# Appendix G -
# Ecosystems and Species Diversity Report

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# Appendix G - Ecosystems and Species Diversity Report

## 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.

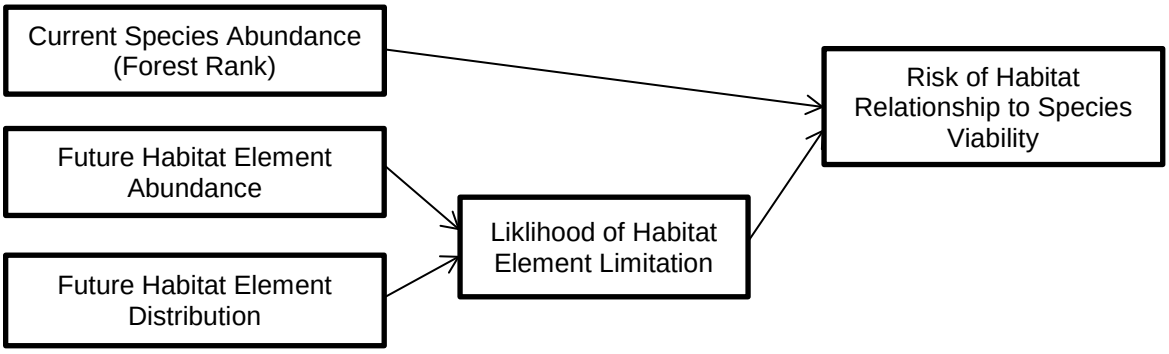


**Figure G 1. Relationship of variables used to rate risk to species viability**

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,<br>threatened and endangered species,<br>regional forester's sensitive species<br>locally rare species | Conservation targets |
| Characteristics of ecological system sustainability (key characteristics),<br>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 Appendix G - 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 dusky 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. Some portions of this system will have open canopies.

**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, black and scarlet) 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. Some portions of this system will have open canopies. 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 dusky 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.

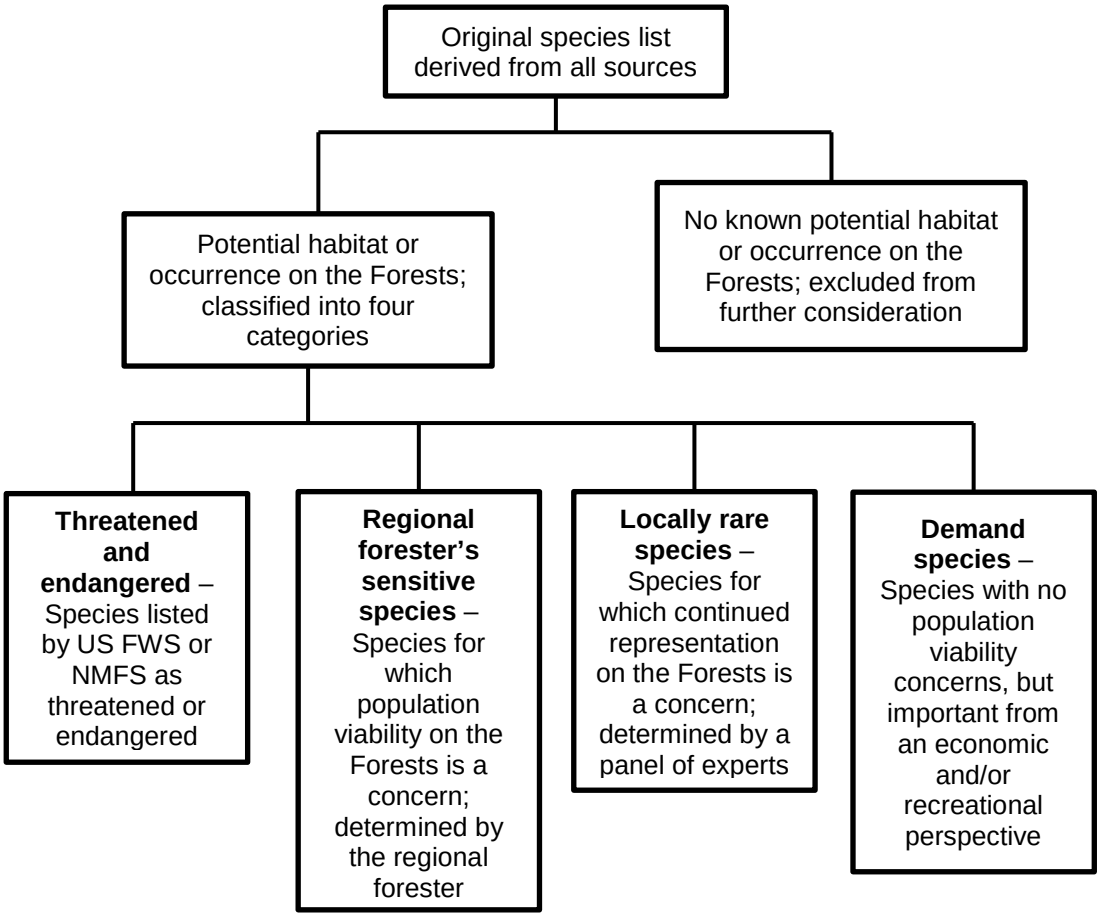


**Figure G 2. Species screening and selection process overview**

## 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 | Dusky 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 |
| Mammal | Indiana Bat *(Myotis sodalis)* | Holly Springs | 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 |
| *Myotis sodalis* | Indiana Bat | 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 |
| *Myotis sodalis* | Indiana Bat | 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* | Dusky Gopher Frog | Very High |
| *Rhadinaea flavilata* | Pine Woods Snake | Moderate |
| *Myotis sodalis* | Indiana Bat | Low |

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 |
| *Myotis sodalis* | Indiana Bat | Very 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 dusky 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 |
| *Myotis sodalis* | Indiana Bat | Very 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* | Dusky 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 |
| | | | 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 yellow trumpets (*Sarracenia alata* Alph. Wood) | 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 |
| SG | Wet Pine Savanna Associates | 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 |

### 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 |
| | | | % System Acres Burned During the Growing Season | Very High |
| | | Distance from Roads | Total Road and Trail Density | High |
| | | Ecological System Abundance at Desired Condition | % Ecological System Acres at Desired Condition | Very High |
| | | | % potential acres with Appropriate System | Very High |
| | | Forest Age Diversity | % Mature Forest | Moderate |
| | | | % Old Forest | Moderate |
| | | | % Regenerating Forest | Moderate |
| | | Vegetation Structure | % Mature Open and Sparse Canopy | Very High |
| | | | % Old-growth | Moderate |
| | | Invasive Species Abundance | Compliance with Invasive Species Guidelines | Very High |
| | | | % Invasive Species Occupying System | Very High |
| | | | Reduction of Fire Ants | Very High |
| | | Understory Composition | Compliance with Understory Composition Guidelines | Very High |
| SG | Xeric Sandhill Associates | 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 |

## 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 |
| *Myotis sodalis* | Indiana Bat | 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 |
| | | | Compliance with Man-made Roost Structure Guidelines | Moderate |
| | | | Compliance with Snag Protection Guidelines | Very High |
| | | Habitat Element Abundance | Compliance with Bat Roost Structure Guidelines | Very High |
| | | | Compliance with Den Tree Guidelines | Very High |
| | | | Compliance with Snag Guidelines | Very High |
| ES | Upland Longleaf Pine Forest and Woodland | Forest Age Diversity | % Mature Forest | High |
| | | | % Old Forest | Very High |
| ES | Southern Dry Upland Hardwood Forest | Forest Age Diversity | % Mature Forest | High |
| | | | % Old Forest | Very High |
| ES | Northern Dry Upland Hardwood Forest | Forest Age Diversity | % Mature Forest | High |
| | | | % Old Forest | Very High |
| ES | Southern Mesic Slope Forest | Forest Age Diversity | % Mature Forest | High |
| | | | % Old Forest | Very High |
| ES | Floodplain Forest | Forest Age Diversity | % Mature Forest | High |
| | | | % 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 |
| | | | % 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 |
| *Myotis sodalis* | Indiana Bat | 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 |
| | | | % Old Forest | Very High |
| | | Vegetation Structure | % Old-growth | Very High |
| ES | Southern Dry Upland Hardwood Forest | Forest Age Diversity | % Mature Forest | High |
| | | | % Old Forest | Very High |
| ES | Southern Mesic Slope Forest | Forest Age Diversity | % Mature Forest | High |
| | | | % Old Forest | Very High |
| ES | Floodplain Forest | Forest Age Diversity | % Mature Forest | High |
| | | | % Old Forest | Very High |
| | | Vegetation Structure | % Old-growth | Very High |
| ES | Loblolly Pine Forest | Forest Age Diversity | % Mature Forest | High |
| | | Vegetation Structure | % Old-growth | Very High |
| ES | Slash Pine Forest | Forest Age Diversity | % Mature Forest | High |
| | | 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. Dusky 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* | Dusky 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 |
| | | | Paved Open Road Density | High |
| | | | Total Road and Trail Density | High |
| | | | Unpaved Gated Road Density | Moderate |
| | | | Unpaved Open Road Density | High |
| | | Forest Age Diversity | % Mature Forest | High |
| ES | Northern Dry Upland Hardwood Forest | Distance from Roads | ORV Trail Density | Moderate |
| | | | Paved Open Road Density | High |
| | | | Total Road and Trail Density | High |
| | | | Unpaved Gated Road Density | Moderate |
| | | | Unpaved Open Road Density | High |
| | | Forest Age Diversity | % Mature Forest | High |
| ES | Northern Mesic Hardwood Forest | Distance from Roads | ORV Trail Density | Moderate |
| | | | Paved Open Road Density | High |
| | | | Total Road and Trail Density | High |
| | | | Unpaved Gated Road Density | Moderate |
| | | | Unpaved Open Road Density | High |
| | | Forest Age Diversity | % Mature Forest | High |
| ES | Floodplain Forest | Distance from Roads | ORV Trail Density | Moderate |
| | | | Paved Open Road Density | High |
| | | | Total Road and Trail Density | High |
| | | | Unpaved Gated Road Density | Moderate |
| | | | Unpaved Open Road Density | High |
| | | 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 |
| *Myotis sodatis* | Indiana Bat | 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 |
| *Myotis sodalis* | Indiana Bat | Very High |
| *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 |
| | | | % of Benchmark Acres of Old Forest Systems | High |
| | | | 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 |
| *Gopherus polyphemus* | Gopher Tortoise | 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 |

| Species Name | Common Name | Species-to-Group Weight |
|---|---|---|
| *Ophisaurus mimicus* | Mimic Glass Lizard | Very High |
| *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 |
| *Rana sevosa* | Duskey Gopher Frog | 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 |
| | | | Percent of System Acres Burned During the Growing Season | 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 | Very High |
| | | | Reduction of Fire Ants | Very High |
| ES | Southern Dry Upland Hardwood Forest | Fire Regime | Percent of System Acres Burned at Desired Return Interval | Moderate |
| | | | Percent of System Acres Burned During the Growing Season | Moderate |
| | | Ecological System Abundance at Desired Condition | Percent of potential acres with Appropriate System | Moderate |
| | | Invasive Species Abundance | Compliance with Invasive Species Guidelines | Moderate |
| | | | Percent of Invasive Species Occupying System | Moderate |
| | | | Reduction of Fire Ants | Moderate |
| ES | Near-coast Pine Flatwoods | Fire Regime | Percent of System Acres Burned at Desired Return Interval | Very High |
| | | | Percent of System Acres Burned During the Growing Season | 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 | Very High |
| | | | 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 |
| | | | Percent of System Acres Burned During the Growing Season | 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 | Very High |
| | | | Reduction of Fire Ants | Very High |
| ES | Wet Pine Savanna | Fire Regime | Percent of System Acres Burned at Desired Return Interval | Very High |
| | | | Percent of System Acres Burned During the Growing Season | 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 | Very High |
| | | | 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 |
| | | | Percent of System Acres Burned During the Growing Season | 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 | Very High |
| | | | Reduction of Fire Ants | Very High |
| ES | Loblolly Pine Forest | Fire Regime | Percent of System Acres Burned at Desired Return Interval | Very High |
| | | | Percent of System Acres Burned During the Growing Season | Very High |
| | | Ecological System Abundance at Desired Condition | Percent of Ecological System Acres at Desired Condition | 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 |

| 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 |
| | | | Percent of System Acres Burned During the Growing Season | Very High |
| | | Ecological System Abundance at Desired Condition | Percent of Ecological System Acres at Desired Condition | 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 |

### *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* | Dusky 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 |
| | | | Percent of System Acres Burned During the Growing Season | Very High |
| | | Distance from Roads | ORV Trail Density | High |
| | | | Paved Open Road Density | High |
| | | | Total Road and Trail Density | High |
| | | | Unpaved Gated Road Density | High |
| | | | Unpaved Open Road Density | High |
| | | 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 |
| | | | Percent of System Acres Burned During the Growing Season | Very High |
| | | 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 | Very High |
| | | | Unpaved Open Road Density | Very High |
| | | Hydrologic Function | Compliance with Hydroligic Function Guidelines | Very High |
| | | 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 |
| | | | Percent of System Acres Burned During the Growing Season | Very High |
| | | 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 | Very High |
| | | | Unpaved Open Road Density | Very High |
| | | 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 |
| | | | Percent of System Acres Burned During the Growing Season | High |
| | | 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 | Very High |
| | | | Unpaved Open Road Density | Very High |
| | | 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 |
| | | | Percent of System Acres Burned During the Growing Season | Very High |
| | | 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 | Very High |
| | | | Unpaved Open Road Density | Very High |
| | | 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. Dusky 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 |
| *Dodecatheon meadia* | Shootingstar | Very High |

| Species Name | Common Name | Species-to-Group Weight |
|---|---|---|
| *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 |
| *Myotis sodalis* | Indiana Bat | 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* | Dusky 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 |
|---|---|---|---|---|
| ESES | Upland Longleaf Pine Forest and Woodland | 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 | High |
| | | | Unpaved Open Road Density | Very High |
| ES | Southern Dry Upland Hardwood Forest | 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 | High |
| | | | Unpaved Open Road Density | Very High |
| ES | Southern Mesic Slope Forest | 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 | High |
| | | | Unpaved Open Road Density | Very High |
| ES | Floodplain Forest | 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 | High |
| | | | Unpaved Open Road Density | Very High |
| ES | Near-coast Pine Flatwoods | 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 | High |
| | | | 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 |
| | | | Paved Open Road Density | Very High |
| | | | Total Road and Trail Density | Very High |
| | | | Unpaved Gated Road Density | High |
| | | | Unpaved Open Road Density | Very High |
| ES | Wet Pine Savanna | 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 | High |
| | | | 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 |
| | | | Paved Open Road Density | Very High |
| | | | Total Road and Trail Density | Very High |
| | | | Unpaved Gated Road Density | High |
| | | | Unpaved Open Road Density | Very High |
| ES | Herbaceous Seepage Bogs and Flats | 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 | High |
| | | | Unpaved Open Road Density | Very High |
| ES | Canebrake | 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 | High |
| | | | Unpaved Open Road Density | Very High |
| ES | Loblolly Pine Forest | 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 | High |
| | | | Unpaved Open Road Density | Very High |
| ES | Slash Pine Forest | 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 | High |
| | | | 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 |
| *Myotis sodalis* | Indiana Bat | 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* | Dusky 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* | Dusky 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 |
| *Lindera melissifolia* | Pondberry | Very High |
| *Matelea obliqua* | Climbing Milkweed | Moderate |
| *Myotis austroriparius* | Southeastern Myotis | Moderate |
| *Myotis sodalis* | Indiana Bat | 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 |

| Species Name | Common Name | Species-to-Group Weight |
|---|---|---|
| *Celastrus scandens* | Climbing Bittersweet | Moderate |
| *Chamaecyparis thyoides* | Atlantic White Cedar | High |
| *Cirsium lecontei* | LeConte's Thistle | Very High |
| *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 |

| Species Name | Common Name | Species-to-Group Weight |
|---|---|---|
| *Macranthera flammea* | Flame Flower | High |
| *Matelea obliqua* | Climbing Milkweed | Moderate |
| *Mimulus ringens* | Square-stem Monkey Flower | Moderate |
| *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* | Dusky 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 |

| Species Name | Common Name | Species-to-Group Weight |
|---|---|---|
| *Stylisma aquatica* | Water Southern Morning-glory | Moderate |
| *Stylisma pickeringii var pattersonii* | Patterson's Bindweed | Very High |
| *Syngonanthus flavidulus* | Yellow Pipewort | Very High |
| *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 |
| | | | Unpaved Gated Road Density | Moderate |
| | | | Unpaved Open Road Density | High |
| ES | Southern Dry Upland Hardwood Forest | Distance from Roads | ORV Trail Density | Very High |
| | | | Unpaved Gated Road Density | Moderate |
| | | | Unpaved Open Road Density | High |
| ES | Southern Mesic Slope Forest | Distance from Roads | ORV Trail Density | Very High |
| | | | Unpaved Gated Road Density | Moderate |
| | | | Unpaved Open Road Density | High |
| ES | Floodplain Forest | Distance from Roads | ORV Trail Density | Very High |
| | | | Unpaved Gated Road Density | Moderate |
| | | | Unpaved Open Road Density | High |
| ES | Near-coast Pine Flatwoods | Distance from Roads | ORV Trail Density | Very High |
| | | | Unpaved Gated Road Density | Moderate |
| | | | Unpaved Open Road Density | High |
| ES | Ephemeral Ponds and Emergent Wetlands | Distance from Roads | ORV Trail Density | Very High |
| | | | Unpaved Gated Road Density | Moderate |
| | | | 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 |
| | | | Unpaved Gated Road Density | Moderate |
| | | | Unpaved Open Road Density | High |
| ES | Seeps, Springs, and Seepage Swamps | Distance from Roads | ORV Trail Density | Very High |
| | | | Unpaved Gated Road Density | Moderate |
| | | | Unpaved Open Road Density | High |
| ES | Herbaceous Seepage Bogs and Flats | Distance from Roads | ORV Trail Density | Very High |
| | | | Unpaved Gated Road Density | Moderate |
| | | | Unpaved Open Road Density | High |
| ES | Canebrake | Distance from Roads | ORV Trail Density | Very High |
| | | | Unpaved Gated Road Density | Moderate |
| | | | Unpaved Open Road Density | High |
| ES | Loblolly Pine Forest | Distance from Roads | ORV Trail Density | Very High |
| | | | Unpaved Gated Road Density | Moderate |
| | | | Unpaved Open Road Density | High |
| ES | Slash Pine Forest | Distance from Roads | ORV Trail Density | Very High |
| | | | Unpaved Gated Road Density | Moderate |
| | | | 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<br>Healthy Watersheds<br>Watershed-specific Planning Guidelines<br>Riparian Forests<br>Lakes and Ponds<br>Lower Mississippi River Bottomland and Floodplain Forest<br>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 very 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 |
| | | | Dam Density Rating | Very High |
| | | | Road Crossings Rating | Very High |
| | | Water Quality--Sediment | Compliance with Sediment-related BMPs for Forest Management | High |
| | | | Compliance with Sediment-related BMPs for Roads Management | High |
| | | | Sediment Risk Rating | High |
| | | 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 |
| | | | Dam Density Rating | Very High |
| | | | Riparian Road Density Rating | Very High |
| | | | 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 |

| Crosswalk to this Ecological System… | If this forest type… | Occurs on this Ecological Site Type… |
|---|---|---|
| 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 |
| **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 | |

| Crosswalk to this Ecological System… | If this forest type… | Occurs on this Ecological Site Type… |
|---|---|---|
| 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 |
| **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 |

| Crosswalk to this Ecological System… | If this forest type… | Occurs on this Ecological Site Type… |
|---|---|---|
| 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 | |
| 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 | |

| Crosswalk to this Ecological System… | If this forest type… | Occurs on this Ecological Site Type… |
|---|---|---|
| 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 | |
| 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 |

| Crosswalk to this Ecological System… | If this forest type… | Occurs on this Ecological Site Type… |
|---|---|---|
| **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 | |
| 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 |

| Crosswalk to this Ecological System… | If this forest type… | Occurs on this Ecological Site Type… |
|---|---|---|
| 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 | |
| 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 |

| Soil Name | Locations |
|---|---|
| Smithdale-Rock outcrop sandstone cx | Bienville |
| 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 |

| Soil Name | Locations |
|---|---|
| Cahaba, Latonia and Bassfield soils, 0-2 percent slopes, occasionally flooded | Chickasawhay / De Soto |
| Cascilla and Jena soils | Holly Springs / Tombigbee |
| 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 |

| Ecological System | Ecologically Sustainable Coverage (%) | Current Value (%) | Current Grade | Ecologically Sustainable Coverage (%) | Current Value (%) | Current Grade |
|---|---|---|---|---|---|---|
| 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 |
| | **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 |

| Ecological System | Ecologically Sustainable Coverage (%) | Current Value (%) | Current Grade | Ecologically Sustainable Coverage (%) | Current Value (%) | Current Grade |
|---|---|---|---|---|---|---|
| **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 |
| 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 |

| Ecological System | Ecologically Sustainable Coverage (%) | Current Value (%) | Current Grade | Ecologically Sustainable Coverage (%) | Current Value (%) | Current Grade |
|---|---|---|---|---|---|---|
| **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 |
| 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 |

| Ecological System | Ecologically Sustainable Coverage (%) | Current Value (%) | Current Grade | Ecologically Sustainable Coverage (%) | Current Value (%) | Current Grade |
|---|---|---|---|---|---|---|
| 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 |
| 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 |

| Ecological System | Ecologically Sustainable Coverage (%) | Current Value (%) | Current Grade | Ecologically Sustainable Coverage (%) | Current Value (%) | Current Grade |
|---|---|---|---|---|---|---|
| **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 |
| 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 |

| Ecological System | Ecologically Sustainable Coverage (%) | Current Value (%) | Current Grade | Ecologically Sustainable Coverage (%) | Current Value (%) | Current Grade |
|---|---|---|---|---|---|---|
| **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 |
| | **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 | | | |

| Ecological System | Ecologically Sustainable Coverage (%) | Current Value (%) | Current Grade | Ecologically Sustainable Coverage (%) | Current Value (%) | Current Grade |
|---|---|---|---|---|---|---|
| **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 |
| 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 | *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 Seaturtle |
| Reptile | *Chelonia mydas* | Green Seaturtle |
| Reptile | *Dermochelys coriacea* | Leatherback Seaturtle |
| Reptile | *Drymarchon corais couperi* | Eastern Indigo Snake |
| Reptile | *Eretmochelys imbricata* | Hawksbill Seaturtle |
| Reptile | *Graptemys flavimaculata* | Yellow-blotched Map Turtle |
| Reptile | *Graptemys oculifera* | Ringed Map Turtle |
| Reptile | *Lepidochelys kempii* | Kemp's Ridley |
| Reptile | *Pseudemys alabamensis* | Alabama Redbellied 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 | |
| Mussel | Sheepnose | *Plethobasus cyphyus* | G3 | Y | forest plan components not needed (5) |
| Mussel | Mississippi Pigtoe | *Pleurobema beadleianum* | G2G3 | Y | |

| Taxa | Common Name | Scientific Name | Global Rank | Confirmed Occurrence | rationale for selection / non-selection |
|---|---|---|---|---|---|
| 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 | |
| Vascular Plant | Southern butterwort | *Pinguicula primuliflora* | G3G4 | Y | forest plan components will be developed |
| Vascular Plant | Yellow fringeless orchid | *Platanthera integra* | G3G4 | Y | |

| Taxa | Common Name | Scientific Name | Global Rank | Confirmed Occurrence | rationale for selection / non-selection |
|---|---|---|---|---|---|
| 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 |

1) Occurrence not confirmed - These are species for which habitat exists on the Forests, and although occurrence is likely, it is not confirmed. Species on this list will be re-evaluated if occurrence on the Forests is confirmed.

2) Not affected by management - Species which are not affected by any current or potential form of management or lack of management in the planning area.

3) Poorly studied species - Species for which there is too little information known to complete a reliable assessment. This includes species with uncertain population status, uncertain taxonomy, uncertain distribution information, or uncertain life history information.

4) Secure in the forest plan area - Species that are 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. Includes those species screened during the process with an S-rank lower than S2 or occurrence in SWG Plan less than Tier 2 and did not merit further consideration.

5) Forest plan components not needed - species are covered by forest plan components for ecosystem diversity, which will adequately provide habitat for these species; no other forest plan components are needed for species conservation. Ecosystem diversity forest plan components are described in the Ecological Diversity Report and include species associated with each ecological system as well as ecological diversity driven Forest plan components

# 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 |
| 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 | |

| Taxa | Common Name | Scientific Name | Confirmed Occurrence | Rationale for selection/ non-selection |
|---|---|---|---|---|
| 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 | |
| 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 | |

| Taxa | Common Name | Scientific Name | Confirmed Occurrence | Rationale for selection/ non-selection |
|---|---|---|---|---|
| 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 | |
| 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) |

| Taxa | Common Name | Scientific Name | Confirmed Occurrence | Rationale for selection/ non-selection |
|---|---|---|---|---|
| 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 |
| 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 | |

| Taxa | Common Name | Scientific Name | Confirmed Occurrence | Rationale for selection/ non-selection |
|---|---|---|---|---|
| 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 | |

1) Occurrence Not Confirmed - These are species for which habitat exists on the Forests, and although occurrence is likely, it is not confirmed. Species on this list will be re-evaluated if occurrence on the Forests is confirmed.

2) Not affected by management - Species which are not affected by any current or potential form of management or lack of management in the planning area.

3) Poorly studied species - Species for which there is too little information known to complete a reliable assessment. This includes species with uncertain population status, uncertain taxonomy, uncertain distribution information, or uncertain life history information.

4) Secure in the forest plan area - Species that are 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. Includes those species screened during the process with an S-rank lower than S2 or occurrence in SWG Plan less than Tier 2 and did not merit further consideration.

5) Forest plan components not needed - species are covered by forest plan components for ecosystem diversity, which will adequately provide habitat for these species; no other forest plan components are needed for species conservation. Ecosystem diversity forest plan components are described in the Ecological Diversity Report and include species associated with each ecological system as well as ecological diversity driven Forest plan components.