United States Department of the Interior

FISH AND WILDLIFE SERVICE

Mississippi Field Office
6578 Dogwood View Parkway, Suite A
Jackson, Mississippi 39213

December 30, 2013

IN REPLY REFER TO:
2013-CPA-087

Ms. Liz Agpaoa
Regional Forester
USDA – Forest Service
1720 Peachtree Road NW
Atlanta, Georgia 30309

Subject: Biological Assessment for the National Forests in Mississippi Land and Resource Management Plan

Dear Ms. Agpaoa:

This responds to your November 18, 2013 letter requesting our review of the Biological Assessment (BA) prepared for the National Forests of Mississippi (NFM) Land and Resource Management Plan (LRMP). Within the BA, the effects of the NFM LRMP on ten federally listed endangered and threatened species and their critical habitat were evaluated. You made a determination that the proposed LRMP "may affect, but is not likely to adversely affect" the following eight species under Section 7 of the Endangered Species Act and have requested our concurrence. These species include:

Common Name	Scientific Name	Federal Status
Gopher tortoise	*Gopherus polyphemus*	threatened
Gulf sturgeon (CH)	*Acipenser oxyrinchus desotoi*	threatened
Louisiana black bear	*Ursus americanus luteolis*	threatened
Louisiana quillwort	*Isoetes louisianaensis*	endangered
Mississippi sandhill crane (CH)	*Grus canadensis pulla*	endangered
Pallid sturgeon	*Scaphirhynchus albus*	endangered
Pondberry	*Lindera melissifolia*	endangered
Red-cockaded woodpecker	*Picoides borealis*	endangered

*CH – critical habitat has been designated for these species

The LRMP contains numerous standards and guidelines that are designed to enhance and protect wildlife habitat for rare and sensitive species including federally listed threatened and

endangered species. The NFM made a determination of "not likely to adversely affect" based on the following general and species-specific factors:

General Factors

1. The objective of the LRMP is to restore major forest communities, especially habitat structure, composition, and distribution, to a condition needed to maintain the viability of species associated with these communities. Therefore, the LRMP will have a net beneficial effect on federally listed species.

2. The NFM will follow the habitat management strategies found in the most current US Fish and Wildlife Service Recovery Plan for each threatened or endangered species relevant to the NFM.

3. The NFM will continue to consult on a project-by-project basis on those projects that are proposed to occur within potential habitat for federally listed species.

Species Specific Factors

Gopher Tortoise

1. Heavy equipment (including mowers) should stay at least 25 feet from known gopher tortoise burrow aprons (heavy equipment is defined as agricultural tractors, crawler loaders, crawler dozer, backhoe/loader, front end loader, scraper pan, motor grader, skid steer, forklift [P.I.T.], hydraulic excavator, and specialty tracked equipment). Logging slash should be kept at least 25 feet from known tortoise burrows as well. Within that 25 foot buffer area, light machinery and hand tools should be utilized for vegetation control.
2. Conduct gopher tortoise burrow surveys at 5-year intervals per the Gopher Tortoise Recovery Plan of 1990.

Gulf Sturgeon

3. Erosion control measures should be applied in all ground-disturbing activities to reduce movement of bare soil and minimize direct delivery of sediment to streams or other waterbodies. Appropriate erosion control measures (installing water diversion, revegetation, mulch, silt fences, etc.) should be implemented as promptly as practical.

Louisiana Black Bear

1. Known black bear den sites will be protected from impacts associated with vegetation management and ground-disturbing activities, within a minimum of 100 feet around the den, until they are no longer usable as a den site.
2. Potential black bear den trees should be retained during all vegetation management treatments occurring in habitats suitable for bears. Potential den trees are those that are greater than 36 inches diameter at breast height containing visible cavities.
3. Continue active involvement with the Bear Education and Restoration Group of Mississippi which focuses on bear conservation, restoration, management, and public education.

Louisiana Quillwort

1. Feral hog traps or other control activities that lure hogs to a concentrated area will be located at a minimum of 100 feet from known Louisiana quillwort colonies.
2. No herbicides will be mixed or applied within 100 feet of Louisiana quillwort plants/colonies.
3. Heavy logging equipment will not be used within a 165 foot buffer area of Louisiana quillwort plants/colonies. Suitable habitats for Louisiana quillwort within areas intended for timber harvesting and thinning will be surveyed prior to beginning operations.
4. Removal of beaver dams shall be conducted in such a manner as to minimize or avoid increased sedimentation and impacts to hydrology of streams and riparian areas associated with Louisiana quillwort.
5. New roads, off-road vehicle trails, and building construction will not be created within 165 feet of existing Louisiana quillwort plants/colonies. Suitable habitats for Louisiana quillwort within areas intended for new construction will be surveyed prior to beginning work. Road and trail construction and maintenance and general construction activities shall be conducted in such a manner as to minimize or avoid increased sedimentation and impacts to hydrology of streams and riparian areas associated with Louisiana quillwort.

Mississippi Sandhill Crane

Although there is no evidence that Mississippi sandhill cranes are currently found on the NFM, the LRMP proposes to develop a cooperative management unit for cranes on the De Soto National Forest to increase potential nesting and foraging habitat.

Pallid Sturgeon

Although there is no evidence that the pallid sturgeon is found within or adjacent to the NFM, the LRMP proposes to establish streamside buffer zones, restrict vegetation management activities in riparian zones, and employ erosion control measure in order to minimize downstream water quality impacts.

Pondberry

1. Feral hog traps or other control activities that lure hogs to a concentrated area will be located at a minimum of 100 feet from known pondberry plants/colonies.
2. No herbicides will be mixed or applied within 100 feet of pondberry plants/colonies.
3. Avoid timber harvesting, thinning operations, road and trail construction or building construction within 100 feet of pondberry plants/colonies. Heavy logging equipment will not be used within this buffer area.

Red-cockaded Woodpecker

1. Protect active and inactive cavity trees within burn units.
2. Limit pine regeneration area size.
3. Limit operable season to avoid nesting and brood-rearing periods in active clusters.

4. When pests occur in or near red-cockaded woodpecker colonies, a Forest Service pest management specialist and biologist may recommend treatment with cut and remove, cut and leave, or cut and spray to prevent destruction or loss of the colony site.
5. When treating southern pine beetle infestations within a red-cockaded woodpecker colony, trees vacated by southern pine beetle will not be cut or chemically treated. Uninfested trees within a 200-foot red-cockaded woodpecker colony buffer zone will not be cut or chemically treated unless such efforts would likely prevent southern pine beetle infestation of cavity trees. Disturbance in the colony sites will be kept to a minimum especially during breeding season.

We have determined that the information provided in the BA and draft LRMP is sufficient for us to evaluate the potential adverse and beneficial effects of implementation of the LRMP on the species listed above. We have also evaluated the species-specific conservation and protection measures that were identified in the BA and draft LRMP and believe that these factors will programmatically avoid and/or minimize potential adverse effects to these species. Based on these factors and NMF's commitment to continue consulting with our office on a project-by-project basis relative to potential adverse effects on these listed species, we concur with NFM's determination of "not likely to adversely affect" for the Mississippi sandhill crane, red-cockaded woodpecker, gulf sturgeon, pallid sturgeon, Louisiana black bear, gopher tortoise, Louisiana quillwort, and pondberry. In view of this, we believe that the requirements of Section 7 have been fulfilled for these species. However, NFM's obligations under Section 7 must be reconsidered, if: (1) new information reveals that the proposed project may affect listed species in a manner or to an extent not previously considered, (2) the proposed project is subsequently modified to include activities which were not considered during this consultation, or (3) new species are listed or critical habitat designated that might be affect by the proposed project.

Your biological assessment also concluded that the proposed LRMP would result in a "likely to adversely affect" determination for the following listed species:

Common Name	Scientific Name	Federal Status
Dusky gopher frog (CH)*	*Rana sevosa*	endangered
Indiana bat	*Myotis sodalis*	endangered

We also concur with your determination that unavoidable local adverse effects may occur to some individuals of one or more of these species and by this letter initiate formal Section 7 consultation under the ESA on the potential effects of the LRMP to the dusky gopher frog and Indiana bat. All information required of you to initiate consultation was either included in your BA or is otherwise accessible for our consideration and reference.

Section 7 of the ESA allows the Service up to 90 calendar days to conclude formal consultation with your agency and an additional 45 calendar days to prepare our biological opinion. Therefore, we expect to provide you with our biological opinion no later than April 10, 2014.

If you have any questions, please contact David Felder of our office, telephone: (601) 321-1131.

Sincerely,

for Stephen M. Ricks
Field Supervisor
MS Field Office

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Mississippi Field Office
6578 Dogwood View Parkway, Suite A
Jackson, Mississippi 39213

April 14, 2014

IN REPLY REFER TO:
2014-F-230

Ms. Liz Agpaoa
Regional Forester
USDA Forest Service
1720 Peachtree Road NW
Atlanta, Georgia 30309

Dear Ms. Agpaoa:

This document is the Fish and Wildlife Service's (Service) biological opinion (BO) based on our review of the United States Department of Agriculture, Forest Service, National Forests of Mississippi's (NFM) proposed Land and Resource Management Plan (Forest Plan) and its effects on the Indiana bat (*Myotis sodalis*) and the dusky gopher frog (*Rana sevosa*) and its critical habitat per section 7 of the Endangered Species Act (ESA) of 1973, as amended (16 United States Code [U.S.C.] 1531 et seq.). Your September 2013 Biological Assessment (BA) including your request for formal consultation was received on November 26, 2013.

This BO is based on information provided in the revised Forest Plan, BA, draft Environmental Impact Statement (EIS), and other sources of information. A complete administrative record of the consultation is on file at the Mississippi Field Office, Jackson, Mississippi.

Consultation History

On August 20, 2013, NFM submitted to the Service the draft Forest Plan, EIS, and BA for our review. Our office provided numerous comments and recommended changes to the proposed documents through numerous phone calls and electronic mails between August and November of 2013.On November 26, 2013, the Service received the final BA, which included a request to initiate formal consultation under section 7 of the ESA.

On December 30, 2013, the Service accepted the request to enter into formal consultation and concurred with the NFM effects determination of "may affect, but is not likely to adversely affect" for eight federally listed endangered or threatened species. Table 1 provides a list of the species analyzed and rationale for effects determination.

The Service sent NFM a draft BO on April 7, 2014. NFM completed the review of the draft BO on April 10, 2014.

FWS log No: 43910-2014-F-230 **Date Started: November 26, 2013**
Ecosystem: Central Gulf **Action Agency: USDA – Forest Service**
Project Title: Land and Resource Management Plan for the National Forests of Mississippi

Table 1. Species considered in the 2013 BA analyses for the proposed action and effect determinations.

Common Name	Scientific Name	Federal Status	Conclusion[1]	Rationale
Mammals				
Indiana bat	*Myotis sodalis*	Endangered	MALAA	Individuals adversely affected
Louisiana black bear	*Ursus americanus luteolus*	Threatened	NLAA	Conservation measures adequate
Birds				
Mississippi sandhill crane	*Grus canadensis pulla*	Endangered	NLAA	Not present
Red-cockaded woodpecker	*Picoides borealis*	Endangered	NLAA	Conservation measures adequate
Fish				
Gulf sturgeon	*Acipenser oxyrinchus desotoi*	Threatened	NLAA	Conservation measures adequate
Pallid sturgeon	*Scaphirhynchus albus*	Endangered	NLAA	Not Present
Reptiles				
Gopher tortoise	*Gopherus polyphemus*	Threatened	NLAA	Conservation measures adequate
Amphibians				
Dusky gopher frog	*Rana sevosa*	Endangered	MALAA	Individuals adversely affected
Plants				
Louisiana quillwort	*Isoetes louisianensis*	Endangered	NLAA	Conservation measures adequate
Pondberry	*Lindera melissifolia*	Endangered	NLAA	Conservation measures adequate

[1] NLAA – May affect, not likely to adversely affect
MALAA – May affect, likely to adversely affect

BIOLOGICAL OPINION

Programmatic consultation approach

This programmatic BO establishes a two-level consultation process for activities completed under the Forest Plan. Evaluation of the Forest Plan at the plan level represents the Level 1 consultation and all subsequent project-specific evaluations for future actions completed under the Forest Plan are the Level 2 consultations. Due to the temporal and spatial uncertainty that exists at the Forest Plan level regarding-anticipated incidental take, however, incidental take will be exempted in the Level 2 consultations for site-specific actions as they are proposed, consulted on, and appended to the programmatic opinion. This will help ensure that the NFM adheres to the reasonable and prudent measures needed to appropriately minimize the impacts of the incidental take that will result from the Level 2 action under review.

Under this programmatic approach, the NFM must continue to review all future individual projects to determine if they may affect a listed species (including species listed in Table 1) or designated critical habitat. Future projects that may affect listed resources are subject to Level 2 consultation; written notification to the Service, including a biological evaluation of such projects is required. Projects that may affect, but are not likely to adversely affect listed species or designated critical habitat will require written concurrence from the Service through informal Level 2 consultation. In most cases the response time for these concurrences should be significantly abbreviated. Projects that are likely to adversely affect listed species or designated critical habitat will be individually reviewed to determine: 1) whether they were contemplated in the Level 1 programmatic opinion and 2) if they are consistent with the guidelines established in the Level 1 programmatic opinion and whether the reasonable and prudent measures and terms and conditions provided in the incidental take statement are applicable. This will ensure that the effects of any incidental take resulting from individual projects are minimized. The original programmatic opinion taken together with all project documentation contained in the Level 2 consultation will make up the complete BO for each Level 2 project.

Future projects that are likely to adversely affect listed species or critical habitat, and do not adhere to the guidelines and conditions evaluated during the programmatic consultation, or any future projects that are considered to be outside the scope of the proposed action or Forest Plan, may require separate formal consultations.

Action area

The action area includes all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR 402.02). The action area is defined by measurable or detectable changes in land, air and water or to other measurable factors that will result from the proposed action. The action area is not limited to the "footprint" of the action, but rather encompasses the biotic, chemical, and physical impacts to the environment resulting directly or indirectly from the action.

In general, the action area for the purposes of this analysis is all lands, under any ownership, within the proclamation boundary of the NFM. During their analysis, the NFM did not identify any direct or indirect effects that moved outside of this area.

The Service has described the **action area** to include the 351,000 acre DeSoto National Forest (DeSoto Ranger District) and the 134,885 acre Holly Springs National Forest (Holly Springs Unit). Although the Forest Plan addresses all National Forest Lands within Mississippi, this consultation will only address those forests that contain the Indiana bat and dusky gopher frog, the two species that are likely to be adversely affected by the proposed action. The remaining eight federally listed species found on the NFM are not likely to be adversely affected by the proposed action.

Indiana bat – Holly Springs National Forest

The Holly Springs National Forest (HSNF) contains two units, the Holly Springs and the Yalobusha Units. The Yalobusha Unit is considered to be outside the home range for the Indiana bat, and therefore is not considered part of the action area. The HSNF program management emphasis is on enhancement of forest health to achieve desired structural conditions for ecological systems. Conversion of off-site species to shortleaf pine-oak forest and hardwood-dominated forests is another important aspect of the program. The Holly Springs Unit is 134,885 acres in size. Over this planning period, the HSNF proposes to manage timber on approximately 16,000 acres of these lands. Vegetation management practices will include 5,712 acres of regeneration cutting (even or two-aged) and 10,626 acres of commercial thinning. In addition, the Forest Plan proposed to prescribe burn approximately 23,000 acres per year (Note: specific acreage for the two HSNF Units was not separated in the Forest Plan; therefore, all acreage estimates are for both Units combined).

Dusky gopher frog – DeSoto National Forest

The DeSoto National Forest (DNF) is composed of two Ranger Districts (DeSoto and Chickasawhay). The Chickasawhay District is not occupied by the dusky gopher frog nor does it contain designated critical habitat for the species, thus it is not considered part of the action area. The DeSoto Ranger District includes seven critical habitat units encompassing approximately 3,084 acres in Forrest, Perry, and Harrison Counties, MS.

The DeSoto Ranger District is 351,000 acres in size. Over this planning period, the district proposes to manage timber on approximately 30,843 acres of these lands. Vegetation management practices will include 6,530 acres of regeneration cutting, and 22,788 acres of commercial thinning. In addition, the DeSoto Ranger District proposed to prescribe burn approximately 84,000 acres per year.

DESCRIPTION OF PROPOSED ACTION

The U.S. Forest Service (USFS) proposes to revise the 1985 Forest Plan for the NFM. Under the National Forest Management Act, Forest Plans must be developed to guide all

long-term natural resource management activities on National Forest System lands. They describe desired resource conditions, resource management practices, levels of resource production and management, the availability of suitable land for resource management, and monitoring and evaluation requirements for effective implementation. Forest Plans provide management direction for 10 – 15 years to ensure that ecosystems are capable of providing sustainable benefits to the public.

The goal of the Forest Plan is to restore major forest communities, especially habitat structure, composition, and distribution, to a condition needed to maintain the viability of species associated with these communities. The Forest Plan identifies desired conditions related to this goal that are broad statements specifying what the NFM will strive to achieve. Specific, measurable objectives are stepped down from these desired conditions. Finally, standards and guidelines provide the specific technical direction for managing resources. Standards are required limits to activities, while guidelines are preferred limits. Site-specific projects implement the Forest Plan and are developed to bring the forest closer to the goals and desired conditions identified. However, the Forest Plan does not propose any site-specific projects; it is programmatic in scope and does not contain decisions to implement specific actions or projects. Therefore, this consultation is limited to the consideration of effects of the broader programmatic strategy for managing forest resources. The Service expects future consultation on actions and programs that are proposed, analyzed, and implemented under this Forest Plan.

The NFM determined that the proposed action "may affect, and is likely to adversely affect" the Indiana bat and dusky gopher frog. We concur with this determination and the following BO addresses whether the proposed action of implementing the Forest Plan, including any interrelated or interdependent actions, is likely or not likely to jeopardize the continued existence of these species, or adversely modify designated critical habitat.

The NFM are widely dispersed across the state, providing ecological diversity and a representative cross-section of Mississippi's natural and cultural heritage. Originally established in the 1930s on predominately cut-over and eroded abandoned farmlands, the six national forests (or seven ranger districts) that make up the NFM provide a forested setting that offers a variety of uses and opportunities. These National Forest System lands, although separated from each other, cover approximately 1.2 million acres and are managed under one Forest Plan. The following provides an overview of the individual national forests and ranger districts or management units that make up the NFM. The six national forests (NF) include Bienville NF (Scott, Smith, Jasper, and Newton Counties), Delta NF (Issaquena and Warren Counties), DeSoto NF (Wayne, Jones, Greene, Perry, Forrest, Pearl River, Stone, George, Harrison, and Jackson Counties), Holly Springs NF (Benton, Lafayette, Marshall, Tippah, Union, and Yalobusha Counties), Homochitto NF (Adams, Amite, Copiah, Franklin, Jefferson, Lincoln, and Wilkinson Counties), and Tombigbee NF (Chickasawhay, Pontotoc, Winston, Choctaw, and Oktibbeha Counties).

Objectives in the Forest Plan are designed to restore major forest communities, especially habitat structure, composition, and distribution, to a condition needed to maintain the viability of species associated with these communities.

Specific proposed vegetation management activities for restoration include prescribed fire, timber harvest, wildlife habitat improvements and herbicide use. Prescribed fire is the tool that provides for restoration on the most acreage of the NFM. Historically, the role of fire in shaping the native plant and animal communities in Mississippi was not well understood, and the use of prescribed burning as a tool for reversing the loss of habitat and native communities was not widely practiced. Today, an aggressive prescribed fire program on the NFM is returning the national forests to a more historic fire regime and at the same time maintaining human safety as the highest priority. While the prescribed burning program in 1985 averaged 124,000 acres annually, the average in recent years was over 200,000 acres. The proposed Forest Plan estimates that approximately 220,000 acres will be treated by prescribed burning annually across the NFM. Control lines will generally consist of existing roads, trails, and streams wherever possible. In areas where control lines need to be constructed, methods will include use of hand tools and/or bulldozer. Lines will consist of 2-5 foot (ft) wide strips dug to mineral soil. Some smaller trees (9" diameter at breast height [dbh] or less) will be felled during construction, but larger trees will usually be avoided with the line going around and between them. Snags (standing dead trees) near the line will be felled which pose a hazard to personnel or may burn and fall thus spreading fire across the line into areas not scheduled for burning.

Timber sales, which include regeneration cuts, thinning, and salvage, are another important management activity that alters and/or disturbs significant acreage of forested habitat on the NFM. Timber sales are offered through a competitive bid process to achieve various objectives, which include restoration of the structure and composition of the forest, stand regeneration for wildlife habitat improvement, and commodity production in support of local economies.

Timber harvest operations include the clearing of skid trails, log landings, and temporary roads to access timber harvest units. These roads will be closed and seeded after use. Timber stand improvement activities may also be implemented. This would involve mechanical or chemical treatment to remove competing trees that are generally 5 inches or less in diameter.

Salvage harvest is included in the previous estimates of acreage of timber harvest. The objective is to salvage trees for use as wood products following natural disaster (e.g. wind storms, tornados, heavy snow/ice, and floods) or insect outbreaks (e.g. gypsy moth, southern pine beetle). Although salvage sales are similar to other timber sales, they differ by being implemented quickly to recover dead or damaged trees for forest products (before they decay or become unsuitable for such commercial use) and to reduce spread of insects and disease. It is impossible to accurately project future amounts of salvage. Potential salvage depends on the amount and severity of future tree mortality and damage resulting from events such as insect outbreaks, ice storms, and windstorms.

Wildlife habitat improvement activities include the maintenance of existing grassland openings, the creation of new temporary openings in the form of seeding log landings and temporary roads, and general ecosystem restoration projects. Stream habitat enhancement activities are used to enhance streams and sometimes involve the felling of individual trees for use as fisheries structures.

The NFM utilizes herbicides to accomplish several objectives including non-native invasive plant control, wildlife habitat improvement, timber stand improvement, and control of roadside vegetation. Herbicides applied on the NFM require comprehensive risk assessments that analyze human, wildlife and environmental risk. The USFS generally applies only low risk herbicides chosen to minimize risk to human and wildlife health, and often uses selective treatments over broadcast treatments, and technology that minimizes spray drift. Risk assessments estimate potential off-site movement by spray drift, percolating ground water, and surface water runoff, which must be minimal to un-measurable for approved pesticides and rates of active ingredient per acre. Approved herbicides have low toxicities and short persistence, and low risk of exposure. Protective measures include applying herbicides according to labeling information and using formulations registered by Environmental Protection Agency (EPA) and approved by the USFS.

A number of other management activities are proposed to meet specific management needs beyond ecological restoration. These generally affect small areas and include management of roads, recreation, special use, grazing, and soil and water improvement activities. In general, road management for the NFM entails the maintenance or improvement of existing corridors (reconstruction) rather than establishing new roadways (construction). The primary focus will be on maintaining and rehabilitating the existing road system. Maintenance priorities will include bridge safety, adequate signs, suitable stream crossings, and any resurfacing or reconstruction needed to provide an overall road system that is useable and safe. Road maintenance includes brushing, surfacing, culvert and bridge replacement, and grading to assure safe public access within the NFM.

No major development of recreation facilities is proposed. Management for recreation activities on the NFM will address maintenance needs on hiker and bike trails, hunter and fishing access points, and developed sites such as campgrounds and parking lots. Actions would include brushing, removal of hazard trees, and limited removal of trees during trail construction. Developed recreation sites will stay approximately the same number and size.

Special use authorizations are issued for multiple purposes to individuals, corporations, and other government agencies. The predominant uses are for public roads, communication facilities, oil and gas leasing, military training activities, and utility rights-of-way. Proposed actions include maintaining the existing permits and authorizing new permits. The maintenance activities would predominantly be road maintenance and maintenance of utility line corridors including hazard tree removal and maintenance of grass/forb and shrub communities within the right-of-way. New authorizations that would involve clearing of trees are not expected to be substantial.

The NFM proposes to continue to implement soil and water improvement projects. These projects generally include closing and seeding abandoned roads, illegal roads and trails, rehabilitating old mine sites, and stream bank restoration. The projects could involve some clearing of trees to facilitate treatment operations.

Conservation measures

The BA proposes a conservation strategy to reduce the amount or extent of incidental take of Indiana bats and dusky gopher frogs associated with the Forest Plan. The NFM's proposal includes the following general conservation measures:

- Implement USFS actions as recommended in recovery plans for federally listed species. In the absence of an approved recovery plan, implement and, if necessary develop interim USFS guidelines. Update interim guidelines as needed when new science becomes available.
- Work with the Service and other conservation partners to develop recovery plans for federally listed species and candidate conservation agreements for species proposed for listing.
- Coordinate with partners to implement measures to resolve conflicts with proposed, threatened, and endangered species and their habitats.
- Monitor trends in population status and/or habitat of federally listed species.
- Consult with the Service on all future site specific actions covered under the Forest Plan.

Conservation measures specific to the Indiana bat include:

- Manage naturally occurring tree species composition to provide a continuous supply of suitable roost trees and foraging habitat for Indiana bats. Achieve vegetative diversity that maintains or improves Indiana bats habitat.
- Where consistent with management prescription emphasis, use a variety of silvicultural methods to create desired age class diversity.
- Protect and manage occupied and potential roosting and foraging habitat through pond creation/management, maintaining available roosts/snags, prescribed fire in uplands, bottomland hardwood forest management, and protection of riparian zones.
- Stumps and standing snags should generally be retained to maintain structural diversity during vegetation management treatments. Exceptions may be made when necessary to control insects or disease or to provide for public and employee safety. Distribution of retained snags may be clumped.
- Conduct surveys for new populations.
- If occupied Indiana bat maternity roost trees are discovered, protect them from physical disturbance until they naturally fall to the ground.
- Based on site-specific consultation, Indiana bat areas of use (foraging and roosting) should be designated based on site conditions, radio-tracking or other survey information, and best available information regarding maternity habitat needs. Minimize human disturbance in the maternity colony areas of use until the colony has left the maternity area for hibernation.

- Within the Indiana bat area of use (known or likely foraging and roosting) determined for each maternity colony, prescribed burning should generally be conducted during the hibernation season.
- Protect occupied Indiana bat male roost trees discovered during the summer season (not migration), from physical disturbance by designating a 75-ft radius buffer zone around the tree(s). The buffer zone shall remain in place until migration to hibernacula begins (around September 1). Prohibit ground-disturbing activity or timber harvest within the buffer zone. Prescribed burning may be done within the buffer zone if a fire line is manually constructed no less than 25-ft from, and completely around, the tree to prevent it from catching fire.
- Where Indiana bats are known to occur, maintain a component of large, mature trees in hardwood harvest areas, retaining at least three live trees per acre greater than 20 inches dbh of these preferred species (leave-trees will be located along edges of the harvest area or in clumps to maximize their benefit to bats): silver maple (*Acer saccharinum*), bitternut hickory (*Carya cordiformis*), shellbark hickory (*Carya laciniosa*), shagbark hickory (*Carya ovata*), white ash (*Fraxinus americana*), green ash (*Fraxinus pennsylvanica*), eastern cottonwood (*Populus deltoides*), white oak (*Quercus alba*), northern red oak (*Quercus rubra*), post oak (*Quercus stellata*), black locust (*Robinia pseudoacacia),* American elm (*Ulmus americana*), slippery elm (*Ulmus rubra*).
- Where Indiana bats are known to occur, any dead, decadent or identified hazard tree that has characteristics of a potential Indiana bat maternal roost tree (splintered bole that provides crevices, evidence of decay so that either their bark is exfoliating, it possesses cavities, or dead portions of the tree have been used, excavated, or occupied by species such as woodpeckers or other cavity nesting birds and, most importantly, exposure of the roost to sunlight) will not be removed until consultation with a USFS biologist has been completed. An exception is trees may be cut that are an immediate safety danger to an individual.
- Where Indiana bats are known to occur, project areas where large overstory hardwood trees could be cut, mist-netting surveys, exit surveys, or other surveys approved by the Service, must be done to identify known Indiana bat roosting habitats prior to harvest or cutting. Mature leave-trees in areas where the shelterwood or shelterwood-with-reserves harvest methods are applied (including the uplands) should include mixtures of tree species preferred by Indiana bats for roosting.
- Maintain a component of large over-mature trees, if available, in all uneven-aged harvest units to provide suitable roosting habitat for Indiana bats where they occur.
- When treating southern pine beetle infestations within an Indiana bat roosting area, trees vacated by southern pine beetle will not be cut or chemically treated. Un-infested trees within a 200-ft buffer zone will not be cut or chemically treated unless such efforts would likely prevent southern pine beetle infestation. Disturbance in the maternity roosting area will be kept to a minimum especially during breeding season.

Conservation measures specific to the dusky gopher frog include:

- Restore, and improve canopy conditions and conversion to appropriate ecological system with 1- to 3-year fire intervals and management of embedded ponds and emergent wetlands.
- Prioritize the prescribed burning of upland habitat around Glen's Pond.
- Prioritizing habitat management activities (restoration of longleaf pine, protection of pond sites and their hydrology, invasive species management, and prescribed fire) on all USFS lands designated as critical habitat.
- Timber management within dusky gopher frog critical habitat should be limited to longleaf restoration, managing for woodland conditions, and other species specific habitat objectives.
- Heavy equipment (including mowers) should stay at least 25-ft from known gopher tortoise burrow aprons (heavy equipment is defined as agricultural tractors, crawler loaders, crawler dozer, backhoe/loader, front end loader, scraper pan, motor grader, skid steer, forklift [P.I.T.], hydraulic excavator, and specialty tracked equipment). Logging slash should be kept at least 25-ft from known tortoise burrows as well. Within that 25-ft buffer area, light machinery and hand tools should be utilized for vegetation control.
- Time prescribed fire to when individuals are less likely to be moving during a breeding period (i.e. following the burn matrix).
- Develop a Cooperative Management Unit for the dusky gopher frog that will focus restoration and management activities to improve frog habitat and reduce habitat fragmentation effects within the Glen's Pond metapopulation.

A more detailed account of NFM's Conservation Strategy is contained in their September, 2013 BA.

STATUS OF THE SPECIES/CRITICAL HABITAT

This section summarizes the biology and ecology as well as information regarding the status and trends of the covered species throughout their entire range. The Service uses this information to assess whether a federal action is likely to jeopardize the continued existence of the aforementioned species, or adversely modify designated critical habitat. The "Environmental Baseline" section summarizes information on status and trends of the species specifically within the action area. This summary provides the foundation for the Service's assessment of the effects of the proposed action, as presented in the "Effects of the Action" section.

Indiana Bat

The Indiana bat was originally listed as an endangered species by the Service in 1967. Thirteen winter hibernacula (11 caves and two mines) in six states were designated as critical habitat for the Indiana bat in 1976 (USFWS 1976). No designated critical habitat is within range of the NFM.

The Indiana bat is an insectivorous, temperate, medium-sized bat that migrates annually from winter hibernacula to summer habitat in forested areas. The bat has a head and body length that ranges from 41 to 49 mm, with a forearm length of 35 to 41 mm. The fur is described as dull pinkish-brown on the back but somewhat lighter on the chest and belly, and the ears and wing membranes do not contrast with the fur (Barbour and Davis 1969). Although the bat resembles the little brown bat and the northern long-eared bat, it is distinguished by its distinctly keeled calcar and a long, pointed, symmetrical tragus.

Life history

The key stages in the annual cycle of Indiana bats are: hibernation, spring staging, pregnancy, lactation, volancy/weaning, migration and swarming. Figure 1 provides a depiction of the annual cycle. While there is variation based on weather and latitude, generally bats begin winter torpor in mid-September through late-October and begin emerging in April. Females depart shortly after emerging and are pregnant when they reach their summer area. Birth of young occurs between mid-June and early July and then nursing continues until weaning, which is shortly after young become volant (able to fly) in mid- to late-July. Migration back to the hibernaculum may begin in August and continue through September.

Figure 1. Indiana Bat Annual Chronology

Winter hibernation

After the summer maternity period, Indiana bats migrate back to traditional winter hibernacula. Some male bats may begin to arrive at hibernacula as early as July. Females typically arrive later and by September the number of males and females are present in comparable numbers. Autumn "swarming" occurs prior to hibernation. During swarming, bats fly in and out of cave entrances from dusk to dawn and use trees and snags as day roosts (Cope and Humphrey 1977). Swarming continues for several weeks and mating occurs during the latter part of the period. Fat supplies are replenished as the bats forage prior to hibernation. By late September many females have entered hibernation, but males may continue swarming well into October in what is believed to be an attempt to breed with late arriving females.

Generally, Indiana bats hibernate from October through April (Hall 1962, LaVal and LaVal 1980), depending upon local weather conditions. Indiana bats hibernate in caves and mines with cold, stable microclimates. They form large, dense clusters, ranging from 300 bats per square ft to 484 bats per square ft (Clawson *et al*. 1980, Clawson, pers. observ. October 1996 in USFWS 2000). Clusters form in the same area in a cave each year, with more than one cluster possible in a particular cave (NatureServe 2007). It is generally accepted that Indiana bats, especially females, are philopatric, i.e., they return annually to the same hibernaculum. However, exceptions have been noted (USFWS 2007).

Summer roosting and foraging

After hibernation ends in late March or early April, most Indiana bats migrate to summer roosts. Females emerge from hibernation ahead of males. Reproductively active females store sperm from autumn copulations through winter, and ovulation takes place after the bats emerge from hibernation. The period after hibernation and just before spring migration is typically referred to as "staging," a time when bats forage and a limited amount of mating occurs (USFWS 2007).

Most winter populations leave hibernacula by late April or early May. In spring when fat reserves and food supplies are low and females are pregnant, migration is probably hazardous (Tuttle and Stevenson 1977). Consequently, mortality may be higher in the early spring, immediately following emergence. Once en route to their summer destination, females move quickly across the landscape. Radio-telemetry studies in New York documented females flying between 10 and 30 miles (mi) in one night after release from their hibernaculum, arriving at their maternity sites within one night. Indiana bats can migrate hundreds of miles from their hibernacula. Observed migration distances range from just 34.1 mi to 356.5 mi (USFWS 2007).

Females seek suitable habitat for maternity colonies, which is a requisite behavior for reproductive success. They exhibit strong site fidelity to summer roosting and foraging areas, generally returning to the same summer range annually to bear their young (Garner and Gardner 1992). Females arrive in their summer habitats as early as April 15 in Illinois (Gardner *et al*. 1991, Brack 1979), and usually start grouping into larger maternity colonies by mid-May. Humphrey *et al.* (1977) reported that Indiana bats first arrived at their maternity roost in early May in Indiana, with substantial numbers arriving in mid-May. During this early spring period, a number of roosts may be used temporarily, until a roost with larger numbers of bats is established.

In general, Indiana bats roost in large, often dead or partially dead trees with exfoliating bark and/or cavities and crevices (Callahan *et al.* 1997; Farmer et al. 2002; Kurta *et al.* 2002). Trees in excess of 16 inch dbh with exfoliating bark are considered optimal for maternity colony roost sites, but trees in excess of 9 inch dbh appear to provide suitable maternity roosting habitat (Romme *et al.* 1995). Indiana bat maternity roosts can be described as primary or alternate based upon the proportion of bats in a colony consistently occupying the roost site. Maternity colonies typically use 10 to 20 trees each

year, but only one to three of these are primary roosts used by the majority of bats for some or all of the summer (Garner and Gardner 1992; Miller *et al.* 2002). Alternate roosts are used by individuals, or a small number of bats, and may be used intermittently throughout the summer or used on only one or a few days.

Females frequently switch roosts to find optimal roosting conditions, switching roosts every few days on average, although the reproductive condition of the female, roost type, and time of year affect switching. When switching between day roosts, Indiana bats may travel as little as 23 feet (7 m) or as far as 3.6 miles (5.8 km) (Kurta *et al.* 1996; Kurta *et al.* 2001; Kurta *et al.* 2002). In general, moves are relatively short and typically less than 0.6 mile (1 km) (USFWS 1997).

The range of maternity colony sizes observed for the Indiana bat is 20-100 adult females (Kurta 2004), and 60 females is the average of the overall variability in maternity colony size. Birth of young occurs in late June and early July (Easterla and Watkins 1969, Humphrey *et al.* 1977). The young are able to fly between mid-July and early August (Mumford and Cope 1958, Cope *et al.* 1974, Humphrey *et al.* 1977, Clark *et al.* 1987, Gardner *et al.* 1991, Kurta *et al.* 1996).

The home range of a maternity colony is the area within a 2.5-mile radius (i.e., 12,560 acres) around documented roosts or within a 5-mile radius (i.e., 50,265 acres) around capture location of a reproductive female or juvenile Indiana bat or a positive identification of Indiana bat from properly deployed acoustic devices. Based on data provided in the Indiana bat draft revised recovery plan (USFWS 2007), a maternity colony needs at least 10% suitable habitat (i.e., forested habitat) to exist at a given point on the landscape.

Male Indiana bats may be found throughout the entire range of the species. Some males spend the summer near hibernacula, as has been observed in Missouri (LaVal and LaVal 1980) and West Virginia (Stihler, pers. observ. October 1996, in USFWS 2000). Males appear to roost singly or in small groups, except during brief summer visits to hibernacula. Males have been observed roosting in trees as small as 3 inches dbh, but the average roost diameter for male Indiana bats is 13 inches (USFWS 2007).

Indiana bats forage over a variety of habitat types but prefer to forage in and around the tree canopy of both upland and bottomland forest, along roads, or along the corridors of small streams. Bats forage at a height of approximately 2-30 meters under riparian and floodplain trees (Humphrey *et al.* 1977). They forage between dusk and dawn and feed exclusively on flying insects, primarily moths, beetles, and aquatic insects. Females in Illinois were found to forage most frequently in areas with canopy cover of greater than 80%, and typically utilize larger foraging ranges than males (Garner and Gardner 1992). Forested stream corridors and impounded bodies of water have been identified as preferred foraging habitats for pregnant and lactating Indiana bats (Gardner *et al.* 1991).

Population dynamics

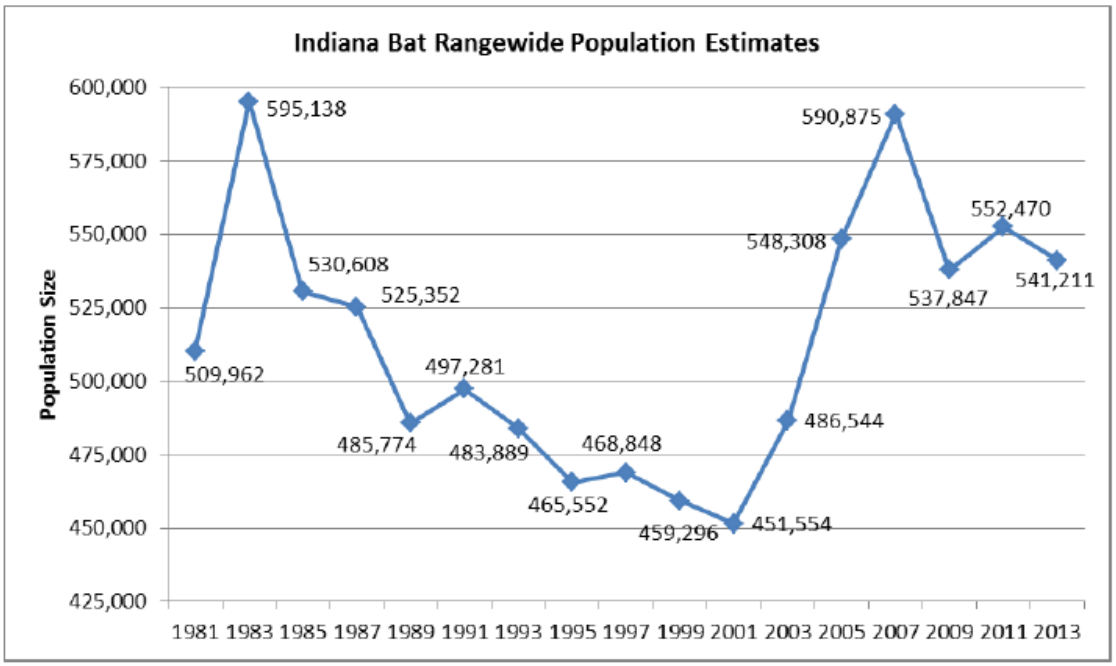
The population of the Indiana bat has decreased significantly from an estimated 808,000 in the 1950s (USFWS 2007). Based on censuses taken at all hibernacula, the current total known Indiana bat population in 2013 is estimated to number about 534,239 bats (Figure 2). Population trend data showed a steady increase from 2001 to 2007, a drop in 2009, an increase in 2011, and finally a drop in 2013 to a population estimate that approximates the 2009 estimate.

Missouri, Indiana, and Kentucky have historically had the highest estimated numbers of hibernating bats; all had estimates of greater than 10,000 bats in 1965. Over the period 1965 to 2005, estimated numbers of hibernating bats in Missouri and Kentucky clearly declined (USFWS 2007). Among the group of states in which aggregate hibernaculum surveys have never reached 100,000 bats, hibernaculum surveys in Arkansas, Tennessee, and Virginia consistently declined from 1965 to 2000. Hibernacula surveys in Illinois, New York, Ohio, and West Virginia were greater in 2000 than in 1965, but trends are not entirely consistent through the period. Thus, the southern tier of states in the species' range shows declines in counts at hibernacula, whereas some states in the upper Midwest show increasing counts (USFWS 2007).

Status and distribution

The current species range includes much of the eastern half of the United States, from Oklahoma, Iowa, and Wisconsin east to Vermont, and south to northwestern Florida. The species has disappeared from, or greatly declined, in most of its former range in the northeastern United States. The current revised recovery plan (USFWS 2007) delineates recovery units based on population discreteness, differences in population trends, and broad level differences in land use and macrohabitats. There are currently four recovery units for the Indiana bat: Ozark- Central, Midwest, Appalachian Mountains, and Northeast.

Figure 2. Indiana bat range wide population estimates from 1981 – 2013 (www.fws.gov/midwest/Endangered/mammals/inba/pdf/2011inbaPopEstimate04Jan12.pdf; (USFWS 2013). (* 2013 estimate does not include most recent survey data from all states in the range. Where the most recent data were lacking, 2011 data were substituted.)



Historically, the Indiana bat had a winter range restricted to areas of cavernous limestone in the karst regions of the east-central United States. Hibernacula are divided into priority groups that have been redefined in the Service's Draft Recovery Plan (USFWS 2007): Priority 1 (P1) hibernacula typically have a current and/or historically observed winter population of greater than or equal to 10,000 Indiana bats; P2 have a current or observed historic population of 1,000 or greater, but fewer than 10,000; P3 have current or observed historic populations of 50 to 1,000 bats; and P4 have current or observed historic populations of fewer than 50 bats. Based on 2009 winter surveys, there were a total of 24 P1 hibernacula in seven states: Illinois (one); Indiana (seven); Kentucky (five); Missouri (six); New York (three); Tennessee (one); and West Virginia (one). One additional P1 hibernaculum was discovered in Missouri in 2012. A total of 55 P2, 151 P3, and 229 P4 hibernacula are also known from the aforementioned states, as well as 15 additional states.

The historical summer range of the Indiana bat is thought to be similar to its modern range. However, the bat has been locally extirpated due to fragmentation and loss of summer habitat. The majority of known maternity sites have been located in forested tracts in agriculturally dominated landscapes such as Missouri, Iowa, Indiana, Illinois, southern Michigan, western Ohio, and western Kentucky, as well as the Northeast, with multiple recent spring emergence telemetry studies.

The reasons for listing the Indiana bat were summarized in the original Recovery Plan (USFWS 1983) including: declines in populations at major hibernacula despite efforts to implement cave protection measures, the threat of mine collapse and the potential loss of the largest known hibernating population at Pilot Knob Mine, Missouri, and other hibernacula throughout the species range were not adequately protected. Although several known human-related factors have caused declines in the past, they may not solely be responsible for recent declines.

Documented causes of Indiana bat population decline include: 1) human disturbance of hibernating bats; 2) improper cave gates and structures rending them unavailable or unsuitable as hibernacula; and 3) natural hazards like cave flooding and freezing. Suspected causes of Indiana bat declines include: 1) changes in the microclimate of caves and mines; 2) dramatic changes in land use and forest composition; and 3) chemical contamination from pesticides and agricultural chemicals. Current threats from changes in land use and forest composition include forest clearing by private industry within the summer range, woodlot management and wetland drainage by landowners, and other private and municipal land management activities that affect the structure and abundance of forest resources. Climate change is also an emerging threat to the Indiana bat, primarily because temperature is an essential feature of both hibernacula and maternity roosts. Potential impacts of climate change on temperatures within Indiana bat hibernacula were reviewed by V. Meretsky (pers. comm., 2006 in USFWS 2007).

Climate change may be implicated in the disparity of population trends in southern versus northern hibernating populations of Indiana bats (Clawson 2002), but Meretsky noted that confounding factors are clearly involved. Humphries *et al*. (2002) used climate change models to predict a northern expansion of the hibernation range of the little brown bat; such modeling would likely result in predictions of range shifts for Indiana bats as well.

Potential impacts of climate change on hibernacula can be compounded by mismatched phenology in food chains (e.g., changes in insect availability relative to peak energy demands of bats) (V. Meretsky, pers. comm., 2006 in USFWS 2007). Changes in maternity roost temperatures may also result from climate change, and such changes may have negative or positive effects on development of Indiana bats, depending on the location of the maternity colony. The effect of climate change on Indiana bat populations is a topic deserving additional consideration.

The greatest current threat to Indiana bats is white nose syndrome (WNS). WNS was first documented in New York in February of 2006 and has since been confirmed in 20 states and 4 Canadian Provinces (www.whitenosesyndrome.org/resources/map). It is currently unknown if WNS is the primary cause or a secondary indicator of another pathogen, but it has been correlated with erratic behavior such as early or mid-hibernation arousal that leads to emaciation and mortality in several species of bats, including the Indiana bat (http://whitenosesyndrome.org/; www.fws.gov).

Overall mortality rates, primarily of little brown bats, have ranged from 90 to 100 percent in hibernacula in the northeastern United States. It is currently estimated that 5.7 to 6.7

million bats have died from WNS in infected regions (www.whitenosesyndrome.org/about-white-nosesyndrome).

Apparent losses of 685 Indiana bats in Hailes Cave and all but 124 of 13,014 Indiana bats in the Williams Preserve Mine in New York were documented during the first winter WNS was observed at each site. Additionally, Indiana bat surveys conducted at hibernacula in New York during early 2008 estimated the population declined 15,662 bats, which represents 3.3% of the 2007 revised range wide population estimate. WNS is thought to be transmitted by direct bat contact with an infected bat and by transmission of the causative agent from cave to cave. The distribution of WNS appears to be expanding in all directions from its epicenter in New York. Between 2007 and 2008, it was documented to have spread from a 9 km radius to a 200 km radius, and at the end of the 2008-2009 winter, it was documented in all major hibernacula in New York. Most recently it has been found in eastern Missouri, northern Alabama, Illinois, and suspected in eastern Iowa. The Service and partners are conducting research to develop management strategies to reduce the spread and impacts of WNS. However, it remains a significant and immediate threat to the Indiana bat.

At the time the revised recovery plan was drafted in 2007, the causative agent for WNS had not yet been discovered and the additive impacts to the already declining Indiana bat were not yet considered. Given the documented deaths of Indiana bat due to WNS in the Northeast since 2006, the species is further threatened with extinction. Numerous research projects have been completed and are ongoing at a rapid rate since the first discovery of WNS, a national response plan has been completed (available at www.whitenosesyndrome.org), multiple states and agencies have approved or are in the process of developing response action plans, and various management actions have been undertaken to slow the spread of the disease (e.g., cave closures, the development of decontamination protocols, etc.). Despite these efforts, there is no known cure for the disease and all bats in North America that hibernate in caves could be threatened with extinction.

Status and distribution in Mississippi

In April of 2013, one female Indiana bat was tracked from the Rose Cave hibernacula in White County, TN to a suspected maternity roost on the Holly Springs Ranger District in Benton County, Mississippi. The straight ling distance from the Rose Cave hibernacula to the maternity sit in Benton County, MS is 367 km (228 mi). There are no known winter hibernacula in Mississippi.

Conservation needs of Indiana bat

The Service's strategy for recovering Indiana bat is founded on three fundamental principles of conservation biology – representation, redundancy, and resiliency. Representation means conserving the breadth of genetic and ecological diversity to ensure the species' adaptive capabilities are preserved. Redundancy means having sufficient number of populations distributed across the landscape to ensure the species

can withstand catastrophic events. Resiliency means having sufficiently large populations to ensure populations can withstand environmental fluctuations.

Implementing this recovery strategy entails five key conservation needs:

Conservation Need 1. Maintaining the current winter and summer range of Indiana bat. Conserving and managing Indiana bats across the species range requires maintaining self-sustaining Indiana bat populations in each recovery unit (which is accomplished by achieving Conservation Needs 2-5).

Conservation Need 2. Conserving and managing winter colonies and hibernacula via:

1. Maintaining both large and small hibernating populations
2. Maintaining or providing appropriate physical structure, airflow, and microclimate of the hibernacula
3. Maintaining forest habitat surrounding hibernacula. This habitat is essential for maintaining the integrity of the hibernacula and provides foraging and roosting habitat for Indiana bats during the fall swarming period when they build up their fat reserves to successfully hibernate.
4. Avoiding disturbance of hibernating bats which can lead to excessive arousal and premature depletion of fat reserves.
5. Minimizing disturbance of bats during the swarming period that can lead to disruptions in mating and foraging activity.

Conservation Need 3. Conserving and managing maternity colonies via:

1. Locating maternity colonies in each recovery unit via spring emergence radio tracking or summer surveys.
2. Ensuring a sufficient number of self-sustaining maternity colonies persist in order to support the regional population (i.e., recovery unit population) by managing and controlling threats acting, singly and cumulatively, upon the fitness of maternity colonies.
3. Maintaining the ecological processes that ensure the continued availability of roosting, foraging, and commuting habitat needed to support maternity colonies

Conservation Need 4. Conserving migrating Indiana bats via:

1. Understanding Indiana bat migration, including:
    a. migratory routes (e.g., determine if Indiana bats follow migratory pathways or landscape features),
    b. migratory behaviors (e.g., migrate singly or in groups, use of stopover habitat, flight height); and
    c. differences between fall and spring migration.
2. Maintaining safe and suitable migration pathways across the species range.
3. Conserving and managing important stopover habitat, if such habitat is deemed necessary.
4. Identifying limiting factors and managing threats during migration at levels that will not impede recovery, including:

a. determining if stopover habitat is limiting to Indiana bats during migration, and if so, conserve and manage stopover habitat,
b. minimizing/managing fatalities due to wind energy, and
c. minimizing/managing other (yet to be identified) threats to successful migration.

Conservation Need 5. Managing the effects of white-nose syndrome (WNS) via:

1. Avoiding/minimizing the transmission of *Geomyces destructans*.
2. Implementing measures to control *G. destructans* should effective, non-harmful measures become available.
3. Restoring and protecting populations affected by WNS, with emphasis on populations that are seemly more resilient to the disease (e.g., hibernating populations that have shown lower levels of decline; maternity colonies that persist after the initial wave of high mortality)

Dusky (=Mississippi) Gopher Frog

Species description

The gopher frog is a mid-sized, stocky, frog in the large cosmopolitan family, Ranidae ("true frogs"). Goin and Netting (1940) originally described gopher frogs from the geographic range of the dusky gopher frog as a distinct species, *Rana sevosa*. However, in subsequent years these frogs were considered the subspecies, *Rana capito sevosa* (Conant and Collins 1991). Since the listing of the dusky gopher frog as an endangered species, the scientific community has recognized the validity of the original description and accepted the species designation, *Rana sevosa*, for gopher frogs occurring in Mississippi (Young and Crother 2001).

The dusky gopher frog has a stubby appearance due to its short, plump body, comparatively large head, and relatively short legs (Conant and Collins 1991). The coloration of its back varies in individual frogs. It ranges from an almost uniform black to a pattern of reddish brown or dark brown spots on a ground color of dark gray or brown (Goin and Netting 1940). Warts densely cover the back. The belly is thickly covered with dark spots and dusky markings from chin to mid-body (Goin and Netting 1940, Conant and Collins 1991). Males are distinguished from females by their smaller size, nuptial pad (swollen area that assists grip during breeding) on their thumbs, and paired vocal sacs on either side of the throat (Goin and Netting 1940). Richter (1998) reported mean snout-vent lengths from three years of data from dusky gopher frogs at Glen's Pond. Measurements ranged from 2.5 to 2.8 inches (in) (63.2 to 70.2 millimeters (mm)) for males and 3.1 to 3.3 in (78.0 to 82.7 mm) for females. Dusky gopher frog tadpoles are similar to those of other gopher frogs and crawfish frogs (Volpe 1957, Altig *et al*. 2001).

Habitat

The dusky gopher frog is an endemic of the longleaf pine ecosystem. Optimal habitat is created when management includes the use of seasonally-appropriate prescribed fire to support a diverse ground cover of herbaceous plants, both in the uplands and in the breeding ponds (Hedman *et al.* 2000, Kirkman *et al.* 2000, Roznik *et al*. 2009). Historically, fire-tolerant longleaf pine dominated the uplands; however, much of the original habitat has been converted to pine (often loblolly (*P*. *taeda*) or slash pine (*P. elliottii*)) plantations and has become a closed-canopy, fire-suppressed forest. Outside of occupied habitat and those areas managed as potential translocation sites, many remaining parts of this ecosystem within the historical range of the frog continue to decline through fragmentation and destruction, primarily as a result of urbanization from residential and commercial development (Wear and Greis 2013).

Dusky gopher frog habitat includes both upland sandy and sandy loam habitats—historically forest dominated by longleaf pine—and wetland breeding sites embedded within the forested landscape. Breeding sites are ephemeral (seasonally flooded) ponds not connected to other water bodies (isolated) (Kirkman *et al.* 2007) with an open canopy (Thurgate and Pechmann 2007).

Adult and subadult dusky gopher frogs spend the majority of their lives underground, generally in stump holes or small mammal burrows within their forested habitat (Richter *et al.* 2001, Tupy 2012). Historically, they were frequently found in active and abandoned gopher tortoise (*Gopherus polyphemus*) burrows (Allen 1932). Thurgate (2006) conducted a choice experiment with two different sets of artificial burrows, those containing chemical cues of gopher tortoises or old field mice (*Peromyscus gossypinus*) and those without. She found that dusky gopher frogs spent significantly more time in the treatment burrows than control burrows. This suggests that the species has an innate response to the chemical cues of these species, and that this response may help them locate burrows in the environment. The gopher tortoise, whose burrows are considered good terrestrial habitat for gopher frogs, is listed as threatened under the ESA within the range of the dusky gopher frog and is in decline. Thus, the specialized microhabitat which they create is rare in occupied dusky gopher frog habitat. Because fossorial habitat represents the primary upland habitat for the species, their survival is dependent on the quality and quantity of appropriate underground refugia (Roznik and Johnson 2009).

Connectivity of dusky gopher frog breeding and nonbreeding habitat within the geographic area occupied by the species must be maintained to support the species' survival (Semlitsch 2002, Rothermel 2004, Harper *et al.* 2008, Richter *et al.* 2009, Richter and Nunziata 2013). This connectivity allows for gene flow among local populations within a metapopulation which enhances the likelihood of metapopulation persistence. (Wiens 1996, Semlitsch 2002, Harper *et al.* 2008).

Critical habitat

Critical habitat was designated for the dusky gopher frog on June 12, 2012 (77 FR 35118). Based on our current knowledge of the life history, biology, and ecology of the species, and the habitat requirements for sustaining the essential life-history functions of the species, we determined primary constituent elements (PCEs) of critical habitat for the dusky gopher frog. These are ephemeral wetland habitat used as breeding ponds; upland forested nonbreeding habitat consisting of open-canopied forests historically dominated by longleaf pine and adjacent to and accessible to and from breeding ponds; and open-canopied upland habitat between breeding and nonbreeding habitats which allows for dusky gopher frog movements between and among such sites.

There are twelve critical habitat units, three of which are divided into two subunits each. Of these, a total of 1,544 ac (625 ha) are located in St. Tammany Parish, Louisiana, and 4,933 ac (1,996 ha) are located in Forrest, Harrison, Jackson, and Perry Counties, Mississippi. Fifty-four percent of these acres are in Federal ownership, 4 percent in State (Mississippi) ownership, and 42 percent in private ownership. Twenty-seven percent of the critical habitat acreage is occupied and 73 percent is unoccupied. Seven critical habitat units occur primarily on the DeSoto National Forest (DNF), DeSoto Ranger District, in Harrison, Forrest, and Perry Counties, Mississippi; one critical habitat unit occurs on Ward Bayou Management Area owned by the U.S. Army Corps of Engineers, Jackson County, Mississippi; one critical habitat unit is on a site owned by the State of Mississippi in Jackson County, Mississippi, two critical habitat units are on property owned by The Nature Conservancy (TNC), Jackson County, Mississippi, and one critical habitat unit is located on private property, St. Tammany Parish, Louisiana.

Life history

Dusky gopher frogs are amphibians with a complex life cycle that consists of aquatic eggs/larvae and terrestrial adults. Adult dusky gopher frogs spend most of their lives underground in forested habitat consisting of fire-maintained, open-canopied woodlands historically dominated by longleaf pine (*Pinus palustris*) with an understory of grasses such as little bluestem (*Schizachyrium scoparium*). During the breeding season, dusky gopher frogs leave their subterranean retreats in the uplands and migrate to their breeding sites during rains associated with passing cold fronts (Young 1997). Both forested uplands and isolated wetland breeding sites are needed to provide space for normal behavior and both individual and population growth.

Although breeding typically occurs from December through March, reproduction has been documented in all months except May, June and July. Late summer and autumn breeding has occurred after heavy rains from tropical depressions and hurricanes in August, September and October (Seigel and Kennedy 1999, Thurgate and Pechmann 2007, Pechmann and Tupy 2012). Male dusky gopher frogs move to breeding ponds before females and begin calling (Richter and Seigel 2002); however, males may call below water and calls may be difficult to detect (Dundee and Rossman 1989, Jensen *et al.* 1995). Females typically arrive at the pond, breed, deposit their eggs as a single clutch on

emergent herbaceous vegetation (Goin and Netting 1940, Dundee and Rossman 1989, Young *et al*. 1995, Richter and Seigel 2002, Richter *et al.* 2003), and leave the pond; males generally remain at the pond longer. Using data collected from 2002 through 2007 from 113 marked frogs, Jones (2008) determined that the mean time spent in the pond basin was 8.97 days for females and 16.88 days for males. Egg masses can be distinguished from the very similar leopard frog egg masses due to their attachment to emergent vegetation; their firm, globular nature; and darker color. The number of eggs per egg mass range from 500 to 2,800 in Mississippi (Richter and Seigel 1997, 1998; Young 1997, Richter 1998), to 3,000 to 7,000 in Louisiana (Volpe 1957, Dundee and Rossman 1989). As clutch size is related to body size in most amphibians, first time breeders likely lay smaller egg masses due to their smaller body size.

Dusky gopher frog egg masses take 9 to 21 days to complete hatching; the hatching rate is driven by water temperature (Richter and Seigel, unpublished data, Baxley and Qualls 2007). Metamorphosis occurs from mid-May to early August at Glen's Pond (Richter *et al.* 2003, Sisson *et al.* 2008). Tadpoles develop in the pond and may metamorphose as early as 94 days after hatching (Pechmann pers. comm. 2014); however, if the breeding pond continues to hold water, tadpoles may gain mass and metamorphose after a longer period. The date that metamorphosis begins appears to be unaffected by oviposition date, and over-wintering of dusky gopher frog tadpoles has been documented (Sisson 2003, Pechmann and Tupy 2010). For example, during the 2009/2010 breeding season, juvenile dusky gopher frogs were first observed on June 2, 2010, 250 days after the first eggs of the season were laid in September of 2009 (Pechmann and Tupy 2010). In contrast, during the 2012/2013 breeding season, the first metamorphosed juveniles were observed on June 2, 2013, only 94 days after the first oviposition on February 28, 2013 (Pechmann and Tupy 2013). Unfortunately, monitoring of the Glen's Pond population has provided documentation that the period of metamorphosis is often truncated by pond drying (Richter *et al.* 2003, Sisson *et al.* 2008, Pechmann and Tupy 2013).

Richter and Seigel (2002) found that metamorphic body size differed considerably between years. Size (measured as snout-vent length)/mass of pond-reared dusky gopher frogs ranged from 1 in/0.05 ounces to 1.7 in/0.24 ounces (24.8 mm/1.5 g to 42 mm/6.8 g) (Richter and Seigel 2002). The proportion of juveniles resulting from a breeding event compared to the number of eggs deposited is highly variable. It can range from 0 percent in years when the breeding site dries before metamorphosis is possible, to 5.4 percent (Richter *et al.* 2003). Richter and Jensen (2005) surveyed the literature and noted that estimates for this measure of reproductive success, when there was no reproductive failure, ranged from 4.3 to 5 percent in other ranid frogs with similar life histories.

After breeding, adult dusky gopher frogs leave pond sites during rainfall events and move to terrestrial below-ground refugia. Metamorphic frogs follow, once their development is complete. Limited data are available on the distance between the wetland breeding and upland terrestrial habitats of post-larval and adult dusky gopher frogs. Richter *et al*. (2001) used radio transmitters to track a total of 13 adult frogs from Glen's Pond to their primary upland retreats. The farthest movement recorded was 981 feet (ft) (299 meters (m)) by a frog tracked for 63 days from the time of its exit from the breeding site (Richter

et al. 2001). Tupy (2012) conducted a more recent radio telemetry study of 17 dusky gopher frogs captured at Glen's Pond. The maximum distance traveled by one of these frogs to its underground refuge was 787 ft (240 m). In 2013, dusky gopher frogs from the Glen's Pond population moved to Pony Ranch Pond located 0.8 mi (1.3 km) away where they bred (Pechmann and Tupy 2013). Apparently, dusky gopher frogs are able to move considerable distances, and movements may be tied to abundance and distribution of below-ground refugia and available breeding habitat.

In the wild, male dusky gopher frogs attain adult size and become reproductively mature at age 1 to 5 years and females at 2 to 5 years (Richter and Seigel 2002, Pechmann *et al.* 2012). Results from field enclosure experiments indicate timing to maturity can take up to 5 years depending on habitat quality (Tupy pers. comm. 2013). Adult body size ranges from 2.2 in to 4.1 in (56 to 105 mm) and varies between the sexes with females being larger than males (Goin and Netting 1940, Wright and Wright 1949, Richter and Seigel 2002). The estimated maximum longevity, based on mark-re-capture data, for male dusky gopher frogs is 9 years and 12 years for females (Pechmann *et al.* 2012). However, only an estimated one quarter of males live longer than 3 years, and only one third of females live longer than 5 years (Richter and Seigel 2002, Pechmann *et al.* 2012). Frogs breed, on average, only one to two seasons and the majority of adults do not skip a breeding opportunity (Richter and Seigel 2002, Pechmann *et al.* 2012).

Little information is available regarding the food habits of dusky gopher frogs. Dusky gopher frog larvae are likely filter-feeders in their pond's water column and also grazers on periphyton and epiphytic algae, as is typical of most tadpoles (Duellman and Trueb, 1986, Alford 1999, Hoff *et al.* 1999). Netting and Goin (1942) provide the only published account for the diet of an adult dusky gopher frog and described finding carabid (*Pasimachus* sp.) and scarabaeid (genera *Canthon* sp. and *Ligryus* sp.) beetles in the gut of one specimen. Adult dusky gopher frogs are carnivorous and likely have a diet similar to that reported for other species of gopher frogs which includes frogs, toads, small mammals, beetles, hemipterans, grasshoppers, spiders, roaches, and earthworms (Deckert 1920, Carr 1940, Dickerson 1969, Blihovde pers. comm.).

Population dynamics

Published studies of population dynamics in gopher frogs (*R. capito*) indicate that their populations are naturally (but often only historically) distributed across the landscape among multiple breeding ponds interconnected by suitable upland habitat; they may have small local/pond subpopulation sizes, which cumulatively can form large populations (Semlitsch *et al*. 1995, Greenberg 2001, Richter *et al*. 2009). When multiple breeding ponds were present in the landscape, there was greater potential for recruitment in a given year. It is likely that, historically, dusky gopher frogs were similarly distributed. As subpopulations of dusky gopher frogs became fragmented and isolated, overall population sizes and genetic variation rapidly diminished (Richter *et al.* 2009). The result is that today only three small, isolated, natural-occurring populations have been documented since 2001 and their distribution is limited from what was once likely a larger, connected complex of subpopulations and breeding ponds.

It is estimated that the population at Glen's Pond is composed of less than 100 adult frogs. Data are insufficient to make population estimates for the other two sites. The assumption can be made that the Mike's Pond population is considerably smaller than the Glen's Pond population, based on preliminary genetic work, and the McCoy's Pond population smaller yet since it is based on the record of one calling male frog. The small number of populations of the dusky gopher frog makes it extremely vulnerable to extinction from natural and man-made processes. Major factors affecting population persistence include life span, the number or proportion of annually breeding and egg-laying females, egg hatching success, percent survival of larvae, and survival rate of metamorphic frogs at the end of their first year. Larval caddisfly predation on eggs and young tadpoles can have important negative effects on recruitment (Richter 2000).

Status and distribution

Alabama and Louisiana

The dusky gopher frog historically occurred in Alabama and Louisiana. A population was observed in Alabama in 1922, and last seen in 1965. Surveys are ongoing in these states to locate new populations or potential habitat for establishment of additional populations.

Mississippi

Allen (1932) found gopher frogs to be common in the coastal counties of Mississippi early in the 20th century; however, between this time and the early 1980's very little information is available on the status of the species. In 1987 and 1988, Crawford (1988) surveyed 42 ponds in six Mississippi counties for the dusky gopher frog. During his attempts to relocate all of the State's historical localities for the gopher frog, he found that habitat in the vicinity of most localities had been altered by conversion of natural forest to agriculture, pine plantations, and urban areas. In addition, the character of remaining historical breeding ponds had been changed from open-canopy, temporary ponds with clear water and hard bottoms to muddy, more permanent closed canopy ponds (G. Johnson, pers. comm. 1999). No appropriate habitat for the dusky gopher frog could be found near any of the historical localities (G. Johnson, pers. comm. 1999). Nevertheless, during his study Crawford discovered a new breeding pond on the DeSoto National Forest (DNF), Harrison County, Mississippi. In the period between this discovery in 1988 and 2004, this site named Glen's Pond supported the only known population of dusky gopher frogs. Glen's Pond has been monitored continuously since its discovery. Since 1996, years of natural recruitment at this site have been limited to 1997, 1998, 2003 (only three metamorphs), 2008, 2010, 2012, and 2013, due to inadequate rainfall or pond drying prior to tadpole metamorphosis. Since 2002, a portion of the available egg masses have been collected and the hatchlings reared to metamorphosis in outdoor tanks for release at Glen's Pond (Tupy *et al.* 2010). In addition, in 2001 and 2005, water from an onsite well was added to Glen's Pond to prevent it from drying. These interventions resulted in metamorphic recruitment during the nine-year period between 1998 and 2007 when there was virtually no natural recruitment, and

supplemented natural recruitment in other years (Sisson 2003, 2005; Pechmann *et al.* 2012). In 2013, dusky gopher frogs moved 0.8 mi (1.3 km) from Glen's Pond to a restored pond named Pony Ranch Pond where they had never been observed previously; seven individual adult frogs were captured using a temporary drift fence (Pechmann and Tupy 2013). Dusky gopher frogs deposited three egg masses in Pony Ranch Pond which produced 18 metamorphosed juveniles (Pechmann and Tupy 2013).

In 2004, dusky gopher frogs were found at two additional sites, Mike's Pond and McCoy's Pond, in Jackson County, Mississippi. Mike's Pond is approximately 20 miles (mi) (32 kilometers (km)) east of Glen's Pond and separated from it by the Tchoutacabouffa River drainage. Mike's Pond supports a very small breeding population. Breeding at Mike's Pond has been verified only four years (2004, 2005, 2010, 2012) since it was discovered, although male dusky gopher frogs have been heard calling as recently as 2013 (Lee 2013). The breeding in 2010 was the result of two Glen's Pond females being introduced into Mike's Pond to breed with the two males heard calling there; two egg masses resulted from this event. McCoy's Pond is east of Mike's Pond by approximately 16 mi (25 km) and separated from it by the Pascagoula River drainage. No dusky gopher frogs have been observed at this site since a frog was heard calling there in 2004; the pond has not held water long enough in most years to support population recruitment.

Efforts to locate new dusky gopher frog populations continue within the historical distribution of the frog in Alabama, Louisiana, and Mississippi. However, available habitat is limited, and the Service and partners have shifted focus to finding habitat that can be restored and used as translocation sites to establish populations. Since 2004, eggs have been removed from the Glen's Pond population, and tadpoles and metamorphic dusky gopher frogs have been raised in cattle tanks and released in Jackson County, Mississippi, at a pond (TNC Pond 1) on a site managed by The Nature Conservancy (TNC) (Old Fort Bayou Mitigation Bank). Survival to adulthood of at least some of the released frogs has been documented at the site; calling male dusky gopher frogs have been heard and one egg mass was laid at the pond in two different years. The number of breeding adults in this population is unknown.

To summarize, since the dusky gopher frog was listed as an endangered species in 2001, three naturally-occurring populations supported by four breeding ponds have been documented. The four ponds are Glen's Pond, Pony Ranch Pond, Mike's Pond, and McCoy's Pond. A fourth population, breeding at TNC 1 Pond, has been established through translocation of Glen's Pond frogs. The Glen's Pond population, supported by the Glen's Pond and Pony Ranch Pond breeding sites, is the only population that is considered stable at this time. We have restored an additional 11 ponds on the DNF, Ward Bayou Wildlife Management Area (WBWMA) (owned by the U.S. Army Corps of Engineers), and TNC property. Two additional ponds have been created; one on DNF and one on WBWMA. We hope these 13 ponds (all designated as critical habitat) may eventually be used as translocation sites. In addition, we designated critical habitat at a site in Louisiana which contains two historical dusky gopher frog breeding ponds. The frog does not currently exist at this privately-owned site. We continue to survey areas of

Alabama and hope to discover currently unknown populations there or at least habitat that could be restored and used to establish a population in the state.

Conservation Needs of the Dusky Gopher Frog

The recovery strategy for the dusky gopher frog consists of maintaining and enhancing existing populations on tracts of public and private land, monitoring the status of existing populations, identifying and securing additional dusky gopher frog populations and habitat, and supporting research that guides land management and provides demographic and ecological data. Management plans should be developed and implemented for all sites where the dusky gopher frog occurs. Appropriate habitat management includes minimizing soil disturbance and loss of native herbaceous groundcover vegetation; conducting prescribed burning, particularly during the growing season; maintaining open-canopied, grassy wetlands; and restoring degraded upland habitat. In addition, management plans should specifically address habitat modifications (e.g., filling of drainage ditches and plow lines, restoring native groundcover flora) necessary to improve and maintain appropriate habitat.

Monitoring programs to track population trends and the response of this species to habitat management activities are needed for all populations. Monitoring programs should be critically evaluated and revised as needed. Since recovery of the dusky gopher frog will necessitate finding or creating new, currently unknown populations, assessment of potentially suitable habitat within the range of the frog and additional presence/absence surveys are needed, especially in Alabama and Louisiana. If no additional dusky gopher frog populations are found, suitable habitat for translocations/reintroductions needs to be identified, and programs developed and implemented to establish and monitor these new populations.

Previous Incidental Take Authorizations

Indiana Bat

All previously issued Service BOs involving the Indiana bat have been non-jeopardy. These formal consultations have involved a variety of action agencies including: (a) the USFS for activities implemented under various Land and Resource Management Plans on National Forests in the eastern United States, (b) the Federal Highway Administration for various transportation projects, (c) the United States Army Corp of Engineers (USACOE) for various water-related projects, and (d) the Department of Defense for operations at several different military installations. Additional Habitat Conservation Plans are being developed for privately-owned natural gas pipeline/storage field systems, State operated forestry programs, and several private wind power developments. Links to previously issued BOs and a summary of previous incidental take can be found at: http://www.fws.gov/midwest/Endangered/mammals/inba/inbaBOs.html

Within the past several years, nearly all National Forests within the range of the Indiana bat have requested formal consultation at the programmatic level. These consultations

have led to non-jeopardy BOs with associated incidental take statements. Although some of these incidental take statements anticipated the take of reproductive females, we have not yet confirmed a loss of a maternity colony on National Forest lands. The reasons for this are likely two-fold. First, the programmatic conservation measures (i.e., standards and guidelines) and second, the project-specific reasonable and prudent measures were designed to minimize maternity colony exposure to the environmental impacts of Forest Plan actions.

Specifically, these measures ensured an abundance of suitable Indiana bat habitat on the National Forests, and protected all known or newly discovered maternity colonies. Approximately 95 percent of previously authorized habitat loss on National Forests has not been a permanent loss. Rather, it has been varying degrees of temporary loss (short-term and long-term) as a result of timber management practices. Although this analysis does not include all National Forests that, to date, have received an incidental take statement, the concepts of the analysis are consistent, regardless of the location. Conservation measures provided by the National Forests as part of the proposed actions, as well as reasonable and prudent measures provided by the Service to minimize the impact of the annual allowable take for each of the National Forests, have been designed to: (1) ensure an abundance of available remaining Indiana bat roosting and foraging habitat on all National Forests; and (2) ensure persistence of any known or newly discovered maternity colonies to the maximum extent practicable.

Incidental take primarily has been exempted in the form of habitat loss because of the great difficulty in detecting and quantifying take of the individual Indiana bats because of their small body size, wide and cryptic summer distribution while roosting under loose bark of trees, and unknown spatial extent and density of their summer roosting population range within the respective National Forests. For some incidental take statements, take has also been extrapolated to include an estimated number of individual Indiana bats. The estimate of the number of individual Indiana bats likely to be taken has been wide-ranging and based on various assumptions. Legal coverage has included the take, by kill, of individual bats; or take by harm through habitat loss; or harassment.

The take exempted to date via section 7 consultations has resulted in short term effects to Indiana bat habitat and, in limited circumstances, on Indiana bat maternity colonies. As many of these consultations necessarily made assumptions about Indiana bat presence, we are uncertain of the actual number of maternity colonies exposed to environmental impacts of Federal actions throughout the species' range, but we believe the actual number is likely less than what we have assumed to be present. Furthermore, although not definitive, monitoring of maternity colonies pre-and post-project implementation preliminarily suggests that our standard conservation measures, when employed in concert, appear to be effective in minimizing adverse effects on the affected maternity colonies. For reasons stated above, the Service concludes that the aggregate effects of the activities and incidental take covered in previous BOs on the Indiana bat have not degraded the overall conservation status (i.e., environmental baseline) of the Indiana bat.

Dusky Gopher Frog

Two formal consultations have been conducted on the dusky gopher frog. The first was an internal (Service) section 7 consultation written in 2002 on the effects of the action of issuance of 10(a)(1)(A) (recovery) permits on the dusky gopher frog. A number of research and monitoring activities were identified that had the potential to negatively affect the species and incidental take was provided for these activities. The second was a programmatic biological opinion, finalized in 2007, resulting from consultation with the U.S. Department of Agriculture's Natural Resources Conservation Service (NRCS) on the potential impacts of the proposed Healthy Forest Reserve Program (HFRP) in Mississippi. This voluntary program is designed to assist private landowners in restoring and enhancing forest ecosystems to promote the recovery of threatened and endangered species in Mississippi, including the dusky gopher frog, gopher tortoise, and black pine snake. Although this program is intended to be beneficial to listed species, incidental take was provided for all dusky gopher frogs over the existing baseline conditions of the private property. Incidental take would be in the form of harm and harassment should the private landowner opt out of HFRP and consequently stop actively managing the land (i.e. prescribed burning) for this species.

In addition, a conference opinion was issued during the period when the frog was originally proposed to be listed as an endangered species. The USACOE consulted with the Service on issuance of a dredge and fill permit under the Clean Water Act for a new residential and commercial development on private land (Tradition) 656 feet (200 meters) immediately north of Glen's Pond. This consultation resulted in a BO for the threatened gopher tortoise, and a conference opinion for the dusky gopher frog. The BO written by the Service established measures that must be undertaken before each section of the Tradition development can proceed, for the life of the permit.

ENVIRONMENTAL BASELINE

Under section 7(a) (2) of the ESA, when considering the "effects of the action" on federally listed species, the Service is required to take into consideration the environmental baseline. The environmental baseline includes past and ongoing natural factors and the past and present impacts of all Federal, State, or private actions and other activities in the action area (50 CFR 402.02), including Federal actions in the area that have already undergone section 7 consultation, and the impacts of State or private actions that are contemporaneous with the consultation in process. As such, the environmental baseline is "an analysis of the effects of past and ongoing human and natural factors leading to the current status of the species, its habitat (including critical habitat), and ecosystem, within the action area (Service and National Marine Fisheries Service [NMFS] 1998)". The environmental baseline is, therefore, a "snapshot" of the species' health at a given point in time, but it does not include the effects of the proposed action.

Indiana Bat

Status of the species within the action area

Winter populations

There are currently no known Indiana bat hibernacula in Mississippi. Mississippi does not contain karst areas where natural caves would be found. There are abandoned mine sites that could provide winter hibernacula, however, surveys of these mine sites have not revealed wintering Indiana bats.

Summer populations

In April of 2013, one female Indiana bat was tracked from the Rose Cave hibernacula in White County, TN to a suspected maternity roost on the Holly Springs Ranger District in Benton County, Mississippi. The straight ling distance from the Rose Cave hibernacula to the maternity sit in Benton County, MS is 367 km (228 mi). The suspected maternity roost is within a beaver ponded forested wetland. No large scale Indiana bat surveys have been conducted in Mississippi to date since this species was just recently confirmed through radio tracking studies, therefore, range and distribution of Indiana bats in Mississippi is unclear.

Dusky Gopher Frog

Status of the species within the action area

The action area includes designated critical habitat that is either occupied or unoccupied. Occupied critical habitat includes Unit 2, Subunits A (Glen's Pond) and B (Pony Ranch Pond; became occupied after the designation of critical habitat). Both Glen's Pond and Pony Ranch Pond are located on the DNF in Harrison County, Mississippi. Mark-recapture and demographic analyses suggest that the use of cattle tanks to raise dusky gopher frog tadpoles to metamorphosis during drought years has saved the population from likely extinction and helped maintain the population size of approximately 100 adult frogs (Pechmann *et al.* 2012). The most recent estimate of the Glen's Pond population is 96 adult frogs (Pechmann *et al.* 2012). The contribution of adult frogs to the Glen's Pond population from the 2013 breeding at Pony Ranch Pond is currently unknown.

The action area also includes designated critical habitat that is unoccupied. There are 6 unoccupied critical habitat units on the DNF in Forrest, Harrison and Perry Counties, Mississippi: Unit 3 (Carr Bridge Road Pond), Units 8 and 9 (Ashe Nursery Ponds), and Units 10, 11, and 12 (Mars Hill Area Ponds).

The NFM continues to work with the Service and our state and non-governmental partners to improve habitat for the dusky gopher frog in the area of Glen's Pond and elsewhere on the DNF, including the unoccupied critical habitat units listed above. In fact, they have been leading the effort to restore ponds on the DNF to make them

appropriate breeding sites for the dusky gopher frog so they may be used in future translocations. Pond restoration efforts on the DNF have resulted in dusky gopher frogs breeding at Pony Ranch Pond near Glen's Pond and thus creating a metapopulation. Additional actions conducted by managers on the DNF to improve habitat for the dusky gopher frog translocations have included deepening of existing ponds, construction of water retention berms at existing ponds, shrub and tree removal, and prescribed fire. Ponds on DNF have been altered to increase water depth and hydroperiod, and to create a more open canopy which will support herbaceous growth. Restoration of the surrounding upland habitat through thinning and re-establishment of longleaf pine has also been implemented by DNF.

In 2002, a location was selected on the DNF for the construction of a pond where one had not previously existed. The Harrison County Soil Conservation Service and NRCS worked with the Service, the Mississippi Department of Wildlife, Fisheries, and Parks (MDWFP), DNF, and gopher frog researchers to develop a plan for creating a pond that would provide an additional breeding site near Glen's Pond. DNF provided personnel and equipment for the construction. The initially-completed pond (New Pond) required years of alterations to improve its hydroperiod and size In addition, considerable effort was required in order to establish herbaceous groundcover and wetland vegetation in the basin. However, in 2012 the pond achieved the point where it was considered appropriate dusky gopher frog breeding habitat, and the first dusky gopher frog tadpoles were released there. Given that female dusky gopher frogs become reproductively mature at 2 to 5 years, the 2014-2015 breeding season would be the earliest that it could be possible to document frogs returning to the pond and successfully breeding.

The Service, DNF, and our non-governmental partners have also worked with the developers of the Tradition property to restore and protect habitat immediately adjacent to Glen's Pond. Coordinated management efforts have included control of invasive vegetation; removal of beds used to plant off-site pine species; and re-vegetation with longleaf pine trees. Tradition representatives have also permitted DNF to burn this area as a part of the adjacent forest burn unit surrounding Glen's Pond. By burning the whole area as a single unit, the need for a permanent firebreak was avoided, along with potential threats to the frog and it's below ground habitat.

Factors affecting species environment within the action area

Habitat destruction and degradation are considered the primary factors in the decline of the dusky gopher frog. Longleaf pine forested habitat has been reduced to less than 5 percent of its original distribution (Outcalt and Outcalt 1994). Ponds once appropriate for breeding have been altered by bedding, clearing, damming, and nutrient loading during conversion of the surrounding forested habitat, or no longer exist due to land use changes. Fire suppression at some sites has led to tree and shrub encroachment into ponds and destruction of the herbaceous groundcover needed for egg attachment. In addition, many of these same factors have resulted in the decline of the gopher tortoise, whose burrows provide belowground habitat for adult gopher frogs. Due to the decline of the gopher

tortoise and the historical practice of pushing and hauling away stumps for the naval stores industry, belowground habitat may be limiting in the frog's upland habitat.

EFFECTS OF THE ACTION

Indiana Bat

Effects of the Forest Plan goals, objectives, and desired conditions on the Indiana bat

The Forest Plan emphasizes habitat necessary to sustain minimum viable populations that represent existing native vertebrates throughout the forest. Maintenance and improvement of populations of endangered, threatened, or sensitive species will continue to be a NFM priority.

For the Indiana bat, the NFM will manage potential habitat for conditions that will result in a mosaic of hardwood species within stands differing in shape and size, with interspersed openings, considering the appropriate mix of roosting and foraging habitat, along with travel corridors. The Forest Plan directs that recovery plans for listed species, including the Indiana bat, be implemented. The Forest Plan also ensures that partnerships will continue by directing cooperation and coordination with responsible government and land and resource management agencies, tribes, and partners regarding endangered, threatened, and sensitive species.

We believe that the overall goals, objectives, and desired conditions of the Forest Plan are consistent with the ecological needs of the Indiana bat. We expect that implementation of this plan will protect and manage for viable Indiana bat populations.

Effects of the specific management actions on Indiana bat

Although the overall goals of the Forest Plan are expected to have beneficial effects for the Indiana bat, the means by which the NFM will achieve their goals may unavoidably cause short-term adverse effects to this species. The proposed management activities could potentially result in take of Indiana bats through direct mortality or injury, or indirectly through harm or harassment. However, the likelihood and severity of this potential take depends on site-specific conditions including Indiana bat activity in the action area, the timing of the action, the type of habitat modification proposed, and characteristics and amount of habitat remaining available after the proposed activity is conducted.

Based on the known status of the species in the action area, the Indiana bat is likely to be present in the action area only in very small numbers. Given the amount of potentially suitable habitat available, the likelihood of an individual bat or colony occupying an area where a management activity is implemented and incurring impacts on the Indiana bat is very low. The large geographic area and low potential number of individuals significantly reduces the potential for Indiana bats to be exposed to these actions.

The standards and guidelines that reduce exposure and responses are described in more detail in the Proposed Action section. It is important to emphasize that this effects analysis is predicated on the fact that all Forest Plan standards and guidelines will be fully implemented. If not, this analysis may no longer be valid.

Forest pest management

The NFM is affected by numerous exotic insects, plants, and other pathogens. Many of these invaders have an associated management goal ranging from immediate eradication to preventing invasion in non-infested areas. The Forest Plan includes an "Integrated Pest Management" approach, including mechanical, biological, and chemical means of control. The overall control of invasive species on the NFM should improve the long-term native biodiversity.

Mechanical control will be used to combat invasive plants on the NFM. While these activities may result in increased noise, human presence, and physical disturbance, these impacts will be short-term, temporary, and localized in nature.

Pesticides will be used very sparingly on the NFM for vegetative management, fisheries management, or to suppress insects and disease infestations when their use is cost efficient, biologically effective, and environmentally acceptable. The NFM will protect aquatic habitats and other sensitive areas by establishing untreated zones adjacent to water bodies and other sensitive areas, where necessary. The NFM will establish protection zones around any known Indiana bat maternity colonies, protecting those known foraging areas from pesticide exposure.

Overall, aggressive control of invasive species on the NFM should increase biodiversity and improve ecosystem function. Based the above information, we expect forest pest management on the NFM will only result in effects on the Indiana bat that are likely to be beneficial, insignificant, or discountable.

Vegetation management

Approximately 91% of the HSNF's land area is considered suitable for timber management. Over this planning period, the HSNF proposes to manage timber on approximately 16,000 acres of these lands. Vegetation management practices will include 5,712 acres of regeneration cutting (even or two-aged) and 10,626 acres of commercial thinning. Expected outcomes for the ecological systems on the HSNF include species composition and structural improvements (9,100 acres), age structure improvements (3,900 acres), and conversion to appropriate ecological systems (3,200 acres).

The primary environmental consequences of these actions include: disturbance from human presence, the loss of roost trees, and the reduction in foraging habitat. Individuals could be exposed to noise and physical human disturbances related to timber management activities; however, such exposure is not likely to have any detectable fitness consequences. We anticipate that individuals that are disrupted may abandon a

portion of their traditional home range during the disturbance, but are likely to readily locate new roosting or foraging areas within or near to their traditional home range. NFM proposes to minimize human disturbance in the maternity colony areas until the colony has left for hibernation.

Potential consequences of timber management also include the removal of roost trees used by a maternity colony and migrants during spring and fall migration. Mortality or injury of individuals or small groups of roosting bats could result during the felling of trees that may harbor roosts. As explained in the Status of Species section, loss of roost trees could have substantial consequences for Indiana bats.

If trees are cut during the hibernation period (November 15 through March 31), the potential for direct effects to Indiana bats can usually be avoided. However, tree removal during the non-hibernation period (April 1 through November 14) may result in mortality of roosting Indiana bats if a tree that contains a roosting bat is removed. If a bat using a roost tree that is removed is not killed during the removal, the roosting bat would be forced to find an alternative roosting site, causing a significant loss of energy that could result in harm or harassment of the individual. If the affected roost tree is a primary roost tree used by an Indiana bat maternity colony, adverse effects could include reduced colony cohesion; increased energy demands from searching for new roost areas; and decreased thermoregulatory efficiency. These impacts can lead to reduced reproductive success (Kurta *et al.* 2002; Kurta and Murray 2002; Gumbert *et al.* 2002; Kunz and Lumsden 2003; Indianapolis Airport Authority 2003; Garner and Gardner 1991; Racey and Entwistle 2003; Humphrey *et al.* 1977; Pierson 1998).

Loss of an inhabited primary roost tree is most likely to occur during the maternity period (May 15 through August 15). Clearing trees during early spring (April 1 to June 1) can affect bats when they are already stressed from migration and pregnancy, and can disrupt colony cohesion as bats are beginning to arrive at their maternity habitat and form a colony. Clearing during the lactation portion of the maternity period when young are not volant (June through early July), has the potential to cause the most severe direct effects because young would likely be injured or killed during the tree felling. At approximately July 15 to August 15, female and juvenile bats are still present in their maternity areas but the young are volant and the colony is starting to disperse into more individual roosts. Because Indiana bats tend to roost individually during swarming (August 16 through November 14), any mortality or harm that occurred under these circumstances would likely be limited to individual bats and would not adversely affect colony cohesion or reproductive success.

The Forest Plan includes several standards and guidelines that minimize the potential for these impacts to occur. The Forest Plan proposes to protect and manage occupied and potential roosting habitat through pond creation/management, maintaining available roost/snags, prescribed fire in uplands, bottomland hardwood forest management, and protection of riparian zones. Specifically, roost trees discovered during the summer season will be protected from physical disturbance by designating a 75-ft radius buffer zone around the trees. The buffer zone shall remain in place until migration to

hibernacula begins. The Forest Plan also proposes to maintain at least three trees per acre greater than 20 inches dbh, favoring trees of the size, structure, and species that Indiana bats are known to frequently use. In addition, the Forest Plan proposes to retain standing snags except in situations where necessary to control insects or disease or to provide for public and employee safety.

While these guidelines will allow the NFM to minimize the likelihood for removing an occupied roost, the potential for this to occur remains. Although some roost trees could be unknowingly cut during timber harvest activities, the Forest Plan guidelines minimize the possibility of high quality roost trees being felled, and ensure that alternate roosts will be available within or very close to their traditional home range. Based on this information, we expect that any potential loss or degradation of Indiana bat habitat will be insignificant to the population.

Furthermore, we expect that some timber management activities will benefit the Indiana bat and its habitat. In the long-term, implementation of the Forest Plan should increase the amount of suitable habitat by creating and maintaining potential roost trees, opening the forest canopy in roosting habitat, and designing stands with irregular borders and openings. In some situations, this will improve habitat suitability for roosting and reproduction by increasing solar exposure for a number of potential roost trees. Proposed timber management methods will increase the overall tree size and proportion of hardwoods in a stand and increase the potential for large dead trees or snags that are suitable for roosting. These activities will improve the overall quality and quantity of Indiana bat habitat, and hence, improve the overall fitness of adult and young Indiana bats.

The Forest Plan also proposes to maintain potential foraging habitat and travel corridors (riparian zones). The methods used to maintain foraging habitat and travel corridors will vary according to the habitat configuration present, but will be addressed project by project. As adequate roosting and foraging habitat is maintained, the character in terms of Indiana bat habitat of the affected sites should be maintained such that Indiana bats will adapt to changes in their home range.

In summary, the proposed timber management actions should provide significant protection for Indiana bats and their habitat. We expect that the standards and guidelines will be successful at avoiding or reducing the potential for adverse impacts to the species throughout its range on the NFM. Nonetheless, potential for the take of Indiana bats exists.

Fire management

While Indiana bats are not confined to fire-dependent habitats, they may occupy habitats that are maintained by fire. For example, shortleaf pine-oak forest and woodlands, which are maintained by fire, may provide some potential Indiana bat habitat on the NFM. In these habitat types, wildfire suppression can decrease the suitability of that habitat for Indiana bats. Woody vegetation may encroach, increasing understory clutter and

decreasing openings, which would degrade Indiana bat habitat (roosting, foraging, travel corridors). In addition, wildfire suppression could decrease the amount of fire-created snags that could serve as roost trees.

However, with so few Indiana bats on the NFM, their tendency to occupy habitats that are not dependent on fire, and the sporadic nature of wildfires, any decrease in roosts should not measurably impact Indiana bat roosting potential. Overall, impacts from wildfire suppression should be greatly reduced by the Forest Plan's proposed prescribed burning activities which work to mimic the effects of fire in these habitats.

The Forest Plan increases the acres and size of prescribed burns and fuel reduction, establishes priorities for fire suppression and fuels reduction, decreases effects of suppression activities, implements rehabilitation activities in burned areas, encourages native vegetation, and uses smoke management practices. Burning programs for improvement of wildlife habitat will continue to be a priority for this and other species where necessary on the NFM. Roughly 23,000 acres will be burned annually by prescribed fire during the first decade. Prescribed fires will be of low to moderate intensities.

Prescribed burning, including fire and line control, may cause temporary noise and physical disturbance, smoke and airborne particulates, creation and destruction of snags, and reduced proliferation of non-native invasive species (NNIS).

Prescribed burning activities may expose individuals to temporary noise, physical disturbance, smoke, and airborne particulates. Noise and physical disturbance may cause any Indiana bats present to permanently or temporarily abandon the roosting area. These activities may also result in the burning of occupied roosting areas. Indiana bats may be exposed to fire, smoke, or roost trees burning and falling. A summer fire that consumes or surrounds an occupied roost tree could injure or kill Indiana bats, especially non-volant young. While we generally assume that volant bats could escape fires, there are no data existing to refute or corroborate this assumption.

A slow moving fire could conceivably be sensed by the bats early enough to allow both adults and young to escape, however, bats may not be able to respond quickly enough such that smoke, heat, and flames could interfere with the bats ability to navigate out of danger. Non-volant pups, if not rescued by an adult, would be exposed to smoke, heat and flames.

Indiana bats may also be exposed to smoke inhalation, which could induce respiratory distress or even death. Smoke could occur in the burn area itself, or drift into adjacent areas outside of the burn. Heat and flames could cause the death on any individuals not able to escape them. Given the standard and guidelines, we do not anticipate that reproductive females or young will be exposed to these stressors. Males and non-reproductive females could be exposed, however.

Prescribed burning activities may also indirectly affect Indiana bats through their prey base. Some insect species are vulnerable to fire in all life stages (Leach and Ross 1995, Brennan et al. 1994), and hence a portion of the available prey base may also be adversely affected. However, prescribed burning may also benefit bats by improving the foraging habitat and increasing the arthropod prey abundance (Lyon *et al.* 2000, Carter *et al.* 2002). Burning may also control and reduce some types NNIS, which should benefit Indiana bat in the long-term by improving biodiversity, and hence prey availability.

Prescribed burning may temporarily increase erosion potential, but Forest Plan standards and guidelines limit the potential for erosion into streams and other aquatic habitats, making any potential impacts on prey items undetectable.

We also anticipate that any alteration to habitat from fire management activity performed will not adversely impact the fitness of individual Indiana bats. The standards and guidelines, as previously discussed, will ensure that the character of the affected areas will be maintained. Based on this information, we expect that the effects of any potential alteration of habitat will be undetectable. Moreover, we expect beneficial effects for Indiana bats to occur with both hazardous fuels reduction and prescribe burning activities. In the short- and long-term, implementing the proposed hazardous fuels reduction actions should increase the amount of suitable habitat by creating and maintaining potential roost trees, opening the forest canopy in roosting habitat, and designing stands with irregular borders and openings. In some situations, this will improve habitat suitability for roosting and reproduction by increasing solar exposure for a number of potential roost trees. Proposed methods should increase the overall tree size in a stand and increase the potential for large dead trees or snags that are suitable for roosting. These activities may improve the roosting potential, increasing the survival of adult and young Indiana bats.

Summary of effects associated with the Forest Plan

We anticipate that the Forest Plan with its standards and guidelines will improve the quality and quantity of suitable habitat for Indiana bats within the action area. The fitness of some individuals may be adversely impacted as a result of timber and fire management actions. We anticipate, however, that the standards and guidelines will greatly limit the extent to which these adverse effects will occur.

We anticipate that there may be short-term adverse effects, but over the long term the Forest Plan will benefit Indiana bats occurring within the action area overall. We do not anticipate detectable negative consequences to the species as a result of the adverse impacts that may result from the Forest Plan. As such, we do not anticipate detectable reductions in reproduction, numbers or distribution for the species.

Dusky Gopher Frog

Effects of the Forest Plan goals, objectives, and desired conditions on the dusky gopher frog

The Forest Plan emphasizes habitat management necessary to sustain minimum viable populations of existing native vertebrates throughout the forest. Maintenance and improvement of populations of endangered, threatened, or sensitive species will continue to be a NFM priority.

For the dusky gopher frog, the NFM will restore and improve canopy conditions and convert forests to appropriate ecological systems using 1-to 3-year fire intervals and management of embedded ponds and emergent wetlands. The Forest Plan also directs that recovery plans for listed species, including the dusky gopher frog, be implemented. The Forest Plan also ensures that partnerships will continue by directing cooperation and coordination with responsible government and land and resource management agencies, tribes, and partners regarding endangered, threatened, and sensitive species.

We believe that the overall goals, objectives, and desired conditions of the Forest Plan are consistent with the ecological needs of the dusky gopher frog. We expect that implementation of this plan will protect and manage for viable gopher frog populations.

Effects of the specific management actions on the dusky gopher frog

Although the overall goals of the proposed action are expected to have beneficial effects for the dusky gopher frog, the means by which the NFM will achieve their goals may unavoidably cause short-term adverse effects to this species. The proposed management activities could potentially result in take of dusky gopher frogs through direct mortality or injury, or indirectly through harm or harassment. However, the likelihood and severity of this potential take depends on project-specific conditions including the timing of the action and the type of habitat modification proposed.

Based on the known status of the species in the action area, the dusky gopher is likely to be present in the action area only in very small numbers. Given the amount of potentially suitable habitat available on the forest, the likelihood of an individual frog occupying an area where a management activity is implemented and subsequent impacts to the frogs is very low. The low potential number of individuals significantly reduces the potential for gopher frogs to be exposed to these actions.

The DNF DeSoto Ranger District is 351,000 acres in size. Over this planning period, the district proposes to manage timber on approximately 30,843 acres of these lands. Vegetation management practices will include 6,530 acres of regeneration cutting, and 22,788 acres of commercial thinning. In addition, the DeSoto Ranger District proposed to prescribe burn approximately 84,000 acres per year.

The direct effects of such effect could include mortality of individuals from ground disturbing activities associated with habitat management. Ground disturbing activities that could potentially harm dusk gopher frogs include tree harvest during thinning operations and ecosystem restoration activities including forest conversion to longleaf pine, creation of ephemeral ponds, fire-line maintenance and/or construction, and road maintenance.

Since dusky gopher frogs are found in fire-dependent habitats, there is a risk of potential harm due to prescribed fire activities. For this reason, the Service and other partners have worked with NFM to develop a "burn matrix" that is designed to eliminate injurious effects of prescribed fire to dusky gopher frogs by timing prescribed fire to when individuals are not likely to be moving outside the breeding pond (Table 1).

Table 1. Dusky gopher frog-prescribed burn matrix

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

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

The NFM also proposed to protect upland belowground habitat used by the dusky gopher frogs such as stumps and gopher tortoise burrows which will further minimize the potential for direct mortality to individuals.

Integrated pest management could also have adverse impacts to individuals if herbicides are sprayed near or within potential gopher frog breeding ponds. Accordingly, the NFM proposes to protect aquatic habitats and other sensitive areas by establishing untreated zones adjacent to water bodies and other sensitive areas, where necessary. The NFM will establish protection zones within all critical habitat units, protecting those known or potential breading areas from pesticide exposure. Based on these measures, we do not anticipate take of dusky gopher frogs related to pest management.

The Forest Plan includes numerous conservation measures that minimize the potential take of gopher frogs. One such measure is the prioritization of habitat restoration/ management activities through establishment of a cooperative management unit (CMU) on the DeSoto Ranger District which encompasses Glen's Pond (CH Unit 1) and surrounding habitat (1,655 acres). This CMU, which is guided by the memorandum of

understanding between the USFS, Service, and the MDWFP, will assist in further management of this species by creating a focus point for management needs including restoration of longleaf pine, protection of Glen's pond and its hydrology, invasive species management, and prescribed fire. Such activities will include restoration of historically occurring pine species, thinning of mid-successional and mature pines, prescribed fire to remove encroaching woody vegetation and restore herbaceous groundcover, and chemical and mechanical treatment of encroaching midstory where fire is not a viable management tool.

The NFM does not propose to establish CMUs for the designated critical habitat units that are currently unoccupied (Units 3, 8, 9, 10, 11, and 12). However, the Forest Plan does provide a general conservation measure that habitat management activities will be prioritized on all NFM lands designated as critical habitat.

In summary, the proposed timber management actions should provide significant protection for dusky gopher frogs and their habitat. We expect that the Forest Plan standards and guidelines will be successful at avoiding or reducing the potential for adverse impacts to the species throughout its range on the Forest. Nonetheless, potential for the direct take of dusky gopher frogs during habitat management activities still exists.

Summary of Effects Associated with the Forest Plan

We anticipate that the Forest Plan with its conservation measures will improve the quality and quantity of suitable habitat for dusky gopher frogs within the action area. Some individual frogs may be adversely impacted as a result of timber and fire management actions. We anticipate, however, that the Forest Plan standards and guidelines will greatly limit the extent to which these adverse effects will occur.

We anticipate that there may be short-term adverse effects, but over the long term the Forest Plan will be beneficial overall to dusky gopher frogs occurring within the action area. We do not anticipate detectable negative consequences to the species as a result of the adverse impacts that may result from the Forest Plan. As such, we do not anticipate detectable reductions in reproduction, numbers or distribution for the species.

CUMULATIVE EFFECTS

Cumulative effects include the impacts of future State, tribal, local, or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

Although we are aware of no major non-Federal actions that are reasonably certain to occur within the action area, it may be expected that some activities, particularly on private lands, could have a progressive negative effect on Indiana bats and dusky gopher frogs in the action area. Actions performed on private lands that may adversely affect the

Indiana bat and dusky gopher frog in the future are urban development, fire suppression, application of pesticides, and timber harvest.

CONCLUSION

Indiana Bat

After reviewing the current status of the Indiana bat, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is our biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the Indiana bat. Critical habitat for this species has been designated, however, there is no designated critical habitat in the action area and, thus, no destruction or adverse modification of that critical habitat is anticipated.

Currently, that has only been one documented Indiana bat within or near HSNF; therefore, we anticipate the Indiana bat is likely present in the action area only in small numbers. This small number of individuals limits potential exposure to NFM activities. Furthermore, the standards and guidelines proposed greatly diminish the likelihood of reproductive females and young being exposed directly. However, implementation of the Forest Plan may adversely impact the fitness of Indiana bats occurring within the action area. These adverse consequences are most likely to be either as injury or death of individual Indiana bats from direct exposure to management actions. We do not expect that these adverse impacts will, however, elicit population or species-level responses. We anticipate the overall beneficial effects of the proposed action will maintain and improve roosting and foraging habitat and hence the fitness of Indiana bats occurring within the action area. Thus, overall impact on the conservation status of the local population to which these individuals belong to and on the species range wide is anticipated to be positive. So, we conclude that the proposed action is not expected to, directly or indirectly, reduce appreciably the likelihood of both the survival and recovery of this species in the wild by reducing their reproduction, numbers, or distribution.

Dusky Gopher Frog

Currently, dusky gopher frogs are only known to exist in and near Glen's Pond and Pony Ranch Pond within the DNF; therefore, we anticipate the dusky gopher frogs are likely to be present in the action area only in small numbers. This small area and small number of individuals limits potential exposure to NFM activities. Furthermore, the standards and guidelines proposed within the Forest Plan greatly diminish the likelihood of individuals being adversely impacted directly. However, implementation of the Forest Plan may have direct adverse impacts to some individuals occurring within the action area. These adverse consequences are most likely to be either as injury or death of individual frogs from direct exposure to management actions. We do not expect that these adverse impacts will, however, elicit population or species-level responses. We anticipate the overall beneficial effects of the proposed action will maintain and improve breeding and non-breeding habitat and hence the fitness of dusky gopher frogs occurring within the action area. Thus, overall impact on the conservation status of the local population to

which these individuals belong is anticipated to be positive. Therefore, we conclude that the proposed action is not expected to, directly or indirectly, appreciably reduce the likelihood of both the survival and recovery of this species in the wild.

After reviewing the current status of the dusky gopher frog, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is our biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the dusky gopher frog. The impacts of the proposed action on critical habitat are expected to be wholly beneficial and therefore no destruction or adverse modification of that critical habitat is anticipated.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation under section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behaviors which include, but are not limited to, breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered a prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The measures described below are non-discretionary, and must be implemented by the USFS so that they become binding conditions of any grant, permit, agreement, or contract issued to, for the exemption in section 7(o)(2) to apply. The USFS has a continuing duty to regulate the activity covered by this incidental take statement. If the USFS: (1) fails to assume and implement the terms and conditions or (2) fails to require the contractor to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grand document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the USFS must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement (ITS). [50 CFR §402.14(I)(3)]

Relationship of Program-level ITS to Project-level ITS

Any future actions completed under the Forest Plan that may adversely affect the Indiana bat and dusky gopher frog will require section 7 formal consultation. These consultations will proceed using the procedures outlined in the "Programmatic Consultation Approach" section. A Level 2 biological opinion will be written and appended to this biological

opinion for each project that may adversely affect the Indiana bat. During this Level 2 consultation, project-specific incidental take, as well as the cumulative amount of take pursuant to implementation of the Forest Plan that has occurred, will be assessed. In these future ITSs, reasonable and prudent measures and terms and conditions to minimize the effect of any incidental take that may result will be developed and applied, as appropriate.

AMOUNT OR EXTENT OF TAKE ANTICIPATED

Indiana Bat

The Service anticipates that incidental take of Indiana bats as a result of the proposed Forest Plan will be difficult to quantify and detect due to the bat's small body size, widely dispersed individuals under loose bark or in cavities of trees, and unknown areal extent and density of their roosting populations within the HSNF. However, any incidental take of Indiana bats is expected to be in the form of killing, harming, or harassing. Tree removal during the non-hibernation season period may result in harm or mortality to roosting Indiana bats. Smoke and fire generated during prescribed fires that occur during the non-hibernation period could also cause roosting bats distress or death. Burning may cause an individual roosting bat to abandon a traditionally used roost tree.

Monitoring to determine take of individual bats within an expansive area of forested habitat is a complex and arduous task. Unless every individual tree that contains suitable roosting habitat is inspected by a knowledgeable biologist before management practices begin, it would be impossible to know if a roosting Indiana bat is present in an area proposed for harvest or burning. It would also be impossible to evaluate the amount of incidental take of Indiana bats unless a post-harvest inspection is immediately made of every tree that has been removed or disturbed. Inspecting individual trees is not considered by the Service to be a practical survey method and is not recommended as means to determine incidental take. However, the areal extent of potential roosting habitat affected can be used as a surrogate to monitor the level of take. Although, to the best of our knowledge, no individually-roosting Indiana bats have been incidentally taken during tree removal or other habitat-modifying activities on the HSNF, the possible removal of occupied roost tree (s) that are not recognized as such may result in incidental take of this species. If roosting individuals are present in an area proposed for timber harvest or other disturbance, incidental take of Indiana bats could occur. However, implementation of the terms and conditions associated with the reasonable and prudent measures provided below by the Service will significantly reduce the potential for incidental take.

This incidental take statement anticipates the taking of a presently unquantifiable number of Indiana bats from timber harvest and prescribed fires occurring during the non-hibernation season (April 1 to November 14). The HSNF proposes to conduct non-commercial and commercial timber management practices on a total of 16,000 acres over the next 10 years. In addition, the HSNF proposes to ignite up to 155,661 acres of prescribed fire over the next 10 years.

Therefore, the incidental take statement is based on forest management practices occurring on a maximum of 16,000 acres over a 10 year period, and a maximum of prescribed fire on 155, 661 acres over a 10 year period.

With regards to herbicide applications, recreational activities, mineral management, and infrastructure activities, no incidental take is anticipated from these activities; therefore, no incidental take is authorized for these activities covered in the Forest Plan.

Dusky Gopher Frog

In this ITS, we are evaluating the incidental take of dusky gopher frogs that may result from implementation of the Forest Plan. A Forest Plan is a permissive plan level document that allows and guides, but does not authorize specific actions to occur. As explained within the accompanying biological opinion, the Forest Plan allows for actions that are likely to adversely affect the dusky gopher frog. As such, specific actions conducted under the Forest Plan may result in adverse effects to individual dusky gopher frogs that rise to the level of take. The standards and guidelines proposed as part of the Forest Plan, however, substantively reduce the potential for adverse effects and incidental take to occur. Therefore, projects completed under the Forest Plan that comply with the standards and guidelines in many cases will not adversely affect dusky gopher frog. There may be situations, however, in which incidental take is likely regardless of whether the standards and guidelines are adhered to.

Incidental take of dusky gopher frogs could result from affirmative conservation and recovery actions proposed in the Forest Plan such as ground-disturbing activities associated with habitat management and/or prescribed burning. However, the Service anticipates that incidental take will be difficult to quantify and detect due to the fact that the frogs spend most of their lives underground, and finding a dead or injured individual is unlikely. In addition, the projects that will result from the plan that may result in take of dusky gopher frogs are not (and likely cannot at this time) be described in a specific enough manner that the level of take can be accurately estimated.

However, the Forest Plan does estimate the amount of acreage that will receive forest management actions. The DNF proposes to manage timber on approximately 30,843 acres over the next 10 years. Vegetation management practices will include 6,530 acres of regeneration cutting, and 22,788 acres of commercial thinning. In addition, the DeSoto Ranger District proposed to prescribe burn approximately 84,000 acres per year.

Based on the assumption that all currently occupied and unoccupied critical habitat (assuming it will eventually become occupied) will receive some form of ecosystem restoration activity during implementation of the Forest Plan, this incidental take statement anticipates the taking of a presently unquantifiable number of dusky gopher frogs from timber management activities and prescribed fire (on a 1-3 year burning regimen) on 3,084 acres.

Therefore, the incidental take statement is based on forest management practices occurring on a maximum of 3,084 acres of dusky gopher frog critical habitat over a 10 year period, and a maximum of prescribed fire on 3,084 acres of critical habitat annually.

However, due to the broad nature of the Forest Plan, and the uncertainty of what specific types of future timber management activities may be needed within dusky gopher frog habitat, this anticipated incidental take will be exempted during the Level 2 consultation on a project-by-project basis

EFFECT OF THE TAKE

Indiana Bat

In the accompanying BO, the Service determined that this level of expected take is not likely to result in jeopardy to the Indiana bat or destroy or adversely modify its critical habitat. Therefore, we have determined that the level of anticipated incidental take associated with the actions completed under the Forest Plan is not likely to jeopardize the Indiana bat.

Dusky Gopher Frog

Although the level of expected take cannot be accurately determined, in the accompanying biological opinion the Service determined that the actions conducted under the Forest Plan will support the survival and recovery of the dusky gopher frog and are not likely to result in jeopardy to the species or destruction or adversely modification of its critical habitat

REASONABLE AND PRUDENT MEASURES

The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize impacts of incidental take of Indiana bat and dusky gopher frog. Additional reasonable and prudent measures may be applied to some project level consultations (Level 2) in the future to minimize the effect of incidental take that may result from such projects, where appropriate on a project-by-project basis.

Indiana Bat

1. The NFM will plan, evaluate, and implement forest management practices (vegetation management activities and prescribed fire) on the HSNF (Holly Springs Unit) in a manner consistent with the conservation measures for the Indiana bat described in the Forest Plan as further clarified in the Terms and Conditions of this Incidental Take Statement.
2. The NFM will engage in Level 2 consultation for all site-specific actions that may affect the Indiana bat.

Dusky Gopher Frog

1. The NFM will minimize potential impacts to the dusky gopher frog to the maximum extent practical.
2. The NFM will engage in Level 2 consultation for all ground disturbing activities that may affect the dusky gopher frog.

We believe that, where appropriate on a project-by-project basis, the reasonable and prudent measure outlined above will significantly reduce the impacts of incidental take of the Indiana bat and dusky gopher frog.

TERMS AND CONDITIONS

In order to be exempt from the prohibitions of section 9 of the Act, the NFM must comply with the following terms and conditions, which carry out the reasonable and prudent measures, described above and outline required reporting/monitoring requirements. These terms and conditions are non-discretionary.

The applicability of each term and condition will be determined based on the technical requirements and biological characteristics associated with the specific action being analyzed.

Indiana Bat

1. The NFM shall conduct all vegetation management activities and commercial timber sales consistent with the standards and guidelines outlined in the Forest Plan and BA. Additional clarification is provided for the following measures:

    - Establish a **maternity roosting buffer zone (75 feet)** around all known Indiana bat roost sites. No ground disturbing activities will take place within this buffer other than activities specifically designed to enhance/improve roosting habitat (i.e. removal of shade trees) and only when bats have left maternity roost (i.e. September 1 to March 31). Prescribed burning will also only take place during the non-maternity roosting season (September 1 to March 31).
    - Establish a **maternity foraging buffer zone (2.5 miles)** around all known Indiana bat roost sites. No timber removal will take place during the non-hibernation/maternity season (April 1 and August 31), unless specifically designed to enhance foraging habitat.
    - For all vegetation management activities and commercial timber sales on the Holly Springs Unit, retain at least three (3) live trees per acre greater than 20 inches dbh of these preferred species (Shagbark, Shellbark, and Bitternut hickory; white and green ash; white, northern red, and post oak; American and slippery elm; eastern cottonwood, black locust, and silver maple).

- For all vegetation management activities and commercial timber sales on the Holly Springs Unit, retain at least 5 snags per acre greater than 9 inches dbh and 1 snag per acre over 19 inches dbh. Oaks, hickories, and ashes will be favored for retention of snags. During timber harvests, snags will not be removed except where they constitute a human safety hazard. Snags will be retained in groups with live trees to prevent snag loss to wind throw.
- To protect foraging habitat and travel corridors along rivers and streams, a forested stream buffer strip will be maintained in all areas receiving vegetation management activities. The buffer will be a minimum of 50 feet on each side of perennial streams or rivers and 25 feet on both sides of intermittent streams.
- Ensure that all Forest Service employees and contractors working within Indiana bat habitat are educated to recognize and avoid potential Indiana bat roost trees and the required habitat components for a complete Indiana bat home range.

2. The NFM shall consult with the Service on all future site-specific actions on the HSNF (Holly Springs Unit) covered under the Forest Plan.

    - Project-specific biological evaluations submitted to the Service will include a description of the proposed action, results of any Indiana bat surveys, conservation measures to protect Indiana bats, and reasons why and if standards and guidelines outlined in the Forest Plan are not feasible or prudent.
    - The NFM shall monitor the number of acres of non-commercial and commercial forest management practices and prescribed fires implemented on an annual basis to ensure the total acreages do not exceed the authorized incidental take. The NFM shall provide a summary of annual fiscal year activities and acreages to the Service's MSFO no later than December 15 each year the BO is in effect.

Dusky Gopher Frog

1. The NFM will conduct prescribed burning within occupied dusky gopher frog habitat following the Burn Matrix, as described in the Forest Plan.

2. Project-specific biological evaluations submitted to the Service will include a description of the proposed action, results of any dusky gopher frog surveys, conservation measures to protect dusky gopher frogs, and reasons why and if standards and guidelines outlined in the Forest Plan are not feasible or prudent.

This incidental take statement is based on full implementation of the proposed project as described in the DESCRIPTION OF THE ACTION section and inclusion of the TERMS AND CONDITIONS section of this biological opinion. Failure to implement the project as proposed (including any relevant conservation measures), or implementation of the

project in a manner that causes an effect to listed species not adequately considered in this opinion, may cause coverage of section 7(o)(2) to lapse and require re-initiation of consultation to ensure compliance with section 7(a)(2) of the ESA.

CONSERVATION RECOMMENDATIONS

Section 7(a) (1) of the Act directs Federal agencies to use their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitats, to help carry out recovery plans, or to develop information.

Indiana Bat

We believe that the NFM has already initiated or participated in important efforts to protect, manage, and increase our understanding of the Indiana bat, including their commitment to implement the standards and guidelines in the proposed action. We offer the following Conservation Recommendations to further expand the knowledge of this species, and help better manage for the Indiana bat in Mississippi.

1. Monitor the extent of use by Indiana bats on the NFM. Such monitoring should include the employment of currently accepted techniques used to gather information on the Indiana bat. Prioritize the surveying to areas that have a higher probability of having Indiana bat use or more optimal habitat conditions.
2. In order to develop information on the Indiana bat, cooperate with the Service, and any other interested agency(s), to complete studies on the effects of forest management activities on Indiana bats and their habitat.
3. Conduct radio-telemetry study(s) of Indiana bats within the action area to assess their movements and habitat use relative to vegetation management activities.
4. Monitor the number of suitable roost trees available to the species on the Holly Springs Unit using Forest Inventory Assessment (FIA) data once every five-years at a minimum.

Dusky Gopher Frog

We believe that the NFM has already initiated or participated in important efforts to protect, manage, and increase our understanding of the dusky gopher frog, including their commitment to implement the standards and guidelines in the proposed action. We offer the following Conservation Recommendations to further expand the knowledge of this species, and help better manage for the dusky gopher frog in Mississippi.

1. Establish three additional CMU's for future reintroduction of dusky gopher frogs
    - CMU 1 - Carr Bridge Road Pond (Unit 3)
    - CMU 2 - Ashe Nursery Ponds (Units 8 and 9)
    - CMU 3 - Mars Hill Area Ponds (Units 10, 11, and 12)

2. In order to develop information on the dusky gopher frog, continue to cooperate with the Service, and any other interested agency(s), to complete studies on the effects of forest management activities on dusky gopher frogs and their habitat.

In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefiting listed species or their habitats, the Service requests notification of the conservation recommendations carried out.

REINITIATION NOTICE

This concludes formal consultation on the proposed actions outlined in the request and described above. As required by 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease until reinitiation.

The Service appreciates the cooperation of the USFS during this consultation. We would like to continue working with you and your staff regarding forest management on the National Forests of Mississippi. For further coordination please contact David Felder in our office, telephone (601) 321-1131.

Sincerely,

Stephen Ricks
Field Supervisor

cc: MDWFP, Jackson, MS
Attn: Scott Peyton

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