Appendix F -
Management Indicator Species

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Appendix F - Management Indicator Species

Document Abstract

This report documents the review of the original 1985 management indicator species list. Identifies species determined to be indicators of management effects concerning plan implementation on plant and animal diversity for the revised plan.

F.1 Introduction

During development of the 1985 Land and Resource Management Plan (forest plan) for National Forests in Mississippi, 44 management indicator species were selected. This report documents the evaluation of these species to determine if these species and others are valid indicators of management effects concerning plan implementation on plant and animal diversity.

Both the concept of management indicator species and the application of the management indicator species concept have been critically reviewed in the scientific literature since the 1982 regulations were adopted. Limits to the usefulness of the concept and/or its application are reflected in the literature (e.g., Caro and O'Doherty 1999; Grossman et al. 1990; Landres, Verner, and Thomas 1988; Noss 1990; Simberloff 1998; Weaver 1995). Nonetheless, the 1982 regulations will remain in effect until further direction.

F.1.1 Review of 1985 Management Indicator Species

The process and rationale for selection of management indicator species for the 1985 forest plan is summarized below:

Selection was made from a complete listing of known vertebrates occurring on the National Forests in Mississippi. Basically, the process of elimination was used to screen species down to optimal candidates and select on particular characteristics that meet management needs. Process procedure is as follows:

1. Elimination of those species not dependent on forested habitat or not affected by management activities. This included species, which were found in various habitat types and considered to be habitat generalists.
2. Elimination of transient species and non-residents, which were not significantly dependent on national forest lands.
3. Eliminated species, which could not be suitably evaluated due to the lack of information or the need of a usable monitoring procedure.
4. The resulting list was then examined to identify species with the most limiting requirements on forest seral stages and special habitat components.
5. Major habitat components were examined to determine adequate species representation.
6. High demand species were added to represent public interest and address issues and concerns.
7. Review by cooperating agencies and professionals in the field of wildlife research and management.

Table F 1. Management indicator species selected for National Forests in Mississippi in the 1985 Forest Plan

Demand Species	Viability Concern	Ecological Indicators
Terrestrial Habitats		
White-Tailed Deer	Red Cockaded Woodpecker	Pileated Woodpecker
Wild Turkey	Gopher Tortoise	Eastern Meadowlark
Fox Squirrel	Pitcher Plants	Pine Warbler
Eastern Gray Squirrel		Downy Woodpecker
Delta Fox Squirrel		American Kestrel
Northern Bobwhite Quail		Screech Owl
Wood Duck		Rufous-Sided Towhee
		Hooded Warbler
		Wood Duck
		Bachman's Sparrow
Aquatic Habitats (Lakes and Ponds)		
Largemouth Bass		Golden Shiner
Bluegill		Lake Chubsucker
Redear Sunfish		
Black Crappie		
White Crappie		
Channel Catfish		
Aquatic Habitats (Northern Streams-streams north of Interstate 20)		
Largemouth Bass		Southern Brook Lamprey
Bluegill		Bluntface Shiner
Longear Sunfish		Striped Shiner
		Freckled Madtom
		Blackbanded Darter
		Banded Darter
Aquatic Habitats (Southwestern Streams-south of I-20 and west of Hwy. 49)		
Spotted Bass		Banded Darter
		Southern Brook Lamprey
		Rainbow Darter
		Brindled Madtom
		Longnose Shiner
		Bluntface Shiner
		Blacktail Redhorse
Aquatic Habitats (Southeastern Streams- south of I-20 and east of Hwy.49)		
Spotted Bass		Gulf Darter
Longear Sunfish		Blackbanded Darter
Shadow Bass		Cherryfin Shiner
		Weed Shiner
		Speckled Madtom

This process resulted in selection of 44 species as management indicator species in 1985 (Table F 1). The 44 species designated as management indicator species in the 1985 forest plan were evaluated to determine whether or not these species were meeting the purposes for which they were selected and to consider other species that may need to be added. Each species was considered in turn to determine whether or not the management indicator species was dependent on forested habitat and was affected by management activities. Species that were found in various habitats (habitat generalists) were likewise selected against. Some species were removed because of the lack of a usable and efficient monitoring system. Not all forest types or management activities were represented, only those for which there was the most perceived management activity. Game species previously selected, although of high public value, were considered to be habitat generalists and not good indicators of management and thus were removed as management indicator species. These species will continue to be monitored as game species by the Mississippi Department of Wildlife, Fisheries and Parks. Following the aforementioned considerations, four previously selected species and four newly selected species were carried forward for additional evaluation concerning management emphasis, management influence, and effects of management on habitat niche (see section F.1.4). This process resulted in the selection of six species to represent indicators of management on the National Forests in Mississippi.

Red-cockaded Woodpecker (*Picoides borealis*)

Habitat Association - 40+ years, longleaf/yellow pine

Habitat Monitoring – FSVeg database, acres prescribed burned, acres of mid-story control

Population Monitoring - Number of active clusters

This species was selected to represent mature longleaf/yellow pine forest. The red-cockaded woodpecker is listed as federally endangered throughout its range and is dependent on national forest management for its recovery and survival. Many management practices on the National Forests in Mississippi are focused on improvement of red-cockaded woodpecker habitat (ex. prescribed burning, mid-story removal, forest thinning, etc.). There is a direct correlation between management activities and red-cockaded woodpecker population levels. This species is fairly easy to monitor, and the forest has numerous years of population trend data previously collected.

Recommendation: Evaluate further. Continue to monitor under current protocols.

Gopher Tortoise (*Gopherus polyphemus*)

Habitat Association - 40+ years, longleaf/slash pine

Habitat Monitoring – FSVeg database, priority soil surveys

Population Monitoring – Burrow surveys

This species was selected to represent mature longleaf/slash pine forests. However, it also influenced by soil types and understory conditions. Population declines have occurred as a result of habitat destruction, habitat degradation, and human predation. Gopher tortoises are a “K” species (long lived, low reproductive rate); therefore, response to management takes a long time which suggests that the species would not be a good indicator of current management.

Recommendation: Remove from management indicator species list. Continue to monitor under current protocols.

Pitcher Plants (*Sarracenia* spp.)

Habitat Association – Coastal bogs and savannahs

Habitat Monitoring – FSVeg database (acres of pitcher plant bogs)

This species was selected to represent unique lower coastal plain habitat called coastal bogs and savannahs. Maintaining coastal bogs and savannahs continue to be a management focus for the National Forests in Mississippi. Although this genus is an important attribute of these ecosystems, monitoring is not efficient nor a true reflection of management of these systems. Management of these systems will be monitored by acres restored as the plan is implemented.

Recommendation: Remove from management indicator species list. Continue to monitor under current protocols.

White-tailed Deer (*Odocoileus virginianus*)

Habitat Association - 0-10 years, all forest types

Habitat Monitoring – FSVeg database

Population Monitoring – Wildlife management area harvest data

This species was selected to represent early forest habitat. However, this species is actually a habitat generalist and does well in areas containing a mix of habitat types. There is no direct correlation between Forest Service management activities and deer population levels.

Recommendation: Remove from management indicator species list. However, because the white-tailed deer is a demand species, monitoring of harvest data should continue.

Eastern Wild Turkey (*Meleagris gallopavo*)

Habitat Association – 40+ years, all forest types

Habitat Monitoring – FSVeg database

Population Monitoring – Wildlife management area harvest data

This species was selected to represent mature forests. However, turkey populations are also influenced by early seral habitat, prescribed fire, and the development of low vegetation under forest cover. Harvest data from wildlife management areas may be influenced by other factors and therefore may not be a good indicator of Forest Service management.

Recommendation: Remove from management indicator species list. However, because the Eastern wild turkey is a demand species, monitoring of harvest data should continue.

Eastern Gray Squirrel (*Sciurus carolinensis*)

Habitat Association – 40+ years, all pine-hardwood and hardwood

Habitat Monitoring – FSVeg database

Population Monitoring – Wildlife management area harvest data

This species was selected to represent mature pine-hardwood and hardwood forest. Harvest data from wildlife management areas may be influenced by other factors (ex. hunter effort) and therefore may not

be a good indicator of Forest Service management. In addition, squirrel populations are highly variable because of their responsiveness to abundance of annual mast crops, which can vary widely from year to year. Lastly, wildlife management area harvest data does not differentiate between gray squirrels and fox squirrels. Eastern gray squirrel harvest is based on estimated percentage of total squirrel harvest by wildlife management area biologists/managers.

Recommendation: Remove from management indicator species list. However, because the Eastern gray squirrel is a demand species, monitoring of harvest data should continue.

Fox squirrel (*Sciurus niger*)

Habitat Association – 40+ years, longleaf pine

Habitat Monitoring – FSVeg database

Population Monitoring – Wildlife management area harvest data

(40+ years, longleaf pine) (wildlife management area harvest data) – This species was selected to represent mature longleaf pine forest. However, current literature suggests that fox squirrels are associated with edge habitats. The National Forests in Mississippi does not have a goal of managing for edge habitat. Harvest data from wildlife management areas may be influenced by other factors (ex. hunter effort) and therefore may not be a good indicator of Forest Service management. In addition, squirrel populations are highly variable because of their responsiveness to abundance of annual mast crops, which can vary widely from year to year. Lastly, wildlife management area harvest data does not differentiate between gray squirrels and fox squirrels. Fox squirrel harvest is based on estimated percentage of total squirrel harvest by wildlife management area biologists/managers.

Recommendation: Remove from management indicator species list. However, because the fox squirrel is a demand species, monitoring of harvest data should continue.

Delta Fox Squirrel (*Sciurus niger subauratus*)

Habitat Association – 40+ years, hardwood forests

Habitat Monitoring – FSVeg database

Population Monitoring – Wildlife management area harvest data

This species was selected to represent mature bottomland hardwood forests on the Delta National Forest. Harvest data from wildlife management areas may be influenced by other factors (ex. hunter effort) and therefore may not be a good indicator of Forest Service management. In addition, squirrel populations are highly variable because of their responsiveness to abundance of annual mast crops, which can vary widely from year to year. Lastly, wildlife management area harvest data does not differentiate between gray squirrels and fox squirrels. Delta fox squirrel harvest is based on estimated percentage of total squirrel harvest by wildlife management area biologists/managers.

Recommendation: Remove from management indicator species list. However, because the Delta fox squirrel is a demand species, monitoring of harvest data should continue.

Northern Bobwhite (*Colinus virginianus*)

Habitat Association - 0-10 years, longleaf/yellow pine

Habitat Monitoring – FSVeg database

Population Monitoring – Wildlife management area harvest data, breeding bird survey data

This species was selected to represent early age longleaf/yellow pine forests. However, this species actually represents conditions of interspersed woodland, with open grassy conditions. Trend data indicate that populations are declining across most of its range. Many of the causes for decline can be attributed to factors beyond the scope of Forest Service management (ex. predators, invasive pests, etc.)

Recommendation: Remove from management indicator species list. However, because northern bobwhite quail is a demand species, monitoring of harvest data should continue.

Wood Duck (*Aix sponsa*)

Habitat Association – Delta wetlands and sloughs

Population Monitoring – Wildlife management area harvest data, nest box use, breeding bird survey data

This species was selected to represent wetland and slough habitat on the Delta National Forest. Maintaining wetland and slough habitat on the Delta National Forest continues to be a management focus on the National Forests in Mississippi. While nest box monitoring indicates that wood ducks are reproducing at acceptable rates on the Delta National Forest, other data sources such as hunter harvest statistics and bird point counts are not well suited to monitoring wood duck populations. Hunter harvest statistics are not well suited because wood ducks are not reported separately from other duck species harvested. Point counts, by their nature are not suited to sampling a species such as wood duck that exhibit relatively low densities and very clumped distributions. This species was initially carried forward to be evaluated further pertaining to importance of management emphasis, management influence, and uniqueness of habitat niche. This process concluded that the wood duck ranked low in all evaluation criteria and does not efficiently indicate the effects of management activities.

Recommendation: Evaluate further. Continue to monitor through nest box use.

Bachman's Sparrow (*Aimophila aestivalis*)

Habitat Association - 0-10 years, longleaf/slash pine

Habitat Monitoring – FSVeg database

Population Monitoring – Wildlife management area harvest data

This species represents open mature pine forest with fire maintained conditions rather than 0-10 longleaf/slash as it was associated to in the past. After discussion, it was decided that red-cockaded woodpecker was a better representative of management activities associated with mature pine forest due to more in depth data collection.

Recommendation: Remove from management indicator species list. Continue to monitor through breeding bird survey (point counts).

Eastern meadowlark (*Sturnella magna*)

Habitat Association - 0-10 years, yellow pine

Habitat Monitoring – FSVeg database

Population Monitoring – Breeding bird survey data

This species is not a forest bird. It is associated with open habitats like prairies, hayfields and pastures and is in decline across its range. The lack of detection of eastern meadowlark, despite considerable monitoring effort indicates this species is not an adequate indicator of early yellow pine habitat nor would it be for open ecosystem types due to its decline rangewide.

Recommendation: Remove from management indicator species list.

American Kestrel (*Falco sparverius*)

Habitat Association - 0-10 years, pine-hardwood

Habitat Monitoring – FSVeg database

Population Monitoring – Breeding bird survey data

This species was selected to represent early age mixed pine-hardwood forests and snag/cavity habitat. Data on populations of American kestrel on the National Forests in Mississippi for bird counts are sparse, despite considerable effort expended on point counts. Other species easily found during point counts could represent snag/cavity habitat.

Recommendation: Remove from management indicator species list.

Rufous-sided Towhee (*Pipilo erythrophthalmus*)

Habitat Association - 0-10 years, hardwood

Habitat Monitoring – FSVeg database

Population Monitoring – Breeding bird survey data

This species was selected to represent early age hardwood forests. However, current literature indicates that rufous-sided towhees are associated with edge habitats. The National Forests in Mississippi do not have a goal of managing for edge habitat.

Recommendation: Remove from management indicator species list. Continue to monitor through breeding bird surveys (point counts).

Pileated Woodpecker (*Dryocopus pileatus*)

Habitat Association – 40+ years, all forest types

Habitat Monitoring – FSVeg database

Population Monitoring – Breeding bird survey data

This species was selected to represent mature forests. It is also an indicator of snag/cavity habitat. The pileated woodpecker is easy to monitor through current breeding bird survey.

Recommendation: Evaluate further. Continue to monitor through breeding bird surveys (point counts).

Pine Warbler (*Dendroica pinus*)

Habitat Association – 40+ years, yellow pine

Habitat Monitoring – FSVeg database

Population Monitoring – Breeding bird survey data

This species was selected to represent mature yellow pine forest. However, this species is actually associated with numerous seral stages of all pine forest. Presently, another species (red-cockaded woodpecker) is recommended to indicate the management of pine forest.

Recommendation: Remove from management indicator species list. Continue to monitor through breeding bird surveys (point counts).

Downy woodpecker (*Picoides pubescens*)

Habitat Association – 40+ years, slash pine

Habitat Monitoring – FSVeg database

Population Monitoring – Breeding bird survey data

This species was selected to represent mature slash pine forest and snag/cavity habitat. However, current literature suggests that downy woodpeckers are associated with middle-aged and mature forest of both pine and hardwoods. Since the great majority of slash pine forests are introduced off-site plantations targeted to be restored to longleaf pine, these habitats are expected to decline. No species is known to depend exclusively on these slash pine forests, and current management actions are designed to return these acres to longleaf pine. In addition, another species (pileated woodpecker) is recommended to indicate the management of snag/cavity habitat.

Recommendation: Remove from management indicator species list. Continue to monitor through breeding bird surveys (point counts).

Eastern Screech-Owl (*Otus asio*)

Habitat Association – 40+ years, pine-hardwood

Habitat Monitoring – FSVeg database

Population Monitoring – Breeding bird survey data

This species was selected to represent mature pine-hardwood forest. However, it is also associated with open to medium growth pine as well as clearings and forest edges. In addition, this species is nocturnal. Data on populations of eastern screech-owl on the National Forests in Mississippi are sparse, despite considerable effort expended on point counts. Because regional data indicates an increasing trend, this suggests that eastern screech-owl populations on the National Forests in Mississippi are not being adequately sampled by the breeding bird point counts.

Recommendation: Remove from management indicator species list.

Hooded Warbler (*Wilsonia citrina*)

Habitat Association – 40+ years, hardwood forests

Habitat Monitoring – FSVeg database

Population Monitoring – Breeding bird survey data

This species was selected to represent mature hardwood forest. The National Forests in Mississippi continue to maintain mature hardwood forests in the forest plan. The hooded warbler is easy to monitor

through current breeding bird survey. This species was initially carried forward to be evaluated further pertaining to importance of management emphasis, management influence, and uniqueness of habitat niche. This process concluded that the hooded warbler ranked low in all evaluation criteria and does not efficiently indicate the effects of management activities on the National Forests in Mississippi.

Recommendation: Evaluate further. Continue to monitor through breeding bird surveys (point counts).

Lotic Fish

Species

Southern brook lamprey (*Ichthyomyozon gagei*), cherryfin shiner (*Lythururus roseipinnis*), bluntface shiner (*Cyprinella camura*), striped shiner (*Luxilus chrysocephalus*), longnose shiner (*Notropis longirostris*), weed shiner (*Notropis texanus*), blacktail redhorse (*Moxostoma poecilurum*), freckled madtom (*Noturus nocturnus*), brindled madtom (*Noturus miurus*), speckled madtom (*Noturus leptacanthus*), bluegill (*Lepomis macrochirus*), longear sunfish (*Lepomis megalotis*), largemouth bass (*Micropterus salmoides*), spotted bass (*Micropterus punctulatus*), shadow bass (*Ambloplites ariommus*), blackbanded darter (*Percina nigrofasciata*), brighteye darter (*Etheostoma lynceum*), rainbow darter (*Etheostoma caeruleum*), and Gulf darter (*Etheostoma swaini*)

Habitat Association-

Northern streams - streams north of Interstate 20

Southwestern streams - streams south of Interstate 20 and west of Highway 49

Southeastern streams - streams south of Interstate 20 and east of Highway 49

Population Monitoring – Stream electrofishing and seining data

None of the nineteen fish species selected in 1985 serve their intended purpose as management indicator species. The following discussion is a summary of the reasons that individual fish species make poor choices as management indicator species. This in no way diminishes the biological importance of these organisms or suggests that monitoring of fish species should be reduced on the National Forests in Mississippi. Fish populations simply do not lend themselves to the analysis of cause and effect relationships with land management activities for the following reasons.

8. Interspersed land ownership—Most of the 24 watersheds on the National Forests in Mississippi have a relatively low percentage of National Forest System land. In fact, the National Forests in Mississippi exhibit a highly unconsolidated land ownership pattern. Seventeen of 24 watersheds have approximately 5 percent or less National Forest System lands. Thus, fish populations in a given watershed are likely to be significantly influenced by factors occurring on private land, which are both out of National Forests in Mississippi control and largely unknown to Forest Service personnel.
9. Fish are highly mobile—Fish can and do move away from stream events which alter their environment. These events may be natural, such as flood or drought conditions, or human related alterations such as channel modifications or changes in land management practices. In either event sampling methods designed to establish long-term population trends can be greatly affected by short-term movements of an indicator species (fish).
10. Some fish species, such as the brindled madtom actively avoid detection or capture. Madtoms will bury themselves up to several inches in the stream substrate to avoid capture. Thus, detection becomes extremely difficult even when the species is present in the sampling area.

Recommendation: Remove all 19 species from management indicator species list. However, monitoring of streams should continue. Monitoring in the future should focus on a fish community-based assessment. Fish species should be grouped together based on their feeding and/or reproductive strategies. Indices or percentages would be generated based on these strategies. While populations of individual species are variable and may fluctuate from year to year in a particular stream or watershed, the community-based approach should provide more consistent information. Any significant changes in community-based metrics may warrant additional investigation into the health of a stream or watershed.

Lentic Fish

Species

Largemouth bass (*Micropterus salmoides*), bluegill (*Lepomis macrochirus*), redear sunfish (*Lepomis microlophus*), black crappie (*Pomoxis nigromaculatus*), white crappie (*Pomoxis annularis*), channel catfish (*Ictalurus puncitatus*), golden shiner (*Notemingonus chrysoleucas*), lake chubsucker (*Erimyzon sucetta*)

Habitat Association – Lakes and ponds

Population Monitoring – Electrofishing and seining

These species were selected to represent lentic (lake) habitat. Monitoring is conducted by electrofishing and seining. Many management practices such as liming, fertilizing, and spawning habitat improvement are focused on providing recreational fishing opportunities on the National Forests in Mississippi. Largemouth bass is the principal predator in most National Forests in Mississippi lakes and is also a demand species. Population structure of this species has been a good indicator the effectiveness of Forest Service management activities. Because of their low level of occurrence and difficulty in capturing, redear sunfish, black crappie, white crappie, channel catfish, golden shiner, and lake chubsucker have not been good indicators of management effectiveness.

Recommendation: Evaluate largemouth bass further. Remove other 7 species as management indicator species. Continue to monitor those species using current electrofishing protocol.

F.1.2 Additional Species Evaluated

Longleaf Pine (*Pinus palustris*)

Species Association – Red-cockaded woodpecker, gopher tortoise, Mississippi gopher frog

Habitat Monitoring – FSVeg database

Species was selected to measure the effectiveness of management to restore longleaf pine ecosystem. Measure of effectiveness is by acres of longleaf pine planted by year and number of acres of longleaf pine classified in FSVEG.

Southern Pine Beetle (*Dendroctonus fontalis*)

Habitat Association – Overstocked pine forests

Habitat Monitoring – FSVeg database

Population Monitoring – Southern Research, Pineville

This species is selected to measure the effects of forest management aimed at promoting forest health (e.g., site/soil based species selection, appropriate fire cycles, and preventing or thinning of overstocked stands). However, we don't fully understand what triggers southern pine beetle outbreak population cycles, during which southern pine beetle is much less discriminatory in its tree killing behavior, and will impact less susceptible stands/species on a much more frequent basis, although to a lesser degree, i.e. everything is vulnerable to being attacked during outbreaks, but spots in less susceptible stands will typically exhibit lower damage, losses, spread, and duration, than those in more susceptible or higher hazard conditions. Aggressive 1st thinnings, snag retention, sawtimber thinning, as well as frequent burning of more burnable acres and longleaf restoration on appropriate sites, will reduce the adverse impacts of southern pine beetle when outbreak conditions materialize in the future.

Monitoring will be conducted using southern pine beetle phermone trapping survey.

Wood Thrush (*Hylocichla mustelina*)

Habitat Association – Mature forest interior

Habitat Monitoring – FSVeg database

Population Monitoring – Breeding bird survey data

This species is known to require large tracts of unbroken forest interior for successful breeding to occur. This will measure the ability of the Forest Service to reduce “edge” in its vegetation management program. Monitoring will be by breeding bird survey and FSVEG database in conjunction with GIS analysis of mature forest stands as compared to open areas.

F.1.3 Management Indicator Species Selected

Five previously selected species and three newly selected species were carried forward for additional evaluation concerning management emphasis, management influence, and effects of management on habitat niche (section F.1.4). Each species was assigned a score of 1-3 in order of priority with 3 being the most important for each category. A composite ranking average was calculated for each species and any proposed management indicator species having an average composite ranking average of 5 or greater were selected. This process resulted in the selection of six species to represent indicators of management on the National Forests in Mississippi. In order to estimate the effects of management activities on fish and wildlife populations the following species have been selected because their population changes are believed to indicate the effects of management activities.

Largemouth Bass (*Micropterus salmoides*)

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

Longleaf Pine (*Pinus palustris*)

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

Red-cockaded Woodpecker (*Picoides borealis*)

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

Southern Pine Beetle (*Dendroctonus fontalis*)

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

Pileated Woodpecker (*Dryocopus pileatus*)

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

Wood Thrush (*Hylocichla mustelina*)

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

F.1.4 Management Indicator Species Evaluation Tables For National Forests in Mississippi by Ranger District

Management Emphasis Ranking			De Soto RD	Chickasawhay RD	Holly Springs	Yalobusha		Ackerman	Tombigbee
	Bienville	Delta	De Soto		Holly Springs		Homochitto	Tombigbee	
Hooded Warbler	1	1	1	1	1	1	1	1	1
Largemouth Bass	3	1	3	3	3	3	3	3	3
Longleaf Pine	2	x	3	3	x	x	3	x	x
Pileated Woodpecker	2	2	2	2	2	2	2	2	2
Red-cockaded Woodpecker	3	x	3	3	x	x	3	x	x
Southern Pine Beetle	3	x	3	3	3	3	3	3	3
Wood Duck	1	3	1	1	1	1	1	1	1
Wood Thrush	1	1	1	1	1	1	1	1	1

x - No known occurrence or not likely to occur on this unit.

1 - Primary objective is to avoid or minimize negative impacts.

2 - Achieve multiple resource objectives while maintaining or improving current conditions.

3 - Priority placed on improving conditions with other resource objectives becoming secondary.

NFS Habitat Niche			De Soto RD	Chickasawhay RD	Holly Springs	Yalobusha		Ackerman	Tombigbee
	Bienville	Delta	De Soto		Holly Springs		Homochitto	Tombigbee	
Hooded Warbler	1	1	1	1	1	1	1	1	1
Largemouth Bass	1	1	1	1	1	1	1	1	1
Longleaf Pine	2	x	2	2	x	x	2	x	x
Pileated Woodpecker	1	1	1	1	1	1	1	1	1
Red-cockaded Woodpecker	3	x	3	3	x	x	3	x	x
Southern Pine Beetle	1	x	1	1	1	1	1	1	1
Wood Duck	1	1	1	1	1	1	1	1	1
Wood Thrush	2	2	2	2	2	2	2	2	2

x - No known occurrence or not likely to occur on this unit.

1 - Similar habitat conditions are commonly found across both federal and private ownerships.

2 - NFS lands provide habitat niche generally not common on other lands in the state.

3 - NFS managed lands provide unique habitat conditions essential to the species.

Management Influence Ranking			De Soto RD	Chickasawhay RD	Holly Springs	Yalobusha		Ackerman	Tombigbee
	Bienville	Delta	De Soto		Holly Springs		Homochitto	Tombigbee	
Hooded Warbler	1	1	1	1	1	1	1	1	1
Largemouth Bass	3	1	3	3	3	3	3	3	3
Longleaf Pine	3	x	3	3	x	x	3	x	x
Pileated Woodpecker	2	2	2	2	2	2	2	2	2
Red-cockaded Woodpecker	3	x	3	3	x	x	3	x	x
Southern Pine Beetle	3	x	3	3	3	3	3	3	3
Wood Duck	1	2	1	1	1	1	1	1	1
Wood Thrush	2	2	2	2	2	2	2	2	2

x - No known occurrence or not likely to occur on this unit.

1 - Influence considered low or questionable, other outside factors may pose an equal or greater influence.

2 - Influence considered an important (principal) factor for affecting changed conditions.

3 - Positive change in conditions is dependent upon or has a direct correlation to management actions.

Average Composite Rankings			De Soto RD	Chickasawhay RD	Holly Springs	Yalobusha		Ackerman	Tombigbee	Composite ranking sum	Composite ranking average
	Bienville	Delta	De Soto		Holly Springs		Homochitto	Tombigbee			
Red-cockaded Woodpecker	9		9	9			9			36.0	9.0
Longleaf Pine	7		8	8			8			31.0	7.8
Southern Pine Beetle	7		7	7	7	7	7	7	7	56.0	7.0
Largemouth Bass	7	3	7	7	7	7	7	7	7	59.0	6.6
Pileated Woodpecker	5	5	5	5	5	5	5	5	5	45.0	5.0
Wood Thrush	5	5	5	5	5	5	5	5	5	45.0	5.0
Wood Duck	3	6	3	3	3	3	3	3	3	30.0	3.3
Hooded Warbler	3	3	3	3	3	3	3	3	3	27.0	3.0

Proposed management indicator species having an average composite ranking average of 5 or greater were carried forward as management indicator species.

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