Draft Environmental Assessment

2012 Forest Management for Compartments 10 and 27

on

SAM D. HAMILTON NOXUBEE NATIONAL WILDLIFE REFUGE
Noxubee, Oktibbeha, and Winston Counties, Mississippi

For Further Information, Contact:
Refuge Manager
U. S. Fish and Wildlife Service
Sam D. Hamilton Noxubee National Wildlife Refuge
2970 Bluff Lake Road
Brooksville, MS 39739

Prepared by:
U. S. Department of Interior
Brooksville, Noxubee
August 2012

TABLE OF CONTENTS

Chapter 1 PURPOSE AND NEED FOR ACTION 5

Chapter 2 ALTERNATIVES INCLUDING THE PROPOSED ACTION 6

Chapter 3 AFFECTED ENVIRONMENT 8

Chapter 4 ENVIRONMENTAL CONSEQUENCES..... 19

Chapter 5 CONSULTATION AND COORDINATION WITH OTHERS 37

Chapter 6 LITERATURE REFERENCES 39

Chapter 7 LIST OF PREPARERS……..…..41

Appendix RESPONSE TO PUBLIC COMMENTS……42

BACKGROUND

The authority to manage forested lands derives from several Acts of Congress including the Migratory Bird Conservation Act of 1929, the Fish and Wildlife Act of 1956, the Wilderness Act of 1964, the National Wildlife Refuge System Administration Act of 1966 and the Endangered Species Act of 1973.

The Service's policy is to manage forested habitat in a manner that best meets the overall objectives of a particular refuge. The Service's primary objective of forest management on refuges is to develop, manage and perpetuate the diversity of indigenous wildlife populations needed to meet refuge objectives. Forest management planning and approved management techniques are outlined in the Refuge Manual (6 RM 3) (Appendix A).

A description of the refuge's long-term management actions and direction is found within the Noxubee National Wildlife Refuge Comprehensive Conservation Plan (CCP) of 2004 (http://www.fws.gov/southeast/planning/CCP/NoxubeeFinalPg.html) (USFWS 2004). The purpose of the plan is to provide a 15-year management scheme that will address conservation of fish, wildlife and plant resources and their related habitats while providing opportunities for compatible wildlife-dependent recreational uses. This document provides the overarching wildlife, public use, and management needs of the refuge.

Based on goals and objectives within the 2004 Noxubee National Wildlife Refuge CCP and Recovery Standards outlined within the Red-cockaded Woodpecker (RCW) Recovery Plan (http://www.fws.gov/rcwrecovery/recovery_plan.html) (USFWS 2003), silvicultural procedures have been previously planned for Compartment 10 and 27. The silvicultural prescription for Compartment 27 was completed in 2007. The silvicultural prescription for Compartment 10 was completed in 2010. A total of six (6) stands within these two silvicultural prescriptions remain to be completed (Compartment 10 – Stands 8, 10, 15, and 21, and Compartment 27 – Stands 7 and 11). Management techniques to be used within Compartment 27 - Stands 7 and 11 and Compartment 10 – Stand 10 were planned as the silvicultural procedure of seed-tree management technique which would reduce the number of overstory trees to 6 trees per acre. This procedure is used in the regeneration of a forest stand but would remove the stand as foraging habitat for numerous years until trees matured once again. The remaining stands were planned for the silvicultural procedure of thinning, a technique used to improve good quality foraging habitat for the red-cockaded woodpecker.

However, since the development of the original silvicultural prescriptions the number of active RCW clusters on the refuge has appeared to decline, key refuge personnel related to the planning and management of these stands (the wildlife biologist and the refuge manager) have changed, and new biological information has been obtained through monitoring the red-cockaded woodpecker clusters and Forage Habitat Analyses.

The planning process associated for the next revision of the refuge's CCP is being scheduled to start in the Fall of 2012. If all proceeds as planned, the revised CCP would be finalized in the Fall of 2014. As part of revision, the refuge will produce a Habitat

Management Plan (HMP) in accordance with Service Policy (620 FW 1) (http://www.fws.gov/policy/620fw1.html) that would be attached to the CCP. The HMP guides analysis and selection of specific habitat management strategies to achieve habitat goals and objectives and would address needed forest management activities on the refuge. Due to the recognized environmental changes that have occurred, and described above, since the writing of the original silvicultural prescriptions, Refuge Manager Dr. Steven Reagan decided to re-evaluate the environmental effects of the active forest prescriptions and consider the three following options: (1) do no active silvicultural procedures until the completion of the CCP and HMP; (2) assess alternative silvicultural procedures within previously planned silvicultural prescriptions within Compartments 10 and 27 to determine if these would better address the biological needs for which the refuge conducts habitat management; or (3) conduct active silvicultural management within Compartment 27 using the silvicultural procedure seed-tree harvest as originally planned.

Chapter 1 Purpose and Need for Action

The federally legislated purpose for which Sam D. Hamilton Noxubee National Wildlife Refuge (NWR) was established on June 14, 1940 by Executive Order 8444 under the authority of 16 U.S.C. 715 (Migratory Bird Conservation Act) is "…for use as a Refuge and breeding ground for migratory birds and other wildlife…" 16 U.S.C. 715 (Migratory Bird Conservation Act).

In conjunction with the primary establishing purpose, the Refuge will provide an area for the "… conservation, management, and restoration of the fish, wildlife, and plant resources and their habitats for the benefit of present and future generations of Americans" 16 U.S.C. 668(a)(2) (National Wildlife Refuge System Administration Act) as well as "…for the development, advancement, management, conservation, and protection of fish and wildlife resources…" 16 U.S.C. 742(b)(1) (Fish and Wildlife Act of 1956).

The passage of the Endangered Species Act (ESA) in 1973 (as amended) required the Refuge to support recovery actions for federally listed endangered and threatened species.

The purpose of this Environmental Assessment is to evaluate the feasibility of implementing the 2012 Timber Prescription for Compartment 10 and 27. The proposed action would thin a total of 199 acres in six stands of 50-80 year old pine-hardwood forest retaining 60 ft^2/ac of pine basal area. Currently these 199 acres are characterized by high basal areas of both pine and hardwoods with a dense and tall hardwood midstory. As such, the habitat is in poor to unsuitable condition relative to the attributes of the desired future condition of good quality foraging habitat for the endangered red-cockaded woodpecker (RCW).

The proposed action is needed to meet RCW foraging habitat requirements outlined in the RCW Recovery Plan (USFWS 2003) and to meet Objective A.1 in the Refuge's approved Comprehensive Conservation Plan (USFWS 2004). Currently the stands' basal areas, particularly for midstory and canopy hardwoods, are above that considered good quality foraging habitat for the red-cockaded woodpecker. The proposed action would be the harvest and reduction of hardwoods to a condition consistent with the criteria of good quality foraging habitat for RCWs. Management for the endangered RCW requires proper timber management to ensure a continuance of suitable habitat in perpetuity. Other benefits of the proposed action include providing increases in species diversity and habitat availability to wildlife that favor open pine habitats with grassy/herbaceous understories, such as Bachman's sparrow, Northern bobwhite quail, fox squirrel, wild turkey, and brown-headed nuthatch.

Chapter 2 Alternatives Including the Proposed Action

2.1 Alternative 1 (No Action): Current Management

Under this alternative, the Refuge's 2012 Timber Prescriptions for Compartment 10 and 27 would not be implemented.

2.2 Alternative 2 (Proposed Action): 2012 Timber Prescription for Compartment 10 and 27 for Sam D. Hamilton Noxubee NWR

The proposed action would allow the Service to implement the 2012 Timber Prescriptions for Compartment 10 and 27 thereby thinning 199 acres of pine-hardwood forest to 60 ft^2/ac of basal area in Compartment 27 (stands 7 &11) and Compartment 10 (stands 8, 10, 15, & 21) (Figure 1).

A thinning as referred to in this alternative is defined as: cutting and removing a portion of overstory pine and hardwood trees to reduce the basal area of overstory trees to 60 ft^2/acre of pine post-harvest in a somewhat uniform fashion throughout the treatment area. Basal area is defined as: the mathematical area expressed in square feet that a tree stem occupies at 4.5 feet above the ground.

Refer to the 2012 Timber Prescriptions for Compartment 10 and 27 for Sam D. Hamilton Noxubee NWR for specific details regarding administration of the timber sale.

2.3 Alternative 3: Seed-tree Regeneration

Under this alternative, the Refuge would regenerate only 74 of the 199 acres of pine-hardwood forest in stands 7 & 11 of Compartment 27 using a seed-tree cut leaving 5-6 residual trees per acre. Compartment 10 would not be affected under this alternative.

A seed tree-regeneration as referred to in this alternative is defined as: cutting and removing the vast majority of overstory trees leaving only 5-6 residual overstory pine trees per acre for the purpose of regenerating pine.

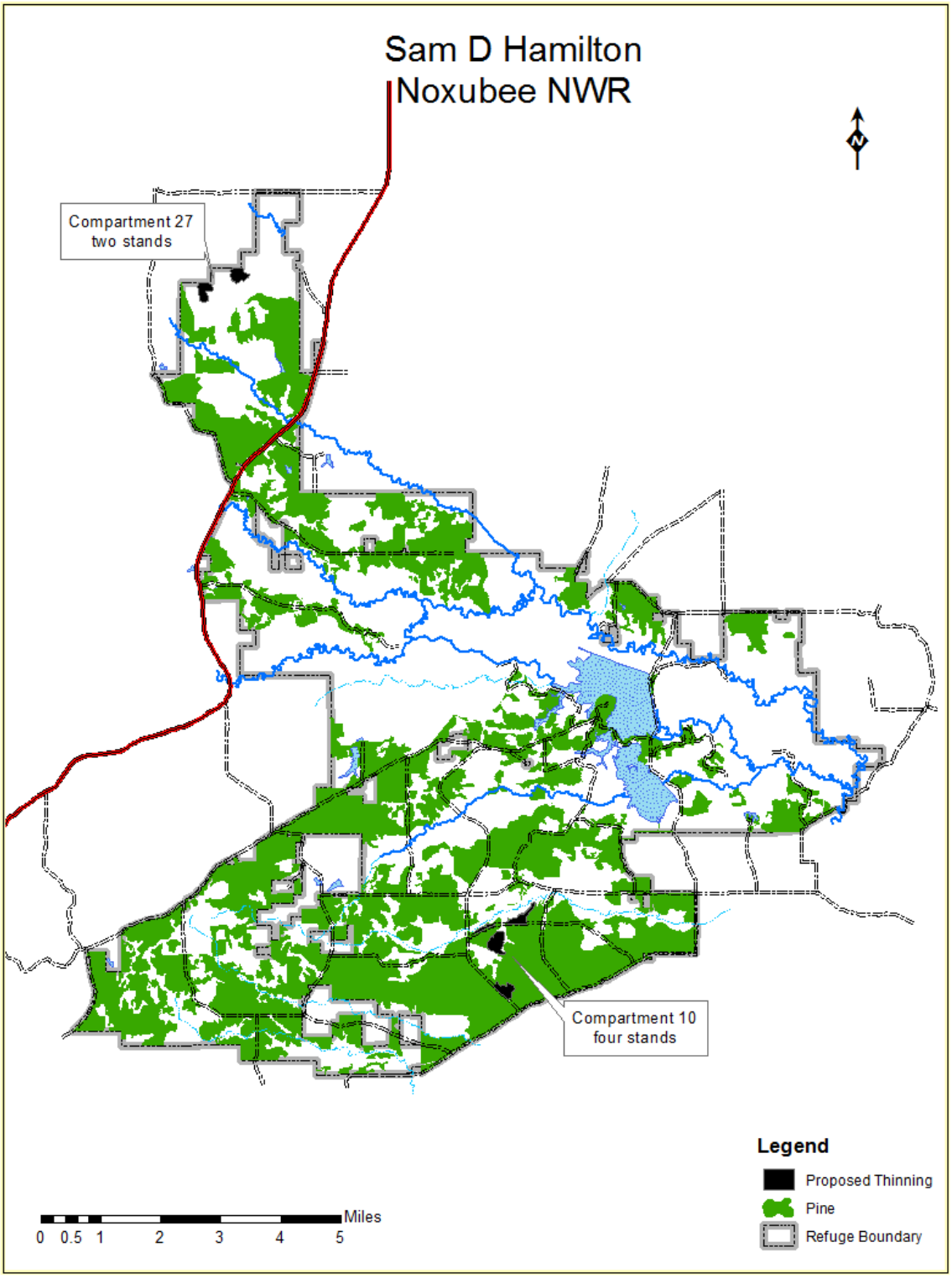

Figure 1. Location of proposed treatment areas to be thinned as described in the Alternative 2 (Proposed Action).

Chapter 3 Affected Environment

Noxubee National Wildlife Refuge (NWR) was established on June 14, 1940 and renamed the Sam D. Hamilton Noxubee NWR on June 22, 2012. It is located in Noxubee, Oktibbeha, and Winston Counties in east-central Mississippi. The 48,229-ac Refuge is located approximately 80 miles northeast of Jackson and 14 miles south of Starkville (Figure 2). The approved acquisition area for Sam D. Hamilton Noxubee NWR is 53,449 acres.

The Noxubee River, a tributary of the Tombigbee, flows through the central portion of the Refuge from west to east. Mississippi State University owns the John Starr Memorial Forest which borders the Refuge on the north and west sides. Private forest industry lands border the Refuge on the southern side. The state of Mississippi owns three sixteenth section lands that either are true in-holdings or adjoin the Refuge on the east and north sides. Private landowners border the remaining boundary of the Refuge.

The majority of the Refuge, ninety-three percent, consists of forested habitats. Upland hardwood forests include white oak (*Quercus alba*), post oak (*Quercus stellate*), southern red oak (*Quercus falcata*), and loblolly pine (*Pinus taeda*) interspersed with oaks, hickories, blackgum (*Nyssa sylvatica*), and sweetgum. Pine and pine-hardwood forests are dominated by loblolly pine. Bottomland hardwood forests consist of water oak (*Quercus nigra*), willow oak (*Quercus phellos*), cherrybark oak (*Quercus pagoda*), overcup oak (*Quercus lyrata*), American beech (*Fagus grandifolia*), blackgum, and sweetgum. Bald cypress/gum swamp forests on Noxubee NWR are pure or nearly pure stands of bald cypress (*Taxodium distichum*).

On November 15, 1935 the Soil Conservation Service acquired approximately 95,000 acres of land in and around what would become Noxubee NWR under the authority of the Resettlement Administration. On these lands were established farms whose lands showed signs of overuse, high erosion and lowered productivity which was unfortunately a common occurrence in the late 1920's. When the Refuge was formally established five years later, this ecosystem was in the process of being restored. Many of todays accepted features were already established. Bluff Lake was created in 1938 and many of today's roads were established but were simple gravel road requiring significant maintenance. Much of the upland forested habitats were planted with loblolly pine and the new forest was establishing itself on what were old homesteads and farm fields. How much of today's forest is based on tree plantings remains unclear. By 1950, annual narrative reports record the first uses of timber management on the Refuge. By the 1940's and continuing today these Refuge habitats support some of the richest plant and animal communities found in the Eastern Gulf Coast Plan. Today the Refuge provides habitat for more than 50 species of mammals, 50 species of fish, 50 species of reptiles and amphibians, and 250 species of birds, including the endangered red-cockaded woodpecker.

Today, approximately 45,000 acres of the Refuge are forested habitats of which approximately 22,000 acres are pine forests. The proposed 199-acre treatment area is

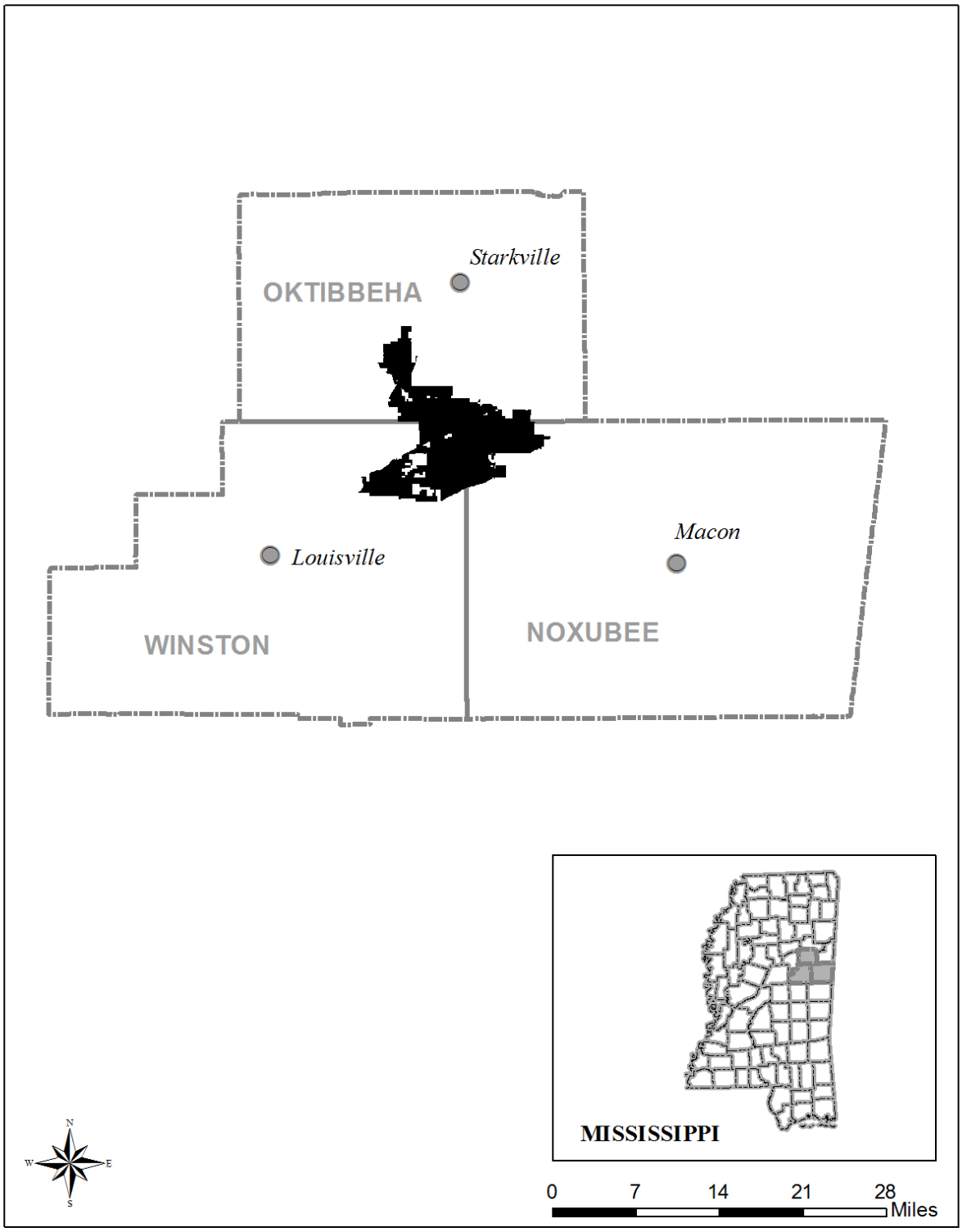

Figure 2. Location of Sam D. Hamilton Noxubee National Wildlife Refuge.

located in pine-hardwood forest within Compartment 27 (stands 7 &11) and Compartment 10 (stands 8, 10, 15 & 21).

3.1 Physical Environment

3.1.1 Soils

The Refuge extends over three separate soil physiographic regions: interior flatwoods which typically are poorly drained clays, upper coastal plain with soils ranging from well-drained sand to clay, and black belt prairie with soils forming from Selma chalk. Most of the Refuge is located in the interior flatwoods physiographic region. Eight soil associations are found on Sam D. Hamilton Noxubee NWR. The majority of soils are in the Longview-Falkner-Prentiss, Mathison-Urbo, and Falkner-Longview-Savannah complexes.

Refuge elevations range from 200 to 560 feet above mean sea level. The majority of the Refuge is relatively flat with elevations rarely varying more than 20 feet. The west and southwest portions of the Refuge (Bevills Hill) have the greatest variation in elevations and is best described as hilly. In these areas, elevations can vary up to 100 feet over small distances. A small portion of the Refuge's southeast corner has flat to gently rolling elevations.

Soils in the proposed treatment areas are in the Longview-Falkner-Prentiss association with soil types of Falkner silt loam, 0-2 percent slopes (FaA) and Longview silt loam, 0-2 percent slopes type (LoA) (NRCS Web Soil Survey - http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx). Falkner silt loams are characterized as somewhat poorly drained with a high available water capacity. Longview silt loams are characterized as somewhat poorly drained with a high available water capacity.

3.1.2 Water

Sam D. Hamilton Noxubee NWR is located within the East Gulf Coastal Plain (EGCP) and the Tombigbee River Basin. The Tombigbee River drains approximately 6,100 square miles of northeastern Mississippi and western Alabama into the Mobile River and on into the Gulf of Mexico. Noxubee River, which bisects the Refuge, is a tributary of the Tombigbee River. The Noxubee River headwaters originate in the hilly section of Winston County on portions of the Tombigbee National Forest and flows southeastwardly through Winston, Oktibbeha, and Noxubee Counties. The Noxubee River has remained a naturally meandering river, and therefore, is an excellent example of a naturally functioning watershed. Twenty-five miles of the Noxubee River meanders through the Refuge. An additional 55 miles of tributary streams and creeks exist on the Refuge. Oktoc creek is a branch of the Noxubee River that forks off and subsequently returns several miles downstream. A levee constructed in the 1930's across Oktoc creek created Bluff Lake. Loakfoma creek which originates in the western portion of the Refuge is a dammed tributary of Oktoc creek. In 1963, Loakfoma Lake was created by the construction of a levee and water control structure on Loakfoma creek. During flooding events, the Noxubee River and its tributaries can inundate over 8,000 acres of the bottomland hardwood forests found on the Refuge.

3.2 Biotic Environment

3.2.1 Vegetation

Specific acreage by habitat is as follows: 8,016 acres of upland hardwood forest, 21,635 acres of shortleaf/loblolly pine forest, 15,579 acres of bottomland hardwood forest, 128 acres of bald cypress stands, 85 acres of blackbelt prairie demonstration area, 700 acres of fields, 385 acres of moist soils, and 1,448 acres of open water. 800 acres of the bottomland hardwood forest are in green-tree management, meaning the area can be flooded primarily for wintering waterfowl. Remaining acreage is comprised of roads, rights-of-way, 80 miles of streams, and facilities.

Four major vegetation types within the upland hardwood are: Upland Hardwood, Loblolly Pine-Hardwood, Loblolly Pine-Shortleaf Pine and Loblolly Pine. The bottomland hardwood forest vegetation type is Sweetgum-Willow Oak. A detailed description of the major vegetation types are listed below.

Upland Hardwood (3,126 acres)

This cover type is mainly an upland xeric site association in which the species compositions change depending upon elevations. The oaks dominate the stand with hickories comprising a smaller component. Other tree species occurring are yellow poplar (*Liriodendron tulipifera*), blackgum, red maple (*Acer Rubrum*), ash, elm, sweetgum, shortleaf pine, and loblolly pine. Dogwood (*Cornus* spp.), sassafras (*Sassafras albidum*), serviceberries (*Amelanchier* spp.), redbud (*Cercis canadensis*), hophornbeam (Ostrya virginiana), American beech (*Fagus grandifolia*), witch-hazel (*Hamamelis* spp.), sparkleberry (*Vaccinium arboreum*), wild grapes (*Vitis* spp.), greenbriers (*Smilax* spp.), and poison-ivy (*Toxicodendron radicans*) are found in the midstory and understory. Common herbaceous species are mayapple (*Podophyllum peltatum*), Trillium (*Trillium* spp.), wild ginger (*Alpinia* spp.), bellworts (*Uvulvaria* spp.), asters (*Aster* spp.), and goldenrod (*Solidago* spp.). The type is a subclimax or climax depending upon the geographic location and site index.

Loblolly Pine-Hardwood Forest Type (4,890 acres)

This cover type is a mixture of loblolly pine and hardwoods with no more than 20 percent of the overstory comprised of loblolly pine. The loblolly pine-hardwood cover type occurs on sites ranging from coastal swamps to xeric sites. The hardwood components consist of a mixture of sweetgum, water oak, cherrybark oak, swamp chestnut oak (*Quercus michauxii*), ash, yellow poplar, elm, red maple, and hickories. Shrubs and midstory trees include wax myrtle (*Morella cerifera*), American beautyberry (*Callicarpa americana*), possumhaw (*Llex decidua*), sparkleberry, dogwood, and hawthorns (*Crataegus* spp.). Common vines include blackberries (*Rubus* spp.), greenbriers, grapes, and honeysuckle (*Lonicera japonica*). This cover type develops toward a hardwood climax (Mississippi Museum of Natural Science 2005)

The proposed treatment areas are currently within this cover type.

Loblolly Pine-Shortleaf Pine (1,731 Acres)

This type is comprised of a loblolly and shortleaf pine majority, although the proportion of each species varies. It occurs most often in moist, even poorly drained soils of the Coastal Plain. However, it can also grow on dry, shallow eroded soils at higher elevations. Species associated with the loblolly pine-shortleaf pine cover type include southern red oak, white oak, persimmon (*Diospyros virginiana*), blackgum, hickories, and flowering dogwood (*Cornus florida*). With a lack of fire management, hardwoods species are common in the midstory. Panicums (*Panicum* spp.), sedges (*Carex* spp.), and little bluestem (*Schizachyrium scoparium*) are common undergrowth, if the stand has been managed by prescribed fire. This cover type is transient and will convert to an upland oak climax without disturbance, such as high wind events, fire, insect outbreaks, or human alteration.

Loblolly Pine (19,904 acres)

This type is composed of either pure stands or a mixture in which loblolly pine comprises the majority of the overstory. It occurs on a variety of soils from well-drained upland soils to somewhat poorly drained flatwoods soils. The loblolly pine cover type is widespread and therefore associated with many species. The most common associated species include sweetgum, water oak, willow oak, cherrybark oak, red maple, hickories, and blackgum. The associated species are also common in the midstory. Dense, young stands support sparse herbaceous vegetation, but as the stand opens up, bluestems, panicums, and sedges appear. This cover type tends to be successionally temporary unless a fire regime is present (Mississippi Museum of Natural Science 2005).

The proposed treatment areas would be converted to this cover type if the proposed action is implemented.

Sweetgum-Willow Oak Forest Type (15,579 Acres)

The sweetgum-willow oak cover type is associated with alluvial floodplains of rivers in the southern United States. Species composition in this cover type is determined by soils. On well-drained first bottom ridges and terrace flats with silty clay soils, sweetgum will dominate the stand. Oaks will dominate on clay soils. Willow oak and water oak will be found on the first bottom ridges with better drainage. Nuttall oak (*Quercus texana*) occur on the first bottom flats. Other species associated with this cover type are sugarberry, ash, elm, overcup oak, hickory, Eastern cottonwood (*Populus deltoides*), persimmon, red maple, and rarely bald cypress. The associate species also are the dominant midstory species. The herbaceous layer can include greenbrier, poison-ivy, redvine (*Brunnichia ovata*), mayapple, jack-in-the-pulpit (*Arisaema triphyllum*), netted chainfern (*Woodwardia areolata*), and jumpseed (*Polygonum virginianum*) (Mississippi Museum of Natural Science 2005).

Baldcypress-Water Tupelo Forest Type (128 Acres)

This forest cover type is composed of almost pure bald cypress. Bald cypress occurs in areas with frequent prolonged flooding along streams. While bald cypress occurs in

swamps and estuaries throughout the coastal plain, it cannot tolerate high salinities. Its major associates are water tupelo and blackgum. Minor associates include black willow (*Salix nigra*), cottonwood, ash, water hickory (*Carya aquatica*), and overcup oak. The midstory may include buttonbush (*Cephalanthus occidentalis*), acuminate (*Forestiera acuminate*), and Virginia sweetspire (*Itea virginica*). The ground cover will contain species such as whitegrass (*Leersia virginica*), waterwillow (*Justicia americana*), swamp sedge (*Carex joorii*), and opposite-leaf spotflower (*Acmella oppositifolia*), depending upon the amount of shade (Mississippi Museum of Natural Science 2005).

Noxubee NWR is comprised of very few bald cypress/gum swamps. However, bald cypress is interspersed throughout the bottomland hardwood forest especially along streams. Most of the bald cypress existing on the Refuge are approximately ninety years in age. Bald cypress is a long living tree species which has been known to survive over a thousand years. Bald cypress is an important wildlife tree species because of cavity development and nest and roost trees. Bald cypress is retained whenever possible to increase its' population on the refuge.

3.2.2 Threatened and Endangered Species

3.2.2.1 Red-cockaded Woodpecker

The RCW (*Picoides borealis*) is confined to old pine stands in the southeastern United States. Because this species evolved in a fire-maintained ecosystem, these woodpeckers prefer open, park-like pine stands with no midstory, few hardwood trees, and herbaceous groundcover. Red-cockaded woodpeckers (RCW) excavate cavities only in live pine trees that are usually 75 years old or greater but have created cavities in trees less than 50 years old. RCW foraging habitat is characterized by pine stands greater than 30 years of age that are between 40 and 70 ft^2/acre of basal area with little to no midstory, few hardwoods, and herbaceous understory (USFWS 2003). Habitat loss and then demographic isolation are the primary cause of their endangerment. Pine stands are on shorter management rotations and fire has been excluded from most of the landscape causing RCW habitat to be scarce.

The RCW Recovery Plan calls for growing season burns, pine basal areas of 40-70 ft^2/acre, the installation of artificial cavities, population monitoring, and the translocation of individuals to help increase genetic diversity and overcome demographic isolation (USFWS 2003).

Red-cockaded woodpeckers are cooperative breeders. A cooperative group usually consists of the breeding male and female along with one to four “helpers”. Helpers are most often previous years’ offspring of the breeding pair. Each group roost and nests in a cluster of cavity trees, within and around which they establish and defend a territory that is also used for foraging. According to RCW Recovery Plan guidelines, foraging habitat for each family group must be provided within a ½ mile from each cluster center (USFWS 2003). When these ½ mile circles overlap between two or more other RCW groups nearby, the area of overlap must be partitioned into equal sections and allocated to clusters accordingly (USFWS 2003). These foraging areas for each cluster are known as foraging partitions.

The Refuge is required by the RCW Recovery Plan to monitor its woodpecker population annually. During the 2012 breeding season there were 58 recognized clusters, 30 active and 28 inactive clusters, of RCWs on Sam D. Hamilton Noxubee NWR (Carter III & Associates 2012) (Figure 3).

The RCW Recovery Plan lists the RCW population on Noxubee NWR to be a support population (USFWS 2003). This means that the population on the Refuge is not necessary for down or delisting of the species. Rather, the RCW population can support recovery by providing RCW immigrants and genetic resources to other recovery populations during a time when many designated recovery populations have not reached their population size objectives. Nonetheless, the Refuge population is still significant and the current goal of 88 groups allows the Refuge a means of "supporting" recovery actions for the species. This may in the future include translocation of juvenile birds to primary or secondary core populations or even other support populations. The Refuge will continue to manage the existing population as mandated by the ESA and facilitate recovery of the species although a future downlisting or delisting of this species is not contingent on the refuge reaching its population goal.

The red-cockaded woodpecker population on the Refuge is the most northerly of four major populations in the state. In Mississippi, the red-cockaded woodpecker is restricted to the Bienville, Desoto, and Homochitto National Forests and Sam D. Hamilton Noxubee NWR combined for a total of approximately 300 groups. The species has almost completely disappeared from private and commercial forests in the state with only five groups known to still occur. The Refuge currently manages approximately 17,000 acres of open loblolly dominated pine forest for the species with a habitat goal to support 88 groups as established in Recovery Plan (USFWS 2003).

The proposed treatment area would involve 42 acres of foraging partitions of two active RCW clusters.

3.2.3 Fishery Resources

The dynamic nature of the flooding regime and associated wetland habitats provide a renewable fishery resource on the Refuge. The creeks, sloughs, and lakes support a diverse warm water fishery, including largemouth bass (*Micropterus salmoides*), spotted bass (*M. punctulatus*), black crappie (*Pomoxis nigromaculatus*), white crappie (*P. annularis*), bream (*Lepomis* spp.), channel catfish (*Ictalurus punctatus*), and blue catfish (I. furcatus). Nongame fish such as common carp (*Cyprinus carpio*), freshwater drum (*Aplodinotus grunniens*), and bigmouth buffalo (*Ictiobus cyprinellus*) are also found in Refuge waters. When flooding occurs in the spring, these areas provide excellent nurseries for juvenile fish USFWS 2004).

3.2.4 Resident Wildlife

Wildlife species found on the Refuge are typical of bottomland hardwood forest and upland hardwood/pine habitat. The Refuge provides habitat for fox and gray squirrels, swamp and eastern cottontail rabbits, wild turkey, Northern bobwhite quail and white-tailed deer. Furbearers present include opossum, muskrat, nutria, mink, river otter,

beaver, red and gray foxes, and raccoon. Thirty-four species of reptiles are known to occur on Sam D. Hamilton Noxubee NWR including American alligator, black racers, gray rat snake, western cottonmouth, fence lizard, green anole, skinks, box turtle, alligator and common snapping turtle, red-eared slider, and river cooter. Amphibian recorded on the Refuge include amphiuma, marbled and slimy salamander, spring peeper, bull frog, Fowler's toad, and green and bird-voiced treefrogs. Many species of bats utilize the Refuge's forests, including species of concern such as southeastern myotis and Rafinesque's big-eared bat (USFWS 2004). Southeastern myotis and Rafinesque's big-eared bat are associated with bottomland hardwood forests.

3.2.5 Birds

Up to 12,000 waterfowl spend the winter on Sam D. Hamilton Noxubee NWR. The Refuge provides year-round habitat for nesting wood ducks. Several heron and egret rookeries have been located throughout the refuge. The Bluff Lake rookery annually has between 30,000-36,000 nesting herons and egrets. The Refuge's CCP lists the following birds as Priority Migratory Neotropical birds on Sam D Hamilton Noxubee NWR: Bachman's sparrow, red-cockaded woodpecker, Swainson's warbler, brown-headed nuthatch, Kentucky warbler, Northern bobwhite quail, orchard oriole, prairie warbler, prothonotary warbler, red-headed woodpecker, chuck-will's-widow, worm-eating warbler, and yellow-billed cuckoo (USFWS 2004).

3.3 Social Environment

3.3.1 Cultural Resources

The U.S. Fish and Wildlife Service, like other federal agencies, are legally mandated to inventory, assess, and protect cultural resources located on those lands that the agency owns, manages, or controls. The Service's cultural resource policy is delineated in 614 FW 1-5 and 126 FW 1-3. In the FWS's Southeast Region, the cultural resource review and compliance process is initiated by contacting the Regional Historic Preservation Officer/Regional Archaeologist (RHPO/RA). The RHPO/RA will determine whether the proposed undertaking has the potential to impact cultural resources, identify the "area of potential effect," determine the appropriate level of scientific investigation necessary to ensure legal compliance, and initiates consultation with the pertinent State Historic Preservation Office (SHPO) and federally recognized Tribes.

Past Refuge archaeological investigations have focused on pre-construction compliance surveys and land exchanges. These surveys show that a range of both Native American and Euro-American sites are present on the refuge, including prehistoric occupation sites, roads, and cemeteries. All three of the proposed project areas will be evaluated by the Region Preservation Officer, in consultation with the State Historic Preservation Office and appropriate Tribal cultural resource staff as required under the general provisions of 36 CFR 800 and by the Service cultural resource policy cited above.

If the consultation indicates that there is a potential for unrecorded historic properties in the project area, surveys will be conducted to locate, evaluate, assess, and avoid project adverse effects to any significant property in the area of potential effect.

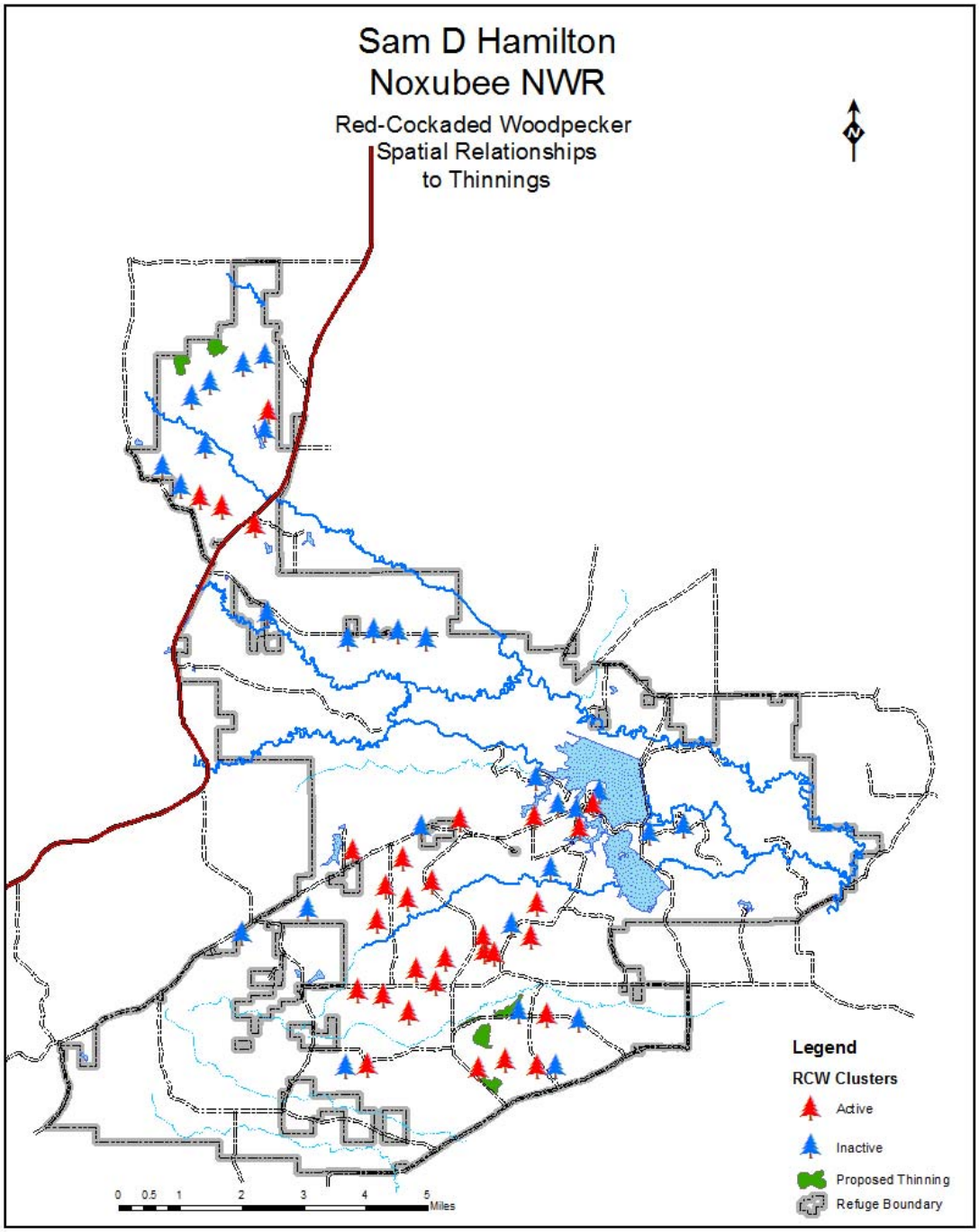

Figure 3. Locations of red-cockaded woodpecker clusters on Noxubee NWR in relation to proposed treatment areas to be thinned as described in Alternative 2 (Proposed Action).

3.3.2 Refuge Facilities

Refuge facilities include roads, trails, culverts, water control structures, levees, bridges, signs buildings and out structures such as kiosks, sheds, etc. No new facilities are to be created as part of the silvicultural prescriptions. Existing roads, trails and other features associated with transportation of silvicultural products will be maintained at the expense of the contractor.

3.3.3 Wildlife Dependent Recreation

The National Wildlife Refuge System Administration Act of 1966 as amended by the National Wildlife Refuge System Improvement Act of 1997 (16 U.S.C. 668dd et seq.) provides authority for the Service to manage the Refuge and its wildlife populations. In addition it declares that compatible wildlife-dependent public uses are legitimate and appropriate uses of the Refuge System that are to receive priority consideration in planning and management. There are six wildlife-dependent public uses: hunting, fishing, wildlife observation, wildlife photography, environmental education and interpretation. It directs managers to increase recreational opportunities including hunting on National Wildlife Refuges when compatible with the purposes for which the Refuge was established and the mission of the National Wildlife Refuge System.

The refuge offers all six wildlife-dependent public uses on portions or all of the Refuge at various times of the year. The Refuge offers hunting seasons for deer, waterfowl, turkey, squirrel, rabbit, quail, woodcock, raccoon and opossum. Seasons are limited to specific dates and locations of the Refuge to ensure compatibility with the purpose of the Refuge. Fishing is allowed from March through October on all Refuge waters except the Noxubee River which is open year-round. The Refuge is open to the public year round. Visitors have many opportunities for wildlife observation and photography using Refuge trails, boardwalks, and scenic overlooks. The Refuge coordinates with the Starkville School District, Mississippi State University and other groups to educate the public about the U.S. Fish & Wildlife Service, the mission of National Wildlife Refuge System, and the refuge's contribution to wildlife and habitat conservation. Educational programs are often administered in the Larry Box Environmental Education Center located on the Refuge. Interpretative signs and panels are located along trails and boardwalks plus informational brochures are available to the public.

3.3.4 Socio Economic

The region encompassing the Refuge is supported by an agriculture and timber economy. According to a 2006 survey by Mississippi Agricultural and Forestry Experimental Station on Forestry and Forestry Products in Mississippi, there are approximately 19.6 million acres of forest within the State and the value of Mississippi's timber harvest exceeded $1 billion each year since 1993 (http://msucares.com/forestry/economics/important.html). This same reference reports the three counties within which the Refuge sits contains 761,986 acres of forested lands (Table 1). Much of the area is forested and the forest products industry is vital to the region's local economy. Forestry is second only to farming as the largest industry in Mississippi. Most of the forest industry is based on privately owned forest land. Population estimates, total households, percent persons below poverty level, housing

units, and median annual household incomes are listed in Table 2 for Noxubee, Oktibbeha, and Winston Counties (U.S. Census Bureau 2010).

Table 1. Summary of forest types, acres and value of timber harvest by County.

County	Forest Type	Acres	Value of All Timber Harvest
Noxubee			
	Pine	94,273	$20 million
	Hardwood	132,177	
	Mixed Pine/Hardwood	25,064	
Oktibbeha			
	Pine	51,069	$10.2 million
	Hardwood	130,353	
	Mixed Pine/Hardwood	16,168	
Winston			
	Pine	116,131	$19.1 million
	Hardwood	164,926	
	Mixed Pine/Hardwood	31,825	

Table 2. Demographics of Noxubee, Oktibbeha and Winston Counties, Mississippi, based on U.S. Census 2010 data.

Parish	*Population*	*Households*	*Percent Persons below Poverty*	*Housing Units*	*Median Annual Household Income ($)*
Noxubee	11,545	4,169	35.6%	5,170	22,178
Oktibbeha	47,671	17,933	32.0%	20,947	30,320
Winston	19,198	7,360	25.0	8,745	30,738

Chapter 4 Environmental Consequences

This chapter describes the foreseeable environmental consequences of implementing the three management alternatives described in Chapter 2. When detailed information is available, a scientific and analytic comparison between alternatives and their anticipated consequences is presented, which is described as "impacts" or "effects." When detailed information is not available, anticipated consequences are based on knowledge of the site, past observations and the professional judgment and experience of Refuge staff and Service biologists.

4.1 Summary of Effects

4.1.1 Abiotic Environment

4.1.1.1 Soils

Alternative 1 (No Action)

Direct/Indirect Effects

Under this alternative, soils would undergo natural erosion, sedimentation and disturbance.

Cumulative Effects

Natural processes such as erosion would continue. No cumulative effects on soil fertility would occur.

Alternative 2 (Proposed Action)

The proposed alternative would include temporary skid trails and loading sets. Direct impacts would include soil compaction and erosion from heavy equipment. A temporary increase in soil movement can be expected due to vegetation removal and use of logging equipment. Based on previous operations under similar conditions, the actual implementation of the proposed action is expected to take 6-10 weeks and compaction would be minimized due to such a short time that heavy equipment would be on site. Logging would not be allowed when soils are wet as recommended by Mississippi's Best Management Practices (BMP) (http://www.mfc.ms.gov/pdf/Mgt/WQ/Entire_bmp_2008-7-24.pdf) (Mississippi Forestry Commission 2008). These impacts would also be mitigated through construction of water bars and re-seeding of loading sets recommended by BMPs (MS For. Comm. 2008). Log landings, main skidder trails and temporary log roads would be disked, seeded with winter wildlife grass mix and fertilized after harvest operations cease as recommended by BMPs (MS For. Comm. 2008).

Cumulative Effects

Mitigation measures and implementation of Best Management Practices including not harvesting timber when soils are wet would result in minimal soil effects. Timber harvest

activities would not occur again in the proposed treatment area for approximately 10 years upon completion of the proposed action, providing more than adequate time for soils to recover.

Alternative 3 (Seed-tree Cut)

Direct/Indirect Effects

This alternative would include temporary skid trails and loading sets. Direct impacts would include soil compaction and erosion from heavy equipment. A temporary increase in soil movement can be expected due to vegetation removal and use of logging equipment. Actual implementation would take 4-8 weeks. Compaction would be minimized due to such a short time that heavy equipment would be on site. Logging would not be allowed when soils are wet as recommended by Mississippi's Best Management Practices (BMP) (http://www.mfc.ms.gov/pdf/Mgt/WQ/Entire_bmp_2008-7-24.pdf) (Mississippi Forestry Commission 2008). These impacts would also be mitigated through construction of water bars and re-seeding of loading sets recommended by BMPs (MS For. Comm. 2008). Log landings, main skidder trails and temporary log roads would be disked, seeded with winter wildlife grass mix and fertilized after harvest operations cease as recommended by BMPs (MS For. Comm. 2008).

Cumulative Effects

Mitigation measures and implementation of Best Management Practices including not harvesting timber when soils are wet would result in minimal soil effects. Timber harvest activities would not occur again in the proposed treatment area for at least 10 years providing more than adequate time for soils to recover.

4.1.1.2 Water

Alternative 1 (No Action)

Direct/Indirect Effects

Under this alternative, water quality would be influenced by natural influences already in place. Water tables would fluctuate in response to storms, fires, insect outbreaks, rainfall, etc.

Cumulative Effects

No cumulative effects would occur under this alternative.

Alternative 2 (Proposed Action)

Direct/Indirect Effects

Increases in water are generally associated with reduced vegetative cover. However the proposed action would have negligible effects on water resources in the 199 acres

impacted by this alternative. The site is not in a floodplain nor are there any streams in the proposed treatment areas.

Cumulative Effects

Under this alternative, no cumulative effects are expected. Timber harvest activities would not occur again in the proposed treatment area for at least another 10 years. No streams or floodplains exist in the treatment areas. Existing State water quality criteria and use classifications are adequate to achieve desired on-refuge conditions; thus, implementation of the proposed action would not impact adjacent landowners or users beyond the constraints already implemented under existing State standards and laws.

Alternative 3 (Seed-tree Cut)

Direct/Indirect Effects

Increases in water are generally associated with reduced vegetative cover. However the timber harvest would have negligible effects on water in such a small area of 74 acres. The site is not in a floodplain nor are there any streams in these stands.

Cumulative Effects

Under this alternative, no cumulative effects are expected. Timber harvest activities would not occur again in the proposed treatment area for at least another 10 years. No streams or floodplains exist in these stands. Existing State water quality criteria and use classifications are adequate to achieve desired on-refuge conditions; thus, implementation of this alternative would not impact adjacent landowners or users beyond the constraints already implemented under existing State standards and laws.

4.1.1.3 Air

Alternative 1 (No Action)

Direct/Indirect Effects

Under this alternative, the impacts to air quality would include current influences already in place from nearby settlements and transportation.

Cumulative Effects

No cumulative effects would occur under this alternative.

Alternative 2 (Proposed Action)

Direct/Indirect Effects

Short-term effects on air quality are expected with dust from timber harvesting and exhaust from heavy equipment operation. Under this alternative, there would be a small

additional temporary increase in air pollutants. However, the short period of timber harvest (6-10 weeks) would mitigate this effect to negligible levels.

Cumulative Effects

Anticipated negative effects are associated with emissions from heavy equipment used during harvest. Harvest should only take 6-10 weeks and would not occur again in the proposed treatment area for at least 10 years. No cumulative short or long-term effects are anticipated.

Alternative 3 (Seed-tree Cut)

Direct/Indirect Effects

Short-term effects on air quality are expected with dust from timber harvesting and exhaust from heavy equipment operation. Under this alternative, there would be a small additional temporary increase in air pollutants. However, the short period of timber harvest (4-8 weeks) would mitigate this effect to negligible levels.

Cumulative Effects

Anticipated negative effects are associated with emissions from heavy equipment used during harvest. Harvest should only take 4-8 weeks and would not occur again in the proposed treatment area for at least 10 years. No cumulative short or long-term effects are anticipated.

4.1.2 Biotic Environment

4.1.2.1 Vegetation

Alternative 1 (No Action)

Direct/Indirect Effects

Under this alternative, the proposed treatment areas would not be harvested. In 10 years, the stands would be re-evaluated for silvicultural treatment. The pine and hardwood trees would continue maturing until a storm, fire, insect outbreak or other natural disturbance alters the stands. The stands would not be suitable now or in the future as habitat for the endangered red-cockaded woodpecker due to the high basal area of hardwood and pine trees (USFWS 2003).

Cumulative Effects

Late succession, shade tolerant hardwood species would accumulate in the stands. Future habitat for red-cockaded woodpeckers would not be available in these stands.

Alternative 2 (Proposed Action)

Direct/Indirect Effects

Under this alternative, the 199 acres of treatment areas would be harvested according to the Refuge's 2012 Timber Prescription for Compartment 10 and 27. Approximately 60 ft^2/ac of pine basal area would remain in the stands post-harvest. Thinning the treatment areas would cause the habitat to immediately become suitable for RCWs according to the RCW Recovery Plan (USFWS 2003) and meet Objective A.1 in the Refuge's CCP (USFWS 2004). These stands would be maintained as RCW habitat utilizing prescribed fire, creating an understory comprised of grasses and forbs (USFWS 2003).

Cumulative Effects

Implementation of the proposed action alternative is not expected to have measurable negative cumulative impacts on vegetation. On the contrary, plant species diversity would increase due to sunlight reaching the forest floor, the probability of insect outbreaks would be reduced, and RCW foraging habitat would be increased for the future.

Alternative 3 (Seed-tree Cut)

Direct/Indirect Effects

Under this alternative, 74 acres in Compartment 27 would be harvested to leave approximately 5-6 residual pine trees per acre. Young pine trees would be regenerated as required in the Refuge's CCP (USFWS 2004, *Objective A.1.2*); however, habitat would not be suitable for RCWs for at least 30 years post-harvest (USFWS 2003). Herbaceous grassy understories may develop immediately but would be very short-lived as young pine trees grow and shade-out other vegetation.

Cumulative Effects

Implementation of this alternative is not expected to have measurable negative cumulative impacts on vegetation. Positive cumulative effects are RCW habitat would be provided in 30 years post-harvest. This alternative would have little effect however on balancing the age class distribution of pine on the Refuge due to the small number of acres involved.

4.1.2.2 Threatened and Endangered Species

Alternative 1 (No Action)

Direct/Indirect Effects

Currently the proposed treatment areas are in poor to unsuitable conditions as good quality foraging habitat for RCW. Under this alternative, the habitat condition would not change in the short-term. Habitat would continue to decline as excessive hardwoods in the midstory and canopy continue to grow.

Cumulative Effects

The stands conditions would not improve from poor to unsuitable for red-cockaded woodpeckers in the future.

Alternative 2 (Proposed Action)

Direct/Indirect Effects

An Intra-service Section 7 Evaluation associated with this assessment was conducted, and it was determined that the proposed action is not likely to adversely affect the red-cockaded woodpecker (Refer to 2012 Intra-Service Section 7 Evaluation for Timber Prescription for Compartment 10 and 27 on Sam D. Hamilton Noxubee NWR).

Forty-two acres of the 199-acre treatment area fall within the foraging partitions of six RCW clusters (Figure 4). A survey conducted by an outside contractor concluded that two (Cluster 94 & 23) of the six clusters were active (Carter III & Associates 2012). The treatment areas do not include any of the RCW nesting clusters themselves and therefore, no inactive or active RCW cavity trees would be affected. Although these 42 acres are within the foraging partitions of two active clusters, these acres appear to be poor to unsuitable as RCW foraging/nesting habitat currently. The proposed action would immediately improve habitat for RCWs by reducing pine and hardwood basal area. A foraging analysis was conducted as part of the Section 7 Evaluation to determine if the thinning of 42 acres of pine and hardwoods would reduce RCW foraging habitat below minimum required standards set in the RCW Recovery Plan (USFWS 2003). The results of the foraging habitat analysis indicated the proposed harvest areas are limited due to excessive hardwoods in the midstory and canopy and timber thinning would help improve good quality foraging habitat. After thinning, suitable RCW foraging habitat will be established. The number and size of the remaining pine and hardwoods in the thinned stands will be consistent with the attributes for these pine and hardwood elements of good quality foraging habitat, as described in the RCW Recovery Plan.

Cumulative Effects

Red-cockaded woodpeckers would benefit from the proposed action for the long-term by increasing RCW habitat by 199 acres. These stands would be managed for the RCW indefinitely.

Alternative 3 (Seed-tree Cut)

Direct/Indirect Effects

Ten acres of the 74-acre treatment area fall within the foraging partitions of three RCW clusters. A survey conducted by an outside contractor concluded that all three clusters (Clusters 90, 91, & 101) were inactive (Carter III & Associates 2012). An additional survey during August 2012 conducted by Refuge personnel concluded that the three clusters are still inactive. The treatment areas do not include any of the RCW nesting

clusters themselves and therefore, no RCW cavity trees would be affected. Although these 10 acres are within the foraging partition of three inactive clusters, these acres are not suitable as RCW foraging/nesting habitat currently. A foraging analysis was conducted as part of the Section 7 Evaluation to determine if the removal of the 10 acres of pine would reduce RCW foraging habitat below minimum required standards set in the RCW Recovery Plan (USFWS 2003). The results of the foraging analysis indicated the proposed harvest areas are limited by excessive hardwoods in the midstory and canopy. The seedtree treatment would provide suitable foraging habitat only after 30 years of growth of the regenerated pine following treatment, and with future thinning to provide 40-70 basal area.

Cumulative Effects

Cumulative effects would be beneficial to red-cockaded woodpeckers in the long-term (> 30 years) by ensuring future RCW habitat within this stand through the regeneration of pine as required in the Refuge's CCP (USFWS 2004, *Objective A.1.2*). However, this alternative would have little effect on balancing the age class distribution of pine on the Refuge due to the small number of acres involved.

4.1.2.3 Fishery Resources

No semi-permanent or permanent water features are present within the proposed treatment areas; therefore, all alternatives would have no effect on fishery resources. For effects to water quality, refer to Section 4.1.1.2.

4.1.2.4 Resident Wildlife

Alternative 1 (No Action)

Direct/Indirect Effects

Under this alternative, closed canopy, mixed pine hardwood forest species would continue to utilize these stands until a natural disturbance altered the composition and structure of the forest. Deer and rabbit would have little food and cover available due to the lack of vegetation in the understory.

Cumulative Effects

A negative cumulative effect on early successional species would occur due to the lack of herbaceous, grassy vegetation in the proposed treatment areas. Positive cumulative effects would occur to those species that utilize closed canopy forests; however, over 83% of the Refuge is currently in this condition (*personal comm. R. Smith, Refuge Forester*, USFWS 2004).

Alternative 2 (Proposed Action)

Direct/Indirect Effects

The proposed action would reduce basal area and canopy cover. An increase in grass, forbs, shrubs, and sprouts would result from the increased sunlight to the forest floor. Early successional species that prefer herbaceous, grassy understories would benefit considerably from the opened canopy. Turkeys would utilize the areas for foraging and nesting habitat. Deer and rabbit would benefit from an increased availability of cover and food as vegetation grows in the understory. The proposed action of reducing hardwood trees while retaining mature pine trees is favorable for fox squirrel habitat (Perkins and Conner 2004).

Individual animals would be temporarily displaced and disturbed during harvest; however, surrounding forest would support displaced individuals until timber operations ended. Direct loss of animals could occur if crushed by heavy equipment, especially slower animals such as reptiles and amphibians. Most birds and mammals would be able to move out of the way.

Cumulative Effects

The proposed action would have positive cumulative effects in the future for species that inhabit open mature pine stands with a grassy understory. No negative cumulative impacts are expected on wildlife as a whole.

Alternative 3 (Seed-tree Cut)

Direct/Indirect Effects

This alternative would regenerate the pine forest at the same time opening the canopy allowing sunlight into the stand temporarily. Early successional species that prefer herbaceous, grassy understories would benefit for the first year or two post-harvest. Subsequently, young pine would grow and shade-out the forest floor making the stands unsuitable for early successional species for at least 30 years. After that time, the young trees could be thinned allowing more sunlight to the forest floor.

Individual animals would be temporarily displaced and disturbed during harvest; however, surrounding forest would support displaced individuals. Direct loss of animals could occur if crushed by heavy equipment, especially slower animals such as reptiles and amphibians. Most birds and mammals would be able to move out of the way.

Cumulative Effects

This alternative would have only short-term positive effects for early successional species that inhabit open mature pine stands due to quick growth and shading caused by regenerating pine. No negative cumulative impacts are expected on wildlife as a whole.

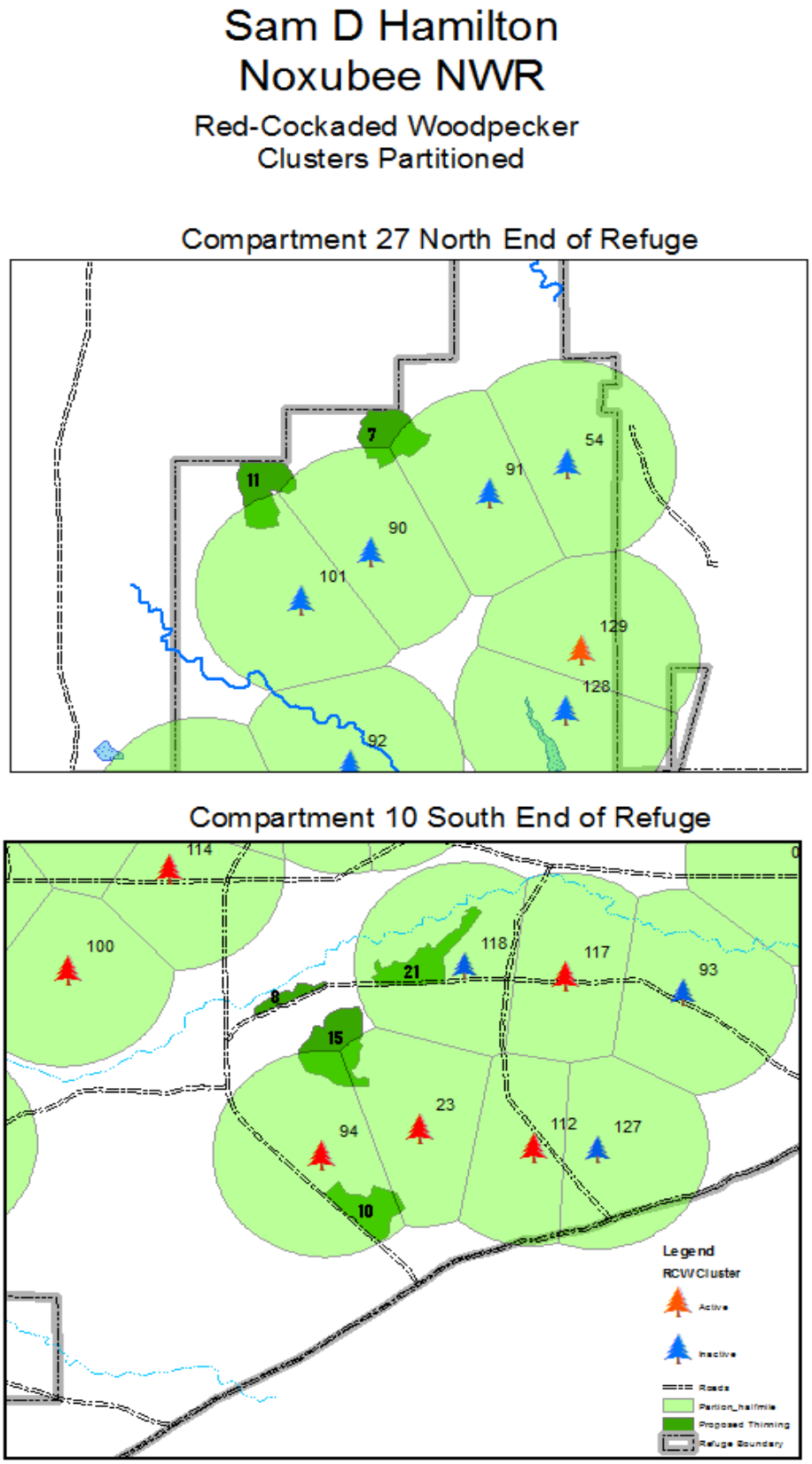

Figure 4. Foraging partitions of those RCW clusters affected by thinning the proposed treatment areas as described in Alternative 2 (Proposed Action).

4.1.2.5 Birds

Alternative 1 (No Action)

Direct/Indirect Effects

Under this alternative, the bird species that are currently present in the proposed treatment areas would continue to utilize these stands until a natural disturbance altered its composition and structure. Bird species that utilize the current mixed pine-hardwood stands have stable and increasing populations in Mississippi, such as pileated woodpeckers, red-eyed vireos, and pine warblers (Sauer *et al*. 2011). High priority species with decreasing population trends in the EGCP (http://www.partnersinflight.org/bcps/plan/pl_04_10.pdf), including red-cockaded woodpecker, Northern bobwhite quail, Bachman's sparrow and brown-headed nuthatch, would not benefit under this alternative.

Cumulative Effects

These stands would not provide short- or long-term habitat for priority bird species including the red-cockaded woodpecker, Northern bobwhite quail, Bachman's sparrow and brown-headed nuthatch.

Alternative 2 (Proposed Action)

Direct/Indirect Effects

Partners in Flight identified red-cockaded woodpecker, Northern bobwhite quail, brown-headed nuthatch, and Bachman's sparrow to be priority species in open pine habitats of the East Gulf Coastal Plain (http://www.partnersinflight.org/bcps/plan/pl_04_10.pdf). All four of these species prefer open mature pine stands with an herbaceous understory. Bachman's sparrows prefer canopy cover to be less than 50% (Tirpack *et al*. 2009) and thinnings produce the early successional, open canopied habitat the sparrows inhabit (Stober and Krementz 2006). Pentovich *et al.* (1998) concludes that RCW and Bachman's sparrow habitat can be managed simultaneously within the same forest stand. Brown-headed nuthatches also benefit from open mature pine (Wilson and Watts 1999) stands similar to those required by red-cockaded woodpeckers. Northern bobwhite quail (Dimmick *et al*. 2002) prefer open pine and early successional habitats with well developed and diverse herbaceous ground cover. The proposed action would create this habitat type for the long-term benefit of all four priority species.

Harvest operations would not be conducted during the breeding season; therefore, no direct loss of bird nests should occur. Birds are highly mobile and should be able to escape heavy equipment traffic. Some minor disturbance would occur to birds in the stand during harvest; however, this would be negligible. The harvest should only take 6-10 weeks to occur and the surrounding forest would provide temporary suitable habitat for displaced birds during timber operations.

Cumulative Effects

Most of the bird species that currently utilize the pine-hardwood stand are habitat generalists such as pileated woodpeckers, red-eyed vireos, and pine warblers which all have increasing populations in Mississippi (Sauer *et al*. 2011). Most likely they would still find the treatment areas acceptable after timber harvest. In addition, an abundance of mid- to late-successional, closed canopy forest exists on the Refuge for these species (USFWS 2004).

Alternative 3 (Seed-tree Cut)

Direct/Indirect Effects

Early successional bird species would benefit from this alternative for only the early years before young pine shade out the forest floor. Red-cockaded woodpeckers would not be able to utilize these stands for at least 30 years post-harvest.

Harvest operations would not be conducted during the breeding season; therefore, no direct loss of bird nests should occur. Birds are highly mobile and should be able to escape heavy equipment traffic. Some minor disturbance would occur to birds in the stand during harvest; however, this would be negligible. The harvest should only take 4-8 weeks to occur and the surrounding forest would provide temporary suitable habitat for displaced birds during timber operations.

Cumulative Effects

Some species of birds that currently utilize the pine-hardwood stand would no longer find the stand acceptable after timber harvest due to the drastic reduction in overstory trees. This effect would be alleviated after young pine trees reached maturity (> 50 years). An abundance of mid- to late-successional, closed canopy forest exists on the Refuge for these species (USFWS 2004). Early successional bird species would use the stand prior to the stand reaching maturity. Red-cockaded woodpeckers could utilize these stands after 30 years post-harvest.

4.1.3 Social Environment

4.1.3.1 Cultural Resources

Alternative 1 (No Action)

Direct/Indirect Effects

No direct or indirect effects to cultural resources would occur under the no action alternative.

Cumulative Effects

No cumulative effects would occur under the no action alternative.

Alternative 2 (Proposed Action)

Direct/Indirect Effects

No known historic properties are located within the proposed treatment areas. The Regional Historic Preservation Officer will determine whether the proposed undertaking has the potential to impact cultural resources, identify the "area of potential effect," determine the appropriate level of scientific investigation necessary to ensure legal compliance, and will initiate consultation with the Mississippi State Historic Preservation Office (SHPO) and federally recognized Tribes.

If the consultation indicates that there is a potential for unrecorded historic properties in the project area, surveys will be conducted to locate, evaluate, assess and avoid adverse effects to any significant property in the area of potential effect.

Cumulative Effects

No cumulative effects would occur under the proposed action alternative.

Alternative 3 (Seed-tree Cut)

Direct/Indirect Effects

No known historic properties are located within the proposed treatment areas. The Regional Historic Preservation Officer will determine whether the proposed undertaking has the potential to impact cultural resources, identify the "area of potential effect," determine the appropriate level of scientific investigation necessary to ensure legal compliance, and will initiate consultation with the Mississippi State Historic Preservation Office (SHPO) and federally recognized Tribes.

If the consultation indicates that there is a potential for unrecorded historic properties in the project area, surveys will be conducted to locate, evaluate, assess and avoid adverse effects to any significant property in the area of potential effect.

Cumulative Effects

No cumulative effects would occur under the proposed action alternative.

4.1.3.2 Refuge Facilities

Alternative 1 (No Action)

Direct/Indirect Effects

No direct or indirect effects to refuge facilities would occur under the no action alternative.

Cumulative Effects

No cumulative effects would occur under the no action alternative.

Alternative 2 (Proposed Action)

Direct/Indirect Effects

Negligible impacts would occur to refuge roads by log trucks. Logging would not be allowed during wet conditions and temporary logging roads would be re-vegetated according to BMPs (MS For. Comm. 2008).

Cumulative Effects

No cumulative effects would occur under the proposed action alternative.

Alternative 3 (Seed-tree Cut)

Direct/Indirect Effects

Negligible impacts would occur to refuge roads by log trucks. Logging would not be allowed during wet conditions and temporary logging roads would be re-vegetated according to BMPs (MS For. Comm. 2008).

Cumulative Effects

No cumulative effects would occur under this alternative.

4.1.3.3 Wildlife-dependent Recreation

Alternative 1 (No Action)

Direct/Indirect Effects

Wildlife-dependent recreation including hunting, wildlife observation and photography would not be affected under this alternative.

Cumulative Effects

No cumulative effects would occur to wildlife-dependent recreation.

Alternative 2 (Proposed Action)

Direct/Indirect Effects

Wildlife-dependent recreation that occurs within the proposed treatment areas includes hunting, wildlife observation and photography. These opportunities would not be reduced under this alternative. The public would continue to hunt in designated areas.

Numbers and species of game after timber harvest may be slightly and temporarily altered. However, treatment areas would have an increase in game species such as fox squirrels, rabbits, deer, quail and turkey due to their preference for open pine and/or grassy ground cover.

Aesthetics are often decreased immediately after a timber harvest. However, within a year, the proposed treatment areas would appear park-like with open, grassy understories which can be very aesthetically pleasing.

Priority species such as red-cockaded woodpeckers, Northern bobwhite quail and Bachman's sparrows are often difficult to observe due their regional population declines. The proposed action alternative would benefit these species making them more abundant within the treatment areas. This would allow for an increased opportunity by the public to observe and photograph these less common species.

Cumulative Effects

Cumulative effects would largely be positive in that game species would continue to be present within the treatment areas, aesthetics would continue to be pleasing in the future and wildlife observation and photography opportunities would be increased for the long-term.

Alternative 3 (Seed-tree Cut)

Direct/Indirect Effects

The public would continue to hunt in designated areas. Numbers and species of game after timber harvest would be altered. The first year or two post-harvest may have an increase in game species; however, young pine trees would soon close in causing the understory to be shaded out. Deer and turkey would still utilize this habitat but not in high numbers due to the lack of food and cover. Rabbits would initially utilize these stands but it would quickly become unsuitable for rabbits. Young pine stands do provide medium to low quality habitat for gray squirrels but not fox squirrels. Quail would utilize these stands only for the first year or two.

Aesthetics are often decreased immediately after a timber harvest. However, within a year, vegetation covers unsightly logging debris. The view of these stands would be blocked as regenerated pines grow, making opportunities for wildlife observation and photography reduced.

Cumulative Effects

In 25-30 years, these areas would eventually begin to be managed for wildlife habitat improvement once again. Any negative impacts of the harvest would have been alleviated.

4.1.3.4 Socio Economic

Alternative 1 (No Action)

Direct/Indirect Effects

No economic benefit from timber harvest would occur to the local public under this alternative. Neither logging companies, local saw mills, nor the businesses that depend on these operations receive any economic gain.

Cumulative Effects

No cumulative effects would occur under this alternative.

Alternative 2 (Proposed Action)

Direct/Indirect Effects

The proposed alternative is such a small timber operation occurring for only 6-10 weeks that any economic benefits to the local economy would be extremely small and short-lived.

Cumulative Effects

No cumulative effects would occur under this alternative.

Alternative 3 (Seed-tree Cut)

Direct/Indirect Effects

The proposed alternative is such a small timber operation occurring for only 4-8 weeks that any economic benefits to the local economy would be extremely small and short-lived.

Cumulative Effects

No cumulative effects would occur under this alternative.

4.1.3.5 Environmental Justice

Executive Order 12898 "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations" was signed by President Bill Clinton on February 11, 1994, to focus federal attention on the environmental and human health conditions of minority and low-income populations with the goal of achieving environmental protection for all communities. The Order directed federal agencies to develop environmental justice strategies to aid in identifying and addressing disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority and low-income populations. The Order is also intended to promote nondiscrimination in federal programs substantially affecting

human health and the environment, and to provide minority and low-income communities access to public information and participation in matters relating to human health or the environment. This assessment has not identified any direct, indirect or cumulative effects for any of the alternatives unique to minority or low-income populations in the affected area. None of the alternatives would disproportionately place any adverse environmental, economic, social, nor health impacts on minority or low-income populations.

There are no large population centers located within the refuge's boundary.

4.1.3.6 Public Health and Safety

None of the alternatives would have significant effects to public health and safety. This assessment has not identified any direct, indirect or cumulative effects for any of the alternatives.

4.2 Irreversible and Irretrievable Commitments of Resources

An irreversible commitment of resources refers to resources that are renewable only after a long period of time or non-renewable resources such as cultural resources. Irretrievable commitment of resources refers to losses of the productivity or use of renewable resources.

Under the no action alternative, the proposed treatment areas would continue towards senescence and lower species diversity. Pine trees would not be regenerated. Open mature pine forests with herbaceous ground cover and the species supported by this habitat type would not occur.

Under the proposed action alternative, some of the overstory pine and hardwood trees would be lost. However, the trees currently present in this stand would eventually be lost to natural causes; therefore, the harvested trees are not irretrievable resources. The overstory hardwood trees would be lost and future management would favor pine trees over hardwoods, representing an irretrievable commitment of hardwood trees.

4.2 Comparison of Alternatives

Table 3. Comparison of Environmental Impacts of Each Alternative to the Affected Environment.

	Soil	Water	Air	Vegetation	RCW	Fishery Resources	Resident Wildlife
Alternative 1 (No Action)	No changes from human action are associated with this alternative	No changes from human action are associated with this alternative	No changes from human action are associated with this alternative	No changes from human action are associated with this alternative	Not suitable for RCW habitat now or in future	No changes from human action are associated with this alternative	Current species continue utilizing treatment areas; Little food or cover available to deer and rabbit
Alternative 2 (Proposed Action)	Temporary and minor disturbance to soils would occur to treatment areas	Negligible effects to water would occur to treatment areas	Temporary and minor negative effects to air quality would occur to treatment areas	199 acres of pine hardwood forest would be thinned down to 60 ft^2/acre of pine basal area; open canopy would provide sunlight to forest floor creating herbaceous understory	Immediately become suitable for RCW habitat and would be future RCW habitat	No changes from human action are associated with this alternative	Increased herbaceous vegetation would increase food and cover for quail, turkeys, deer, rabbit; turkey nesting habitat created; Fox squirrels and foraging bats benefit from opened canopy; direct loss could occur to individual animals such as reptiles and amphibians during harvest operations
Alternative 3	Temporary and minor disturbance to soils would occur to treatment areas	Negligible effects to water would occur to treatment areas	Temporary and minor negative effects to air quality would occur to treatment areas	74 acres of pine hardwood forest would be cut leaving 6 pine trees/acre to regenerate pine; open canopy would create short-lived herbaceous understory until young regenerated pine grew to shade forest floor	Suitable for RCW habitat in the future (>30 years)	No changes from human action are associated with this alternative	Short-lived benefit to deer, rabbit, turkey, fox squirrel, and bats. Closed canopy species would no longer find treatment area suitable; direct loss could occur to individual animals such as reptiles and amphibians during harvest operations

Table 3. Comparison of Environmental Impacts of Each Alternative to the Affected Environment (continued).

	Birds	Cultural Resources	Refuge Facilities	Wildlife-dependent Recreation	Socio Economic	Environmental Justice	Public Health and Safety
Alternative 1 (No Action)	Species that prefer closed canopy mixed pine hardwood forest would continue use; priority bird species in upland pine forest would not benefit	No changes from human action are associated with this alternative	No changes from human action are associated with this alternative	No changes from human action are associated with this alternative	No economic benefit would occur to local economy	No changes from human action are associated with this alternative	No changes from human action are associated with this alternative
Alternative 2 (Proposed Action)	Priority bird species of upland pine forest, RCW, quail, brown-headed nuthatch, and Bachman's sparrow, benefit from opened canopy and herbaceous understory	No known historic properties are located within the treatment areas. Regional Historic Preservation Officer to determine if proposed action could potentially impact cultural resources.	Negligible impacts would occur to refuge roads; log trucks would not be allowed to operate in wet conditions. Log landings, main skidder trails and temporary log roads would be disked, seeded with winter wildlife grass mix and fertilized after harvest operations cease.	Games species such as fox squirrel, rabbit, deer, quail and turkey would increase. Lesser common priority species would be present for viewing and photographic opportunities.	The proposed alternative is such a small timber operation occurring for only 6-10 weeks that any economic benefits to the local economy would be extremely small and short-lived.	No changes from human action are associated with this alternative	No changes from human action are associated with this alternative
Alternative 3	Species that prefer closed canopy mixed pine hardwood forest would be displaced; however, over 95% of Refuge is in a closed canopy condition. Priority bird species would benefit in the long-term when young pine trees mature and are thinned (>30 years)	No known historic properties are located within the treatment areas. Regional Historic Preservation Officer to determine if proposed action could potentially impact cultural resources.	Negligible impacts would occur to refuge roads; log trucks would not be allowed to operate in wet conditions. Log landings, main skidder trails and temporary log roads would be disked, seeded with winter wildlife grass mix and fertilized after harvest operations cease.	Game species would increase temporarily and then decline for at least next 30 years as young pine trees matured. View of treatment areas limited due to young pine regeneration.	The proposed alternative is such a small timber operation occurring for only 4-8 weeks that any economic benefits to the local economy would be extremely small and short-lived.	No changes from human action are associated with this alternative	No changes from human action are associated with this alternative

4.3 Cumulative Impacts

Cumulative effects on the environment result from incremental effects compounding with other actions from the past, present, and future actions to have greater impact than any one action has by itself. The proposed project's negative impacts are not expected to contribute to those of other actions within the forest to create unacceptable levels of cumulative impacts. The proposed action is not a continuous activity and will only occur over the period of approximately 6-10 weeks. The current and future versions of Mississippi's Best Management Practices handbook will be followed in regards to streamside management zones, skid trails and haul roads, forest harvesting, and other topics for which it is written to help ensure no cumulative impacts occur concerning water quality. Future plans for forest management within this stand would likely occur no earlier than 10 years, providing more than adequate time for effects of the proposed action to dissipate. However, there may be some minor ecological impacts (slight short-term compaction, short-term loss of some vegetation, and a slight decrease in air quality while equipment is actively running within the stands). In a relatively short time, the ecological benefits will greatly outweigh the short term negative impacts.

The proposed action is designed to improve the ecological health of the stands. We do expect there will be and should be positive cumulative effects that ultimately result in higher quality good foraging habitat for the RCWs. It is also the goal for these positive cumulative impacts to increase quality habitat for other species including Bachman's sparrow, Northern bobwhite, fox squirrel, brown headed nuthatch and Eastern wild turkey.

Probable future actions would be designed to be beneficial to the stands' habitat, the wildlife dependent on that habitat and the greater environment. Future actions will likely include prescribed fire, herbicide treatments to control woody vegetation, mechanical treatments to control woody vegetation and possible future thinning procedures if required to manage these stands basal area levels. Again, the likely cumulative future effects should be positive.

Chapter 5 Consultation and Coordination with Others

As part of this evaluation, the refuge staff has coordinated with Will McDearman, Fish and Wildlife Service, Red-cockaded Woodpecker Recovery Coordinator and Kathy Lunceford, Ecological Services Biologist. Will McDearman has assisted the refuge in conducting Forage Habitat Analyses for the areas proposed for management. He has also conducted a site visit to Compartment 27 - Stands 7 and 11. Kathy Lunceford conducted the Section 7 review. The refuge staff has also coordinated planning with Travis and Debbie Prisock, Prisock Brothers Logging, Incorporated who have vested ownership in the timber located with Compartment 27 - Stands 7 and 11 as part of the timber-for-land exchange.

Staff within the Southeast Region, Regional Office, including Refuge Supervisor Elizabeth Souheaver, Deputy Refuge Supervisor Holly Gaboriault, NEPA Coordinator Richard Warner, Regional Biologist Chuck Hunter and Deputy Regional Forester Haven Barnhill have reviewed and commented throughout the development of the plans and support documents.

Chapter 6 Literature References

Carter III, J.H., Dr. & Associates. 2012. A letter to Noxubee NWR and summary report of 2012 red-cockaded woodpecker breeding season field work on Noxubee NWR. Southern Pines, NC. 21 pp.

Dimmick, R.W., M.J. Gudlin, and D.F. McKenzie. 2002. The northern bobwhite conservation initiative. Miscellaneous publication of the Southeastern Association of Fish and Wildlife Agencies, South Carolina. 96 pp.

Loeb, S.C. and J.M. O'Keefe. 2006. Habitat use by forest bats in South Carolina in relation to local, stand, and landscape characteristics. Journal of Wildlife Management 70(5): 1210-1218.

Mississippi Forestry Commission. 2008. Mississippi's Best Management Practices, 4th edition. 52 pp.

Mississippi Museum of Natural Science. (2005) Mississippi's Comprehensive Wildlife Conservation Strategy. Mississippi Department of Wildlife, Fisheries and Parks, Mississippi Museum of Natural Science, Jackson, Mississippi.

Perkins, M.W. and L.M. Conner. 2004. Habitat use of fox squirrels in southwestern Georgia. Journal of Wildlife Management 68(3): 509-513.

Perry, R.W., R.E. Thill, and D.M. Leslie, Jr. 2007. Selection of roosting habitat by forest bats in a diverse forested landscape. Forest Ecology and management 238: 156-166.

Plentovich, S., J.W. Tucker, Jr., N.R. Holler and G.E. Hill. 1998. Enhancing Bachman's sparrow habitat via management of red-cockaded woodpeckers. Journal of Wildlife Management 62(1): 347-354.

Sauer, J. R., J. E. Hines, J. E. Fallon, K. L. Pardieck, D. J. Ziolkowski, Jr., and W. A. Link. 2011. The North American Breeding Bird Survey, Results and Analysis 1966 - 2009. Version 3.23.2011 USGS Patuxent Wildlife Research Center, Laurel, Maryland [Trend Analysis Form - http://www.mbr-pwrc.usgs.gov/bbs/trend/tf09.html]

Stober, J. M., and D. G. Krementz. 2006. Variation in Bachman's sparrow home-range size at the Savannah River site, South Carolina. Wilson Journal of Ornithology 118:138-144.

Tirpak, J. M., D. T. Jones-Farrand, F. R. Thompson, III, D. J. Twedt, and W. B. Uihlein, III. 2009. Multiscale habitat suitability index models for priority landbirds in the Central hardwoods and West Gulf Coastal Plain/Ouachitas Bird Conservation Regions. U.S. Forest Service General Technical Report NRS-49, Northern Research Station, Newton Square, Pennsylvania, USA, 195 pp.

U.S. Fish and Wildlife Service. 2004. Noxubee National Wildlife Refuge Comprehensive Conservation Plan, Atlanta, GA. 200 pp.

U.S. Fish and Wildlife Service. 2003. Recovery plan for the red-cockaded woodpecker (*Picoides borealis*): second revision. U.S. Fish and Wildlife Service, Atlanta, GA. 296 pp.

Wilson, M.D. and B.D. Watts. 1999. Response of Brown-headed Nuthatches to thinning of pine plantations. The Wilson Bulletin, 111(1): 56-60.

Chapter 7 List of Preparers

Dr. Steven Reagan
Sam D. Hamilton Noxubee NWR
2970 Bluff Lake Road
Brooksville, MS 39739

Steven E. Lewis
Sam D. Hamilton Noxubee NWR
2970 Bluff Lake Road
Brooksville, MS 39739

Richard E. Smith
Sam D. Hamilton Noxubee NWR
2970 Bluff Lake Road
Brooksville, MS 39739

Gypsy Hanks
North Louisiana Refuges Complex
11372 Hwy 143
Farmerville, LA 71241

Appendix Response To Public Comments

The Service solicited public comment for the 2012 Noxubee Timber Prescription for Compartment 10 and 27 and associated Environmental Assessment. The 18-day review period began August 10, 2012 and ended on August 27, 2012. Public notice was provide through posting an announcement at the refuge's visitor center and the following media: Winston County Journal, Choctaw Plaindealer, Macon Beacon, Starkville Daily News, Commercial Dispatch, Daily Times Leader, Reflector, and Columbus Packet.

A copy of the prescription and associated environmental documents was available at the Starkville-Oktibbeha County Library (326 University Drive, Starkville, MS), Noxubee County Library (100 West Main Street, Brooksville, MS), Winston County Library (301 West Park Street, Louisville, MS), the refuge's visitor center or by visiting the refuge's website (http://www.fws.gov/noxubee/). Comment period closes on August 27, 2012. Comments can be sent to Project Leader, 2970 Bluff Lake Road, Brooksville MS 39739 or emailed with "Comments" in the subject line to: Noxubee@fws.gov.