction, fireline construction, wildlife pond and opening construction, timber harvests, and other ground disturbing projects should include appropriate measures to provide protection for known occurrences of rare species.
- Historical skid roads, haul roads, log landings, and mechanical firelines should be reused.

Management Strategies

The major strategy for this group is the recruitment of new downed wood, stumps, and stump holes and retention of existing ones at the project level. Retention and recruitment can be measured through implementation monitoring and guidelines. It is assumed that the abundance of these habitat elements can be indirectly measured by the presence of mature and old-growth forest and woodland. Sustainable amounts of mature and old-growth forest in combination with retention guidelines provide downed wood into ecological systems. Guidelines for stump retention and minimization of ground disturbance are essential when considering the sustainability of species within this group. Although fire can destroy downed wood on the ground, it should not be excluded from use. The mud salamander and pine woods snakes occur in areas sufficiently moist to prevent fire from destroying downed wood in all but the driest of times. Forest plan guidance should limit direct firing and suggest that only low intensity flames should be used in these areas. The ornate chorus frog is an upland species and fire is critical to sustaining its

habitat. Although fire may destroy some downed wood used by this species, having a sustainable supply of downed wood recruited into the system by a mature forest should be sufficient to sustain the species.

Calciphiles

Calciphiles are calcium loving vascular plant species that are dependent upon high levels of calcium in the soil to thrive. A list of targeted species associated with this species group can be found in Table G 77. They generally occur in the black belt, Jackson prairie and loess hills regions of Mississippi (Holly Springs, Tombigbee, and Bienville NFs). These areas are relatively small portions of the respective forests and offer excellent opportunities for biological reserves. Relative abundance of black belt and Jackson prairie is one of the many indicator performance measures for calciphiles (Table G 78). The management strategy for these species is to protect the soil on which they occur from degradation, as the assumption is that protecting the soil sustains the species.

Table G 77. Species in calciphiles associates

Species Name	Common Name	Species-to-Group Weight
Agalinis auriculata	Earleaf False-foxglove	High
Carya laciniosa	Big Shellbark Hickory	High
Dodecatheon meadia	Shootingstar	High
Erythronium albidum	White Dog's Tooth Violet	High
Euonymus atropurpureus	Burning Bush	High
Frasera caroliniensis	American Colombo	High
Juglans cinerea	Butternut	High
Quercus oglethorpensis	Oglethorpe Oak	High
Rhamnus lanceolata	Lance-leaved Buckthorn	High

Table G 78. Calciphiles key attributes and indicators

Key Attribute	Indicator	Line Item-to-Group Weight
Fire Regime	Percent of System Acres Burned at Desired Return Interval	Very High
	Percent of System Acres Burned During the Growing Season	Very High
Distance from Roads	ORV Trail Density	Very High
	Paved Open Road Density	High
	Total Road and Trail Density	Very High
	Unpaved Gated Road Density	Moderate
	Unpaved Open Road Density	Moderate
Ecological System Abundance at Desired Condition	Percent of potential acres with Appropriate System	Very High
Vegetation Structure	% Open	Very High
Indicator Species Status	Population Trend of [indicator species name]	Very High
Invasive Species Abundance	Compliance with Invasive Species Guidelines	Very High
	Percent of Invasive Species Occupying System	Very High
	Reduction of Fire Ants	Very High

Forest plan Components

The desired condition for these species is to protect the soil on which they occur from degradation, as the assumption is that protecting the soil sustains the species. Desired conditions for ecological and species diversity and the guidelines for vegetation, wildlife, soil and water can provide for sustainability of these species.

Calciphilees are calcium loving plants. There are no measurable performance measures at this time, however, due to their limited occurrence and specific limiting factors, these species should be protected as found. Project level inventories should be completed for these species prior to project implementation. Groups of these species, when identified, should be mapped and protected from harm.

Management Strategies

Forest strategy to provide sustainable populations of the members of this species group is to identify location and aerial extent of calcareous soils. Until better soil mapping can be completed, project level mapping utilizing soil test kits will suffice. Presence of members of this species group can serve as indicators until soil testing is done. Since these calcareous soils are relatively rare, and many existing acres have been degraded, protection of all calcareous soil areas is desired.

Species Sensitive to Canopy Cover Modifications

Species sensitive to canopy cover reduction generally occur in areas with closed canopy desired conditions, especially hardwood dominated ecological systems; however, some of these areas may be targeted for vegetative management treatments. A list of targeted species associated with this species group can be found in Table G 79. When conducting projects where species sensitive to canopy cover reduction are known or suspected to occur, consideration should be given to maintaining closed canopy conditions to provide for sustainable species populations. Project level surveys may be necessary to determine species presence; however suitable habitat for the species may serve as a surrogate for surveys.

The key characteristic for this species group is percent of hardwood dominated systems in a mature closed canopy condition. Metrics for these are listed in the ecological systems northern dry upland hardwood forest, southern dry upland hardwood forest, northern mesic hardwood forest, southern mesic slope forest, southern loess bluff forest, floodplain forest, and lower Mississippi River bottomland and floodplain forest, as appropriate for each species (Table G 80).

Table G 79. Species sensitive to canopy cover modifications

Species Name	Common Name	Species-to-Group Weight
Alloperla natchez	Natchez Stonefly	Very High
Antennaria solitaria	Single-headed Pussytoes	High
Antennaria solitaria	Single-headed Pussytoes	High
Aralia racemosa	American Spikenard	Very High
Asarum canadense	Canada Wild-ginger	Very High
Carex impressinervia	Ravine Sedge	Very High
Carex picta	Painted Sedge	High
Celastrus scandens	Climbing Bittersweet	Moderate
Corynorhinus rafinesquii	Rafinesque's Big-eared Bat	Moderate
Cypripedium parviflorum	Small Yellow Lady's-slipper	Very High
Cypripedium pubescens	Yellow Lady's-slipper	Very High
Cypripedium pubescens	Yellow Lady's-slipper	Very High

Species Name	Common Name	Species-to-Group Weight
Dryopteris ludoviciana	Southern Shield Woodfern	High
Dryopteris X australis	Small's Woodfern	High
Epidendrum magnoliae = conopseum	Green-fly Orchid	Very High
Erythronium albidum	White Dog's Tooth Violet	Very High
Galearis spectabilis	Showy Orchis	High
Goodyera pubescens	Downy Rattlesnake-plantain	High
Haploperla chukcho	Chukcho Stonefly	Very High
Hexalectris spicata	Crested Coralroot	High
Juglans cinerea	Butternut	High
Matelea obliqua	Climbing Milkweed	Moderate
Myotis austroriparius	Southeastern Myotis	Moderate
Pachysandra procumbens	Allegheny-spurge	Very High
Panax quinquefolius	American Ginseng	Very High
Physalis carpenteri	Carpenter's Ground-cherry	Very High
Plethodon websteri	Webster's Salamander	Very High
Polemonium reptans	Jacob's Ladder	Very High
Schisandra glabra	Bay Starvine	High
Solidago auriculata	Eared Goldenrod	Very High
Trillium foetidissimum	Fetid Trillium	Moderate
Triphora trianthophora	Three Birds Orchid	Very High
Uvularia floridana	Florida Bellwort	Very High

Table G 80. Species sensitive to canopy cover modifications key attributes and indicators

Target Type	Target Name	Key Attribute	Indicator	Line Item-to-Group Weight
ES	Southern Dry Upland Hardwood Forest	Vegetation Structure	% Mature Closed Canopy	Very High
ES	Southern Mesic Slope Forest	Vegetation Structure	% Mature Closed Canopy	Very High
ES	Floodplain Forest	Vegetation Structure	% Mature Very-Closed Canopy	Very High
ES	Northern Dry Upland Hardwood Forest	Vegetation Structure	% Mature Closed Canopy	Very High
ES	Northern Mesic Hardwood Forest	Vegetation Structure	% Mature Closed Canopy	Very High
ES	Southern Loess Bluff Forest	Vegetation Structure	% Mature Closed Canopy	Very High
ES	Lower Mississippi River Bottomland and Floodplain Forest	Vegetation Structure	% Mature Closed Canopy	Very High

Forest plan Components

Desired conditions for closed canopy conditions for each of these ecological systems and vegetation/wildlife guidelines to maintain those conditions should be developed.

The following guidelines would apply to this species group:

- Planning and implementation of timber harvests and other silvicultural treatments that reduce canopy cover should include measures to provide protection for threatened and endangered, sensitive, and locally rare species that are susceptible to damage or extirpation from canopy cover reduction.

Management Strategies

Forest strategy to maintain species sensitive to canopy cover reduction is to meet desired conditions for the referenced ecosystems. When conducting projects where species sensitive to canopy cover reduction are known or suspected to occur, consideration should be given to maintaining closed canopy conditions to provide for sustainable species populations. Project level surveys may be necessary to determine species presence; however suitable habitat for the species may serve as a surrogate for surveys.

Species Sensitive to Soil Disturbance

These are species considered to be especially impacted by excavation or blading of roads and trails, compaction of soil, soil erosion, soil sedimentation and others. A list of targeted species associated with this species group can be found in Table G 81. If a project has ground disturbing activities planned, than these species should be reviewed for occurrence and mitigation. Implementation monitoring and use of guidelines are the management tools used in ensuring sustainability of these species.

Table G 81. Species sensitive to soil disturbance

Species Name	Common Name	Species-to-Group Weight
Agalinis aphylla	Coastal Plain False-foxglove	High
Agalinis auriculata	Earleaf False-foxglove	High
Agalinis filicaulis	Thin Stemmed False-foxglove	High
Agalinis pseudaphylla	Shinner's False-foxglove	High
Alisma subcordatum	Broad-leaved Water-platain	Moderate
Antennaria solitaria	Single-headed Pussytoes	Moderate
Arabis canadensis	Sicklepod	Very High
Aralia racemosa	American Spikenard	Very High
Aristida simpliciflora	Southern Three-awned Grass	Very High
Asarum canadense	Canada Wild-ginger	Very High
Asclepias hirtella	Prairie Milkweed	Very High
Aster ericoides	White Heath Aster	Very High
Aster puniceus	Purple-stemmed Aster	Very High
Calopogon barbatus	Bearded Grass-pink	Very High
Carex decomposita	Cypress-knee Sedge	High
Carex exilis	Coast Sedge	Very High
Carex impressinervia	Ravine Sedge	Very High
Carex microdonta	Small-Toothed Sedge	Very High
Carex picta	Painted Sedge	Very High
Carex stricta	Uptight Sedge	High
Celastrus scandens	Climbing Bittersweet	Moderate
Chamaecyparis thyoides	Atlantic White Cedar	High
Cirsium lecontei	LeConte's Thistle	Very High

Species Name	Common Name	Species-to-Group Weight
Cleistes bifaria (=divaricata)	Small Spreading Pogonia	Very High
Cornus alternifolia	Alternate-leaf Dogwood	Moderate
Crataegus harbisonii (=C. ashei)	Ashe Hawthorn	High
Crataegus triflora	Three-flower Hawthorn	High
Crotalus adamanteus	Eastern Diamondback Rattlesnake	Low
Cypripedium parviflorum	Small Yellow Lady's-slipper	Very High
Cypripedium pubescens	Yellow Lady's-slipper	Very High
Dalea carnea var. gracilis	Pine Barrens Prairie Clover	High
Desmodium ochroleucum	Cream Tick-trefoil	Moderate
Dodecatheon meadia	Shootingstar	Very High
Dryopteris ludoviciana	Southern Shield Woodfern	Moderate
Dryopteris X australis	Small's Woodfern	Moderate
Echinacea purpurea	Eastern Purple Coneflower	Moderate
Eleocharis melanocarpa	Black-fruited Spikerush	High
Eleocharis robbinsii	Robbins Spikerush	High
Eleocharis tricostata	Three-angled Spikerush	High
Eriocaulon texense	Texas Pipewort	Very High
Erythronium albidum	White Dog's Tooth Violet	Very High
Euonymus atropurpureus	Burning Bush	Moderate
Fallicambarus byersi	Lavender Burrowing Crayfish	Very High
Fallicambarus danielae	Speckled Burrowing Crayfish	Very High
Fallicambarus gordoni	Camp Shelby Burrowing Crayfish	Very High
Frasera caroliniensis	American Colombo	High
Galearis spectabilis	Showy Orchis	Very High
Gaylussacia frondosa	Dangleberry	Moderate
Goodyera pubescens	Downy Rattlesnake-plantain	High
Gopherus polyphemus	Gopher Tortoise	Very High
Heterodon simus	Southern Hognose Snake	Very High
Hexalectris spicata	Crested Coralroot	Very High
Isoetes louisianensis	Louisiana Quillwort	Very High
Isoetes melanopoda	Blackfoot Quillwort	Very High
Isoetes valida	Strong Quillwort	Very High
Lachnocaulon digynum	Pineland Bogbutton	Very High
Lindera melissifolia	Pondberry	Very High
Lindera subcoriacea	Bog Spicebush	Very High
Linum macrocarpum	Spring Hill flax	Very High
Lobelia appendiculata	Appendaged Lobelia	Moderate
Lycopodium cernuum = L. palhinhaea cernua	Nodding Clubmoss	Moderate
Lycopodium digitatum = flabelliforme	Fan Club Moss	Moderate
Macranthera flammea	Flame Flower	High
Matelea obliqua	Climbing Milkweed	Moderate
Mimulus ringens	Square-stem Monkey Flower	Moderate

Species Name	Common Name	Species-to-Group Weight
Ophisaurus mimicus	Mimic Glass Lizard	High
Pachysandra procumbens	Allegheny-spurge	Very High
Panax quinquefolius	American Ginseng	Very High
Panicum nudicaule	Naked-stemmed Panic Grass	High
Parnassia grandifolia	Large-leaved Grass-of-Parnassus	Very High
Peltandra sagittifolia	White Arum	High
Penstemon tenuis	Sharp-sepal Beardtongue	High
Physalis carpenteri	Carpenter's Ground-cherry	Very High
Pinguicula planifolia	Chapman's Butterwort	Very High
Pinguicula primuliflora	Southern Butterwort	Very High
Pituophis melanoleucus lodingi	Black Pine Snake	High
Platanthera blephariglottis	Large White Fringed Orchid	Very High
Platanthera integra	Yellow Fringeless orchid	Very High
Platanthera peramoena	Purple Fringeless Orchid	Moderate
Plethodon websteri	Webster's Salamander	High
Polemonium reptans	Jacob's Ladder	Very High
Polygala hookeri	Hooker's Milkwort	Very High
Polygala leptostachys	Slender Spike Milkwort	High
Polytaenia nuttallii	Prairie Parsley	Very High
Ponthieva racemosa	Shadow-witch Orchid	Very High
Prenanthes aspera	Rough Rattlesnake-root	High
Procambarus barbiger	Jackson Prairie Crayfish	Very High
Pteroglossaspis ecristata (=Eulophia ecristata)	Giant Orchid	High
Pycnanthemum muticum	Blunt Mountainmint	Moderate
Quercus minima	Dwarf Live Oak	High
Quercus oglethorpensis	Oglethorpe Oak	High
Rana sevosa	Mississippi Gopher Frog	High
Rhadinaea flavilata	Pine Woods Snake	Very High
Rhamnus lanceolata	Lance-leaved Buckthorn	Moderate
Rhynchospora macra	Large Beakrush	High
Rhynchospora stenophylla	Chapman Beakrush	Moderate
Ruellia noctiflora	Night Flowering Ruellia	Moderate
Salvia urticifolia	Nettle-leaf Sage	Moderate
Schisandra glabra	Bay Starvine	High
Solidago auriculata	Eared Goldenrod	Very High
Solidago flaccidifolia	Appalachian Goldenrod	High
Spiranthes brevilabris var floridana	Florida Ladies'-tresses	High
Spiranthes longilabris	Giant Spiral Ladies'-tresses	Very High
Spiranthes magnicamporum	Great Plains Ladies'-tresses	Very High
Stylisma aquatica	Water Southern Morning-glory	Moderate
Stylisma pickeringii var pattersonii	Patterson's Bindweed	Very High
Syngonanthus flavidulus	Yellow Pipewort	Very High

Species Name	Common Name	Species-to-Group Weight
Trachyxiphium heteroicum (Hookeriopsis heteroica)	Trachyxiphium Moss	High
Trillium foetidissimum	Fetid Trillium	Moderate
Triphora trianthophora	Three Birds Orchid	Very High
Utricularia olivacea	Piedmont Bladderwort	Low
Utricularia purpurea	Purple Bladderwort	Low
Uvularia floridana	Florida Bellwort	High
Xyris drummondii	Drummond's Yellow-eyed Grass	Very High
Xyris scabrifolia	Harper's Yellow-eyed Grass	Very High

Table G 82. Species sensitive to soil disturbance key attributes and indicators

Target Type	Target Name	Key Attribute	Indicator	Line Item-to-Group Weight
ES	Upland Longleaf Pine Forest and Woodland	Distance from Roads	ORV Trail Density	Very High
ES			Unpaved Gated Road Density	Moderate
ES			Unpaved Open Road Density	High
ES	Southern Dry Upland Hardwood Forest	Distance from Roads	ORV Trail Density	Very High
ES			Unpaved Gated Road Density	Moderate
ES			Unpaved Open Road Density	High
ES	Southern Mesic Slope Forest	Distance from Roads	ORV Trail Density	Very High
ES			Unpaved Gated Road Density	Moderate
ES			Unpaved Open Road Density	High
ES	Floodplain Forest	Distance from Roads	ORV Trail Density	Very High
ES			Unpaved Gated Road Density	Moderate
ES			Unpaved Open Road Density	High
ES	Near-coast Pine Flatwoods	Distance from Roads	ORV Trail Density	Very High
ES			Unpaved Gated Road Density	Moderate
ES			Unpaved Open Road Density	High
ES	Ephemeral Ponds and Emergent Wetlands	Distance from Roads	ORV Trail Density	Very High
ES			Unpaved Gated Road Density	Moderate
ES			Unpaved Open Road Density	High

Target Type	Target Name	Key Attribute	Indicator	Line Item-to-Group Weight
ES	Wet Pine Savanna	Distance from Roads	ORV Trail Density	Very High
ES			Unpaved Gated Road Density	Moderate
ES			Unpaved Open Road Density	High
ES	Seeps, Springs, and Seepage Swamps	Distance from Roads	ORV Trail Density	Very High
ES			Unpaved Gated Road Density	Moderate
ES			Unpaved Open Road Density	High
ES	Herbaceous Seepage Bogs and Flats	Distance from Roads	ORV Trail Density	Very High
ES			Unpaved Gated Road Density	Moderate
ES			Unpaved Open Road Density	High
ES	Canebrake	Distance from Roads	ORV Trail Density	Very High
ES			Unpaved Gated Road Density	Moderate
ES			Unpaved Open Road Density	High
ES	Loblolly Pine Forest	Distance from Roads	ORV Trail Density	Very High
ES			Unpaved Gated Road Density	Moderate
ES			Unpaved Open Road Density	High
ES	Slash Pine Forest	Distance from Roads	ORV Trail Density	Very High
ES			Unpaved Gated Road Density	Moderate
ES			Unpaved Open Road Density	High
SG	Species Sensitive to Soil Disturbance	Soil Productivity	Compliance with Soil Productivity Guidelines	Very High

Forest plan Components

Ecological system sustainability components include desired conditions for forestwide ecosystem diversity, all ecological systems, old-growth, and guidelines for vegetation/wildlife and water (Table G 82).

The following guidelines would apply to this species group:

- Best management practices (BMPs) should be used during ground disturbing activities.
- 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 water bodies. Appropriate erosion control measures (install water diversion, re-vegetation, mulch, silt fence, etc.) should be implemented as promptly as practical.

- 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.
- Historical skid roads, haul roads, log landings, and mechanical firelines should be reused.
- 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.
- Mechanical site preparation exposing bare soil should not occur on slope grades greater than 20 percent.
- 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.
- 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 and endangered, sensitive, and locally rare species that are susceptible to damage or extirpation from ground disturbance.
- When creating wildlife food plots, they should be located outside of rare and wetland communities.
- Fireline and road locations should be assessed for the presence of species sensitive to soil disturbance prior to construction and adjusted to avoid impacts.

Management Strategies

Forest strategy for these species considered to be especially impacted by excavation or blading of roads and trails, compaction of soil, soil erosion, and soil sedimentation is to determine when a project has ground disturbing activities planned. Then the project should be reviewed to determine if these species do occur and develop mitigation measures. Implementation monitoring and use of guidelines are the management tools used in ensuring sustainability of these species.

G.3.5 Aquatic Systems

Rivers and Streams

Rivers and streams consist of all lotic (flowing-water) aquatic systems on the forest and include streamside riparian areas and ephemeral channels. Streamside riparian areas are used as buffers at the project level to protect watersheds from detrimental effects. These systems provide critical habitats for fish, mussels, invertebrates, reptiles, and amphibians. There is extensive acreage of this ecological system on the National Forests in Mississippi as they occur throughout the area.

Riparian zones are inseparably associated with upland forests and break up the upland areas with networks of bottomland forests (both pine and hardwoods). These riparian zones serve multiple ecological purposes. Riparian zones serve as natural filters for water borne sediments moving from the uplands and into the rivers and streams of the forest. Some species of plants and animals use riparian zones for completion of at least some phase of their life cycles, and aquatic species such as fish, some crayfish, and mussels are restricted to this zone.

Because of the fragmented ownership pattern, National Forest System lands often include only a small minority of the watershed (Table G 83). This restricted control limits the ability of the Forests to provide

for the sustainability of those communities and species in watersheds (or self-contained sub-watersheds). However, even these disjunctive tracts have unique ecological values because of the permanent forest cover which tends to create cool, clean, flowing waters when compared to adjacent landowners. Enhancement of water quality is a major goal of the National Forests in Mississippi, but the ability to do that is tempered by the percentage of surface area in National Forest System land.

Table G 83. Current condition watershed-wide (all ownerships), the percentage of National Forest System managed lands, and the Forests' relative management influence

Watershed Name	Current Condition	Percent NFS Lands	Relative Ability to Influence Watershed Health
Beaverdam Creek - Black Creek	Good	54.46	Very High
Hickory Creek - Black Creek	Very Good	50.84	Very High
Tuxachanie Creek - Tchoutacabouf	Good	47.22	Very High
Middle Fork Homochitto River	Very Good	35.19	Very High
Snow Creek - Tippah River	Good	33.08	High
Bluff Creek - Red Creek	Good	30.96	High
Quarterliah Creek - West Tallaha	Good	30.09	High
Little Thompson Creek - Thompson	Good	30.08	High
Tiger Creek - Bogue Homo	Good	28.11	High
Big Sunflower River - Little Sun	Good	27.51	High
Ichusa Creek - Leaf River	Good	25.87	High
Sand Creek - Noxubee River	Good	25.09	High
Maynor Creek - Big Creek	Good	23.69	High
Piney Woods Creek - Gaines Creek	Good	23.61	High
McCall Creek - Homochitto River	Good	19.50	Moderate
Raspberry Creek - Strong River	Good	19.15	Moderate
Mason Creek - Big Creek	Good	18.13	Moderate
Beaumont - Leaf River	Good	17.97	Moderate
Wells Creek - Homochitto River	Good	17.14	Moderate
Shelby Creek - Tippah River	Good	17.05	Moderate
Little Biloxi River - Biloxi Riv	Good	15.38	Moderate
Hatchapaloo Creek - Oakohay Creek	Good	14.80	Moderate
Big Cedar Creek - Pascagoula River	Good	14.70	Moderate
Shockaloo Creek - Tuscolameta Creek	Good	13.59	Moderate
Cypress Creek - Little Tallahatc	Good	12.47	Moderate
Silver Creek - Big Sunflower Riv	Good	11.66	Moderate
Leaf River - Atkinson Creek	Good	11.54	Low
Coffee Bogue - Pearl River	Good	9.98	Low
Flint Creek - Red Creek	Good	9.87	Low
Upper Chuquatonchee Creek	Good	9.42	Low
Cane Creek - Houlka Creek	Good	9.15	Low
Indian Creek - Wolf River	Good	8.87	Low
Byrd Creek - Chickasawhay River	Good	7.41	Low
Heidelberg - Bogue Homo	Good	5.78	Low

Watershed Name	Current Condition	Percent NFS Lands	Relative Ability to Influence Watershed Health
Bluff Creek - Moungers Creek	Good	5.76	Low
Burney Branch - Yocona River	Good	5.60	Low
Hurricane Creek - Muddy Creek	Good	5.59	Low
Persimmon Creek - Skuna River	Good	5.38	Low
Tillatoba Creek - Panola Quitman	Good	3.57	Very Low
Sipsey Creek - Tuscolameta Creek	Good	2.85	Very Low
Willis Creek - Little Bayou Pier	Good	2.40	Very Low
Sardis Lake - Little Tallahatchi	Good	2.38	Very Low
Little Black Creek - Black Creek	Good	1.91	Very Low
Cane Creek - Mud Creek	Good	1.81	Very Low
Bynum Creek - Yocona River	Good	1.67	Very Low
Porters Creek - Hatchie River	Good	1.53	Very Low
Collins Creek - Yazoo River	Good	1.30	Very Low
Upper Buffalo River	Very Good	0.89	Very Low
Tallabinnela Creek	Good	0.74	Very Low
Pelahatchie Creek	Good	0.67	Very Low
Lee Creek - Coldwater River	Good	0.51	Very Low
Middle Buffalo River	Very Good	0.44	Very Low
Foster Creek - Bayou Pierre	Good	0.33	Very Low
Cane Creek - Yalobusha River	Good	0.27	Very Low
West Fork Amite River	Good	0.16	Very Low
Tallahaga Creek	Good	0.16	Very Low
Crane Creek - Wolf River	Good	0.08	Very Low
Tibby Creek - Yockanookany River	Good	0.05	Very Low
Yellow Creek - Noxubee River	Good	0.04	Very Low
Woodland Creek - Beaver Creek	Good	0.01	Very Low

Lakes and Permanent Ponds

Lakes and permanent ponds consist of all lentic (still, impounded, or otherwise non-flowing) aquatic systems on the Forests, excluding the ecological system ponds and emergent wetlands which are discussed in their own section of this report. Many of the lakes on the Forests are man-made structures and support recreational activities. Oxbow lakes and sloughs are included within this system and consist of all water-bodies associated with floodplain aquatic ecosystems on the forest. These systems provide important habitats for fish, birds, mussels, invertebrates, reptiles, and amphibians. Lakes and permanent ponds occur on all units of the Forests.

Aquatic Species Associations

Species occurring in these groups require healthy watersheds and good water quality for survival. Implementation of streamside management zones and consideration of effects to water quality at the project level and management of riparian and floodplain forests should be sufficient to sustain these species.

An indicator for the sustainability of these groups is the relative amount of mature closed canopy floodplain forests. Other key factors of the sustainability of these species groups are included in the ecological sustainability evaluation. Table G 84 depicts 9 of the major factors evaluated and their associated ecological variables. Desired conditions require healthy and functioning watersheds. Guidelines established to follow best management practices, reduce impacts from sediment, use streamside management zones, and generally protect water quality should be sufficient to sustain these species.

Table G 84. Aquatic species groups and components

Aquatic Species Groups	Ecological Variables
Aquatic Coarse Woody Debris Associates	Rivers and Streams Healthy Watersheds Watershed-specific Planning Guidelines Riparian Forests Lakes and Ponds Lower Mississippi River Bottomland and Floodplain Forest Floodplain Forest
Open Water Associates	
Aquatic Species Sensitive to Modification of In-stream Flow	
Aquatic Species Sensitive to Non-native Invasive Species	
Aquatic Species Sensitive to Non-Point Source Pollution	
Aquatic Species Sensitive to Stream Sediment	
Aquatic Species Sensitive to Stream Toxins	
Aquatic Species Sensitive to Water Temperature Regime	
Species Sensitive to Recreational Traffic	

Aquatic Coarse Woody Debris Associates

These species (Table G 85) are dependent on quantities of coarse woody debris located in the stream or riparian area. Coarse woody debris plays a vital role in the life history for many of these species or their prey. Coarse woody debris is measured as a byproduct of a mature riparian area enclosing the stream. A sustainable amount of debris will enter the stream if the surrounding riparian area contains a mature, closed canopy forest with little or no unnatural disturbance. Trees and other woody debris should not be removed from streams unless it is for safety or transportation needs. If removed for transportation requirements, only those trees in the area adjacent to the road or causing direct impacts to roads, trails, or bridges should be removed.

Performance measures for tree age diversity and canopy structure for the riparian ecological systems serve as indicators for this species group (Table G 86). Both are at sustainable levels and are expected to remain sustainable in the future as long as guidelines established are followed. Forest plan components include desired conditions for floodplain forests and watershed health, objectives to maintain mature closed canopy forests in riparian areas, and guidelines for soil and water.

Table G 85. Species in aquatic coarse woody debris associates

Species Name	Common Name	Species-to-Group Weight
Alloperla natchez	Natchez Stonefly	Moderate
Anodontoides radiatus	Rayed Creekshell	Low
Etheostoma raneyi	Yazoo Darter	Moderate
Farancia erytrogramma	Rainbow Snake	Moderate
Haploperla chukcho	Chukcho Stonefly	Moderate
Lampsilis straminea straminea	Rough Fatmucket	Low
Lasmigona complanata complanata	White Heelsplitter	Low
Notropis melanostomus	Blackmouth Shiner	Moderate
Noturus gladiator	Piebald madtom	Moderate
Percina lenticula	Freckled Darter	Moderate
Plethobasus cyphyus	Sheepnose	Low
Pleurobema beadleianum	Mississippi Pigtoe	Low
Pleurobema rubrum	Pyramid Pigtoe	Low
Procambarus penni	Pearl Blackwater Crayfish	Moderate

Table G 86. Aquatic coarse woody debris associates key attributes and indicators

Target Type	Key Attribute	Indicator	Line Item-to-Group Weight
WS	Hydrologic Function	Compliance with Hydrologic Function Guidelines	Moderate
WS	Hydrologic Function	Dam Density Rating	Low
WS	Hydrologic Function	Riparian Road Density Rating	Moderate
WS	Hydrologic Function	Road Crossings Rating	Low
WS	Water Temperature Regime	Riparian Land Use Rating	Very High
WS	Water Quality--Sediment	Compliance with Sediment-related BMPs for Forest Management	Low
WS	Water Quality--Sediment	Compliance with Sediment-related BMPs for Roads Management	Low
WS	Water Quality--Sediment	Forest Cover Rating	High
WS	Water Quality--Sediment	Road Density Rating	Low
WS	Water Quality--Sediment	Sediment Risk Rating	Low
WS	Coarse Woody Debris Abundance	Compliance with Coarse Woody Debris Guidelines	Very High
ES	Coarse Woody Debris Abundance	% Riparian in Mature Forest	Very High

Open Water Associates

These species (Table G 87) require areas of open water. On National Forest System land, the largest bodies of water are often developed for various outdoor recreational activities. Open water surrounded by forest land may be a rare commodity and the National Forests in Mississippi provides opportunities for

some species that are losing habitat elsewhere. Species needs should be incorporated into management of open areas with water, especially large lakes, ponds and rivers.

Abundance is the vital key factor for this species group. As the limiting factor for these species is the presence of extensive open bodies of water, Forest Service management should focus on maintaining quality and extent of existing habitat (Table G 88). If new opportunities become available to create habitat, these species should be considered in all planning processes. Desired conditions and objectives for lakes and permanent ponds, both floodplain ecological systems, and rivers and streams will help to sustain these species.

Table G 87. Species in open water associates

Species Name	Common Name	Species-to-Group Weight
Aix sponsa	Wood Duck	Moderate
Anas platyrhynchos	Northern Mallard	Moderate
Anas rubripes	American Black Duck	Moderate
Corynorhinus rafinesquii	Rafinesque's Big-eared Bat	Low
Haliaeetus leucocephalus	Bald Eagle	High
Myotis austroriparius	Southeastern Myotis	Low

Table G 88. Open water associates key attributes and indicators

Target Type	Target Name	Key Attribute	Indicator	Line Item-to-Group Weight
SG	Open Water Associates	Habitat Type Abundance	Total Habitat Type Acres at Desired Condition	Very High
SG	Open Water Associates	Hydrologic Function	Compliance with Hydroligic Function Guidelines	Very High
SG	Open Water Associates	Invasive Species Abundance	Compliance with Invasive Species Guidelines	Very High
SG	Open Water Associates	Invasive Species Abundance	Percent of Invasive Species Occupying System	High

Aquatic Species Sensitive to Modification of In-stream Flow

Species in this group (Table G 89) are sensitive to in-stream flow modifications which include channelization, dredging, dams, road crossings, and culverts. In many cases, hydrologic modification impedes or completely prevents natural migration and dispersal strategies. In other cases, hydrologic alteration may change water temperature regimes and water chemistry variables such as dissolved oxygen levels. Other more subtle impacts of hydrologic alteration include unnatural fluctuations in hydro period that may impede reproduction or other phases in the life history of associated species. Hydrologic function and water quality are ver important attributes for this group (Table G 90).

Table G 89. Species in aquatic species sensitive to modification of in-stream flow

Species Name	Common Name	Species-to-Group Weight
Acipenser oxyrinchus desotoi	Gulf Sturgeon	Very High
Actinonaias ligamentina	Mucket	Very High
Alloperla natchez	Natchez Stonefly	Very High
Alosa alabamae	Alabama Shad	Very High
Ammocrypta meridiana	Southern Sand Darter	Very High
Anodontoides radiatus	Rayed Creekshell	Very High
Arcidens confragosus	Rock Pocketbook	Very High
Crystallaria asprella	Crystal Darter	Very High
Etheostoma lachneri	Tombigbee Darter	Very High
Etheostoma raneyi	Yazoo Darter	Very High
Farancia erytrogramma	Rainbow Snake	Low
Haploperla chukcho	Chukcho Stonefly	Very High
Isoetes louisianensis	Louisiana Quillwort	Very High
Lampsilis straminea straminea	Rough Fatmucket	High
Lasmigona complanata complanata	White Heelsplitter	Very High
Notropis melanostomus	Blackmouth Shiner	High
Noturus gladiator	piebald madtom	Very High
Percina lenticula	Freckled Darter	Very High
Plethobasus cyphyus	Sheepnose	Very High
Pleurobema beadleianum	Mississippi Pigtoe	Very High
Pleurobema rubrum	Pyramid Pigtoe	Very High
Procambarus penni	Pearl Blackwater Crayfish	Low

Table G 90. Aquatic species sensitive to modification of in-stream flow key attributes and indicators

Target Type	Target Name	Key Attribute	Indicator	Line Item-to-Group Weight
WS	Beaumont - Leaf River	Hydrologic Function	Compliance with Hydroligic Function Guidelines	Very High
WS			Dam Density Rating	Very High
WS			Road Crossings Rating	Very High
WS		Water Quality--Sediment	Compliance with Sediment-related BMPs for Forest Management	High
WS			Compliance with Sediment-related BMPs for Roads Management	High
WS			Sediment Risk Rating	High
WS		Coarse Woody Debris Abundance	Compliance with Coarse Woody Debris Guidelines	Moderate
SG	Species Sensitive to Modification of Instream Flow	Hydrologic Function	Compliance with Hydroligic Function Guidelines	Very High
SG			Dam Density Rating	Very High
SG			Riparian Road Density Rating	Very High
SG			Road Crossings Rating	Very High

Aquatic Species Sensitive to Non-native Invasive Species

Non-native invasive species negatively impact native communities in a number of ways. In some cases, invasives compete with native species for resources and space. Some invasive species may also prey directly upon native species. Still others may temporarily or even permanently alter habitats and community structures. The species in this association (Table G 91) are susceptible to competition, predation, displacement, and habitat alteration. Compliance with guidelines and management of invasive species are vital to these species (Table G 92).

Table G 91. Aquatic species sensitive to non-native invasive species

Species Name	Common Name	Species-to-Group Weight
Acipenser oxyrinchus desotoi	Gulf Sturgeon	Low
Actinonaias ligamentina	Mucket	Very High
Anodontoides radiatus	Rayed Creekshell	Very High
Arcidens confragosus	Rock Pocketbook	Very High
Etheostoma lachneri	Tombigbee Darter	Low
Etheostoma raneyi	Yazoo Darter	Low
Isoetes louisianensis	Louisiana Quillwort	Very High
Lampsilis straminea straminea	Rough Fatmucket	Very High
Lasmigona complanata complanata	White Heelsplitter	Very High
Notropis melanostomus	Blackmouth Shiner	Low
Noturus gladiator	piebald madtom	Low
Nymphoides aquatica	Big Floating Heart	Very High
Nymphoides cordata	Floating Heart	Very High
Percina lenticula	Freckled Darter	Low
Plethobasus cyphyus	Sheepnose	Very High
Pleurobema beadleianum	Mississippi Pigtoe	Very High
Pleurobema rubrum	Pyramid Pigtoe	Very High

Table G 92. Aquatic species sensitive to non-native invasive species key attributes and indicators

Target Type	Key Attribute	Indicator	Line Item-to-Group Weight
WS	Invasive Species Abundance	Compliance with Invasive Species Guidelines	Very High

Aquatic Species Sensitive to Non-Point Source Pollution

Urban and agricultural land uses generate a wide variety of toxins that often find their way into aquatic systems. While no one source may contribute large levels, when aggregated at the watershed scale, these toxins may alter water chemistry to a detrimental extent. Species in this association (Table G 93) are highly susceptible to alterations in water chemistry resulting from high levels of urban and agricultural land uses in a given watershed. Runoff from non-forested land uses can accumulate to levels toxic to species in this association. Compliance with guidelines and water quality are vital to these species (Table G 94).

Table G 93. Aquatic species sensitive to non-point source pollution

Species Name	Common Name	Species-to-Group Weight
Acipenser oxyrinchus desotoi	Gulf Sturgeon	Very High
Actinonaias ligamentina	Mucket	Very High
Alloperla natchez	Natchez Stonefly	Very High
Alosa alabamae	Alabama Shad	Very High
Ammocrypta meridiana	Southern Sand Darter	Very High
Anodontoides radiatus	Rayed Creekshell	Very High
Arcidens confragosus	Rock Pocketbook	Very High
Crystallaria asprella	Crystal Darter	Very High
Etheostoma lachneri	Tombigbee Darter	Very High
Etheostoma raneyi	Yazoo Darter	Very High
Farancia erytrogramma	Rainbow Snake	Very High
Haploperla chukcho	Chukcho Stonefly	Very High
Isoetes louisianensis	Louisiana Quillwort	Very High
Lampsilis straminea straminea	Rough Fatmucket	Moderate
Lasmigona complanata complanata	White Heelsplitter	Very High
Notropis melanostomus	Blackmouth Shiner	Very High
Noturus gladiator	piebald madtom	Very High
Percina lenticula	Freckled Darter	Very High
Plethobasus cyphyus	Sheepnose	Very High
Pleurobema beadleianum	Mississippi Pigtoe	Very High
Pleurobema rubrum	Pyramid Pigtoe	Very High
Procambarus penni	Pearl Blackwater Crayfish	Very High

Table G 94. Aquatic species sensitive to non-point source pollution key attributes and indicators

Target Type	Key Attribute	Indicator	Line Item-to-Group Weight
WS	Water Temperature Regime	Riparian Land Use Rating	Very High
WS	Water Quality--Sediment	Forest Cover Rating	Very High
WS	Water Quality--Toxics	Non-Point Source Rating	Very High
WS	Water Temperature Regime	Riparian Land Use Rating	Very High
WS	Water Quality--Sediment	Forest Cover Rating	Very High
WS	Water Quality--Toxics	Non-Point Source Rating	Very High

Aquatic Species Sensitive to Stream Sediment

Suspended sediments may adversely impact respiration and other biological functions necessary to the survival of some species (Table G 95) in this association. As heavier sediments settle to stream bottoms, important foraging and spawning habitat may also degrade. Excessive deposits of sediment may disrupt photosynthesis in some plant species or even completely bury occurrences. Water quality and hydrologic function are vital to these species and were included in the ecological sustainability evaluation model (Table G 96).

Table G 95. Aquatic species sensitive to stream sediment

Species Name	Common Name	Species-to-Group Weight
Acipenser oxyrinchus desotoi	Gulf Sturgeon	Very High
Actinonaias ligamentina	Mucket	Very High
Alloperla natchez	Natchez Stonefly	Very High
Alosa alabamae	Alabama Shad	Very High
Ammocrypta meridiana	Southern Sand Darter	Moderate
Crystallaria asprella	Crystal Darter	Very High
Etheostoma lachneri	Tombigbee Darter	Very High
Etheostoma raneyi	Yazoo Darter	Very High
Farancia erytrogramma	Rainbow Snake	Moderate
Haploperla chukcho	Chukcho Stonefly	Very High
Isoetes louisianensis	Louisiana Quillwort	High
Lampsilis straminea straminea	Rough Fatmucket	Low
Lasmigona complanata complanata	White Heelsplitter	Moderate
Myriophyllum laxum	Loose Watermilfoil	Very High
Notropis melanostomus	Blackmouth Shiner	Moderate
Noturus gladiator	piebald madtom	Moderate
Nymphoides aquatica	Big Floating Heart	High
Nymphoides cordata	Floating Heart	High
Percina lenticula	Freckled Darter	Very High
Plethobasus cyphyus	Sheepnose	Very High
Pleurobema beadleianum	Mississippi Pigtoe	Very High
Pleurobema rubrum	Pyramid Pigtoe	Very High

Table G 96. Aquatic species sensitive to stream sediment key attributes and indicators

Target Type	Key Attribute	Indicator	Line Item-to-Group Weight
WS	Hydrologic Function	Compliance with Hydroligic Function Guidelines	Very High
WS	Hydrologic Function	Dam Density Rating	Low
WS	Hydrologic Function	Riparian Road Density Rating	Very High
WS	Hydrologic Function	Road Crossings Rating	Very High
WS	Water Temperature Regime	Riparian Land Use Rating	Very High
WS	Water Quality--Sediment	Compliance with Sediment-related BMPs for Forest Management	Very High
WS	Water Quality--Sediment	Compliance with Sediment-related BMPs for Roads Management	Very High
WS	Water Quality--Sediment	Forest Cover Rating	High
WS	Water Quality--Sediment	Road Density Rating	High
WS	Water Quality--Sediment	Sediment Risk Rating	Very High

Aquatic Species Sensitive to Stream Toxins

Unlike non-point source pollution, species in this association (Table G 97) are especially susceptible to point source pollution. While permitted point sources may not adversely impact this group when compliant, spills, discharges, and other accidents may precipitate spikes in stream toxin levels sufficient to extirpate entire occurrences. Extreme alterations in water chemistry from any source can be highly detrimental to these species along thuse were key attributes in the ecological sustainability evaluation model (Table G 98).

Table G 97. Aquatic species sensitive to stream toxins

Species Name	Common Name	Species-to-Group Weight
Acipenser oxyrinchus desotoi	Gulf Sturgeon	Very High
Actinonaias ligamentina	Mucket	Very High
Alloperla natchez	Natchez Stonefly	Very High
Alosa alabamae	Alabama Shad	Very High
Ammocrypta meridiana	Southern Sand Darter	Very High
Anodontoides radiatus	Rayed Creekshell	Very High
Arcidens confragosus	Rock Pocketbook	Very High
Crystallaria asprella	Crystal Darter	Very High
Etheostoma lachneri	Tombigbee Darter	Very High
Etheostoma raneyi	Yazoo Darter	Very High
Farancia erytrogramma	Rainbow Snake	Very High
Haploperla chukcho	Chukcho Stonefly	Very High
Lampsilis straminea straminea	Rough Fatmucket	Very High
Lasmigona complanata complanata	White Heelsplitter	Very High
Notropis melanostomus	Blackmouth Shiner	Very High
Noturus gladiator	piebald madtom	Very High
Percina lenticula	Freckled Darter	Very High
Plethobasus cyphyus	Sheepnose	Very High
Pleurobema beadleianum	Mississippi Pigtoe	Very High
Pleurobema rubrum	Pyramid Pigtoe	Very High
Procambarus penni	Pearl Blackwater Crayfish	Very High

Table G 98. Aquatic species sensitive to stream toxins key attributes and indicators

Target Type	Key Attribute	Indicator	Line Item-to-Group Weight
WS	Hydrologic Function	Riparian Road Density Rating	Very High
WS	Hydrologic Function	Road Crossings Rating	Very High
WS	Water Temperature Regime	Riparian Land Use Rating	Very High
WS	Water Quality--Sediment	Forest Cover Rating	High
WS	Water Quality--Sediment	Road Density Rating	High
WS	Water Quality--Toxics	Non-Point Source Rating	Very High
WS	Water Quality--Toxics	Point Source Rating	Very High

Aquatic Species Sensitive to Water Temperature Regime

These species (Table G 99) are highly dependent on specific water temperature regimes for all or part of their life history. Thermal alteration most often occurs when riparian areas are deforested exposing water surface to increased levels of direct sunlight. Other sources of thermal alteration, such as accidental industrial discharge, are much rarer and usually temporary. Key attributes used in the ecological sustainability evaluation model are included in Table G 100.

Table G 99. Aquatic species sensitive to water temperature regime

Species Name	Common Name	Species-to-Group Weight
Actinonaias ligamentina	Mucket	Very High
Alloperla natchez	Natchez Stonefly	Very High
Alosa alabamae	Alabama Shad	Moderate
Ammocrypta meridiana	Southern Sand Darter	High
Anodontoides radiatus	Rayed Creekshell	Very High
Arcidens confragosus	Rock Pocketbook	High
Etheostoma lachneri	Tombigbee Darter	Very High
Etheostoma raneyi	Yazoo Darter	Very High
Farancia erytrogramma	Rainbow Snake	Low
Haploperla chukcho	Chukcho Stonefly	Very High
Lampsilis straminea straminea	Rough Fatmucket	Very High
Lasmigona complanata complanata	White Heelsplitter	High
Notropis melanostomus	Blackmouth Shiner	Very High
Noturus gladiator	piebald madtom	Very High
Percina lenticula	Freckled Darter	Very High
Plethobasus cyphyus	Sheepnose	Very High
Pleurobema beadleianum	Mississippi Pigtoe	Very High
Pleurobema rubrum	Pyramid Pigtoe	Very High
Procambarus penni	Pearl Blackwater Crayfish	High

Table G 100. Aquatic species sensitive to water temperature regime key attributes and indicators

Target Type	Key Attribute	Indicator	Line Item-to-Group Weight
ES	Hydrologic Function	Compliance with Hydroligic Function Guidelines	Very High
ES	Forest Age Diversity	% Mature Forest	High
ES	Forest Age Diversity	% Old Forest	High
ES	Vegetation Structure	% Mature Very-Closed Canopy	Very High
WS	Hydrologic Function	Dam Density Rating	High
WS	Water Temperature Regime	Riparian Land Use Rating	Very High
WS	Water Quality--Sediment	Forest Cover Rating	High

Species Sensitive to Recreational Traffic

Species in this group (Table G 101) are sensitive to excessive human disturbance such as trampling, harassment, vehicular mortality, excessive collection, breeding or nest disturbance, and direct mortality. Many species are collected commercially and used for a variety of purposes including food, medicinal, decorative, gardening/landscaping, pet trade, bait collection, and trophy fishing. Reptile species are especially sensitive to being harmed, harassed, and killed by humans. This interaction with humans can have long-term negative effects on population sizes and sustainability.

Collection limits for fishable/ hunt able and non-game species are set by Mississippi Department of Wildlife, Fisheries, and Parks, so issues of excessive take are beyond Forest Service control. However, we should explore opportunities to limit access to areas with sensitive populations of these species when feasible. The strategy for these species is to continue to educate the public on species needs, restrict access to known populations, and limit approval of collections of these species to scientific purposes only. Key attributes used in the ecological sustainability evaluation model are included in Table G 102.

Table G 101. Species sensitive to recreational traffic

Species Name	Common Name	Species-to-Group Weight
Acipenser oxyrinchus desotoi	Gulf Sturgeon	Very High
Actinonaias ligamentina	Mucket	Very High
Alloperla natchez	Natchez Stonefly	High
Alosa alabamae	Alabama Shad	Moderate
Ammocrypta meridiana	Southern Sand Darter	Moderate
Anodontoides radiatus	Rayed Creekshell	Very High
Arcidens confragosus	Rock Pocketbook	Very High
Etheostoma lachneri	Tombigbee Darter	Moderate
Etheostoma raneyi	Yazoo Darter	Moderate
Farancia erytrogramma	Rainbow Snake	Very High
Haploperla chukcho	Chukcho Stonefly	High
Lampsilis straminea straminea	Rough Fatmucket	Very High
Lasmigona complanata complanata	White Heelsplitter	Very High
Myriophyllum laxum	Loose Watermilfoil	Low
Notropis melanostomus	Blackmouth Shiner	Moderate
Noturus gladiator	piebald madtom	Very High
Nymphoides aquatica	Big Floating Heart	Moderate
Nymphoides cordata	Floating Heart	Moderate
Percina lenticula	Freckled Darter	Very High
Plethobasus cyphyus	Sheepnose	Very High
Pleurobema beadleianum	Mississippi Pigtoe	Very High
Pleurobema rubrum	Pyramid Pigtoe	Very High
Procambarus penni	Pearl Blackwater Crayfish	Moderate

Table G 102. Species sensitive to recreational traffic key attributes and indicators

Target Type	Key Attribute	Indicator	Line Item-to-Group Weight
WS	Hydrologic Function	Riparian Road Density Rating	Very High
WS	Hydrologic Function	Road Crossings Rating	Very High
WS	Water Quality--Sediment	Road Density Rating	Very High
SG	Distance from Roads	ORV Trail Density	Very High
SG	Distance from Roads	Paved Open Road Density	Very High
SG	Distance from Roads	Total Road and Trail Density	Very High
SG	Distance from Roads	Unpaved Gated Road Density	Very High
SG	Distance from Roads	Unpaved Open Road Density	Very High

G.4 Crosswalk between NatureServe's Ecological Systems and Forest Service Forest Types

Crosswalk to this Ecological System…	If this forest type…	Occurs on this Ecological Site Type…
Bienville		
East Gulf Coastal Plain Floodplain Forest	13-loblolly pine - hardwood	Water and Alluvial
	61-swamp.chest.oak-cherrybark	All
	62-sweetgum-nut.oak-willow	
	63-sugarberry-a.elm-greenash	
	64-laureloak-willowoak	
	98-undrained flatwoods	
	46-bottmhardwoods-yellowpine	
East Gulf Coastal Plain Interior Shortleaf Pine-Oak Forest and Woodland	12-shortleaf pine – oak	
	32-shortleaf pine	
East Gulf Coastal Plain Interior Upland Longleaf Pine Woodland	21-longleaf pine	
East Gulf Coastal Plain Jackson Prairie and Woodland	35-e.red cedar	Prairie
Southern Mesic Slope Forest	47-w.oak-b.oak-yellowpine	Mesic, Alluvial, and Non-riverine Hydric
	51-postoak-blackoak	
	53-w.oak-n.redoak-hickory	
	54-whiteoak	
	56-y.poplar-w.oak-n.red.oak	All
	58-sweet gum - y.poplar	
	69-beech-magnolia	
Southern Loblolly-Hardwood Flatwoods	13-loblolly pine - hardwood	Mesic
	31-loblolly pine	Adanton, Faulkner, Ichusa, Louin, and Oktibbeha Soil series
Successional and Planted Loblolly Pine Forest	13-loblolly pine - hardwood	Xeric, Dry, Dry-mesic, and Prairie
	31-loblolly pine	All soil series except Adanton, Faulkner, Ichusa, Louin, and Oktibbeha soil series
Southern Coastal Plain Dry Upland Hardwood Forest	44-s.redoak-yellowpine	All
	47-w.oak-b.oak-yellowpine	Xeric, Dry, Dry-mesic, and Prairie
	51-postoak-blackoak	
	53-w.oak-n.redoak-hickory	
	54-whiteoak	
Southern Coastal Plain Seepage Swamp and Baygall (includes forested seeps)	68-s.bay-swamptupelo-r.maple	All

Crosswalk to this Ecological System…	If this forest type…	Occurs on this Ecological Site Type…
Chickasawhay		
Administrative Site	99 - administrative	All
East Gulf Coastal Plain Floodplain Forest	13-loblolly pine - hardwood	Water, Alluvial, and Non-riverine Hydric
	46-bottmhardwoods-yellowpine	All
	61-swamp.chest.oak-cherrybark	
	62-sweetgum-nut.oak-willow	
	64-laureloak-willowoak	
	98-undrained flatwoods	
East Gulf Coastal Plain Interior Upland Longleaf Pine Woodland	12-shortleaf pine - oak	
	21-longleaf pine	
	25-yellow pine	
	32-shortleaf pine	
	49-bearoak-s.scrubo-yellowpine	
	57-scrub oak	
East Gulf Coastal Plain Southern Mesic Slope Forest	13-loblolly pine - hardwood	Mesic
	47-w.oak-b.oak-yellowpine	Mesic, Alluvial, and Non-riverine Hydric
	48-n.redoak-hickory-yellowpine	
	50-yellow poplar	All
	53-w.oak-n.redoak-hickory	Mesic, Alluvial, and Non-riverine Hydric
	54-whiteoak	
	56-y.poplar-w.oak-n.red.oak	All
	58-sweet gum - y.poplar	
	69-beech-magnolia	
Loblolly Pine Forest	13-loblolly pine - hardwood	Xeric, Dry, and Dry-mesic
	31-loblolly pine	All
Slash Pine Forest	14-slash pine - hardwood	
	22-slash pine	
Southern Coastal Plain Dry Upland Hardwood Forest	44-s.redoak-yellowpine	
	47-w.oak-b.oak-yellowpine	Xeric, Dry, and Dry-mesic
	48-n.redoak-hickory-yellowpine	
	51-postoak-blackoak	All
	53-w.oak-n.redoak-hickory	Xeric, Dry, and Dry-mesic
	54-whiteoak	
Southern Coastal Plain Seepage Swamp and Baygall	68-s.bay-swamptupelo-r.maple	All
Xeric Sandhills	Not applicable	Xeric

Crosswalk to this Ecological System…	If this forest type…	Occurs on this Ecological Site Type…
De Soto		
East Gulf Coastal Plain Floodplain Forest	13-loblolly pine - hardwood	Water, Alluvial, and Non-riverine Hydric
	24-baldcypress	All
	67-bald cypress-water tupelo	
	61-swamp.chest.oak-cherrybark	
	62-sweetgum-nut.oak-willow	
	64-laureloak-willowoak	
	98-undrained flatwoods	
	46-bottmhardwoods-yellowpine	Water, Alluvial, and Non-riverine Hydric
East Gulf Coastal Plain Interior Upland Longleaf Pine Woodland	12-shortleaf pine - oak	All
	21-longleaf pine	All except Non-riverine Hydric
	25-yellow pine	
	26-longleaf pine - hardwood	
	32-shortleaf pine	All
	49-bearoak-s.scrubo-yellowpine	
	57-scrub oak	
East Gulf Coastal Plain Near Coast Pine Flatwoods	14-slash pine - hardwood	Non-riverine Hydric
	21-longleaf pine	
	22-slash pine	
	25-yellow pine	
	26-longleaf pine - hardwood	
	99-brush species	All
East Gulf Coastal Plain Southern Mesic Slope Forest	13-loblolly pine - hardwood	Mesic
	37-spruce pine	All
	47-w.oak-b.oak-yellowpine	Mesic, Alluvial, and Non-riverine Hydric
	48-n.redoak-hickory-yellowpine	
	50-yellow poplar	All
	53-w.oak-n.redoak-hickory	Mesic, Alluvial, and Non-riverine Hydric
	54-whiteoak	
	56-y.poplar-w.oak-n.red.oak	All
	58-sweet gum - y.poplar	
	69-beech-magnolia	
East Gulf Coastal Plain Treeless Savanna and Wet Prairie	Not applicable	Non-riverine Hydric
Loblolly Pine Forest	13-loblolly pine - hardwood	Xeric, Dry, and Dry-mesic
	31-loblolly pine	All
	46-bottmhardwoods-yellowpine	Xeric, Dry, Dry-mesic, and Mesic
Slash Pine Forest	14-slash pine - hardwood	All except Non-riverine Hydric
	22-slash pine	

Crosswalk to this Ecological System…	If this forest type…	Occurs on this Ecological Site Type…
Southern Coastal Plain Dry Upland Hardwood Forest	44-s.redoak-yellowpine	All
	47-w.oak-b.oak-yellowpine	Xeric, Dry, and Dry-mesic
	48-n.redoak-hickory-yellowpine	
	51-postoak-blackoak	All
	53-w.oak-n.redoak-hickory	Xeric, Dry, and Dry-mesic
	54-whiteoak	
	97-live oak	All
Southern Coastal Plain Herbaceous Seepage Bog	Land class code 251(restored) and 832 (need restoration)	
Southern Coastal Plain Seepage Swamp and Baygall	68-s.bay-swamptupelo-r.maple	
Xeric Sandhills	Not applicable	Xeric
Delta		
Lower Mississippi River Bottomland and Floodplain Forest	62-sweetgum-nut.oak-willow	All
	63-sugarberry-a.elm-greenash	
	65-overcup oak-water hickory	
	73-cottonwood	
	74-willow	
Holly Springs		
Cypress Dominated Wetland	24-baldcypress	All
	67-bald cypress-water tupelo	
East Gulf Coastal Plain Floodplain Forest	13-loblolly pine - hardwood	Alluvial
	46-bottmhardwoods-yellowpine	All
	61-swamp.chest.oak-cherrybark	
	62-sweetgum-nut.oak-willow	
	63-sugarberry-a.elm-greenash	
	64-laureloak-willowoak	
	72-river birch-sycamore	
	75-sycamore-pecan-a.elm	
	98-undrained flatwoods	
East Gulf Coastal Plain Northern Seepage Swamp	68-s.bay-swamptupelo-r.maple	
East Gulf Coastal Plain Interior Shortleaf Pine-Oak Forest and Woodland	12-shortleaf pine - oak	
	25-yellow pine	
	32-shortleaf pine	
	33-virginia pine	
East Gulf Coastal Plain Northern Depression Pondshore	99 - brush species	

Crosswalk to this Ecological System…	If this forest type…	Occurs on this Ecological Site Type…
East Gulf Coastal Plain Northern Dry Upland Hardwood Forest	44-s.redoak-yellowpine	Xeric, Dry, Upland Loess, Prairie, Dry-mesic
	45-chestoak-scarletoak-yellowpine	All
	47-w.oak-b.oak-yellowpine	Xeric, Dry, Upland Loess, Prairie, Dry-mesic
	48-n.redoak-hickory-yellowpine	
	49-bearoak-s.scrubo-yellowpine	All
	51-postoak-blackoak	All
	53-w.oak-n.redoak-hickory	Xeric, Dry, Upland Loess, Prairie, Dry-mesic
	54-whiteoak	
East Gulf Coastal Plain Northern Mesic Hardwood Forest	13-loblolly pine - hardwood	Mesic
	44-s.redoak-yellowpine	Mesic, Alluvial, and Non-riverine Hydric
	47-w.oak-b.oak-yellowpine	
	48-n.redoak-hickory-yellowpine	
	53-w.oak-n.redoak-hickory	
	54-whiteoak	
	56-y.poplar-w.oak-n.red.oak	All
	58-sweet gum - y.poplar	
	82-black walnut	
Slash Pine Forest	22- slash pine	
Loblolly Pine Forest	13-loblolly pine - hardwood	All except Alluvial and Mesic
	31-loblolly pine	All
Homochitto		
Cypress Dominated Wetland	67-bald cypress-water tupelo	All
East Gulf Coastal Plain Floodplain Forest	13-loblolly pine - hardwood	Alluvial
	37-spruce pine	All
	46-bottmhardwoods-yellowpine	All
	61-swamp.chest.oak-cherrybark	All except Loess
	62-sweetgum-nut.oak-willow	All
	63-sugarberry-a.elm-greenash	
	64-laureloak-willowoak	
	71-b.ash-a.elm-r.maple	
	72-river birch-sycamore	
	74-willow	
	98- undrained flatwoods	
East Gulf Coastal Plain Interior Upland Longleaf Pine Woodland	12-shortleaf pine - oak	
	21-longleaf pine	
	25-yellow pine	
	26-longleaf pine - hardwood	
	32-shortleaf pine	

Crosswalk to this Ecological System…	If this forest type…	Occurs on this Ecological Site Type…
East Gulf Coastal Plain Southern Loess Bluff Forest	53-w.oak-n.redoak-hickory	Loess
	54-whiteoak	
	58-sweet gum - y.poplar	
	61-swamp.chest.oak-cherrybark	
	69-beech-magnolia	
East Gulf Coastal Plain Southern Mesic Slope Forest	13-loblolly pine - hardwood	Mesic
	47-w.oak-b.oak-yellowpine	Mesic, Alluvial, and Non-riverine Hydric
	48-n.redoak-hickory-yellowpine	
	50-yellow poplar	All
	53-w.oak-n.redoak-hickory	Mesic, Alluvial, and Non-riverine Hydric
	54-whiteoak	
	56-y.poplar-w.oak-n.red.oak	All
	58-sweet gum - y.poplar	All except Loess
	69-beech-magnolia	
Loblolly Pine Forest	13-loblolly pine - hardwood	All except Alluvial and Mesic
	31-loblolly pine	All
Southern Coastal Plain Dry Upland Hardwood Forest	44-s.redoak-yellowpine	
	45 - chestnut oak-scarlet oak-yellow pine	
	47-w.oak-b.oak-yellowpine	Xeric, Dry, Upland Loess, and Dry-mesic
	48-n.redoak-hickory-yellowpine	
	53-w.oak-n.redoak-hickory	Xeric, Dry, and Dry-mesic
	54-whiteoak	
	88-black locust	All
Southern Coastal Plain Seepage Swamp and Baygall	68-s.bay-swamptupelo-r.maple	
Tombigbee		
East Gulf Coastal Plain Black Belt Calcareous Prairie and Woodland	11-eastern red cedar - hardwood	All
	35-e.red cedar	
East Gulf Coastal Plain Floodplain Forest	13-loblolly pine - hardwood	Alluvial and Water
	46-bottmhardwoods-yellowpine	All
	61-swamp.chest.oak-cherrybark	
	62-sweetgum-nut.oak-willow	
	63-sugarberry-a.elm-greenash	
	64-laureloak-willowoak	
	68-s.bay-swamptupelo-r.maple	
	73-cottonwood	
	74-willow	
	75-sycamore-pecan-a.elm	
	98-undrained flatwoods	
	99-brush species	

Crosswalk to this Ecological System…	If this forest type…	Occurs on this Ecological Site Type…
East Gulf Coastal Plain Interior Shortleaf Pine-Oak Forest and Woodland	12-shortleaf pine - oak	
	32-shortleaf pine	
East Gulf Coastal Plain Northern Dry Upland Hardwood Forest	43-oak-e.redcedar	
	44-s.redoak-yellowpine	
	47-w.oak-b.oak-yellowpine	Xeric, Dry, Loess, Blackbelt Prairie, and Dry-mesic
	48-n.redoak-hickory-yellowpine	
	51-postoak-blackoak	All
	53-w.oak-n.redoak-hickory	Xeric, Dry, Loess, Blackbelt Prairie, and Dry-mesic
East Gulf Coastal Plain Northern Mesic Hardwood Forest	13-loblolly pine - hardwood	Mesic
	47-w.oak-b.oak-yellowpine	Mesic, Alluvial, and Non-riverine Hydric
	48-n.redoak-hickory-yellowpine	
	53-w.oak-n.redoak-hickory	
	55-red oak	All
	56-y.poplar-w.oak-n.red.oak	
	58-sweet gum - y.poplar	
	69-beech-magnolia	
Loblolly Pine Forest	13-loblolly pine - hardwood	All except Alluvial and Mesic
	31-loblolly pine	All
Slash Pine Forest	22-slash pine	All

G.5 Ecological Site Type Definitions

Ecological site types are predominately defined by soil drainage classes. Following are definitions of each ecological site type followed by a list of which soil series are included in the type on each district.

Xeric –

Represented by somewhat excessively well-drained and excessively well-drained soil drainage characteristics occurring on the National Forests in Mississippi. This site type is equivalent to Gopher Tortoise priority soils on the Chickasawhay and De Soto NFs.

Soil Name	Locations
Eustis and Lakeland loamy sands, 0-8 percent slopes	Chickasawhay / De Soto
Eustis and Lakeland soils, 15-30 percent slopes	Chickasawhay / De Soto
Eustis and Lakeland soils, 8-15 percent slopes	Chickasawhay / De Soto
Lakeland sand	Bienville
Wadley fine sand, 0-8 percent slopes	Chickasawhay / De Soto

Dry –

Represented by well-drained soil drainage characteristics occurring on the National Forests in Mississippi.

Soil Name	Locations
Atwood silt loam	Holly Springs / Tombigbee
Benndale and Heidel soils, 8-15 percent slopes	Chickasawhay / De Soto
Cahaba fine sandy loam	Holly Springs / Tombigbee/ Bienville
Cahaba sandy loam	Homochitto
Gullied land-Smithdale complex	Holly Springs / Tombigbee
Heidel fine sandy loam	Bienville
Heidel sandy loam, 15-30 percent slopes	Chickasawhay / De Soto
Lexington silt loam, 8-17% slopes	Holly Springs / Tombigbee
Lucy and Wadley soils	Holly Springs / Tombigbee
Lucy loamy sand	Homochitto
Maben fine sandy loam and Sweatman silt lo	Holly Springs / Tombigbee
Maben loam and Sweatman fine sandy loam	Holly Springs / Tombigbee
Maben silt loam and Sweatman silt loam	Holly Springs / Tombigbee
McLaurin and Benndale fine sandy loams, 0-8 percent slopes	Chickasawhay / De Soto
Ruston and Lucedale soils, 0-8 percent slopes	Chickasawhay / De Soto
Shubuta fine sandy loam, 8-12 percent slopes	Chickasawhay / De Soto
Smithdale and Ruston soils	Holly Springs / Tombigbee
Smithdale fine sandy loam	Bienville /Holly Springs / Tombigbee
Smithdale fine sandy loam, 15-35 percent slopes, eroded	Chickasawhay / De Soto
Smithdale fine sandy loam, 8-15 percent slopes, eroded	Chickasawhay / De Soto
Smithdale-Rock outcrop sandstone cx	Bienville

Soil Name	Locations
Sweatman fine sandy loam	Bienville
Saffell Gravelly Fine Sandy Loam	All compartments on Homochitto except: 202, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 231, 232, 233, 241, 242, 243, 244
Ruston Fine Sandy Loam	Bienville and all compartments on Homochitto except: 202, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 231, 232, 233, 241, 242, 243, 244
Smithdale Sandy Loam	Holly Springs, Tombigbee, and all compartments on Homochitto except: 202, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 231, 232, 233, 241, 242, 243, 244

Upland Loess –

Represented by loess soils occurring on the National Forests in Mississippi.

Soil Name	Locations
Calloway-Grenada complex	Holly Springs / Tombigbee
Gullied land - Loring Complex	Holly Springs / Tombigbee
Gullied land-Providence complex	Holly Springs / Tombigbee
Lexington silt loam, 2-8 % slopes	Holly Springs / Tombigbee
Lexington Silt Loam, Eroded	Homochitto
Loring Silt Loam, 0-8% slopes	Homochitto
Loring silt loam, 2-8 % slopes	Holly Springs / Tombigbee
Memphis Silt Loam, Eroded	Homochitto
Ruston Fine Sandy Loam	Homochitto: Compartments: 202, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 231, 232, 233, 241, 242, 243, 244
Saffell Gravelly Fine Sandy Loam	Homochitto: Compartments: 202, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 231, 232, 233, 241, 242, 243, 244
Smithdale Sandy Loam	Homochitto: Compartments: 202, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 231, 232, 233, 241, 242, 243, 244

Prairie –

Represented by well-drained alkaline prairie soils occurring on the National Forests in Mississippi.

Soil Name	Locations
Demopolis silty clay loam	Tombigbee
Gullied land-Demopolis complex	Tombigbee
Maytag silty clay	Bienville
Okolona silty clay	Bienville

Dry-Mesic –

Represented by moderately well-drained soil drainage characteristics occurring on the National Forests in Mississippi.

Soil Name	Locations
Boswell fine sandy loam	Bienville
Demopolis silty clay loam	Holly Springs
Freest fine sandy loam	Bienville
Freest fine sandy loam, 0-8 percent slopes	Chickasawhay / De Soto
Freest-Susquehanna Complex, 5-12 percent slopes	Chickasawhay / De Soto
Gullied land-Demopolis complex	Holly Springs
Kolin silt loam, eroded	Homochitto
Loring silt loam, 8-17 % slopes	Holly Springs / Tombigbee
Lorman Silt Loam	Homochitto
Lorman silt loam, 15-40 percent slopes	Chickasawhay / De Soto
Ora fine sandy loam	Bienville
Ora loam	Holly Springs
Ora sandy loam	Holly Springs / Tombigbee
Petal fine sandy loam, 8-20 percent slopes	Chickasawhay / De Soto
Poarch, Malbis and Saucier soils, 0-8 percent slopes	Chickasawhay / De Soto
Prentiss fine sandy loam, 0-5 percent slopes	Chickasawhay / De Soto /Holly Springs / Tombigbee
Providence silt loam, 8-15 % slopes	Holly Springs / Tombigbee
Savannah fine sandy loam	Bienville /Holly Springs / Tombigbee
Savannah fine sandy loam, 0-5 percent slopes	Chickasawhay / De Soto
Providence silt loam, 0-8% slopes	Holly Springs / Tombigbee
Providence silt loam, 0-8% slopes	Homochitto

Mesic –

Represented by somewhat poorly-drained soil drainage characteristics occurring on the National Forests in Mississippi.

Soil Name	Locations
Bude Silt Loam	Homochitto
Escambia and Basin soils, 0-3 percent slopes	Chickasawhay / De Soto
Falkner silt loam	Bienville
Falkner silt loam, 0-3 percent slopes	Chickasawhay / De Soto
Ichusa silty clay loam	Bienville
Kipling loam	Holly Springs / Tombigbee
Kipling silt loam	Holly Springs / Tombigbee
Lenoir silt loam, 0-2 percent slopes	Chickasawhay / De Soto
Louin silty clay loam	Bienville
Nahunta silt loam, 0-2 percent slopes	Chickasawhay / De Soto
Oktibbeha silty clay loam	Bienville
Stough fine sandy loam	Bienville
Susquehanna fine sandy loam, 2-8 percent slopes	Chickasawhay / De Soto
Susquehanna fine sandy loam, 8-15 percent slopes, eroded	Chickasawhay / De Soto
Wilcox silt loam	Holly Springs / Tombigbee

Non-riverine hydric –

Represented by very poorly-drained and poorly-drained soil drainage characteristics occurring on the National Forests in Mississippi.

Soil Name	Locations
Adaton silt loam	Bienville
Atmore, Plummer and Smithton soils, 0-2 percent slopes	Chickasawhay / De Soto

Alluvial –

Represented by alluvial / floodplain soils are occasionally flooded or frequently flooded occurring on the National Forests in Mississippi.

Soil Name	Locations
Annemaine loam, 0-2 percent slopes, occasionally flooded	Chickasawhay / De Soto
Ariel Silt Loam, Occasionally Flooded	Homochitto
Belden and Leeper silty clay loams	Holly Springs / Tombigbee
Bibb fine sandy loam fq fld	Bienville
Bibb, Trebloc and Leaf soils, 0-2 percent slopes, frequently flooded	Chickasawhay / De Soto
Bigbee loamy sand, 0-2 percent slopes, occasionally flooded	Chickasawhay / De Soto
Bruno Sandy Loam, Frequently Flooded	Homochitto
Cahaba, Latonia and Bassfield soils, 0-2 percent slopes, occasionally flooded	Chickasawhay / De Soto
Cascilla and Jena soils	Holly Springs / Tombigbee

Soil Name	Locations
Chenneby and Mathiston silt loams	Holly Springs / Tombigbee
Collins Silt Loam, occasionally flooded	Homochitto
Dorovan and Pamlico soils, 0-2 percent slopes, frequently flooded	Chickasawhay / De Soto
Falaya Silt Loam, Occasionally Flooded	Homochitto
Gillsburg and Mantachie soils	Holly Springs / Tombigbee
Gillsburg Silt Loam, Occasionally Flooded	Homochitto
Guyton loam occasionally flooded	Bienville
Harleston fine sandy loam, 0-2 percent slopes, occasionally flooded	Chickasawhay / De Soto
Houlka silty clay loam occasionally flooded	Bienville
Iuka sandy loam, 0-2 percent slopes, occasionally flooded	Chickasawhay / De Soto
Jena fine sandy loam occasionally flooded	Bienville
Kirkville fine sandy loam occasionally flooded	Bienville
Leeper clay loam occasionally flooded	Bienville
Lenoir silt loam, 0-2 percent slopes, frequently flooded	Chickasawhay / De Soto
Mantachie sandy loam 0-2 percent slopes, occasionally flooded	Chickasawhay / De Soto
Mantachie silt loam occasionally flooded	Bienville
Marietta fine sandy loam	Holly Springs / Tombigbee
Marietta silt loam occasionally flooded	Bienville
Nugent loamy sand, 0-2 percent slopes, occasionally flooded	Chickasawhay / De Soto
Oaklimeter and Collins silt loams	Holly Springs / Tombigbee
Ochlockonee and Jena sandy loams, 0-2 percent slopes, occasionally flooded	Chickasawhay / De Soto
Ochlockonee-Kirkville complex	Holly Springs / Tombigbee
Quitman fine sandy loam occasionally flooded	Bienville
Riverwash	Homochitto
Stough fine sandy loam, 0-2 percent slopes, occasionally flooded	Chickasawhay / De Soto
Trebloc Silt Loam, Frequently Flooded	Homochitto
Typic Fluvaquents	Holly Springs / Tombigbee
Urbo and Una soils fq fld	Bienville
Urbo silty clay loam occasionally flooded	Bienville

Water –

Represented by standing water, wet spots, or ponded areas occurring on the Forests. This excludes streams, rivers, or other lotic bodies of water.

G.5.1 Relative Abundance Matrix

Spatial extent (relative abundance) was important to provide insight into possible restoration objectives. Relative abundance is defined as the percentage of each ecological site type covered by each ecological

system. We examined current relative abundance, based upon our FSVeg and soils data, and ecologically sustainable relative abundance as designed by the best available science and natural historic range of variation. Desired relative abundance may take several decades to achieve. The relative abundance matrix uses the ecological site types as defined above to display the ecologically optimal percentage of each system on all units.

The following table was created using ecological sustainability evaluation tool. It compares the current relative abundance with the ecologically sustainable relative abundance and provides a sustainability score. The scores were determined by setting thresholds for each ecological system on each ecological site type. For example, on the Ackerman Unit of the Tombigbee NF, floodplain forests should comprise no more than 5 percent of dry site types. The thresholds in this example would be as follows:

Poor	Fair	Good	Very Good
>10	5-10	1-5	0

Scores of good or very good indicate sustainable ecological systems. For most systems a range of sustainable coverage was determined. The table below is grouped by national forest unit. This was necessary due to the diversity of soil site types across the Forests.

Table G 103. Soil relative abundance matrix

Ecological System	Ecologically Sustainable Coverage (%)	Current Value (%)	Current Grade	Ecologically Sustainable Coverage (%)	Current Value (%)	Current Grade
Ackerman Unit						
	Dry (well drained soils)			**Dry to Mesic (moderately well-drained)**		
Floodplain Forest	0-5	1	Very Good	0-5	1	Very Good
Loblolly Pine Forest	0-5	55	Poor	0-5	71	Poor
Northern Dry Upland Hardwood Forest	40-60	29	Poor	40-60	13	Poor
Northern Mesic Hardwood Forest	0-5	3	Very Good	0-5	1	Very Good
Shortleaf Pine-Oak Forest and Woodland	40-60	12	Poor	40-60	14	Poor
Slash Pine Forest	0-5	0	Very Good	0-5	0	Very Good
	Upland Loess			**Mesic (somewhat poorly drained)**		
Floodplain Forest	0-5	0	Very Good	0-5	0	Very Good
Loblolly Pine Forest	0-5	80	Poor	0-5	48	Poor
Northern Dry Upland Hardwood Forest	40-60	14	Poor	0-5	0	Very Good
Northern Mesic Hardwood Forest	0-5	2	Very Good	80-100	37	Poor
Shortleaf Pine-Oak Forest and Woodland	40-60	4	Poor	1-20	15	Very Good
Slash Pine Forest	0-5	0	Very Good	0-5	0	Very Good

Ecological System	Ecologically Sustainable Coverage (%)	Current Value (%)	Current Grade	Ecologically Sustainable Coverage (%)	Current Value (%)	Current Grade
	Alluvial (floodplain)			**Water or Ponded Areas**		
Floodplain Forest	90-100	13	Poor	90-100	0	Poor
Loblolly Pine Forest	0-5	38	Poor	0-5	49	Poor
Northern Dry Upland Hardwood Forest	0-5	1	Very Good	0-5	0	Very Good
Northern Mesic Hardwood Forest	0-5	40	Poor	0-5	50	Poor
Shortleaf Pine-Oak Forest and Woodland	0-5	7	Fair	0-5	1	Very Good
Slash Pine Forest	0-5	1	Very Good	0-5	0	Very Good
Trace Unit						
	Black Belt Prairie Soils			**Dry (well drained soils)**		
Black Belt Prairie and Woodland	90-100	43	Poor	0-5	0	Very Good
Floodplain Forest	0-5	1	Very Good	0-5	1	Very Good
Loblolly Pine Forest	0-5	38	Poor	0-5	47	Poor
Northern Dry Upland Hardwood Forest	0-5	14	Fair	40-60	22	Poor
Northern Mesic Hardwood Forest	0-5	1	Very Good	0-5	10	Fair
Shortleaf Pine-Oak Forest and Woodland	0-5	3	Very Good	40-60	20	Poor
Slash Pine Forest	0-5	0	Very Good	0-5	0	Very Good
	Dry to Mesic (moderately well-drained)			**Mesic (somewhat poorly drained)**		
Black Belt Prairie and Woodland	0-5	0	Very Good	0-5	1	Very Good
Floodplain Forest	0-5	8	Fair	0-5	1	Very Good
Loblolly Pine Forest	0-5	75	Poor	0-5	62	Poor
Northern Dry Upland Hardwood Forest	40-60	11	Poor	0-5	1	Very Good
Northern Mesic Hardwood Forest	0-5	2	Very Good	90-100	31	Poor
Shortleaf Pine-Oak Forest and Woodland	40-60	4	Poor	0-5	4	Very Good
Slash Pine Forest	0-5	0	Very Good	0-5	1	Very Good

Ecological System	Ecologically Sustainable Coverage (%)	Current Value (%)	Current Grade	Ecologically Sustainable Coverage (%)	Current Value (%)	Current Grade
	Alluvial (floodplain)			**Water**		
Black Belt Prairie and Woodland	0-5	2	Very Good	0-5	5	Very Good
Floodplain Forest	90-100	13	Poor	90-100	8	Poor
Loblolly Pine Forest	0-5	48	Poor	0-5	11	Fair
Northern Dry Upland Hardwood Forest	0-5	8	Fair	0-5	0	Very Good
Northern Mesic Hardwood Forest	0-5	28	Poor	0-5	65	Poor
Shortleaf Pine-Oak Forest and Woodland	0-5	1	Very Good	0-5	11	Fair
Slash Pine Forest	0-5	0	Very Good	0-5	0	Very Good
Bienville Unit						
	Xeric (excessively well-drained)			**Prairie Soils**		
Floodplain Forest	0-5	0	Very Good	0-5	23	Fair
Jackson Prairie and Woodland	0-5	0	Very Good	90-100	7	Poor
Loblolly Pine Forest	0-5	100	Poor	0-5	65	Poor
Seeps, Springs, and Seepage Swamps	0-5	0	Very Good	0-5	0	Very Good
Shortleaf Pine-Oak Forest and Woodland	0-5	0	Very Good	0-5	2	Very Good
Southern Dry Upland Hardwood Forest	0-5	0	Very Good	0-5	3	Very Good
Southern Mesic Slope Forest	0-5	0	Very Good	0-5	0	Very Good
Southern Loblolly-Hardwood Flatwoods	0-5	0	Very Good	0-5	0	Very Good
Upland Longleaf Pine Woodland	90-100	0	Poor	0-5	0	Very Good
	Dry (well drained soils)			**Dry to Mesic (moderately well-drained)**		
Floodplain Forest	0-5	2	Very Good	0-5	5	Very Good
Jackson Prairie and Woodland	0-5	0.1	Very Good	0-5	0	Very Good
Loblolly Pine Forest	0-5	75	Poor	0-5	79	Poor
Seeps, Springs, and Seepage Swamps	0.1-1	0.2	Very Good	0-5	0	Very Good
Shortleaf Pine-Oak Forest and Woodland	1-20	7.7	Very Good	0-5	4	Very Good
Southern Dry Upland Hardwood Forest	0-5	5	Very Good	0-5	4	Very Good
Southern Mesic Slope Forest	0-5	1	Very Good	0-5	1	Very Good

Ecological System	Ecologically Sustainable Coverage (%)	Current Value (%)	Current Grade	Ecologically Sustainable Coverage (%)	Current Value (%)	Current Grade
Southern Loblolly-Hardwood Flatwoods	0-5	0	Very Good	0-5	0	Very Good
Upland Longleaf Pine Woodland	79-99	9	Poor	90-100	7	Poor
	Mesic (somewhat poorly drained)			**Non-Riverine Hydric (poorly drained**		
Floodplain Forest	0-5	4	Very Good	10-20	12	Good
Jackson Prairie and Woodland	0-5	0	Very Good	0-5	0	Very Good
Loblolly Pine Forest	0-5	2	Very Good	0-5	1	Very Good
Seeps, Springs, and Seepage Swamps	0-5	0	Very Good	0-5	0	Very Good
Shortleaf Pine-Oak Forest and Woodland	1-5	3	Very Good	0-5	3	Very Good
Southern Dry Upland Hardwood Forest	0-5	1	Very Good	0-5	1	Very Good
Southern Mesic Slope Forest	10-20	12	Good	5-15	7	Good
Southern Loblolly-Hardwood Flatwoods	70-80	79	Very Good	70-80	76	Very Good
Upland Longleaf Pine Woodland	0-5	0	Very Good	0-5	0	Very Good
	Alluvial (floodplain)			**Water / Wet Spot**		
Floodplain Forest	90-100	50	Poor	90-100	67	Poor
Jackson Prairie and Woodland	0-5	0	Very Good	0-5	0	Very Good
Loblolly Pine Forest	0-5	17	Fair	0-5	11	Fair
Seeps, Springs, and Seepage Swamps	0-5	0	Very Good	0-5	0	Very Good
Shortleaf Pine-Oak Forest and Woodland	0-5	1	Very Good	0-5	4	Very Good
Southern Dry Upland Hardwood Forest	0-5	1	Very Good	0-5	0	Very Good
Southern Mesic Slope Forest	0-5	31	Poor	0-5	18	Fair
Southern Loblolly-Hardwood Flatwoods	0-5	0	Very Good	0-5	0	Very Good
Upland Longleaf Pine Woodland	0-5	0	Very Good	0-5	0	Very Good
Chickasawhay Unit						
	Xeric (excessively well-drained)			**Dry (well drained soils)**		
Floodplain Forest	0-5	4	Very Good	0-5	5	Very Good
Herbaceous Seepage Bog and Flats		Data Need			Data Need	
Loblolly Pine Forest	0-5	29	Poor	0-5	19	Fair

Ecological System	Ecologically Sustainable Coverage (%)	Current Value (%)	Current Grade	Ecologically Sustainable Coverage (%)	Current Value (%)	Current Grade
Seeps, Springs, and Seepage Swamps	0-5	0.2	Very Good	0-5	1	Very Good
Slash Pine Forest	0-5	25	Fair	0-5	24	Fair
Southern Dry Upland Hardwood Forest	0-5	0	Very Good	0-5	1	Very Good
Southern Mesic Slope Forest	0-5	0	Very Good	0-5	1	Very Good
Upland Longleaf Pine Woodland	90-100	42	Poor	90-100	49	Poor
	Dry to Mesic (moderately well-drained)			**Mesic (somewhat poorly drained)**		
Floodplain Forest	0-5	3	Very Good	0-5	4	Very Good
Herbaceous Seepage Bog and Flats		Data Need			Data Need	
Loblolly Pine Forest	0-5	12	Fair	0-5	11	Fair
Seeps, Springs, and Seepage Swamps	0-5	1	Very Good	0-5	1	Very Good
Slash Pine Forest	0-5	35	Poor	0-5	31	Poor
Southern Dry Upland Hardwood Forest	0-5	1	Very Good	0-5	0	Very Good
Southern Mesic Slope Forest	0-5	0	Very Good	0-5	3	Very Good
Upland Longleaf Pine Woodland	90-100	48	Poor	90-100	50	Poor
	Alluvial (floodplain)			**Water**		
Floodplain Forest	80-100	43	Poor	80-100	34	Poor
Herbaceous Seepage Bog and Flats		Data Need			Data Need	
Loblolly Pine Forest	0-5	17	Fair	0-5	13	Fair
Seeps, Springs, and Seepage Swamps	1-10	2	Very Good	1-10	4	Very Good
Slash Pine Forest	0-5	19	Fair	0-5	19	Fair
Southern Dry Upland Hardwood Forest	0-5	0	Very Good	0-5	0	Very Good
Southern Mesic Slope Forest	0-5	3	Very Good	0-5	5	Very Good
Upland Longleaf Pine Woodland	0-5	16	Fair	0-5	25	Fair
De Soto Unit						
	Xeric (excessively well-drained)			**Dry (well drained soils)**		
Floodplain Forest	0-5	2	Very Good	0-5	1	Very Good
Herbaceous Seepage Bog and Flats	0.1-2	0.2	Very Good	0.1-2	0.3	Very Good
Loblolly Pine Forest	0-5	19	Fair	0-5	14	Fair

Ecological System	Ecologically Sustainable Coverage (%)	Current Value (%)	Current Grade	Ecologically Sustainable Coverage (%)	Current Value (%)	Current Grade
Near-Coast Pine Flatwoods	0-5	0	Very Good	0-5	0	Very Good
Seeps, Springs, and Seepage Swamps	1-5	5	Very Good	0-5	6	Fair
Slash Pine Forest	0-5	22	Fair	0-5	16	Fair
Southern Dry Upland Hardwood Forest	0-5	2	Very Good	0-5	2	Very Good
Southern Mesic Slope Forest	0-5	0	Very Good	0-5	1	Very Good
Wet Pine Savanna	0-5	0	Very Good	0-5	0	Very Good
Upland Longleaf Pine Woodland	90-98.9	50	Poor	90-99.9	60	Poor
	Dry to Mesic (moderately well-drained)			**Mesic (somewhat poorly drained)**		
Floodplain Forest	0-5	0	Very Good	0-5	2	Very Good
Herbaceous Seepage Bog and Flats	0.1-4	2	Very Good	0.1-2	1	Very Good
Loblolly Pine Forest	0-5	8	Fair	0-5	15	Fair
Near-Coast Pine Flatwoods	0-5	0	Very Good	0-5	0	Very Good
Seeps, Springs, and Seepage Swamps	0-5	2	Very Good	1-5	4	Very Good
Slash Pine Forest	0-5	34	Poor	0-5	19	Fair
Southern Dry Upland Hardwood Forest	0-5	1	Very Good	0-5	1	Very Good
Southern Mesic Slope Forest	0-5	0	Very Good	10-30	5	Fair
Wet Pine Savanna	0-5	0	Very Good	0-5	0	Very Good
Upland Longleaf Pine Woodland	90-99.9	53	Poor	65-85	53	Poor
	Non-riverine Hydric (poorly drained)			**Alluvial (floodplain)**		
Floodplain Forest	0-5	13	Fair	40-60	42	Good
Herbaceous Seepage Bog and Flats	3-13	6	Very Good	0.1-2	1	Very Good
Loblolly Pine Forest	0-5	5	Very Good	0-5	14	Fair
Near-Coast Pine Flatwoods	50-70	67	Good	0-5	0	Very Good
Seeps, Springs, and Seepage Swamps	2-11	8	Very Good	10-30	15	Very Good
Slash Pine Forest	0-5	0	Very Good	5-15	27	Poor
Southern Dry Upland Hardwood Forest	0-5	0	Very Good	0-5	0	Very Good

Ecological System	Ecologically Sustainable Coverage (%)	Current Value (%)	Current Grade	Ecologically Sustainable Coverage (%)	Current Value (%)	Current Grade
Southern Mesic Slope Forest	0-5	1	Very Good	0-5	4	Very Good
Wet Pine Savanna	10-30	0	Poor	0-5	0	Very Good
Upland Longleaf Pine Woodland	0-5	0	Very Good	0-5	15	Fair
	Water					
Floodplain Forest	70-89.9	58	Poor			
Herbaceous Seepage Bog and Flats	0.1-2	1	Very Good			
Loblolly Pine Forest	0-5	7	Fair			
Near-Coast Pine Flatwoods	1-20	11	Very Good			
Seeps, Springs, and Seepage Swamps	1-20	7	Very Good			
Slash Pine Forest	0-5	0	Very Good			
Southern Dry Upland Hardwood Forest	0-5	0	Very Good			
Southern Mesic Slope Forest	0-5	4	Very Good			
Wet Pine Savanna	0-5	0	Very Good			
Upland Longleaf Pine Woodland	0-5	12	Fair			
Delta Unit						
	Permanently Wet			**Seasonally Wet**		
Lower Mississippi River Bottomland and Floodplain Forest	100	100	Very Good	100	100	Very Good
	Semi-permanently Wet			**Temporarily Wet**		
Lower Mississippi River Bottomland and Floodplain Forest	100	100	Very Good	100	100	Very Good
Holly Springs Unit						
	Dry (well drained soils)			**Dry to Mesic (moderately well-drained)**		
Cypress Dominated Wetlands	0-5	0	Very Good	0-5	0	Very Good
Floodplain Forest	0-5	1	Very Good	0-5	1	Very Good
Loblolly Pine Forest	0-5	40	Poor	0-5	44	Poor
Northern Dry Upland Hardwood Forest	40-60	27	Poor	40-60	14	Poor
Northern Mesic Hardwood Forest	0-5	4	Very Good	0-5	1	Very Good

Ecological System	Ecologically Sustainable Coverage (%)	Current Value (%)	Current Grade	Ecologically Sustainable Coverage (%)	Current Value (%)	Current Grade
Seeps, Springs, and Seepage Swamps	0-5	0	Very Good	0-5	0	Very Good
Shortleaf Pine-Oak Forest and Woodland	40-60	28	Poor	40-60	40	Good
	Upland Loess			**Mesic (somewhat poorly drained)**		
Cypress Dominated Wetlands	0-5	0	Very Good	0-5	0	Very Good
Floodplain Forest	0-5	0	Very Good	0-5	0	Very Good
Loblolly Pine Forest	0-5	43	Poor	0-5	32	Poor
Northern Dry Upland Hardwood Forest	40-60	17	Poor	0-5	0	Very Good
Northern Mesic Hardwood Forest	0-5	4	Very Good	60-80	46	Poor
Seeps, Springs, and Seepage Swamps	0-5	0	Very Good	0-5	0	Very Good
Shortleaf Pine-Oak Forest and Woodland	40-60	36	Fair	20-40	22	Good
	Alluvial (floodplain)			**Water**		
Cypress Dominated Wetlands	1-15	1	Very Good	90-100	0	Poor
Floodplain Forest	40-60	12	Poor	0-5	0	Very Good
Loblolly Pine Forest	0-5	22	Fair	0-5	0	Very Good
Northern Dry Upland Hardwood Forest	0-5	0	Very Good	0-5	0	Very Good
Northern Mesic Hardwood Forest	30-50	46	Good	0-5	87	Poor
Seeps, Springs, and Seepage Swamps	1-5	1	Very Good	0-5	0	Very Good
Shortleaf Pine-Oak Forest and Woodland	0-5	18	Fair	0-5	13	Fair
Yalobusha Unit						
	Dry (well drained soils)			**Dry to Mesic (moderately well-drained)**		
Floodplain Forest	0-5	1	Very Good	0-5	1	Very Good
Loblolly Pine Forest	0-5	60	Poor	0-5	77	Poor
Northern Dry Upland Hardwood Forest	40-60	28	Poor	40-60	11	Poor
Northern Mesic Hardwood Forest	0-5	5	Very Good	0-5	4	Very Good
Shortleaf Pine-Oak Forest and Woodland	40-60	4	Poor	40-60	6	Poor
Slash Pine Forest	0-5	2	Very Good	0-5	1	Very Good

Ecological System	Ecologically Sustainable Coverage (%)	Current Value (%)	Current Grade	Ecologically Sustainable Coverage (%)	Current Value (%)	Current Grade
	Upland Loess			**Alluvial (floodplain)**		
Floodplain Forest	0-5	1	Very Good	75-95	6	Poor
Loblolly Pine Forest	0-5	84	Poor	0-5	48	Poor
Northern Dry Upland Hardwood Forest	40-60	7	Poor	0-5	0	Very Good
Northern Mesic Hardwood Forest	0-5	2	Very Good	5-25	43	Poor
Shortleaf Pine-Oak Forest and Woodland	40-60	2	Poor	0-5	2	Very Good
Slash Pine Forest	0-5	4	Very Good	0-5	1	Very Good
	Water or Ponded Areas					
Floodplain Forest	90-100	1	Poor			
Loblolly Pine Forest	0-5	84	Poor			
Northern Dry Upland Hardwood Forest	0-5	0	Very Good			
Northern Mesic Hardwood Forest	0-5	15	Fair			
Shortleaf Pine-Oak Forest and Woodland	0-5	0	Very Good			
Slash Pine Forest	0-5	0	Very Good			
Homochitto Unit						
	Dry (well drained soils)			**Dry to Mesic (moderately well-drained)**		
Cypress Dominated Wetlands	0-5	0	Very Good	0-5	0	Very Good
Floodplain Forest	0-5	2	Very Good	0-5	2	Very Good
Loblolly Pine Forest	0-5	84	Poor	0-5	82	Poor
Seeps, Springs, and Seepage Swamps	0-5	0	Very Good	0-5	0	Very Good
Southern Dry Upland Hardwood Forest	0-10	4	Good	0-10	2	Good
Southern Loess Bluff Forest	0-5	0	Very Good	0-5	0	Very Good
Southern Mesic Slope Forest	0-5	1	Very Good	0-5	1	Very Good
Upland Longleaf Pine Woodland	90-100	9	Poor	90-100	13	Poor
	Upland Loess			**Mesic (somewhat poorly drained)**		
Cypress Dominated Wetlands	0-5	0	Very Good	0-5	0	Very Good
Floodplain Forest	0-5	5	Very Good	0-5	12	Fair

Ecological System	Ecologically Sustainable Coverage (%)	Current Value (%)	Current Grade	Ecologically Sustainable Coverage (%)	Current Value (%)	Current Grade
Loblolly Pine Forest	0-5	62	Poor	0-5	62	Poor
Seeps, Springs, and Seepage Swamps	0-5	0	Very Good	0-5	0	Very Good
Southern Dry Upland Hardwood Forest	30-50	10	Poor	0-5	1	Very Good
Southern Loess Bluff Forest	30-50	16	Poor	0-5	0	Very Good
Southern Mesic Slope Forest	10-30	6	Fair	80-99	24	Poor
Upland Longleaf Pine Woodland	0-5	1	Very Good	1-20	1	Good
	Alluvial (floodplain)			**Water or Ponded Areas**		
Cypress Dominated Wetlands	1-5	2	Very Good	15-25	17	Good
Floodplain Forest	75-95	37	Poor	65-85	28	Poor
Loblolly Pine Forest	0-5	44	Poor	0-5	41	Poor
Seeps, Springs, and Seepage Swamps	1-5	1	Very Good	1-8	7	Very Good
Southern Dry Upland Hardwood Forest	0-5	0	Very Good	0-5	0	Very Good
Southern Loess Bluff Forest	0-5	0	Very Good	0-5	0	Very Good
Southern Mesic Slope Forest	5-15	12	Very Good	0-5	7	Fair
Upland Longleaf Pine Woodland	0-5	4	Very Good	0-5	0	Very Good

G.6 Species for which there is no known or potential occurrence based upon suitable habitat on the National Forests in Mississippi (Not evaluated further)

Taxa	Scientific Name	Common Name
Amphibian	*Gyrinophilus porphyriticus*	Spring Salamander
Amphibian	*Plethodon ventralis*	Southern Zigzag Salamander
Amphibian	*Pseudacris brachyphona*	Mountain Chorus Frog
Aquatic Invertebrate	*Cambarellus diminutus*	Least Crayfish
Aquatic Invertebrate	*Cambarellus lesliei*	A Crayfish
Aquatic Invertebrate	*Cambarus girardianus*	A Crayfish
Aquatic Invertebrate	*Cambarus latimanus*	A Crayfish
Aquatic Invertebrate	*Hobbseus attenuatus*	Pearl Rivulet Crayfish
Aquatic Invertebrate	*Hobbseus cristatus*	A Crayfish
Aquatic Invertebrate	*Hobbseus orconectoides*	Oktibbeha Rivulet Crayfish
Aquatic Invertebrate	*Hobbseus petilus*	Tombigbee Rivulet Crayfish
Aquatic Invertebrate	*Hobbseus yalobushensis*	A Crayfish
Aquatic Invertebrate	*Homoeoneuria cahabensis*	Cahaba Sand-filtering Mayfly
Aquatic Invertebrate	*Orconectes etnieri*	A Crayfish
Aquatic Invertebrate	*Orconectes hartfieldi*	A Crayfish
Aquatic Invertebrate	*Orconectes jonesi*	A Crayfish
Aquatic Invertebrate	*Orconectes mississippiensis*	A Crayfish
Aquatic Invertebrate	*Orconectes validus*	A Crayfish
Aquatic Invertebrate	*Orconectes virilis*	Virile Crayfish
Aquatic Invertebrate	*Procambarus ablusus*	A Crayfish
Aquatic Invertebrate	*Procambarus bivittatus*	Ribbon Crayfish
Aquatic Invertebrate	*Procambarus cometes*	Mississippi Flatwoods Crayfish
Aquatic Invertebrate	*Procambarus connus*	Carrollton Crayfish
Aquatic Invertebrate	*Procambarus elegans*	A Crayfish
Aquatic Invertebrate	*Procambarus hagenianus vesticeps*	A Crayfish
Aquatic Invertebrate	*Procambarus lagniappe*	Lagniappe Crayfish
Aquatic Invertebrate	*Procambarus lecontei*	Mobile Crayfish
Aquatic Invertebrate	*Procambarus lylei*	Shutispear Crayfish
Aquatic Invertebrate	*Procambarus shermani*	A Crayfish
Bird	*Ammodramus maritimus*	Seaside Sparrow
Bird	*Ammodramus nelsoni*	Nelson's Sharp-tailed Sparrow
Bird	*Anas fulvigula*	Mottled Duck
Bird	*Calidris mauri*	Western Sandpiper
Bird	*Charadrius alexandrinus tenuirostris*	Southeastern Snowy Plover
Bird	*Charadrius wilsonia*	Wilson's Plover
Bird	*Egretta rufescens*	Reddish Egret
Bird	*Falco columbarius*	Merlin
Bird	*Haematopus palliatus*	American Oystercatcher

Taxa	Scientific Name	Common Name
Bird	*Rynchops niger*	Black Skimmer
Bird	*Sterna maxima*	Royal Tern
Bird	*Sterna nilotica*	Gull-billed Tern
Bird	*Sterna sandvicensis*	Sandwich Tern
Bird	*Tyrannus dominicensis*	Gray Kingbird
Bird	*Tyrannus forficatus*	Scissor-tailed Flycatcher
Crustacean	*Fallicambarus burrisi*	Burris' Burrowing Crawfish
Fish	*Ambloplites rupestris*	Rock Bass
Fish	*Ammocrypta clara*	Western Sand Darter
Fish	*Clinostomus funduloides*	Rosyside Dace
Fish	*Cottus carolinae*	Banded Sculpin
Fish	*Cyprinella callistia*	Alabama Shiner
Fish	*Cyprinella galactura*	Whitetail Shiner
Fish	*Cyprinella spiloptera*	Spotfin Shiner
Fish	*Enneacanthus gloriosus*	Bluespotted Sunfish
Fish	*Etheostoma blennioides*	Greenside Darter
Fish	*Etheostoma duryi*	Black Darter
Fish	*Etheostoma flabellare*	Fantail Darter
Fish	*Etheostoma kennicotti*	Stripetail Darter
Fish	*Etheostoma nigripinne*	Blackfin Darter
Fish	*Etheostoma rufilineatum*	Redline Darter
Fish	*Etheostoma zonifer*	Backwater Darter
Fish	*Fundulus dispar*	Northern Starhead Topminnow
Fish	*Fundulus euryzonus*	Broadstripe Topminnow
Fish	*Fundulus jenkinsi*	Saltmarsh Topminnow
Fish	*Heterandria formosa*	Least Killifish
Fish	*Ichthyomyzon castaneus*	Chestnut Lamprey
Fish	*Leptolucania ommata*	Pygmy Killifish
Fish	*Lythrurus fasciolaris*	Rosefin Shiner
Fish	*Macrhybopsis gelida*	Sturgeon Chub
Fish	*Macrhybopsis meeki*	Sicklefin Chub
Fish	*Moxostoma anisurum*	Silver Redhorse
Fish	*Moxostoma carinatum*	River Redhorse
Fish	*Moxostoma duquesnei*	Black Redhorse
Fish	*Moxostoma macrolepidotum*	Shorthead Redhorse
Fish	*Notropis boops*	Bigeye Shiner
Fish	*Notropis candidus*	Silverside Shiner
Fish	*Notropis chalybaeus*	Ironcolor Shiner
Fish	*Notropis edwardraneyi*	Fluvial Shiner
Fish	*Notropis rubellus*	Rosyface Shiner
Fish	*Notropis sabinae*	Sabine Shiner
Fish	*Notropis wickliffi*	Channel Shiner

Taxa	Scientific Name	Common Name
Fish	*Noturus exilis*	Slender Madtom
Fish	*Noturus flavus*	Stonecat
Fish	*Noturus munitus*	Frecklebelly Madtom
Fish	*Percina evides*	Gilt Darter
Fish	*Percina kathae*	Mobile Logperch
Fish	*Percina phoxocephala*	Slenderhead Darter
Fish	*Phoxinus erythrogaster*	Southern Redbelly Dace
Fish	*Platygobio gracilis*	Flathead Chub
Fish	*Rhinichthys atratulus*	Blacknose Dace
Fish	*Scaphirhynchus platorynchus*	Shovelnose Sturgeon
Fish	*Stizostedion canadense*	Sauger
Fish	*Stizostedion sp 1*	Southern Walleye
Fish	*Stizostedion vitreum*	Walleye
Mammal	*Lasionycteris noctivagans*	Silver-haired Bat
Mussel	*Cyclonaias tuberculata*	Purple Wartyback
Mussel	*Cyprogenia aberti*	Western Fanshell
Mussel	*Elliptio arca*	Alabama Spike
Mussel	*Elliptio dilatata*	Spike
Mussel	*Epioblasma triquetra*	Snuffbox
Mussel	*Fusconaia barnesiana*	Tennessee Pigtoe
Mussel	*Lampsilis hydiana*	Louisiana Fatmucket
Mussel	*Lasmigona complanata alabamensis*	Alabama Heelsplitter
Mussel	*Lexingtonia dolabelloides*	Slabside Pearlymussel
Mussel	*Ligumia recta*	Black Sandshell
Mussel	*Medionidus mcglameriae*	Tombigbee Moccasinshell
Mussel	*Potamilus alatus*	Pink Heelsplitter
Mussel	*Ptychobranchus fasciolaris*	Kidneyshell
Mussel	*Quadrula metanevra*	Monkeyface
Mussel	*Quadrula rumphiana*	Ridged Mapleleaf
Mussel	*Strophitus connasaugaensis*	Alabama Creekmussel
Mussel	*Strophitus undulatus*	Squawfoot
Mussel	*Uniomerus obesus*	Southern Pondhorn
Reptile	*Graptemys nigrinoda*	Black-knobbed Map Turtle
Reptile	*Lampropeltis getula nigra*	Black Kingsnake
Reptile	*Malaclemys terrapin pileata*	Mississippi Diamondback Terrapin
Reptile	*Nerodia clarkii clarkii*	Gulf Salt Marsh Snake
Reptile	*Pituophis melanoleucus melanoleucus*	Northern Pine Snake
Reptile	*Regina septemvittata*	Queen Snake
Terrestrial Invertebrate	*Gastrocopta abbreviata*	Plains Snaggletooth
Terrestrial Invertebrate	*Gryllotalpa major*	Prairie Mole Cricket
Vascular Plant	*Adiantum capillus-veneris*	Southern Maidenhair-fern

Taxa	Scientific Name	Common Name
Vascular Plant	*Agalinis homalantha*	San Antonio False-foxglove
Vascular Plant	*Amsonia ludoviciana*	Louisiana Bluestar
Vascular Plant	*Aplectrum hyemale*	Puttyroot
Vascular Plant	*Arabis lyrata*	Dwarf Rockcress
Vascular Plant	*Arabis patens*	Spreading Rockcress
Vascular Plant	*Aristida spiciformis*	Pine Barren Three-awned Grass
Vascular Plant	*Asplenium resiliens*	Black-stem Spleenwort
Vascular Plant	*Asplenium rhizophyllum*	Walking-fern Spleenwort
Vascular Plant	*Aster pratensis*	Barrens Silky Aster
Vascular Plant	*Aster prenanthoides*	Crooked-stem aster
Vascular Plant	*Athyrium pycnocarpon*	Glade Fern
Vascular Plant	*Avicennia nitida*	Black Mangrove
Vascular Plant	*Bidens coronata*	Golden Flowered Beggar Tick
Vascular Plant	*Burmannia biflora*	Northern Burmannia
Vascular Plant	*Calopogon multiflorus*	Many-flower Grass-pink
Vascular Plant	*Canna flaccida*	Golden Canna
Vascular Plant	*Carex gracilescens*	Slender Sedge
Vascular Plant	*Carex jamesii*	Nebraska Sedge
Vascular Plant	*Carex seorsa*	Separated Sedge
Vascular Plant	*Carex striata*	Walter's Sedge
Vascular Plant	*Carex tenax*	A Sedge
Vascular Plant	*Carex verrucosa*	Warty Sedge
Vascular Plant	*Castilleja coccinea*	Scarlet Indian-paintbrush
Vascular Plant	*Chamaecrista deeringiana*	Florida Senna
Vascular Plant	*Cheilanthes alabamensis*	Alabama Lipfern
Vascular Plant	*Cladium mariscoides*	Twig Rush
Vascular Plant	*Cladrastis kentukea*	Yellowwood
Vascular Plant	*Clematis glaucophylla*	White-leaved Leather-flower
Vascular Plant	*Coelorachis cylindrica*	Pitted Jointgrass
Vascular Plant	*Conradina canescens*	Seaside Balm
Vascular Plant	*Cooperia drummondii*	Evening Rainlily
Vascular Plant	*Coreopsis auriculata*	Lobed Tickseed
Vascular Plant	*Coreopsis nudata*	Georgia Tickseed
Vascular Plant	*Crataegus brachyacantha*	Blueberry Hawthorn
Vascular Plant	*Cypripedium kentuckiense*	Southern Lady's-slipper
Vascular Plant	*Dirca palustris*	Eastern Leatherwood
Vascular Plant	*Echinacea pallida*	Pale Purple Coneflower
Vascular Plant	*Eleocharis elongata*	Slim Spikerush
Vascular Plant	*Eleocharis equisetoides*	Horse-tail Spikerush
Vascular Plant	*Eleocharis rostellata*	Beaked Spikerush
Vascular Plant	*Elyonurus tripsacoides*	Pan American Balsamscale
Vascular Plant	*Erythrodes querceticola*	Low Erythrodes

Taxa	Scientific Name	Common Name
Vascular Plant	*Euphorbia inundata*	Florida Pine Spurge
Vascular Plant	*Eustoma exaltatum*	Tall Prairie-gentain
Vascular Plant	*Evax prolifera*	Bighead Pygmycudweed
Vascular Plant	*Gentiana catesbaei*	Elliot's Gentian
Vascular Plant	*Glyceria arkansana*	Arkansas Manna-grass
Vascular Plant	*Gratiola brevifolia*	Sticky Hedge-hyssop
Vascular Plant	*Gutierrezia dracunculoides*	Broom Snakeroot
Vascular Plant	*Gymnocladus dioicus*	Kentucky Coffee-tree
Vascular Plant	*Helianthemum arenicola*	Gulf Rockrose
Vascular Plant	*Herbertia lahue ssp caerulea*	Herbertia
Vascular Plant	*Hibiscus coccineus*	Brilliant Hibiscus
Vascular Plant	*Hottonia inflata*	Featherfoil
Vascular Plant	*Hydrastis canadensis*	Golden Seal
Vascular Plant	*Hydrophyllum appendiculatum*	Appendaged Waterleaf
Vascular Plant	*Hypericum myrtifolium*	Myrtle-leaved St. Johnswort
Vascular Plant	*Ilex cassine*	Dahoon Holly
Vascular Plant	*Ipomoea pes-caprae*	Railroad Vine
Vascular Plant	*Juncus filipendulus*	Texas Plains Rush
Vascular Plant	*Juniperus silicicola*	Southern Red Cedar
Vascular Plant	*Lesquerella gracilis*	Spreading Bladder-pod
Vascular Plant	*Ligusticum canadense*	Nondo Lovage
Vascular Plant	*Lilaeopsis carolinensis*	Carolina Lilaeopsis
Vascular Plant	*Lilium michiganense*	Michigan Lily
Vascular Plant	*Linum sulcatum*	Grooved Yellow Flax
Vascular Plant	*Lobelia boykinii*	Boykin's Lobelia
Vascular Plant	*Ludwigia alata*	Winged Seedbox
Vascular Plant	*Lycium carolinianum*	Carolina Wolf-berry
Vascular Plant	*Lycopus amplectens*	Sessile-leaved Bugleweed
Vascular Plant	*Magnolia tripetala*	Umbrella Magnolia
Vascular Plant	*Marshallia tenuifolia*	Narrow-leaf Barbara's Button
Vascular Plant	*Mitreola angustifolium*	Narrowleaf Miterwort
Vascular Plant	*Nemastylis geminiflora*	Prairie Iris
Vascular Plant	*Neviusia alabamensis*	Alabama Snow-wreath
Vascular Plant	*Oenothera triloba*	Prairie Evening-primrose
Vascular Plant	*Paronychia erecta*	Beach Sand-squares
Vascular Plant	*Paspalum monostachyum*	Gulfdune Paspalum
Vascular Plant	*Perideridia americana*	Eastern Eulophus
Vascular Plant	*Phacelia dubia*	Small-flower Scorpionweed
Vascular Plant	*Phaseolus sinuatus*	Sandhill Bean
Vascular Plant	*Physalis angustifolia*	Coast Ground-cherry
Vascular Plant	*Physalis arenicola*	Cypress-head Ground-cherry
Vascular Plant	*Pieris phyillyreifolia*	Climbing Fetterbush

Taxa	Scientific Name	Common Name
Vascular Plant	*Pinguicula pumila*	Dwarf Butterwort
Vascular Plant	*Pinus clausa*	Sand Pine
Vascular Plant	*Platanthera integrilabia*	White Fringeless orchid
Vascular Plant	*Polanisia tenuifolia*	Slender-leaf Clammy-weed
Vascular Plant	*Polygala crenata*	Crenate Milkwort
Vascular Plant	*Pycnanthemum setosum*	Awned Mountainmint
Vascular Plant	*Quercus palustris*	Pin Oak
Vascular Plant	*Rhododendron arborescens*	Smooth Azalea
Vascular Plant	*Rhynchospora cephalantha var attenuata*	Capitate Beakrush
Vascular Plant	*Rhynchospora curtissii*	Curtiss's Beakrush
Vascular Plant	*Rhynchospora decurrens*	Swamp-forest Beakrush
Vascular Plant	*Rhynchospora fernaldii*	Fernald's Beakrush
Vascular Plant	*Rhynchospora globularis var pinetorum*	Small's Beakrush
Vascular Plant	*Rhynchospora harperi*	Harper Beakrush
Vascular Plant	*Rhynchospora tracyi*	Tracy's Beakrush
Vascular Plant	*Rosa foliolosa*	White Prairie Rose
Vascular Plant	*Sageretia minutiflora*	Tiny-leaved Buckthorn
Vascular Plant	*Sapindus marginatus*	Florida Soapberry
Vascular Plant	*Sarracenia leucophylla*	Crimson Pitcherplant
Vascular Plant	*Sarracenia rosea*	Rose Pitcherplant
Vascular Plant	*Sarracenia rubra ssp wherryi*	Wherry's Pitcherplant
Vascular Plant	*Schizachyrium maritimum*	Gulf Bluestem
Vascular Plant	*Sedum pulchellum*	Rock Stonecrop
Vascular Plant	*Setaria corrugata*	Coastal Fox-tail
Vascular Plant	*Spiranthes lacera*	Northern Slender Ladies'-tresses
Vascular Plant	*Taenidia integerrima*	Yellow Pimpernell
Vascular Plant	*Tiarella cordifolia*	Heart-leaved Foam-flower
Vascular Plant	*Trillium ludovicianum*	Louisiana Trillium
Vascular Plant	*Trillium pusillum*	Least Trillium
Vascular Plant	*Vaccinium tenellum*	Gale-leaf Blueberry
Vascular Plant	*Viola pubescens var eriocarpon*	Smooth Yellow Violet
Vascular Plant	*Xyris louisianica*	Louisiana Yellow-eyed Grass
Vascular Plant	*Yeatesia viridiflora*	Green-flower Yeatesia

G.7 Threatened and endangered species removed from the National Forests in Mississippi list due to no known occurrence

Taxa	Scientific Name	Common Name
Bird	*Charadrius melodus*	Piping Plover
Bird	*Pelecanus occidentalis*	Brown Pelican
Bird	*Sterna antillarum*	Least Tern
Bird	*Sterna antillarum athalassos*	Interior Least Tern
Bird	*Vermivora bachmanii*	Bachman's Warbler
Fish	*Etheostoma rubrum*	Bayou Darter
Fish	*Scaphirhynchus suttkusi*	Alabama Sturgeon
Mammal	*Myotis grisescens*	Gray Myotis
Mammal	*Myotis sodalist*	Indiana or Social Myotis
Mammal	*Puma concolor coryi*	Florida Panther
Mammal	*Trichechus manatus*	Manatee
Mussel	*Epioblasma brevidens*	Cumberlandian Combshell
Mussel	*Epioblasma penita*	Southern Combshell
Mussel	*Lampsilis perovalis = Hamiota perovalis*	Orange-nacre Mucket
Mussel	*Medionidus acutissimus*	Alabama Moccasinshell
Mussel	*Pleurobema curtum*	Black Clubshell
Mussel	*Pleurobema decisum*	Southern Clubshell
Mussel	*Pleurobema marshalli*	Flat Pigtoe
Mussel	*Pleurobema perovatum*	Ovate Clubshell
Mussel	*Pleurobema taitianum*	Heavy Pigtoe
Mussel	*Potamilus capax*	Fat Pocketbook
Mussel	*Potamilus inflatus*	Inflated Heelsplitter
Mussel	*Quadrula stapes*	Stirrupshell
Plant	*Apios priceana*	Price's Potato Bean
Plant	*Schwalbea americana*	Chaffseed
Reptile	*Caretta caretta*	Loggerhead; Cabezon
Reptile	*Chelonia mydas*	Green Turtle
Reptile	*Dermochelys coriacea*	Leatherback; Tinglar
Reptile	*Drymarchon corais couperi*	Eastern Indigo Snake
Reptile	*Eretmochelys imbricata*	Hawksbill; Carey
Reptile	*Graptemys flavimaculata*	Yellow-blotched Map Turtle
Reptile	*Graptemys oculifera*	Ringed Map Turtle
Reptile	*Lepidochelys kempii*	Kemp's Or Atlantic Ridley
Reptile	*Pseudemys alabamensis*	Alabama Redbelly Turtle
Terrestrial Invertebrate	*Nicrophorus americanus*	American Burying Beetle
Terrestrial Invertebrate	*Neonympha mitchellii*	Mitchell’s Satyr

G.8 Regional forester sensitive species analyzed for the National Forests in Mississippi

Taxa	Common Name	Scientific Name	Global Rank	Confirmed Occurrence	rationale for selection / non-selection
Amphibian	One-toed Amphiuma	*Amphiuma pholeter*	G3	N	occurrence not confirmed (1)
Amphibian	Webster's Salamander	*Plethodon websteri*	G3	Y	forest plan components will be developed
Bird	Bachman's Sparrow	*Aimophila aestivalis*	G3	Y	
Bird	Bald Eagle	*Haliaeetus leucocephalus*	G4	Y	
Crustacean	Speckled Burrowing Crayfish	*Fallicambarus danielae*	G2	Y	
Crustacean	Camp Shelby Burrowing Crayfish	*Fallicambarus gordoni*	G1	Y	
Crustacean	Pearl Rivulet Crayfish	*Hobbseus attenuatus*	G2	N	occurrence not confirmed (1)
Crustacean	Jackson Prairie Crayfish	*Procambarus barbiger*	G2	Y	forest plan components will be developed
Crustacean	Spiny-tailed Crayfish	*Procambarus fitzpatricki*	G2	Y	
Crustacean	Pearl Blackwater Crayfish	*Procambarus penni*	G3	Y	forest plan components not needed (5)
Fish	Alabama Shad	*Alosa alabamae*	G3	Y	
Fish	Crystal Darter	*Crystallaria asprella*	G3	N	occurrence not confirmed (1)
Fish	Southeastern Blue Sucker*	*Cycleptus meridionalis*	G3G4	N	
Fish	Blue Sucker	*Cycleptus elongatus*	G3G4	N	
Fish	Yazoo Darter	*Etheostoma raneyi*	G2	Y	forest plan components not needed (5)
Fish	Blackmouth Shiner	*Notropis melanostomus*	G2	Y	
Fish	Piebald Madtom	*Noturus gladiator**	G3	Y	
Fish	Freckled Darter	*Percina lenticula*	G2	Y	
Insect	Natchez Stonefly	*Alloperla natchez*	G2	Y	
Insect	Arogos skipper	*Atrytone arogos arogos*	G3G4T1T2	Y	forest plan components will be developed
Insect	Chukcho Stonefly	*Haploperla chukcho*	G2	Y	forest plan components not needed (5)
Mammal	Rafinesque's big-eared bat	*Corynorhinus rafinesquii*	G3G4	Y	forest plan components will be developed
Mammal	Southeastern Myotis	*Myotis austroriparius*	G3G4	Y	
Mussel	Rayed Creekshell	*Anodontoides radiatus*	G3	Y	forest plan components not needed (5)
Mussel	Southern Hickorynut	*Obovaria jacksoniana*	G1G2	N	occurrence not confirmed (1)
Mussel	Alabama Hickorynut	*Obovaria unicolor*	G3	N	

Taxa	Common Name	Scientific Name	Global Rank	Confirmed Occurrence	rationale for selection / non-selection
Mussel	Sheepnose	*Plethobasus cyphyus*	G3	Y	forest plan components not needed (5)
Mussel	Mississippi Pigtoe	*Pleurobema beadleianum*	G2G3	Y	
Mussel	Pyramid Pigtoe	*Pleurobema rubrum*	G2	Y	
Reptile	Mimic Glass Lizard	*Ophisaurus mimicus*	G3	Y	forest plan components will be developed
Reptile	Black Pine Snake	*Pituophis melanoleucus lodingi*	G4T3	Y	
Nonvascular Plant	Trachyxiphium Moss	*Trachyxiphium heteroicum (Hookeriopsis heteroica)*	G2?	Y	
Vascular Plant	Shinner's False-foxglove	*Agalinis pseudaphylla*	G1G2Q	Y	
Vascular Plant	Incised Agrimony	*Agrimonia incisa*	G3	Y	forest plan components not needed (5)
Vascular Plant	Southern Three-awned Grass	*Aristida simpliciflora*	G3	Y	
Vascular Plant	Dixie grapefern	*Botrychium jenmanii*	G3G4	Y	
Vascular Plant	Baltzell's sedge	*Carex baltzelli*	G3	N	occurrence not confirmed (1)
Vascular Plant	Cypress-knee Sedge	*Carex decomposita*	G3	Y	forest plan components will be developed
Vascular Plant	Ravine Sedge	*Carex impressinervia*	G1G2	Y	
Vascular Plant	Small spreading pogonia	*Cleistes bifaria*	G3G4	Y	
Vascular Plant	Ashe Hawthorn	*Crataegus harbisonii (=C. ashei)*	G1	Y	
Vascular Plant	Three-flower Hawthorn	*Crataegus triflora*	G2	Y	
Vascular Plant	Cream Tick-trefoil	*Desmodium ochroleucum*	G2?	Y	
Vascular Plant	Small's woodfern	*Dryopteris X australis*	HYB	Y	
Vascular Plant	Butternut	*Juglans cinerea*	G3G4	Y	
Vascular Plant	Pineland Bogbutton	*Lachnocaulon digynum*	G3	Y	forest plan components not needed (5)
Vascular Plant	Bog Spicebush	*Lindera subcoriacea*	G2	Y	forest plan components will be developed
Vascular Plant	Spring Hill flax	*Linum macrocarpum*	G2?	Y	forest plan components not needed (5)
Vascular Plant	Flame Flower	*Macranthera flammea*	G3	Y	
Vascular Plant	Broadleaf Barbara's Buttons	*Marshallia graminifolia var. cynanthera*	G3	Y	forest plan components will be developed
Vascular Plant	Loose Watermilfoil	*Myriophyllum laxum*	G3	Y	
Vascular Plant	White-flowered Beardtongue	*Penstemon tenuiflorus*	G3?	N	occurrence not confirmed (1)
Vascular Plant	Carpenter's Ground-cherry	*Physalis carpenteri*	G3	Y	forest plan components not needed (5)
Vascular Plant	Chapman's Butterwort	*Pinguicula planifolia*	G3?	Y	

Taxa	Common Name	Scientific Name	Global Rank	Confirmed Occurrence	rationale for selection / non-selection
Vascular Plant	Southern butterwort	*Pinguicula primuliflora*	G3G4	Y	forest plan components will be developed
Vascular Plant	Yellow fringeless orchid	*Platanthera integra*	G3G4	Y	
Vascular Plant	Hooker's Milkwort	*Polygala hookeri*	G3	Y	forest plan components not needed (5)
Vascular Plant	Slender spike milkwort	*Polygala leptostachys*	G3G4	Y	forest plan components will be developed
Vascular Plant	Giant Orchid	*Pteroglossaspis ecristata (=Eulophia ecristata)*	G2	Y	
Vascular Plant	Oglethorpe Oak	*Quercus oglethorpensis*	G3	Y	
Vascular Plant	Orange azalea	*Rhododendron austrinum*	G3	N	occurrence not confirmed (1)
Vascular Plant	Hairy Peduncled Beakrush	*Rhynchospora crinipes*	G1	Y	forest plan components not needed (5)
Vascular Plant	Large Beakrush	*Rhynchospora macra*	G3	Y	
Vascular Plant	Night Flowering Ruellia	*Ruellia noctiflora*	G2	Y	
Vascular Plant	Bay Starvine	*Schisandra glabra*	G3	Y	
Vascular Plant	Ovate Catchfly	*Silene ovata*	G2G3	Y	forest plan components will be developed
Vascular Plant	Giant Spiral Ladies'-tresses	*Spiranthes longilabris*	G3	Y	forest plan components not needed (5)
Vascular Plant	Carolina fluffgrass	*Tridens carolinianus*	G3	Y	
Vascular Plant	Fetid trillium	*Trillium foetidissimum*	G3	Y	forest plan components will be developed
Vascular Plant	Least Trillium	*Trillium pusillum*	G3	N	occurrence not confirmed (1)
Vascular Plant	Florida Bellwort	*Uvularia floridana*	G3	Y	forest plan components will be developed
Vascular Plant	Chapman's Yellow-eyed Grass	*Xyris chapmanii*	G3	Y	poorly studied species (3)
Vascular Plant	Drummond's Yellow-eyed Grass	*Xyris drummondii*	G3	Y	forest plan components not needed (5)
Vascular Plant	Louisiana Yellow-eyed Grass	*Xyris louisianica*	G3	Y	poorly studied species (3)
Vascular Plant	Harper's Yellow-eyed Grass	*Xyris scabrifolia*	G3	Y	forest plan components will be developed

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G.9 Locally rare species analyzed for the National Forests in Mississippi

Taxa	Common Name	Scientific Name	Confirmed Occurrence	Rationale for selection/ non-selection
Amphibian	Four-toed Salamander	*Hemidactylium scutatum*	Y	Forest plan components not needed (5)
Amphibian	Ornate Chorus Frog	*Pseudacris ornata*	Y	Forest plan components will be developed
Amphibian	Mud Salamander	*Pseudotriton montanus*	Y	
Amphibian	Red Salamander	*Pseudotriton ruber*	Y	Secure in the forest plan area (4)
Crustacean	Lavender Burrowing Crayfish	*Fallicambarus byersi*	Y	Forest plan components not needed (5)
Crustacean	Prominence Rivulet Crayfish	*Hobbeseus prominens*	Y	
Crustacean	Choctaw Rivulet Crayfish	*Hobbeseus valleculus*	Y	
Bird	Henslow's Sparrow	*Ammodramus henslowii*	Y	
Bird	Yellow Rail	*Coturnicops noveboracensis*	Y	
Bird	Prairie Warbler	*Dendroica discolor*	Y	Not affected by management (2)
Bird	Swallow-tailed Kite	*Elanoides forficatus*	Y	Forest plan components not needed (5)
Bird	Southeastern American Kestrel	*Falco sparverius paulus*	Y	Forest plan components will be developed
Bird	Black Rail	*Laterallus jamaicensis*	Y	Forest plan components not needed (5)
Bird	Swainson's Warbler	*Limnothlypis swainsonii*	Y	Secure in the forest plan area (4)
Bird	Osprey	*Pandion haliaetus*	Y	
Fish	Southern Sand Darter	*Ammocrypta meridiana*	Y	Forest plan components not needed (5)
Fish	Steelcolor Shiner	*Cyprinella whipplei*	Y	
Fish	Tombigbee Darter	*Etheostoma lachneri*	Y	
Fish	Bluenose Shiner	*Pteronotropis welaka*	Y	
Mammal	Hoary Bat	*Lasiurus cinereus*	Y	Forest plan components will be developed
Mammal	Northern Yellow Bat	*Lasiurus intermedius*	Y	
Mammal	Oldfield Mouse	*Peromyscus polionotus*	Y	Forest plan components not needed (5)
Mammal	Black Bear	*Ursus americanus*	Y	Forest plan components will be developed

Taxa	Common Name	Scientific Name	Confirmed Occurrence	Rationale for selection/ non-selection
Mussel	Mucket	*Actinonaias ligamentina*	Y	Forest plan components not needed (5)
Mussel	Rock Pocketbook	*Arcidens confragosus*	Y	
Mussel	Rough Fatmucket	*Lampsilis straminea straminea*	Y	
Mussel	White Heelsplitter	*Lasmigona complanata complanata*	Y	
Mussel	Round Hickorynut	*Obovaria subrotunda*	N	Occurrence not confirmed (1)
Reptile	Eastern Diamondback Rattlesnake	*Crotalus adamanteus*	Y	Forest plan components will be developed
Reptile	Rainbow Snake	*Farancia erytrogramma*	Y	Forest plan components not needed (5)
Reptile	Southern Hognose Snake	*Heterodon simus*	Y	Forest plan components will be developed
Reptile	Coachwhip	*Masticophis flagellum*	Y	Secure in the forest plan area (4)
Reptile	Slender Glass Lizard	*Ophisaurus attenuatus*	U	Poorly studied species (3)
Reptile	Pine Woods Snake	*Rhadinaea flavilata*	Y	Forest plan components will be developed
Vascular Plant	Coastal Plain False-foxglove	*Agalinis aphylla*	Y	Forest plan components not needed (5)
Vascular Plant	Earleaf False-foxglove	*Agalinis auriculata*	N	Occurrence not confirmed (1)
Vascular Plant	Thin Stemmed False-foxglove	*Agalinis filicaulis*	Y	Forest plan components not needed (5)
Vascular Plant	Broad-leaved Water-platain	*Alisma subcordatum*	Y	Not affected by management (2)
Vascular Plant	Single-headed Pussytoes	*Antennaria solitaria*	Y	Secure in the forest plan area (4)
Vascular Plant	Sicklepod	*Arabis Canadensis*	Y	Forest plan components not needed (5)
Vascular Plant	American Spikenard	*Aralia racemosa*	Y	Forest plan components will be developed
Vascular Plant	Canada Wild-ginger	*Asarum canadense*	Y	
Vascular Plant	Prairie Milkweed	*Asclepias hirtella*	Y	Forest plan components not needed (5)
Vascular Plant	White Heath Aster	*Aster ericoides*	Y	
Vascular Plant	Purple-stemmed Aster	*Aster puniceus*	Y	
Vascular Plant	Bearded Grass-pink	*Calopogon barbatus*	Y	Forest plan components will be developed
Vascular Plant	Wild Hyacinth	*Camassia scilloides*	Y	Forest plan components not needed (5)
Vascular Plant	Coast Sedge	*Carex exilis*	Y	Forest plan components will be developed
Vascular Plant	Mead's Sedge	*Carex meadii*	Y	Secure in the forest plan area (4)
Vascular Plant	Small-Toothed Sedge	*Carex microdonta*	Y	Forest plan components not needed (5)
Vascular Plant	Painted Sedge	*Carex picta*	Y	
Vascular Plant	Uptight Sedge	*Carex stricta*	Y	

Taxa	Common Name	Scientific Name	Confirmed Occurrence	Rationale for selection/ non-selection
Vascular Plant	Big Shellbark Hickory	*Carya laciniosa*	Y	Forest plan components will be developed
Vascular Plant	Climbing Bittersweet	*Celastrus scandens*	Y	
Vascular Plant	Atlantic White Cedar	*Chamaecyparis thyoides*	Y	
Vascular Plant	Hairy Lipfern	*Cheilanthes lanosa*	N	
Vascular Plant	White Turtlehead	*Chelone glabra*	Y	Secure in the forest plan area (4)
Vascular Plant	Green-and-Gold	*Chrysogonum virginianum*	Y	
Vascular Plant	LeConte's Thistle	*Cirsium lecontei*	N	Forest plan components will be developed
Vascular Plant	Small Spreading Pogonia	*Cleistes bifaria (=divaricata)*	Y	Secure in the forest plan area (4)
Vascular Plant	Alternate-leaf Dogwood	*Cornus alternifolia*	Y	Forest plan components not needed (5)
Vascular Plant	Small Yellow Lady's-slipper	*Cypripedium parviflorum*	Y	Forest plan components will be developed
Vascular Plant	Yellow Lady's-slipper	*Cypripedium pubescens*	Y	
Vascular Plant	Pine Barrens Prairie Clover	*Dalea carnea var. gracilis*	Y	
Vascular Plant	Erect-leaf Witchgrass	*Dichanthelium erectifolium*	Y	Secure in the forest plan area (4)
Vascular Plant	Shootingstar	*Dodecatheon meadia*	Y	Forest plan components not needed (5)
Vascular Plant	Southern Shield Woodfern	*Dryopteris ludoviciana*	Y	Forest plan components will be developed
Vascular Plant	Eastern Purple Coneflower	*Echinacea purpurea*	Y	
Vascular Plant	Black-fruited Spikerush	*Eleocharis melanocarpa*	Y	Forest plan components not needed (5)
Vascular Plant	Robbins Spikerush	*Eleocharis robbinsii*	Y	
Vascular Plant	Three-angled Spikerush	*Eleocharis tricostata*	Y	
Vascular Plant	Green-fly Orchid	*Epidendrum magnoliae = conopseum*	Y	
Vascular Plant	Texas Pipewort	*Eriocaulon texense*	Y	
Vascular Plant	White Dog's Tooth Violet	*Erythronium albidum*	Y	
Vascular Plant	Burning Bush	*Euonymus atropurpureus*	Y	
Vascular Plant	American Columbo	*Frasera caroliniensis*	Y	
Vascular Plant	Showy Orchid	*Galearis spectabilis*	Y	Forest plan components will be developed
Vascular Plant	Dangleberry	*Gaylussacia frondosa*	Y	Forest plan components not needed (5)
Vascular Plant	Downy Rattlesnake-plantain	*Goodyera pubescens*	Y	Forest plan components will be developed
Vascular Plant	Big-leaf witch-hazel	*Hamemalis ovalis*	Y	
Vascular Plant	Crested Coralroot	*Hexalectris spicata*	Y	

Taxa	Common Name	Scientific Name	Confirmed Occurrence	Rationale for selection/ non-selection
Vascular Plant	Blackfoot Quillwort	*Isoetes melanopoda*	Y	Forest plan components not needed (5)
Vascular Plant	Strong Quillwort	*Isoetes valida*	Y	
Vascular Plant	Naked-fruited Rush	*Juncus gymnocarpus*	Y	Secure in the forest plan area (4)
Vascular Plant	Appendaged Lobelia	*Lobelia appendiculata*	Y	Forest plan components not needed (5)
Vascular Plant	Nodding Clubmoss	*Lycopodium cernuem = L. palhinhaea cernua*	Y	Not affected by management (2)
Vascular Plant	Fan Club Moss	*Lycopodium digitatum = flabelliforme*	Y	Forest plan components will be developed
Vascular Plant	Climbing Milkweed	*Matelea obliqua*	Y	Forest plan components not needed (5)
Vascular Plant	Square-stem Monkey Flower	*Mimulus ringens*	Y	Forest plan components will be developed
Vascular Plant	Big Floating Heart	*Nymphoides aquatica*	Y	
Vascular Plant	Floating Heart	*Nymphoides cordata*	Y	
Vascular Plant	Smoother Sweet-cicely	*Osmorhiza longistylis*	Y	Secure in the forest plan area (4)
Vascular Plant	Allegheny-spurge	*Pachysandra procumbens*	Y	Forest plan components will be developed
Vascular Plant	American Ginseng	*Panax quinquefolius*	Y	
Vascular Plant	Naked-stemmed Panic Grass	*Panicum nudicaule*	Y	
Vascular Plant	White Arum	*Peltandra sagittifolia*	Y	Forest plan components not needed (5)
Vascular Plant	Sharp-sepal Beardtongue	*Penstemon tenuis*	Y	
Vascular Plant	Odorless Mock-orange	*Philadelphus inodorus*	N	Occurrence not confirmed (1)
Vascular Plant	Large White Fringed Orchid	*Platanthera blephariglottis*	Y	Forest plan components not needed (5)
Vascular Plant	Crested Fringed Orchid	*Platanthera cristata*	Y	Secure in the forest plan area (4)
Vascular Plant	Purple Fringeless Orchid	*Platanthera peramoena*	Y	Forest plan components not needed (5)
Vascular Plant	Jacob's Ladder	*Polemonium reptans*	Y	
Vascular Plant	Prairie Parsley	*Polytaenia nuttallii*	Y	
Vascular Plant	Shadow-witch Orchid	*Ponthieva racemosa*	Y	
Vascular Plant	Rough Rattlesnake-root	*Prenanthes aspera*	Y	Forest plan components will be developed
Vascular Plant	Blunt Mountainmint	*Pycnanthemum muticum*	Y	Forest plan components not needed (5)
Vascular Plant	Dwarf Live Oak	*Quercus minima*	Y	
Vascular Plant	Bottomland Post Oak	*Quercus mississipiensis*	N	Occurrence not confirmed (1)
Vascular Plant	Lance-leaved Buckthorn	*Rhamnus lanceolata*	Y	Forest plan components not needed (5)
Vascular Plant	Needle Palm	*Rhapidophyllum hystrix*	Y	Forest plan components will be developed

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Vascular Plant	Chapman Beakrush	*Rhynchospora stenophylla*	Y	Forest plan components not needed (5)
Vascular Plant	Slender Arrow-head	*Sagittaria isoetiformis*	Y	
Vascular Plant	Nettle-leaf Sage	*Salvia urticifolia*	Y	
Vascular Plant	Eared Goldenrod	*Solidago auriculata*	Y	
Vascular Plant	Appalachian Goldenrod	*Solidago flaccidifolia*	Y	
Vascular Plant	Florida Ladies-tresses	*Spiranthes brevilabris var floridana*	Y	Forest plan components will be developed
Vascular Plant	Great Plains Ladies'-tresses	*Spiranthes magnicamporum*	Y	Forest plan components not needed (5)
Vascular Plant	American Bladdernut	*Staphylea trifolia*	Y	Secure in the forest plan area (4)
Vascular Plant	Water Southern Morning-glory	*Stylisma aquatica*	Y	Forest plan components not needed (5)
Vascular Plant	Patterson's Bindweed	*Stylisma pickeringii var pattersonii*	Y	Forest plan components will be developed
Vascular Plant	Yellow Pipewort	*Syngonanthus flavidulus*	Y	Forest plan components not needed (5)
Vascular Plant	Louisiana Trillium	*Trillium ludovicianum*	N	Occurrence not confirmed (1)
Vascular Plant	Narrow-leaf Fever Root	*Triosteum angustifolium*	Y	Secure in the forest plan area (4)
Vascular Plant	Three Birds Orchid	*Triphora trianthophora*	Y	Forest plan components will be developed
Vascular Plant	Piedmont Bladderwort	*Utricularia olivacea*	Y	Forest plan components not needed (5)
Vascular Plant	Purple Bladderwort	*Utricularia purpurea*	Y	

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