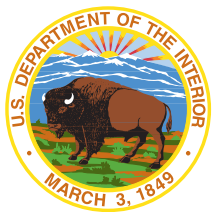


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March 2004



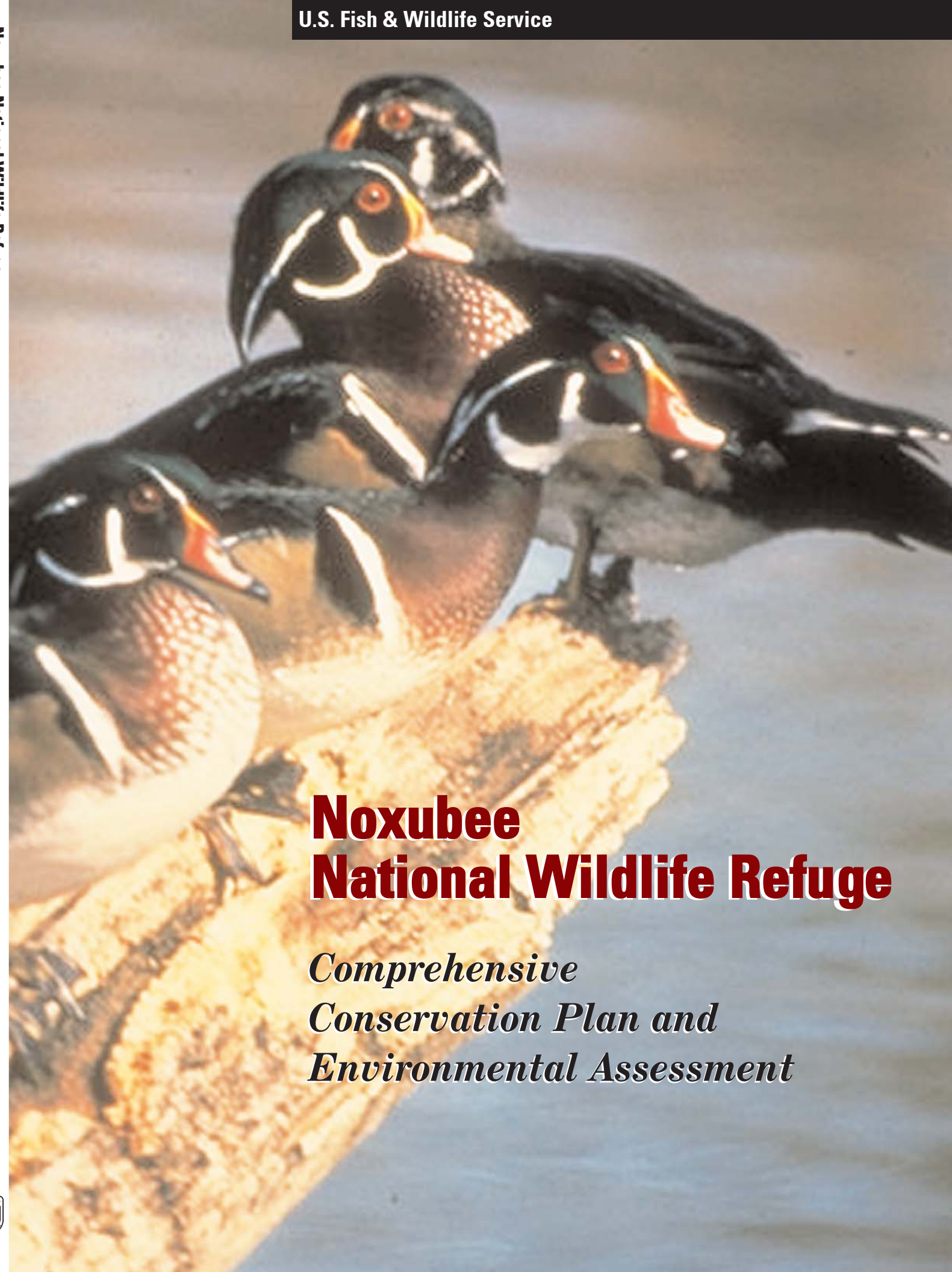
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# Noxubee National Wildlife Refuge

*Comprehensive  
Conservation Plan and  
Environmental Assessment*

*Comprehensive Conservation Plans provide long-term guidance for management decisions; set forth goals, objectives, and strategies needed to accomplish refuge purposes; and identify the Fish and Wildlife Service's best estimate of future needs. These plans detail program planning levels that are sometimes substantially above current budget allocations and, as such, are primarily for Service strategic planning and program prioritization purposes. The plans do not constitute a commitment for staffing increases, operational and maintenance increases, or funding for future land acquisition.*

*Noxubee  
National Wildlife Refuge*

**Final Comprehensive  
Conservation Plan**



**Table of Contents**

**Section A. Comprehensive Conservation Plan**

<b>Chapter I. Background</b>	1
Introduction	1
Purpose and Need for the Plan	1
Fish and Wildlife Service	2
Mission	2
Description	2
National Wildlife Refuge System	2
Mission	2
Description	2
Legal Policy Context	3
Relationship to State Wildlife Agency	4
Ecosystem Context	4
Overview	4
Ecological Threats and Problems	6
Conservation Priorities	9

<b>Chapter II. Refuge Description</b>	11
Introduction	11
Refuge History	11
Refuge Purpose	13
Refuge Environment	13
Biological Resources	13
Refuge Administration and Management	17
Physical Resources	25
Social and Economic Environment	26
Cultural Resources	31
Ecological Threats and Problems	32
Conservation Priorities	33

<b>Chapter III. Plan Development</b>	35
Overview	35
Scoping Issues and Concerns	35
Habitats	36
Fish and Wildlife Populations	36
Land Protection and Conservation	36
Education and Visitor Services	36
Refuge Administration	37

<b>Chapter IV. Management Direction</b>	39
Introduction	39
Vision	39
<i>Goals, Objectives, and Strategies</i>	39
A. Habitats	40
B. Fish and Wildlife Populations	46
C. Land Protection and Conservation	49
D. Education and Visitor Services	53
E. Cultural Resources	58
F. Refuge Administration	59

<b>Chapter V. Plan Implementation</b>	63
Background	63
Proposed Projects and Personnel	63
Funding and Personnel	68
Volunteers	68
Partnership Opportunities	70
Step-Down Plans	71
Monitoring and Adaptive Management	72





## ***Section B. Environmental Assessment***

<b>Chapter I. Background</b> .....	75
Introduction .....	75
Purpose and Need for the Plan .....	75
Decisions to be Made .....	76
Planning Study Area .....	76
Comprehensive Conservation Planning Process .....	76
Public Involvement in Planning .....	78
Wildlife and Habitat Management .....	79
Recreation and Public Use .....	79
Land Protection and Conservation .....	80
Refuge Administration and Management .....	80
<b>Chapter II. Alternatives</b> .....	81
Formulation of Alternatives .....	82
Description of Alternatives .....	82
Alternative 1 .....	82
Alternative 2 .....	86
Alternative 3 .....	89
Features Common to All Alternatives .....	92
Comparison of Alternatives .....	93
Proposed Action .....	114
Alternatives Considered but Eliminated from Detailed Analysis .....	115
Compatible Secondary Uses .....	115
Other Management .....	116
<b>Chapter III. Affected Environment</b> .....	116
<b>Chapter IV. Environmental Consequences</b> .....	117
Overview .....	117
Effects Common to All Alternatives .....	117
Biological Resources .....	119
Physical Resources .....	120
Social and Economic Resources .....	122
Cultural Resources .....	123
Unavoidable Adverse Impacts .....	124
Irreversible and Irretrievable Commitment of Resources .....	124
Short-Term Uses Versus Long-Term Productivity .....	124
<b>Chapter V. Consultation and Coordination</b> .....	125
<b>Appendices</b>	
A. Glossary .....	127
B. References .....	134
C. Relevant Legal Mandates .....	136
D. Biota .....	142
E. Intra-Service Section 7 Biological Evaluation .....	153
F. Compatibility Determinations .....	157
G. Land Aquisition .....	170
H. Comments and Service Responses to the Draft Comprehensive Conservation Plan .....	174
<b>Figures</b>	
1. Fish and Wildlife Service's Central Gulf Ecosystem Region .....	5
2. Noxubee National Wildlife Refuge Location .....	12
3. Priority Migratory Neotropical Bird Species found at Noxubee National Wildlife Refuge .....	15
4. Current Refuge Land Cover .....	19



5. Forest Types and Acreages at Noxubee National Wildlife Refuge .....	21
6. Current Refuge Management Areas and Roads .....	23
7. Projected Public Use at Noxubee National Wildlife Refuge .....	28
8. Approved Acquisition Boundary for Noxubee National Wildlife Refuge .....	51
9. Existing and Proposed Visitor Facilities .....	54
10. Proposed Project and Personnel Cost Summary .....	70
11. Personnel Needed to Fully Implement Plan .....	71
12. Planning Study Area .....	77
13. Alternative 1, Current Conditions .....	83
14. Alternative 1, Staffing Chart .....	86
15. Alternative 2, Proposed Conditions .....	87
16. Alternative 3, Proposed Conditions .....	90
17. Alternatives 2 and 3, Staffing Chart .....	92
18. Comparison of Alternatives .....	94
19. Comprehensive Conservation Planning Team for Noxubee National Wildlife Refuge .....	125
20. Protection Priorities for the Proposed Expansion at Noxubee National Wildlife Refuge and Recommended Methods of Acquisition .....	172
21. Land Acquisition Priorities for the Proposed Expansion at Noxubee National Wildlife Refuge .....	173



# Guiding Principals of the National Wildlife Refuge System

We are land stewards, guided by Aldo Leopold's teachings that land is a community of life and that love and respect for the land is an extension of ethics. We seek to reflect that land ethic in our stewardship and to instill it in others.

Wild lands and the perpetuation of diverse and abundant wildlife are essential to the quality of the American life.

We are public servants. We owe our employers, the American people, hard work, integrity, fairness, and a voice in the protection of their trust resources.

Management, training from preservation to active manipulation of habitats and populations, is necessary to achieve the missions of the National Wildlife Refuge System and the U.S. Fish and Wildlife Service.

Wildlife-dependent uses involving hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation, when compatible, are legitimate and appropriate uses of the National Wildlife Refuge System.

Partnerships with those who want to help us meet our mission are welcome and indeed essential.

Employees are our most valuable resource. They are respected and deserve an empowering, mentoring, and caring work environment.

We respect the rights, beliefs, and opinions of our neighbors.



**Section A.  
Final Comprehensive  
Conservation Plan**

**CHAPTER I - Background**

# I. BACKGROUND

## Introduction

Contained in this Comprehensive Conservation Plan for Noxubee National Wildlife Refuge is a description of the long-term management actions and direction for the refuge. When fully implemented, this plan should achieve the refuge vision. Overriding considerations reflected in the plan are that fish and wildlife conservation requires first priority in refuge management; and that wildlife-dependent recreation is allowed and encouraged as long as it is compatible with, or does not detract from, the mission of the refuge or the purposes for which it was established.



*White-tailed deer  
USFWS Photo*

A planning team developed a range of alternatives that could best achieve the goals of the refuge and that could be implemented. After reviewing comments and management needs the alternatives were evaluated. The alternative chosen to manage the refuge is described in Section A, Chapter IV, Management Direction. The other alternatives which were considered are addressed in Section B, Environmental Assessment.

## Purpose and Need for the Plan

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 recreation uses. This document identifies the overarching wildlife, public use, and management needs of the refuge.

Specifically, the plan will:

- Provide a clear statement of management direction for the refuge;
- Provide refuge neighbors, visitors, and government officials with an understanding of Service management actions on and around the refuge;
- Ensure that Service management actions, including land protection and recreation/education programs, are consistent with the mandates of the National Wildlife Refuge System;
- Ensure that management of the refuge is consistent with federal, state, and county plans;
- Provide a basis for the development of budget requests for operational, maintenance, and capital improvement needs.

Many agencies, organizations, institutions, and businesses have developed relationships with the Service to advance the mission of national wildlife refuges. This Comprehensive Conservation Plan

**Section A.  
Final Comprehensive  
Conservation Plan**

**CHAPTER I - Background**

supports the Partners-in-Flight Initiative; the North American Waterfowl Management Plan; the American Woodcock Management Plan; the Western Hemisphere Shorebird Reserve Network; and the National Wetlands Priority Conservation Plan. For further information regarding migratory birds, see website <http://birds.fws.gov>.

**Fish and Wildlife Service**

*Mission*

As part of its mission, the Service manages more than 550 national wildlife refuges covering over 92 million acres. These areas comprise the National Wildlife Refuge System, the world's largest collection of lands dedicated to wildlife, with 77 million acres in Alaska, and the remaining acreage spread across the other 49 states and several island territories.

*Description*

The Fish and Wildlife Service is the primary federal agency responsible for conserving, protecting, and enhancing the Nation's fish and wildlife populations and their habitats. Although the Service shares some conservation responsibilities with other federal, state, tribal, local, and private entities, it has specific trust responsibilities for migratory birds, threatened and endangered species, anadromous fish, and certain marine mammals. In addition, the Service administers a national network of lands and waters for the management and protection of these resources.

**National Wildlife Refuge System**

*Mission*

The mission of the National Wildlife Refuge System, as defined by the National Wildlife Refuge System Improvement Act of 1997, is: "...to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife and plant resources and their habitats within the United States for the benefit of present and future generations of Americans."

*Description*

The National Wildlife Refuge System Improvement Act of 1997, established, for the first time, a clear legislative mission of wildlife conservation for the National Wildlife Refuge System. Activities were initiated in 1997 to complement the direction of this new legislation, including an effort to complete comprehensive conservation plans for all refuges within a 15-year time frame. These plans, which are developed with full public involvement, will assist in guiding management of refuges by establishing natural resource programs as well as recreation/education programs.

The Act states that each refuge shall be managed to:

- Fulfill the mission of the National Wildlife Refuge System;
- Fulfill the individual purpose of each refuge;
- Consider the needs of wildlife first;
- Fulfill requirements of comprehensive conservation plans that are prepared for each unit of the refuge system;



*Noxubee  
National Wildlife Refuge*

**Section A.  
Final Comprehensive  
Conservation Plan**

**CHAPTER I - Background**



*Wildlife viewing  
USFWS Photo*

- Maintain the biological integrity, diversity, and environmental health of the refuge system; and
- Recognize that wildlife-dependent recreation activities including hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation are legitimate and priority public uses.

The Act also retains refuge managers' authority to use sound professional judgement in determining compatible uses on national wildlife refuges and whether or not they will be allowed. It establishes a formal process for determining "compatible use."

Approximately 37.5 million people visited national wildlife refuges in 1998—most to observe wildlife in their natural habitats. As visitation grows on refuges, there are significant economic benefits to local communities. Economists found that refuge visitors contribute more than \$400 million annually to local economies. Nearly 40 percent of the country's adults spent \$101 billion on wildlife-related pursuits in 1996, according to the Fish and Wildlife Service's National Survey of Fishing, Hunting, and Wildlife-Associated Recreation. Volunteers continue to be a major contributor to the success of the refuge system. In 1998, volunteers contributed more than 1.5 million hours on refuges nationwide, a service valued at more than \$20.6 million.

The wildlife and habitat vision for national wildlife refuges stresses that wildlife come first; that ecosystems and biodiversity are vital concepts in refuge management; that refuges must be healthy and growth strategic; and that the refuge system serves as a model for habitat management with broad participation from others.

*Legal Policy Context*

The mission and goals of the National Wildlife Refuge System, Congressional legislation, Presidential Executive Orders, and international treaties guide administration of national wildlife refuges. Policies for management options of refuges are further refined by administrative guidelines established by the Secretary of the Interior and by policy guidelines established by the Director of the Fish and Wildlife Service. Management options of the refuge's establishing authorities, Public Law 104, Stat. 2957 (Section 108, H.R. 3338), and the National Wildlife Refuge System Improvement Act of 1997, the legal and policy guidance for the operation of national wildlife refuges, are contained in documents and acts listed in Appendix C.

Lands within the National Wildlife Refuge System are closed to public uses unless specifically and legally opened. All programs and uses must be evaluated based on mandates set forth in the National Wildlife Refuge System Improvement Act of 1997. Those mandates are to:

- Contribute to ecosystem goals, as well as refuge purposes and goals;
- Conserve, manage, and restore fish, wildlife, and plant resources and their habitats;
- Monitor the trends of fish, wildlife, and plants;

- Manage and ensure appropriate visitor uses that benefit the conservation of fish and wildlife resources and contribute to the enjoyment of the public; and
- Ensure that visitor activities are compatible with refuge purposes.

#### *Relationship to State Wildlife Agency*

A provision of the National Wildlife Refuge System Administration Act of 1997, and subsequent agency policy, is that the Service shall ensure timely and effective cooperation and collaboration with State fish and wildlife agencies during the course of acquiring and managing refuges. State wildlife management areas and national wildlife refuges provide foundations for protection and contribute to the overall health and sustainment of fish and wildlife species in Mississippi.

The Mississippi Department of Wildlife, Fisheries, and Parks is a state-partnering agency with the Service, charged with enforcement responsibilities for migratory birds and endangered species as well as managing state natural resources. The state's participation and contribution throughout the comprehensive conservation planning process have provided for ongoing opportunities and open dialogue to improve the ecological integrity of fish and wildlife in Mississippi. An integral part of the planning process has been integrating common mission objectives, where appropriate.

The mission of the Mississippi Department of Wildlife, Fisheries, and Parks is to conserve and enhance Mississippi's natural resources, to provide continuing outdoor recreational opportunities, to maintain the ecological integrity and aesthetic quality of the resources, and to ensure socioeconomic and educational opportunities for present and future generations. For more information about the Mississippi Department of Wildlife, Fisheries, and Parks, see website <http://www.mdwfp.com>.

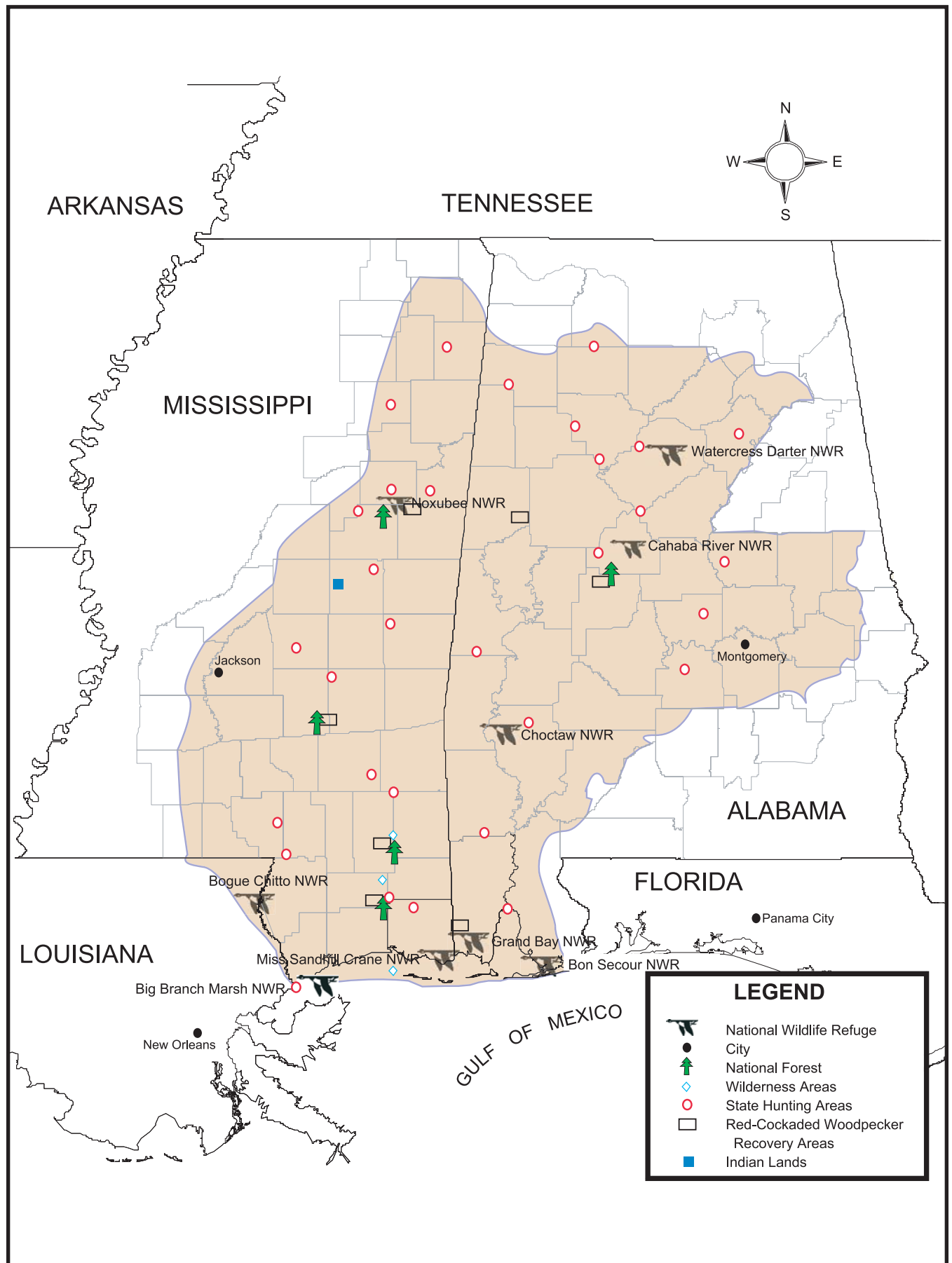
#### **Ecosystem Context**

##### *Overview*

Noxubee National Wildlife Refuge is managed within the Fish and Wildlife Service's biological watershed referred to as the Central Gulf Ecosystem (Fig. 1). This ecosystem once supported a vast collection of habitats. Dominant forces include heavy rainfall supporting abundant flood waters and frequent thunderstorms serving as an ignition source for natural fires. But, flood control, agricultural conversion, intense timber removal/alteration, past logging practices, and other human-induced alterations have affected this ecosystem, leading to significant impacts to water and soil quality, as well as plant and animal abundance and diversity.

Biological diversity, including oak/hickory/pine and bottomland hardwood forests and longleaf pine savannahs, has been severely altered from historic conditions. This has resulted in degradation of the rich composition that once supported diverse communities. Forest structure and quality are influenced by site conditions and fire, as well as past logging practices. Hardwoods are dominant over pine in many stands depending on soil moisture,

**Figure 1. Fish and Wildlife Service's Central Gulf Ecosystem**



**Section A.**  
**Final Comprehensive**  
**Conservation Plan**

**CHAPTER I - Background**



*Loblolly pine*  
*USFWS Photo*

past disturbance, and landowner preference. Most forests are closed-crowned, but longleaf pine savannahs also occur on dry and fire-affected sites. Historically, longleaf pine savannahs were widely dominant on the central gulf coastal plain. The elimination of longleaf pine habitats has decimated some associated wildlife species throughout the ecosystem. Species most adversely affected are area- sensitive or dependent on special habitat requirements, such as the endangered red-cockaded woodpecker which uses open pine habitat (trees 80 to 100 years old) with very open understory maintained by frequent fires.

Most privately owned lands in this ecosystem are disturbed by logging and agriculture and not managed for biological diversity. The financial and technical assistance offered through federal agencies focuses management toward promoting conservation, water quality protection, and fish and wildlife stewardship. This situation is helping the Fish and Wildlife Service to build conservation partnerships, increase species diversity, establish common conservation priorities and goals, and solve common conservation threats and problems.

*Ecological Threats and Problems*

National wildlife refuges in the Central Gulf Ecosystem are presented with a tremendous challenge to sustain and perpetuate biological diversity. Man's activities and the cumulative effects of human development form the basis for significant threats and problems affecting long-term biological diversity. The underlying threats and problems to biological diversity within the ecosystem include:

- Simplification and elimination of wildlife communities and habitats;
- Development and conversion of longleaf pine forests to other pine forest plantations;
- Suppression of fire and the difficulty of public acceptance to use fire as a management tool;
- Development and management of flood control/stream alterations, and water diversion projects;
- Increased demand for consumptive and non-consumptive public uses, including demand for opportunities related to fish and wildlife resources;
- Cumulative habitat effects of land and water resource development activities; and
- Loss of riverine habitats.

As a result of these conservation issues, many species that were endemic to the ecosystem have become either threatened, endangered, or rare as identified under the Endangered Species Act. Others have even become extinct. Within the ecosystem, some 76 species of plants and animals are listed as threatened or endangered, 140 species are listed as species of special concern, and 53 species, which once inhabited the ecosystem, are known to be extinct. The State of Mississippi lists 41 plant and animal species as either threatened or endangered. Conservationists are concerned with the survival of diversity in this biologically rich



*Noxubee*  
*National Wildlife Refuge*

**Section A.**  
**Final Comprehensive**  
**Conservation Plan**

**CHAPTER I - Background**

region. Many species of land birds have declining populations, including the endangered red-cockaded woodpecker. Wood stork populations are declining due to man's alteration of wetlands and non-protection of nesting areas.

The land uses of the ecosystem are dominated by agriculture and managed forests. Extensive conversion of upland forests to agriculture and pine monocultures has resulted in reductions of species, species diversity, and fire frequency. Conversely, there have been increases in soil erosion, sediment loads, and introductions of exotic and invasive species. Although forest cover has continued to increase during the past 10 years, this increase largely occurs in intensively managed, often monotypic stands of pine.

Through simplification and elimination of forest habitats, including upland forests, composition has been dramatically altered in this ecosystem. The increasing demand for pulpwood and the economic incentives for shorter rotation and conversion to pine forest plantations have caused pine to become more of an economic issue. Nearly all forests are second-growth, and many sites have experienced soil erosion and loss of fertility during logging and agricultural use. Forests have been converted to farmland, industrial parks, and urban areas. Hydrological changes are caused by sedimentation, construction of dams and other barriers, and channelization. Portions of almost all the watersheds in the ecosystem have been impounded during the last 75 years.

Some logged lands have been converted to plantation forestry, a practice that results in low-diversity pine stands. Surviving old-growth forests have experienced human-caused changes, including the loss of large grazing animals (e.g., woodland bison, eastern elk), the loss of predators (e.g., red wolves, black bears, mountain lions), periods of understory livestock grazing (e.g., feral pigs), recent increases in white-tailed deer populations, invasions by non-indigenous species, and reductions in fire frequency.

Pine stands that originated through fire or farm abandonment face a constant management challenge—a native insect known as the southern pine beetle. Outbreaks of this insect are more common in older and stressed trees. Human activities may have resulted in larger blocks of pine forests of relatively uniform age becoming more susceptible to large outbreaks of this beetle. Although these outbreaks can be alarming and can render trees hazardous to human life and property, the southern pine beetle may play a role in natural fire regimes by helping produce heavy fuel loads (White 1987). In addition, human-induced fire has played a key role in shaping this ecosystem over the past 7,000 years. However, managing prescribed burns to improve wildlife habitat is problematic due to the lack of public acceptance of the procedure, and the difficulty in acquiring the necessary permits to burn.

In general, the surviving old-growth forests represent a biased sample of the original forests; they tend to be on steeper, drier, rockier, or wetter sites that were harder to farm or less valuable for harvest

**Section A.**  
**Final Comprehensive**  
**Conservation Plan**

**CHAPTER I - Background**

(White and White 1995). The mid- to late-1900s represented a period of reduced fire frequency, size, and intensity. This, in turn, led to increases in species adapted to moister conditions, understory stem density and woody cover, and decreases in fire-dependent species.

Exotics can be very invasive and detrimental to indigenous species of the ecosystem. Exotic species such as kudzu, bicolor lespedeza, water hyacinth, and feral hogs are posing major problems to declining wildlife populations. Action must be taken annually to control these populations.

Throughout the southeast, natural flooding and erosion dynamics of rivers are important natural processes to maintain biological diversity. Impoundments, changes in the quality and quantity of water, draining of bottomlands, and channelizing of rivers are major causes of loss in biological diversity dependent on dynamic stream and river systems.

Modifications to the historic flood plains have caused major declines in fishery and aquatic resource productivity. The reduction of ecological functions from non-point source runoff of sediments, excess nutrients, and pesticides is a continual problem. Paddlefish and mussel populations are declining due to the chain of water management modification and management along the Tennessee-Tombigbee River Watershed. Alteration of the hydrological regime is a common disturbance in bottomland and floodplain forests, rivers, streams, and lakes. Hydrological change has altered flood depth, duration, frequency, and seasonal timing in many of these systems leading to a change in the water table in specific cases.

Channel modifications, which include straightening the streambed, smoothing bottom contours, and removing logs, obstructions, and plants, alter the rate and timing of water flow (the local water table is lowered, resulting in increased downstream flooding, decreased aquatic productivity, micro-habitats within the channel, and disrupted food webs). Sedimentation, blockages, and channel modifications often occur within one river system, leading to decreases in native fishes and other aquatic species, a loss of species intolerant of such changes, and increases in tolerant species and non-indigenous species (Crumby et al., 1990). Non-point source pollution and sedimentation are hard to control. Sedimentation is a serious problem for most aquatic organisms, particularly primary producers as well as benthic (bottom-dwelling) invertebrates and fishes that require gravel or rock substrates.

Other factors responsible for depletion of aquatic faunas are pollution (including chemical and thermal pollution) and introduction of non-native fish and aquatic plants. Invasive, non-native plants that are capable of altering function (i.e., hydrology, photosynthesis, food webs), in aquatic systems in the ecosystem include hydrilla and water hyacinth (Hotchkiss 1967; Lachner et al., 1970), which can form homogenous stands and exclude more desirable native species. Remaining waters are influenced by levee construction, channel modification, agricultural runoff, cattle grazing, timber harvest, and invasion of non-native species.

*Noxubee*  
*National Wildlife Refuge*

**Section A.**  
**Final Comprehensive**  
**Conservation Plan**

**CHAPTER I - Background**

The demand for public recreation and environmental education in the ecosystem, as well as throughout the refuge system, is constantly increasing. As the population increases, it brings about a corresponding increase in urban and industrial development. The result is a continuous decrease in the amount of rural land where people typically carry out wildlife-dependent activities such as hunting, fishing, bird-watching, etc. As these changes occur, the public demand for these activities falls increasingly on public land, both state and federal.

*Conservation Priorities*

Conservation priorities for national wildlife refuges in the Central Gulf Ecosystem focus on threatened and endangered species, trust species, and species of area concern. By working with others, the Service is more effective in achieving its overall mission and management goals. A combination of land protection and habitat management methods is utilized by the Service and others to compensate for old growth pine and floodplain woods habitat loss and to meet shared/common long-term goals established for this area.

Sustainable communities and species conservation and recovery on refuges require the joint efforts of private landowners, local communities, and state and federal governments. The Fish and Wildlife Service is adopting collaborative resource partnerships both within and outside of national wildlife refuges to reduce the declining trend of fish and wildlife populations and biological diversity; to establish conservation priorities; to clarify goals; and to solve common threats and problems associated with fish and wildlife resources. Biological objectives in the ecosystem for species targeted in this plan reflect the Partners-in-Flight Plan, North American Waterfowl Management Plan, and the recovery of the red-cockaded woodpecker.

Biological objectives for refuges are derived from recommendations of the ecosystem planning team as well as from conservation initiatives of other agencies—both governmental and non-governmental. These conservation initiatives are jointly managed by government agencies, conservation organizations, and private landowners. The ecosystem team has identified the following four priority tasks, each of which the refuge will work to support. These tasks are reflected in the goals presented in Chapter IV.

- Manage populations of migratory birds, including restoring and protecting key habitats;
- Restore and protect important pine habitats and their associated plant and animal communities;
- Restore and protect the important functions and values of riverine habitats; and
- Undertake activities to increase public awareness and interest in fish and wildlife, their habitats, and the ecosystems upon which they depend.

*Noxubee*  
*National Wildlife Refuge*

**Section A.**  
**Final Comprehensive**  
**Conservation Plan**

---

**CHAPTER I - Background**



Section A.  
Final Comprehensive  
Conservation Plan

CHAPTER II -  
Refuge Description

## II. REFUGE DESCRIPTION

### Introduction

Noxubee National Wildlife Refuge is located within three counties (Noxubee, Oktibbeha, and Winston) in east-central Mississippi, approximately 17 miles south-southwest of Starkville and approximately 80 miles north-northeast of Jackson. Primary access to the refuge is by either Oktoc Road from Starkville, or by Highway 25 via Loakfoma Road and Brooksville/Louisville Road (Fig. 2).



USFWS Photo

### Refuge History

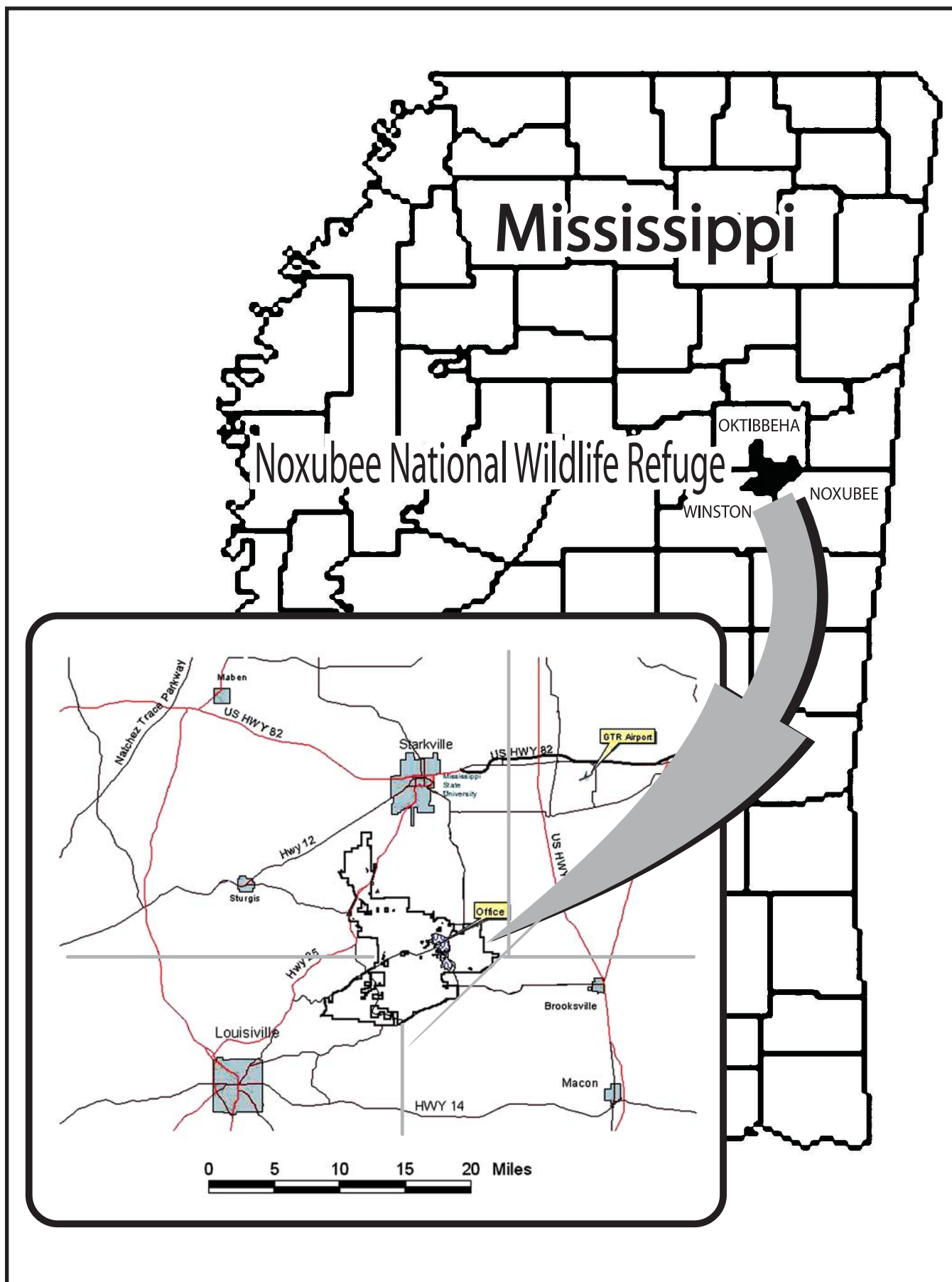
The refuge was established in 1940 from lands acquired through the 1930s Resettlement Administration. Initially, it was established by Executive Order 8444 on June 14, 1940. This order reserved lands acquired by the Rural Resettlement Administration as a refuge and breeding ground for migratory birds and other wildlife. On January 27, 1944, Public Land Order 205 modified the refuge boundary by adding lands thought to be suitable for wildlife, and eliminating land requested by the Soil Conservation Service.

Another similar modification occurred in 1947 (Public Land Order 401). Since those initial acquisitions, most land acquired by the refuge has been by exchange, under the authority of Title III of the Bankhead-Jones Farm Tenant Act. A smaller amount of land has been acquired by purchase, under the authority of the Migratory Bird Conservation Act of 1929 (45 Stat. 1222). Currently, the refuge owns 47,049 acres within the 56,451-acre approved acquisition boundary, leaving over 8,000 acres in private ownership.

Prior to government ownership, the land area within the present refuge boundary was intensively farmed and over-grazed by cattle. Today, after 50 years as a national wildlife refuge, the area has seen a return of bountiful wildlife populations and a progression towards restoration of the pine and hardwood forest types that were eliminated in the late 1800s and early 1900s.

Approximately 42,500 acres of the refuge are bottomland hardwood, upland hardwood, mixed pine/hardwood and pine forests. These forest lands are occupied by a variety of upland species including turkey, deer, and quail. The endangered red-cockaded woodpecker relies on old growth pine habitat managed by the refuge for its survival. In addition, many neotropical migratory bird

Figure 2. Noxubee National Wildlife Refuge Location



*Noxubee*  
*National Wildlife Refuge*

**Section A.**  
**Final Comprehensive**  
**Conservation Plan**

**CHAPTER II -**  
**Refuge Description**

species greatly benefit from the refuge forests. Four greentree reservoirs, two major lakes, numerous natural ponds, and sixteen man-made impoundments provide important habitat for other migratory birds, including wintering habitat for waterfowl and bald eagles.

More than 150,000 visitors participate in several activities each year including fishing, hunting, hiking, wildlife photography, wildlife observation, and environmental education and interpretation. The refuge serves as an outdoor classroom for Mississippi State University, Starkville City School District, and other local educational institutions.

**Refuge Purpose**

The primary establishing legislation for the refuge was Executive Order 8444, dated June 14, 1940, with the stated purpose "...as a refuge and breeding ground for migratory birds and other wildlife...." 16 U.S.C., 715 (Migratory Bird Conservation Act).

"...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., 668dd(a)(2) (National Wildlife Refuge System Administration Act).

"...for the development, advancement, management, conservation, and protection of fish and wildlife resources...." 16 U.S.C., 742f(a)(4).

"...for the benefit of the United States Fish and Wildlife Service, in performing its activities and services. Such acceptance may be subject to the terms of any restrictive or affirmative covenant, or condition of servitude...." 16 U.S.C., 742f(b)(1) (Fish and Wildlife Act of 1956).

Subsequently, a small amount of land purchased with Migratory Bird Conservation Stamp monies held the following purpose "...for use as an inviolate sanctuary, or for any other management purpose, for migratory birds." 16 U.S.C., 715d (Migratory Bird Conservation Act).

**Refuge Environment**

*Biological Resources*

The rich variety of habitats on the refuge provide for a wide diversity of fish and wildlife species. At least 254 species of birds; 47 mammals; 34 reptiles; 23 amphibians; 25 fish; and untold numbers of invertebrates inhabit the refuge. Migratory birds move with the changing of the seasons. In the spring, as most waterfowl leave the refuge for their northward migration, thousands of neotropical migratory birds begin to arrive from their wintering grounds in Central and South America. The majority will continue north after replenishing their energy reserves, but many, such as the prothonotary warbler, great-crowned flycatcher, and summer tanager use the refuge for nesting. A list of bird species known to inhabit the refuge is included in Appendix D.

*Noxubee*  
*National Wildlife Refuge*

**Section A.**  
**Final Comprehensive**  
**Conservation Plan**

**CHAPTER II -**  
**Refuge Description**



*Red-cockaded woodpecker*  
*USFWS Photo*



*Bachman's sparrow*  
*USFWS Photo*

*Threatened and Endangered Species*

The red-cockaded woodpecker, bald eagle, and wood stork are listed as either threatened or endangered and each utilize the refuge. The endangered red-cockaded woodpecker is a resident species and many of the refuge's management programs are directed toward its survival. This small resident bird has disappeared over large portions of its former range in the southeastern United States due to the suppression of natural fires and over-cutting of pine forests. This bird requires precise conditions within mature pine forests with very open understory managed by frequent fires. The threatened American bald eagle is sighted on a regular basis from November through February. The golden eagle is occasionally seen during this period. The wood stork is a state-listed species commonly sighted during the late summer months when the lakes are drawn down. Price's potato-bean is a federally listed threatened plant that may occur on the refuge. While it has been found in Oktibbeha County, no populations have been documented on the refuge (Price's Potato-bean Recovery Plan 1993). Six species of endangered freshwater mussels (i.e., southern clubshell, Judge Tait's, penitent, Alabama moccasinshell, orange-nacre mucket, ovate clubshell) have been found in streams and rivers near the refuge, and there is a possibility that these species may occur on the refuge.

The most diverse vertebrate group found in the ecosystem is birds, with at least 254 species, most of which are forest-dwelling to some degree. Songbirds are found throughout refuge habitats, with some of the most noticeable species being pine warblers, prothonotary warblers, common yellowthroats, white-eyed vireo's, Bachman's sparrows, cardinals, wood thrushes, and brown-headed nuthatches. Priority migratory neotropical bird species identified as special management concern by the Partners-In-Flight Plan and found on the refuge are listed in Figure 3. Game birds such as eastern wild turkey and bobwhite quail are found on the refuge.

*Waterfowl*

Many birds are seen in the refuge's wetlands. About 18 waterfowl species utilize the refuge and receive significant management attention. Mallards, wood ducks, ring-necked ducks, and Canada geese make up the bulk of the waterfowl found on the refuge, with populations peaking in winter, sometimes up to 15,000. At this time as many as 300 migrating geese join the 600 resident giant Canada geese on the refuge.

*Wading Birds*

Large numbers of wading birds are present, including wood storks, great and little blue herons, little green herons, great and snowy egrets, and a large nesting colony of cattle egrets. Two rookeries are established on the refuge—one that contains five thousand breeding pairs of cattle egrets plus snowy egrets, little blue herons, and white ibis, and one that contains several hundred great blue herons and great egrets.



*Noxubee*  
*National Wildlife Refuge*

**Section A.**  
**Final Comprehensive**  
**Conservation Plan**

**CHAPTER II -**  
**Refuge Description**

*Raptors*

Common raptors include red-shouldered, Cooper's, red-tailed, and sharp-shinned hawks; barred owls; both black and turkey vultures; and occasionally Mississippi kites. Bald eagles are winter residents of the refuge, and a nesting pair was discovered in 2003. Golden eagles are occasionally spotted on the refuge, as are peregrine falcons.

*Mammals*

Of the 47 mammal species found on the refuge, the most prominent and abundant is the white-tailed deer. The refuge places considerable management effort on controlling its population. Other common mammals include beavers, gray and fox squirrels, swamp and eastern cottontail rabbits, grey foxes, coyotes, and several species of small rodents such as mice, rats, and voles. Surprisingly, one of the most diverse groups of mammals is bats with seven species likely to occur on the refuge.

*Reptiles*

Thirty-four reptile species are known to occur on the refuge and the largest and most notable is the alligator. The most common snakes are black racers, gray rat snakes, Western cottonmouths, and several species of water snakes. Common lizards include four species of skinks, Carolina anoles, and Northern fence lizards. Turtle species include red-eared sliders, river cooters, common and alligator snapping turtles, and three-toed box turtles.

**Figure 3. Priority Migratory Neotropical Bird Species found at Noxubee National Wildlife Refuge**

Highest Priority Species	Refuge Habitat
Bachman's sparrow	Open pine/oak forest; palmetto scrub; bushy pastures
Red-cockaded woodpecker	Open pine forests
Swainson's warbler	Swamps; bottomland hardwood forests
Brown-headed nuthatch	Open pine forests
Kentucky warbler	Forest undergrowth
Northern bobwhite quail	Fields; brushy open areas; roadsides; forest edge
Orchard oriole	Forest edges and clearings
Prairie warbler	Brushy slashings; bushy pastures; low pines
Prothonotary warbler	Forest swamps
Red-headed woodpecker	Forest edges; open pine woods; tall deciduous trees
Chuck-will's-widow	Pine forests; bottomland hardwood forests
Worm-eating warbler	Dense deciduous forests
Yellow-billed cuckoo	Forests; thickets; forest edges

Species occurrence based on point count surveys conducted by Chris Reynolds, Mississippi State University 1999.

*Noxubee*  
*National Wildlife Refuge*

**Section A.**  
**Final Comprehensive**  
**Conservation Plan**

**CHAPTER II -**  
**Refuge Description**



*American alligator hatchlings*  
*USFWS Photo*

*Amphibians*

Thirty-four species of amphibians are known to occur on the refuge, the largest of which is the three-toed amphiuma. Several species of salamanders, including the marbled and slimy, are commonly seen. Frogs and toads such as Spring peepers, bull, green tree, bird-voiced tree, and Fowlers are common on the refuge.

*Fish*

Bluff Lake, Loakfoma Lake, Ross Branch Reservoir, and the Noxubee River harbor 25 species of fish, of which 5 are primary game species. Popular game fish include several species of catfish, largemouth bass, black and white crappie, and numerous species of bream, redear, and bluegill. Nongame fish include common carp, bowfin, and several species of shiners and darters. The paddlefish is a species of special concern as identified in the Southeast Region's Fisheries and Aquatic Resources Strategic Plan. The fish may have traditionally spawned up Oktoc Creek prior to levee construction and development of Bluff Lake. Annual refuge reports from the 1940s and 1950s indicate that hundreds of these fish were taken in Bluff Lake, possibly a result of fish being impounded by flood events of the Noxubee River.

*Habitats*

Refuge habitats can be divided into three primary types: Forests; Fields and Grasslands; and Wetlands. Of these types, forests are by far the majority of the habitat totaling 45,186 acres. Fields and grasslands include several forest openings (1-150 acres) and the Morgan Hill prairie restoration area plus utility rights-of-way, all totaling 958 acres. Wetlands (not including bottomland forest habitats) include Bluff and Loakfoma lakes, Ross Branch Reservoir, Noxubee River, Prisock Moist-Soil Management Area, and numerous small streams and ponds scattered throughout the refuge. These wetland habitats total approximately 2,400 acres. Below is a more detailed description of these primary habitat types.

*Forests*

Ninety-three percent of the refuge consists of forested habitat, with forest types including upland pines (loblolly, shortleaf pine, and a small amount of longleaf); upland hardwoods (white, southern red, and post oaks, black cherry and several hickories); bottomland hardwoods (cherry bark, swamp, overcup, water and willow oaks, beech, box elder, sweetgum, river birch, yellow-poplar, red maple, elm, and sycamore); and mixed pine/hardwood and cypress stands. Refuge forests consist of five primary types: pine; pine/hardwood; upland hardwood; bottomland hardwood; and cypress. About 23,619 acres are dominated by loblolly pine interspersed with shortleaf pine. Pine/hardwood stands total 2,851 acres and are dominantly loblolly pine; however, there is a substantial amount of hardwood species such as oaks, hickories, blackgum and sweetgum. Upland hardwood stands total 3,263 acres and consist primarily of white oak, post oak, southern red oak, and hickory species with dogwood and redbud

*Noxubee  
National Wildlife Refuge*

**Section A.  
Final Comprehensive  
Conservation Plan**

**CHAPTER II -  
Refuge Description**

common in the understory. Bottomland hardwood stands total 15,308 acres and consist primarily of water, overcup, willow, and cherrybark oak species along with other hardwood species such as American beech, blackgum, and sweetgum. Cypress stands total 145 acres and consist of pure or nearly pure stands of American bald cypress. (See Figure 4 for the current refuge land cover and Figure 5 for forest types and acreages.)

*Grasslands*

The Morgan Hill area is the only part of the refuge managed as a natural grassland. In 1993, test plots of Indian, switch, and big bluestem grasses were sown in an attempt to restore a representative portion of the Alabama black belt prairie that historically occurred in the area. Historical reports show the area originally consisted of tallgrass prairie interspersed with groves of cedar, oak, and hickory. The area is treated with prescribed fire about every 2 years to control encroachment of woody vegetation.

*Wetlands*

The majority of wetland habitat on the refuge occurs in Bluff and Loakfoma lakes (1,200 and 600 acres, respectively). Both lakes consist of primarily shallow water habitats (3-12 feet deep) towards their centers with edges that become progressively more shallow. These shallow edges support the bulk of vegetation in the lakes, which consists primarily of emergent species including cattail, smartweed, lotus, and bald cypress. Ross Branch Reservoir (43 acres) is also a man-made impoundment with similar habitat; however, it has slightly deeper water due to its steep banks. Riverine areas comprise the other primary type of wetland habitat found on the refuge (i.e., Noxubee River and its tributaries). During flood events, the Noxubee River and its tributaries can inundate approximately 8,750 acres of the total 14,186 acres of bottomland hardwood forests found on the refuge. Prominent plant species found in aquatic environments include fragrant water lily, American lotus, *Juncus*, swamp smartweed, duckweed, and wild millet.

**Refuge Administration and Management**

Refuge administration refers to the operation and maintenance of refuge programs and facilities including construction. The refuge has 17 permanent employees and receives substantial assistance from volunteers, college student interns, and Youth Conservation Corps enrollees. The major management activities conducted on the refuge include managing forest areas and water impoundments for migratory birds and wildlife diversity, and providing education and visitor services in support of hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation. The refuge has an important management partnership with the Starkville School District, each providing environmental education and interpretation at the Noxubee Conservation Center for local children. The refuge and Mississippi State University also have an active partnership. University students and faculty contribute many hours towards conducting investigations and research projects on the refuge.

The refuge also manages the following special designation areas:

- Old Robinson Road Research Natural Area (46 acres of cypress forests);
- Morgan Hill Research Natural Area (67 acres of red cedar/pine/hardwood forests);
- Wilderness Study Area (1,090 acres of bottomland hardwood forests);
- Old Robinson Road National Historic Landmark (approximately 400 acres of various forest types forming a corridor along 1.9 miles of the historic roadway).

These management areas (Fig. 6) possess unique qualities and attributes and are managed according to specific guidance (refer to <http://policy.fws.gov/603fw2.html>, and click on Fish and Wildlife Service Manual for further details).

#### *Special Management Areas*

The Wilderness Act of 1964 (Public Law 88-577), required that the Secretary of the Interior review every roadless area of 5,000 acres or more and every roadless island, regardless of size, within the National Wildlife Refuge System, and report recommendations to the President as to the suitability or non-suitability of such areas for preservation as wilderness. The President was then to forward recommendations for wilderness to Congress. The Service (then called the Bureau of Sport Fisheries and Wildlife) completed a wilderness review of Noxubee National Wildlife Refuge in 1974, identifying a 1,200-acre area as suitable for wilderness designation. The wilderness proposal was transmitted to Congress on December 4, 1974. However, Congress has yet to act on the wilderness proposal. The refuge revised the wilderness proposal in 1999 and 2000, and excluded 110 acres separated from the main portion of the proposed wilderness by a levee and the Noxubee River; this area also had been impacted by past timber harvesting. This revision to the proposed wilderness boundary was originally recommended by the refuge manager in March 1975.

The refuge's proposed wilderness area includes 1,090 acres of seasonally flooded and timbered bottomland hardwoods bound by the Noxubee River on the west and north, and Oktoc Creek on the south. The forest in the area has not been harvested since the 1930s, several years before the refuge was established. As such, the area is likely the best representation of an old growth bottomland hardwood forest to be found in east-central Mississippi.

Service policy requires that areas outside Alaska, pending Congressional action, be managed to preserve the wilderness resource. The proposed wilderness at Noxubee refuge is managed under guidance found in the Refuge Manual under 6 RM 8, Wilderness Area Management. The Service is proposing to revise this policy; the Draft Wilderness Stewardship Policy was published in the Federal Register on January 16, 2000. The draft policy provides additional guidance on management of wilderness and proposed







*Noxubee*  
*National Wildlife Refuge*

**Section A.**

**Final Comprehensive  
Conservation Plan**

**CHAPTER II -  
Refuge Description**

wilderness. The only management activities conducted in the proposed wilderness are research projects and maintenance of the Wilderness Trail (foot trail). Research projects are basically limited to collections and surveys which have no impact on the area's wilderness character. The Wilderness Trail forms a loop of approximately 4 miles through the area, with the trailhead located at the end of Keaton Tower Road. The trail is maintained with chainsaws and hand tools. In addition to hiking and wildlife observation, hunting and fishing are allowed in the area.

*Forest Management*

Of the 45,186 acres of forests on the refuge, 42,867 acres (95 percent) are under long-term management as described in the 1996 Forest Management Plan. A variety of silvicultural techniques is used to manage forest habitats, always with an emphasis on providing habitat for threatened and endangered species, migratory birds, and other resident wildlife. Commercial timber harvesting is utilized, where appropriate, to accomplish silvicultural treatments such as selective thinning, stand regeneration, and disease control.

**Figure 5. Forest Types and Acreages at Noxubee National Wildlife Refuge.**

Pine	23,619
Pine/Hardwood	2,851
Upland Hardwood	3,263
Bottomland Hardwood	15,308
Cypress	145

**Current Management of Desired Age-Class Distribution (Pine Acreage)**

Stand Age in Years	Age Class	Total Forest Desired	Total Forest Present
0-10	Regeneration	10%	5%
11-30	Immature	20%	5%
31-80	Mature	50%	84%
80+	Old Growth	20%	6%

**Current Management of Desired Age-Class Distribution (Hardwood Acreage)**

Stand Age in Years	Age Class	Total Forest Desired	Total Forest Present
0-10	Regeneration	5%	3%
11-30	Immature	10%	7%
31-120	Mature	65%	90%
120+	Old Growth	20%	0%

*Noxubee*  
*National Wildlife Refuge*

**Section A.**  
**Final Comprehensive**  
**Conservation Plan**

**CHAPTER II -**  
**Refuge Description**



*Mallard ducks in flooded timbers*  
*USFWS Photo*

Selective thinning consists of removing selected trees for the purpose of enhancing the health and vigor of remaining trees. This technique is especially important in maintaining healthy stands of pines that are resistant to attack by southern pine beetles. The technique is also occasionally used in hardwood stands where mast-bearing trees need to be released from competition with other species that are less valuable to wildlife.

Stand regeneration consists of removing most or all of the over-story trees to facilitate the regeneration of young trees. This technique is used to achieve a more even distribution of age classes within the refuge's forest stands and to provide early successional habitat needed by several wildlife species, especially certain groups of neotropical migratory birds. Regeneration is done in such a way that it mimics natural regeneration processes such as wind throw and southern pine beetle outbreaks.

Prescribed fire is also used to treat approximately 6,000 acres of forest habitat each year. The majority of this burning is done in pine habitats, and to a lesser extent in pine/hardwood habitats. Prescribed fire is a valuable tool that primarily retards succession in the mid- and lower-story vegetation as it eliminates shrubs and small trees, allowing grasses and herbaceous plants to grow instead. This sort of habitat improvement is absolutely essential to maintaining habitat for red-cockaded woodpeckers, Bachman's sparrow, bobwhite quail, and several other wildlife species. Additional benefits of prescribed fire include reducing the risk and catastrophic effect of wildfire, as well as functioning to recycle nutrients locked up in woody vegetation.

*Fields*

Refuge fields are managed to produce a variety of vegetation types. Many fields are planted with grain crops such as sorghum, wheat, or lespedeza to provide food for wildlife species such as waterfowl and quail. Other fields are left fallow to provide a more natural plant community of native forbs and grasses, many of which have value as food or cover for wildlife. Still other fields are maintained in perennial grasses, such as bermuda, dallis, and fescue. Prescribed fire and mowing are the primary tools used to maintain field habitats.

*Water Impoundments*

Bluff and Loakfoma lakes are man-made and have water control structures that allow the refuge to actively manage water levels. The shallow backwater portions of these lakes provide extensive moist-soil habitat. By discing and mowing these areas during summer draw downs, the refuge is able to encourage moist-soil plants such as wild millet, smartweed, and sedges that are very important waterfowl foods. These draw-down events also provide important feeding opportunities for wood storks, as fish and other small animals are concentrated in small pools.







*Noxubee*  
*National Wildlife Refuge*

**Section A.**  
**Final Comprehensive**  
**Conservation Plan**

**CHAPTER II -**  
**Refuge Description**

To attract waterfowl, four greentree reservoirs were constructed and are now managed to permit winter flooding of certain bottom-land areas. This allows active management of water levels in these areas that mimics the natural flooding regime caused by winter rains. These areas provide essential habitat to migratory waterfowl, especially mallards and wood ducks, as well as a variety of wading birds.

Ross Branch Reservoir is used to store water to flood the Prisock Moist-Soil Management Area. This area consists of 220 acres subdivided into 12 small impoundments that are managed intensively for waterfowl. Management practices are designed to produce high quality waterfowl foods through the planting of crops such as sorghum, rice, or millet, or by managing native moist-soil plants.

*Invasive Species/Pests*

Infestations of southern pine beetle, kudzu, cogon grass, and American lotus require on-going eradication efforts. Integrated invasive plant management and a combination of technologies are utilized which may include biological, mechanical, or chemical applications to control or eradicate certain species.

*Other Management*

Other activities administered by the refuge include routine maintenance, law enforcement, management of utility and conservation easements, wildlife propagation and stocking, scientific collections, marking and banding, disease prevention and control, maintenance of facilities, and acquiring key properties from willing sellers. The refuge staff also provides technical assistance to private landowners who implement conservation practices.

**Physical Resources**

*Soils and Topography*

The refuge lies within the coastal plain physical division; however, it extends over three separate soil association regions: interior flatwoods, which typically are poorly drained clays; upper coastal plain with soils that are more sandy clays, usually well drained due to topography; and black belt prairie with soils that are calcareous based clays and loams with moderate drainage (Miller 1967). The majority of the refuge is in the interior flatwoods region which is relatively flat with elevations rarely varying more than 20 feet throughout the area. The extreme west and southwest portion of the refuge (Bevills Hill area) lies in the upper coastal plain region. This region is best described as hilly, and has the greatest variation in elevations found on the refuge. Here, elevations can vary as much as 100 feet over a distance of several hundred feet. A small portion of the southeast corner of the refuge (Morgan Hill area) is in the black belt prairie region, and has topography that is intermediate between the two previous regions. The area is flat to gently rolling with elevations varying as much as 100 feet, but over a longer distance, such as several thousand feet. Overall refuge elevations range from 200 to 560 feet Mean Sea Level.

*Noxubee  
National Wildlife Refuge*

**Section A.  
Final Comprehensive  
Conservation Plan**

**CHAPTER II -  
Refuge Description**

The prominent soil associations found on Noxubee refuge are: Stough-Freest-Vimville; Falkner-Longview-Savannah; Longview-Falkner-Prentiss; Mathiston-Urbo; Maben-Ruston-Savannah; Stough-Prentiss-Myatt; Sweatman-Boswell; Wilcox-Falkner; Kipling-Savannah-Oktibbeha; and Wilcox.

*Hydrology*

The waters of the refuge drain through the Noxubee River towards the southeast, into the Tennessee-Tombigbee Waterway, which in turn drains into the Mobile River and eventually into the Gulf of Mexico. Refuge waters include more than 55 miles of streams and creeks, 20 miles of the Noxubee River, and 1,900 acres of lakes (primarily Bluff and Loakfoma). Water movement is slow in low-lying areas.

*Climate*

The refuge has long, hot summers because moist tropical air from the Gulf of Mexico persistently covers the area. Winters are cool and fairly short with only a rare cold wave that usually moderates in a few days. Precipitation is fairly heavy throughout the year, with prolonged droughts being rare. In winter, the average temperature is 45 degrees Fahrenheit, and the average daily minimum temperature is 34 degrees. In summer, the average daily temperature is 80 degrees, and the average daily maximum temperature is 91 degrees. Temperatures regularly fall below freezing in the winter, and rise above 90 degrees in the summer, with occasional heat waves pushing mid-day temperatures into the 100s.

The normal rainy season occurs from December to May, with an average annual precipitation of about 56 inches. Thunderstorms occur regularly throughout the summer. The average seasonal snowfall is 1 inch. During an average year, measurable snowfall takes place during December through March. The average relative humidity in mid-afternoon is about 55 percent. Humidity is higher at night, and the average at dawn is about 90 percent. The prevailing wind is from the south. Wind speed is highest in spring averaging 8 miles per hour. Severe local storms, including tornadoes, occasionally strike in the area. Storms are short in duration and can cause damage in localized areas. Every few years, in summer or autumn, a tropical depression or remnant of a hurricane that has moved inland from the Gulf of Mexico causes extremely heavy rains, lasting 2 or 3 days.

**Social and Economic Environment**

The refuge consists of 47,049 acres within a 56,451-acre approved acquisition boundary, with 8,556 acres in private ownership (inholdings within the approved acquisition boundary). Its northern boundary is about 5 miles south-southwest of Starkville, Mississippi, and about 12 miles west of Brooksville, Mississippi. The largest municipality and population center in the area is Columbus, Mississippi, about 35 miles to the northeast, in Lowndes County.

The region encompassing the refuge, often referred to as the Golden Triangle, is supported by an agricultural and timber economy. Much

*Noxubee  
National Wildlife Refuge*

**Section A.  
Final Comprehensive  
Conservation Plan**

**CHAPTER II -  
Refuge Description**

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. Manufacture of wood products also forms the second largest manufacturing sector in Mississippi. Most of the forest industry is based on privately owned forest land, which tends to be in smaller scattered parcels. Concurrently, the number of working farms is declining and the size of larger corporate farms is increasing regionally. While agricultural and timber products have always been a large component of the economy, beginning in the 1950s and continuing until the national recession in the 1980s, manufacturing became the primary source of employment and income for the area's population. Growth in this sector slowed somewhat during the late 1990s. Currently, value-added manufacturing is seen as the most promising field for economic development in the region.

The total population of the three counties in which the refuge is located is about 70,400 people, or only about 3 percent of the state's population, and grows at about 2.4 percent every 5 years. The people in these counties typically are native to the state, have a per capita income of about \$8,000 (about 82 percent of the state rate), with only about 64.2 percent of persons over 25 having high school diplomas (nearly identical to the 64.3 percent state rate). In the area, approximately 17 percent of households rely on some sort of public assistance income (compared to 15 percent of the state's households). Occupations vary with the locale; the larger municipal areas (Starkville and Columbus) have a comparatively high percentage of professional, managerial, and administrative support occupations, whereas the smaller towns and rural areas tend to have a higher proportion of employed persons working as operators, handlers, laborers, and assemblers. Unemployment rates in the population centers tend to remain below the national average, at about 3 percent annually (vs. 5 percent). The unemployment rates are substantially higher in the surrounding rural areas, fluctuating from around 7 to almost 10 percent.

The above statistics were compiled from the 1990 Census of Housing and Population, the Starkville Visitors and Convention Council, and the Golden Triangle Planning and Development District, Inc.

**Land Uses**

The management of public lands is essential for sustaining and enhancing wildlife habitat used and enjoyed by growing numbers of people in Mississippi. There are 13 national wildlife refuges, 2 national forests, and 3 national parks within the state. There are 3 wilderness areas in Mississippi, 2 are managed by Desoto National Forest and the other is managed by the National Park Service at Gulf Islands Seashore.

The Mississippi Department of Wildlife, Fisheries, and Parks manages approximately 38 wildlife management areas, 21 fishing lakes, 28 state parks, and brackish and saltwater fishing areas along the coast totaling some 800,000 acres. The Department coordinates the state wildlife conservation program and provides public recreation opportunities including an extensive hunting and fishing program.



**Section A.  
Final Comprehensive  
Conservation Plan**

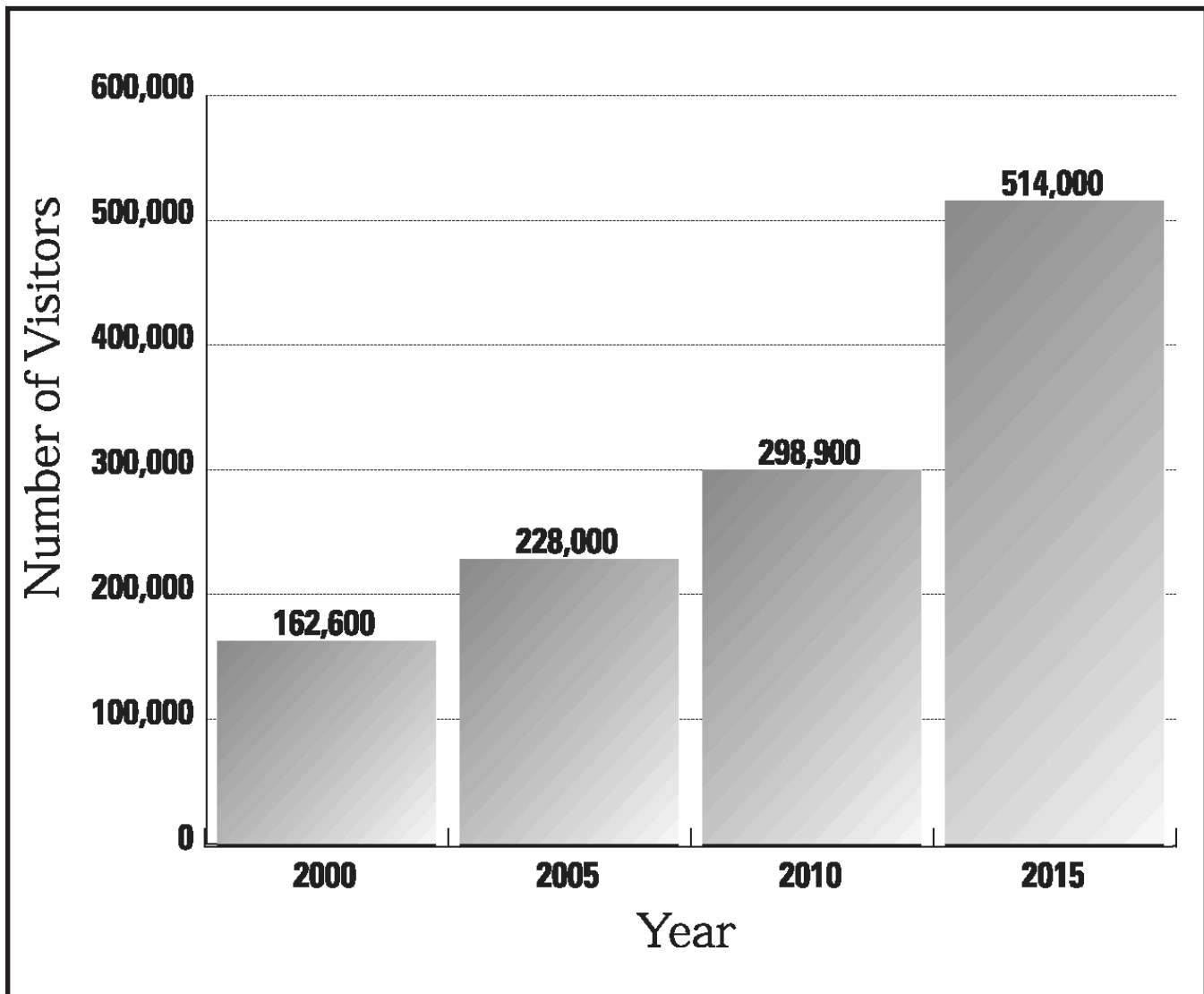
**CHAPTER II -  
Refuge Description**

The closest wildlife management areas to the refuge include the 5,333-acre Black Prairie, 8,244-acre John W. Starr, and the 24,314-acre Choctaw—all within an hour's drive of the refuge. The nearest sport fishing lake is Oktibbeha County Lake and the nearest parks are Lake Lowndes and Legion State.

**Education and Visitor Services**

The refuge plays an important role in the economy of local communities and the region. With annual visitation approaching 200,000, the refuge is obviously an important destination for people seeking recreational and educational opportunities, attracting local residents as well as tourists (Fig. 7). Approximately one-third of these visitors is participating in consumptive use activities such as hunting and fishing, while the other two-thirds are involved in non-consumptive recreation (e.g., birdwatching, sightseeing, hiking, picnicking, etc.) or education. Most, if not all, utilize services provided by local vendors, thus infusing money into the local economy.

**Figure 7. Projected Public Use at Noxubee National Wildlife Refuge.**



(Projection generated by Starkville Convention and Visitors Bureau based on anticipated regional growth.)

*Noxubee  
National Wildlife Refuge*

**Section A.**

**Final Comprehensive  
Conservation Plan**

**CHAPTER II -  
Refuge Description**

The Noxubee Conservation Center is a major attraction of the refuge, and utilized by the Starkville School District. The 7,000-square-foot facility was opened to the public in 2000, and is capable of serving up to 18,000 students per year.

**Forest Revenues**

The forest management program also has a very direct impact on the local economy. To accomplish needed habitat management, the refuge will typically thin from 200 to 600 forested acres per year, roughly half of which is in pine forests and half in hardwood forests. Likewise, approximately 100 to 200 acres are harvested per year to regenerate new stands of trees, primarily in pine forests. Sometimes additional timber harvests, averaging 50 to 100 acres per year, occur to salvage trees that are damaged by storms or southern pine beetle infestations. Collectively, these timber harvests often amount to more than a million board feet of sawtimber and several thousand cords of pulpwood per year. The value of these raw products is several hundred thousand dollars per year. These timber harvests not only provide raw material for both regional saw and pulp mills, but also provide employment for local loggers, foresters, and others.

**Cooperative Farming**

Cooperative farming is the term used for cropping activities done by a third party on land that is owned by the Service in fee title, or controlled by the Service through a restrictive easement. This type of activity is usually done on a short-term basis (3 years or less) to prepare an optimum seed bed for migratory bird species and native grassland species.

The cropping is done under the terms and conditions of a Cooperative Farming Agreement or Special Use Permit issued by the refuge manager. The terms of the agreement or permit ensure that all current restrictions are followed. Cooperative farming activities are only compatible on previously disturbed areas that have acceptable levels of chemical residue, noxious weeds or non-native plant species or ecotypes, or to honor the land use clauses of a purchase agreement. To ensure that all Service policies are met, all such land use clauses must be approved prior to Service acceptance of the purchase agreement.

Previously, the cooperative farming program at the refuge emphasized the production of soybeans and corn. In recent years, these management activities have been phased out with only two cooperative farmers remaining both harvesting hay from refuge fields. The decrease is primarily the result of changes in the price of commodities. In particular, the price of soybeans and corn decreased while the price of pine pulpwood and sawtimber increased, causing most local farmers to stop farming, placing acreage, instead, in pine plantations.

**Refuge Operating Base Funds**

The refuge's need for goods and services also plays a small but no less direct role in local economies, as local businesses provide many of these. The refuge received \$983,000 in FY 2002, in the form of

*Noxubee  
National Wildlife Refuge*

**Section A.  
Final Comprehensive  
Conservation Plan**

**CHAPTER II -  
Refuge Description**

base operating funds and special programs (such as fire management, expenses for timber sales, etc.), that are typically funded each year. Nearly all of this money goes into the local economy either as the salaries of refuge employees or payments to vendors and contractors for supplies and services.

In addition, improvements made to the refuge also benefit local economies and communities. Recent examples are the paving of 6 miles of county roads which are the primary entrances to the refuge. This was accomplished with refuge funds through an agreement allowing joint maintenance of county-owned roads. Other examples are the Noxubee Conservation Center, built to facilitate environmental education for local students, and the new Refuge Office/Visitor Center to be completed by 2003. Both of these facilities are/will be responsible for attracting many people to the area, thereby infusing money into local economies.

The Noxubee Conservation Center provides environmental education programs to approximately 8,000 students per year (primarily K-12). Likewise, a formal Memorandum of Understanding exists allowing faculty from Mississippi State University to utilize the refuge as an outdoor classroom for a variety of classes including natural resources, architecture, and archaeology. Refuge staff provide presentations to numerous school classes and civic clubs each year. The visitor center portion of the new Refuge Office/Visitor Center will provide many educational opportunities for the public.

**Land Protection and Conservation**

By law, the refuge is exempt from paying property tax, and instead makes revenue sharing payments to three counties in which it is located: Oktibbeha, Noxubee, and Winston. This payment is made through the Refuge Revenue Sharing Act established by Congress. The program provides a method of collecting monetary receipts from revenue generating activities on refuges within the nation, pooling them together, and paying them out to counties containing refuge lands. Payment for acquired land is computed on whichever of the following formulas is greatest: (1) three-fourths of one percent of the fair market value of the lands acquired in fee title; or (2) 25 percent of the net refuge receipts collected; or (3) 75 cents per acre of the lands acquired in fee title within the county. If the receipts generated on refuges do not meet the entitlement amount, Congress may approve additional funds to make up the shortfall. The following is a summary of payments made by Noxubee National Wildlife Refuge over 5 years:

Year	Oktibbeha County	Noxubee County	Winston County
2000	\$149,581	\$107,101	\$167,068
1999	\$170,516	\$122,090	\$190,100
1998	\$183,148	\$131,135	\$203,987
1997	\$194,610	\$139,342	\$216,753
1996	\$ 97,835	\$ 78,749	\$134,610

**Section A.**  
**Final Comprehensive**  
**Conservation Plan**

**CHAPTER II -**  
**Refuge Description**

**Cultural Resources**

Past archaeological investigations at the refuge have been mostly limited to compliance surveys prior to construction projects and land exchanges. A variety of resources has been discovered ranging from relics of early Native-American settlements to more recent sites where farm houses and other structures were located at the time the refuge was established. The earliest known site was located by Dr. Janet Rafferty, near Oktoc Creek, and it produced artifacts dating to the early Archaic period (ca. 9000-7000 B.C.). Another well-studied site is located on the shore of Bluff Lake and dates back to the Gulf Formational through Miller periods (ca. 1000 B.C.), with artifacts consisting of ceramic shards, projectile points, drill bits, hammerstones, and fire-cracked rocks.

Numerous other Native-American sites occur throughout the refuge, where projectile points and pottery shards are commonly found. However, none of these sites has been studied in detail. Although the Choctaw tribe is now the most prominent tribe in this part of Mississippi, the Choctaw culture did not form until after European contact, as remnants of other tribes, decimated by introduced diseases, came together to form a new political and ethnic body. All of the sites described above pre-date the Choctaw culture, and so far no sites have been discovered on the refuge which can definitely be assigned to the Choctaws.

Evidence of Euro-American settlements is also abundant on the refuge. The oldest documented Euro-American site was located in 1997, during an archaeological survey conducted in preparation for the widening of State Highway 25. Named the Colclough Farmstead Site, and dating back to the 1800s and early 1900s, it is considered representative of a middle class slaveholding farmer. Features of the site included a smokehouse, root cellar, piers or posts of a house and several outbuildings, the remains of an animal pen, a bottle dump, and tire ruts. Artifacts recovered included cut and wire nails, handmade brick fragments, window glass, amethyst glass, white-ware, pearlware, salt- and alkaline-glazed stoneware shards, and bones of white-tailed deer and domestic pigs.

Other notable cultural resources located on or near the refuge include the Old Robinson Road, built in 1821, by Raymond Robinson, to serve as a major route between Columbus and Jackson, Mississippi. A portion of the road is located on the refuge and was listed in the National Register of Historic Places in 1975. Numerous other Euro-American sites are found on the refuge, including eleven cemeteries, six churches, four schools, four mill sites (sawmills and gristmills), and one diversion canal.

The refuge is currently collecting information from some of the older refuge employees on a variety of historic sites such as farms, agricultural outbuildings, cattle dips, and cemeteries. Future plans include limited testing at several historic sites to determine site limits, dates of occupation, function, and integrity of archaeological deposits.

**Section A.**  
**Final Comprehensive**  
**Conservation Plan**

**CHAPTER II -**  
**Refuge Description**

**Ecological Threats and Problems**

The loss of large, forested tracts (at least 20,000 acres) of old pine and mixed stands of pine and hardwood has led to the decline of area sensitive species, such as the red-cockaded woodpecker. Fire suppression in pine stands has exacerbated the problem. Flood control on the Tennessee-Tombigbee Waterway and the Noxubee River has led to a decline of fish and other aquatic populations, including paddlefish and six species of mussels. Management of invasive species is difficult without sufficient staff and equipment. The lack of funding for investigations and evaluations of biological programs pertaining to avifauna, mollusks, herbivores, invertebrates, plants, and cultural

Management Area	Management Issue or Problem
Forests	Loss of large stands of old growth and mature forests; Changes in habitat composition and species diversity due to fire suppression; Management of red-cockaded woodpecker may come at the expense of other species; Suppression of natural fire in and around developed urban areas; Increase in exotic and noxious plant and animal species; Construction of access roads for forest management activities;
Lakes, Streams, Wetlands	Water pollution and sewage discharge generated from development upstream from refuge habitats to the north and east; Loss of riverine habitat and degraded water quality from off-refuge discharge; Increased demands on local water supplies; Manipulation of water levels in lakes for waterfowl management at the expense of fisheries resources; Development and management of flood control systems; Increases in exotic and noxious plant and animal species; Use of insecticides and herbicides;
Grassland/Prairie Vegetation	Conversion of native grasslands to improved pasture/agriculture; Lack of funding to support long-term maintenance of prairie restoration site;
Public Use	Increase in overall public use without adequate staff and facilities to accommodate the increase; Pressure to provide more hunting opportunities;
General Administration	Maintenance of numerous entry points and access roads; Lack of staff to conduct baseline biological surveys and monitoring;



*Noxubee*  
*National Wildlife Refuge*

**Section A.**  
**Final Comprehensive**  
**Conservation Plan**

**CHAPTER II -**  
**Refuge Description**

resources is an ongoing problem. The present staff and budget are not sufficient to manage the increasing demand for recreation and environmental education activities. Overall, the refuge is faced with a tremendous challenge of managing for the cumulative habitat effects of land and water resource development activities. The primary ecological threats and problems associated with the refuge are listed on the previous page.

Land management activities to the north and east of the refuge pose a serious threat to wildlife resources on the refuge. These land management activities include commercial, residential, and industrial development. Private lands bordering the refuge to the north and east are close to the growing communities of Starkville and Longview, and busy travel routes—Highways 12 and 25. This development threatens wildlife resources in a variety of ways, primarily through direct loss of habitat, but also indirectly through water pollution generated from runoff and sewage discharges.

A large industrial hog farm is located east of the refuge and there is a considerable threat of other industrial farming operations (i.e., chicken houses, catfish ponds) locating nearby. Private parcels bordering refuge lands are becoming increasingly fragmented through home building.

**Conservation Priorities**

Priorities identified for Noxubee National Wildlife Refuge in the Central Gulf Ecosystem Five-Year Action Plan include a strong emphasis on managing for the red-cockaded woodpecker and continued emphasis on managing to support the overall health of the ecosystem. Specific priorities include:

- Restore and protect key habitats and manage populations for migratory birds;
- Restore and protect pine habitats and their associated plant and animal communities including red-cockaded woodpeckers;
- Collect breeding bird census information;
- Complete additional phases of environmental education center in cooperation with local schools;
- Develop a refuge friends group (nonprofit);
- Develop projects in partnership with federal, state, and local agencies, and non-governmental organizations that focus on long-term public education opportunities.

*Noxubee*  
*National Wildlife Refuge*

**Section A.**  
**Final Comprehensive**  
**Conservation Plan**

---

**CHAPTER II -**  
**Refuge Description**

**Section A.  
Final Comprehensive  
Conservation Plan**

**CHAPTER III -  
Plan Development**

## III. PLAN DEVELOPMENT

### Overview

Early in the process of developing this plan and after public scoping meetings conducted in 1998, the planning team identified a list of issues and concerns that was likely to be associated with the conservation management of the refuge.

### Scoping Issues and Concerns

Issue identification is a major factor in determining management goals and objectives and the management direction for the refuge. To ensure that management of the refuge is reflective of the issues

and concerns, a series of meetings were conducted to guide the planning effort. The planning process was coordinated with government agencies, various organizations, and surrounding communities. This coordination is essential to ensure support for the plan and projects identified for the refuge.

Community participation is an integral component of any planning process. Initial planning efforts for this plan began in January 1998. On March 11, 1998, the refuge staff, regional planning staff, and a group of



*Dozing fire breaks  
USFWS Photo*

local citizens met to identify refuge issues, concerns, and opportunities; to develop a mailing list of concerned and interested publics; and to develop planning and public involvement strategies. Local citizens participated in open discussions. Those citizens included environmentalist and refuge volunteer, Margaret Copeland, Co-President of the Oktibbeha County Audubon Society; refuge user, commercial logger, hunter, fisherman, and land in-holder, Travis Prisock; and academic, Dr. Randy Robinette, Head, Department of Wildlife and Fisheries, Mississippi State University. The pre-planning meeting was professionally facilitated by contractors from Patrick C. Moore, ASLA, Alexandria, Louisiana.

On May 12, 1998, a scoping meeting was held on the Mississippi State University campus to garner public opinion on management of the refuge. The meeting was advertised through local newspapers and open to the public. Mr. Tony Thompson of the Natural Resources Conservation Service facilitated the meeting of 24 members of the local community. To further ensure public involvement in the planning process, the refuge manager developed a

**Section A.**  
**Final Comprehensive**  
**Conservation Plan**

**CHAPTER III -**  
**Plan Development**

questionnaire to solicit public opinion of the refuge and suggestions for its management. A summary of the public scoping meeting and the 85 responses received from the questionnaire is reflected below.

*Habitats*

--There is concern expressed by turkey hunters about the timing of prescribed fires and smoke coinciding with turkey hunting season. Other citizens are concerned about the effects of prescribed burning on various other species and the impacts to air quality.

--Local loggers would like for the level of timber harvesting to increase on the refuge, while others would like to see the level of timber harvesting decreased.

--The effects on game fish populations from manipulating water levels in Bluff and Loakfoma lakes to provide for waterfowl are a concern expressed by some citizens.

*Fish and Wildlife Populations*

--A few citizens are concerned about the need to control beaver population levels on the refuge.

--Visitors and staff are concerned that some alligators are becoming overly accustomed to people, and where this is occurring, the welfare and safety of the public and staff may be at risk.

--Commercial catfish operators near the refuge are concerned about the increase in cormorants roosting on the refuge and feeding on catfish in their rearing ponds.

*Land Protection and Conservation*

---Some citizens are concerned that too many resources (staff/funds) may be directed towards management of the proposed wilderness and research natural areas.

--Some citizens are concerned that management of private inholdings on lands inside the refuge acquisition boundary limit the ability of managers to achieve and contribute to overall habitat configuration and wildlife population goals. It is recognized that these in-holdings, particularly on non-forested lands, increase edge effects which are ongoing problems.

*Education and Visitor Services*

--Waterfowl hunters would like for the refuge to bring back and manage an annual waterfowl hunt.

--Fishermen would like to see an increase in sport fishing access and opportunities on refuge-managed waters.

--Citizens want to improve entrance roads and directional and informational signs on the refuge.

--Some citizens would like for birdwatching and hiking to be separated--away from areas open to hunting. They would like a

*Noxubee  
National Wildlife Refuge*

**Section A.  
Final Comprehensive  
Conservation Plan**

**CHAPTER III -  
Plan Development**

reduction in the interaction between hunters and other recreational users of the refuge during hunting season.

--Several citizens would like the refuge to improve and increase wildlife viewing facilities.

*Refuge Administration*

--Several citizens expressed a desire for the Fish and Wildlife Service to locate, investigate, and protect cultural resources that may be on refuge lands. Once this is accomplished, citizens would like for the refuge to provide interpretation programs concerning these resources.



*Noxubee*  
*National Wildlife Refuge*

**Section A.**  
**Final Comprehensive**  
**Conservation Plan**

---

**CHAPTER III -**  
**Plan Development**

Section A.  
Final Comprehensive  
Conservation Plan

CHAPTER IV -  
Management Direction

## IV. MANAGEMENT DIRECTION

### Introduction

The Service manages fish and wildlife habitats considering the needs of all resources in decision-making. But first and foremost, fish and wildlife conservation assumes priority in refuge management. A requirement of the National Wildlife Refuge System Improvement Act of 1997, is for the Service to maintain the ecological health, diversity, and integrity of refuges. The refuge is a vital link in the overall function of the ecosystem. Refuges in the Central

Gulf Ecosystem include managed forests and wetlands for waterfowl. To offset the historic and continuing loss of these habitats within the ecosystem, the refuge and other public lands provide the biological "safety-net" for migratory non-game birds and waterfowl, threatened and endangered species, and resident species.

### Vision

The vision for Noxubee National Wildlife Refuge is to manage the refuge so that it exemplifies a model of land management with a wide diversity of native flora, fauna, and habitats. The refuge someday will be a 56,000-acre



*Flooded bottomlands  
USFWS Photo*

contiguous tract of land pieced together by connecting habitats of pine forests, old growth and mixed structural pine/hardwood forests, cypress/tupelo swamps, wetlands, Alabama black belt prairie, and vast stands of bottomland hardwood forests. The foreseeable future is one where conservation, partnerships, habitat management, research, and priority public uses, including environmental education, will be part of refuge management practices. Wildlife abundance and high quality facilities will attract many visitors each year. Partners will collaborate to provide a wide range of public use and educational activities, allowing the refuge to contribute to the region's economic stability and enhance the quality of life in central Mississippi.

### Goals, Objectives, and Strategies

The goals, objectives, and strategies addressed below are the Service's response to the issues, concerns, and needs expressed by the planning team, refuge staff, and public. These goals, objectives, and strategies reflect the Service's commitment to achieve the mandates of the National Wildlife Refuge System Improvement Act, the mission of the National Wildlife Refuge System, the North American Waterfowl Management Plan, and the purpose and vision

Section A.  
Final Comprehensive  
Conservation Plan

CHAPTER IV -  
Management Direction

for which Noxubee National Wildlife Refuge was established. The following pages describe the goals established for major management areas, objectives for achieving those goals, and the specific strategies that will be employed by refuge staff. The goals are organized in broad categories of Habitats, Fish and Wildlife Populations, Land Protection and Conservation, Education and Visitor Services, Cultural Resources, and Refuge Administration.

**Goal A: Habitats**

Perpetuate a diversity of high quality, more natural-like communities as habitats for trust and resident species.

*Objective A.1 Pine and Pine/Hardwood Forest Stands*

Maintain species diversity within 26,470 acres of pine and pine/hardwood forests (as outlined in the current Forest Management Plan) that emphasizes providing habitat for the endangered red-cockaded woodpecker and other wildlife dependent on late successional pine habitat.

*Discussion:* A long-term refuge and Central Gulf Ecosystem goal includes supporting recovery efforts for the red-cockaded woodpecker. Red-cockaded woodpeckers have very specific requirements to support reproduction and foraging. It is the only endangered species that is a permanent resident of the refuge. Forty-five groups are located and mapped on refuge lands. Management for this species is directed by the Red-cockaded Woodpecker Recovery Plan, which specifies a target population of 88 groups for the refuge. The refuge maintains a diversity of vegetative conditions and complex forest structure in its pine and pine/hardwood stands to support habitat requirements for red-cockaded woodpeckers, migratory birds, and a host of resident species. The current forest management plan is designed to ensure that late successional pine habitats are available to sustain and expand overall red-cockaded woodpecker populations.

Disturbance patterns created by natural processes such as fire are essential for maintaining biodiversity. For example, the use of prescribed burns for lowering the risk of catastrophic wildfires and maintaining characteristic patterns of vegetation is an applied practice on refuges. Noxubee refuge uses prescribed burns to simulate historic disturbance patterns that help sustain the patchwork of native communities or seral stages that naturally occur within the landscape. The refuge's fire management program is designed to maintain habitat conditions as well as to protect life, property, and natural resources.

Habitat management can include intensive forest applications including commercial timber harvests and prescribed burning to maintain desired stand structure. The refuge manages a mosaic of 26,470 acres of upland pine and pine/hardwood habitats, of which 4,000 to 8,000 acres per year are burned to mimic an understory fire disturbance regime (a regime in which fires are generally not

**Section A.  
Final Comprehensive  
Conservation Plan**

**CHAPTER IV -  
Management Direction**

lethal to the dominant vegetation and do not substantially change the structure of dominant vegetation). Approximately 80 percent or more of the above-ground dominant vegetation survives fire, leaving mainly mature and old growth trees.

*Strategies:*

- A.1.1 Evaluate pine and pine/hardwood compartments every 10 years.
- A.1.2 Ensure regeneration of approximately 1 percent of pine and pine/hardwood acreage each year.
- A.1.3 Monitor active and artificial cluster areas and regulate basal areas to 50-80 sq. feet/acre.
- A.1.4 Monitor remaining area, and when basal areas exceed 100, thin to 75-85 sq. feet/acre, primarily to guard against devastating attacks by southern pine beetles.
- A.1.5 Reduce and prevent mid-story development primarily through prescribed burning on a 1- 4-year cycle and using mechanical control when necessary.
- A.1.6 Continue to research effects of prescribed burning on individual plant and animal species and on natural communities.

*Objective A.2 Hardwood Forests*

Maintain species diversity within 15,308 acres of hardwood forest stands and increase overall mast production and regeneration of mast producing species. This would follow the current Forest Management Plan designed to emphasize older-aged classes that support late-successional migratory birds and resident wildlife.

Discussion: Habitat diversity is achieved by managing forest stands of varying species composition and age. Because little of the refuge bottomland hardwood forest area is home to endangered species, much of it is managed to support waterfowl and other migratory birds.

The refuge is located off the principal migratory route and wintering range of most waterfowl species. However, it provides a major wintering and breeding area for wood ducks. At times, significant numbers of mallards also utilize the bottomlands as a wintering area. Forest management for wood ducks focuses on protecting nest cavity trees along waterways and enhancing food production.

Several neotropical migrant birds also depend on hardwood forest habitat for breeding and/or stop-over habitat during migration. Some of these species need late successional hardwood stands with mature canopies, while others need early successional habitats such as shrubs and saplings.

Events like windstorms, tornadoes, and flooding by beavers are natural disturbances that affect hardwood forests and drive cycles of regeneration. Managers use timber harvesting to mimic these events and produce stands that resemble those found in natural forests. Selective harvesting helps generate uneven-aged stands

Section A.  
Final Comprehensive  
Conservation Plan  
**CHAPTER IV -**  
**Management Direction**

and the heterogeneity that supports biodiversity. Selective thinning is designed to favor tree species that produce mast and cavities.

*Strategies:*

- A.2.1 Evaluate bottomland hardwood compartments every 15 years.
- A.2.2 Ensure regeneration of approximately 0.5 percent of hardwood acreage per year.
- A.2.3 Regulate stand composition to favor hard- and soft-mast producing trees.
- A.2.4 Restore hydrology where needed (through beaver control and dam removal) to minimize water retention during the growing season.

*Objective A.3. Waters and Wetlands*

Maintain existing species diversity in 300 acres of moist-soil impoundments, 1,900 acres of lakes, and 1,150 acres of greentree reservoirs with emphasis on supporting habitat for migratory birds (e.g., wood ducks and mallards), colonial nesting birds, and native aquatic fauna; develop a comprehensive water quality monitoring program refuge-wide.

*Discussion:* Current management of lakes and wetlands provides habitat for wintering waterfowl and resident species. Bluff and Loakfoma lakes are drawn down during summer to encourage growth of wetland plants that are valuable as waterfowl food. The lakes are filled again in the fall to allow waterfowl access to these food plants. Greentree reservoirs are managed similarly through forest management that enhances mast production and the manipulation of water levels to mimic natural flooding regimes, and makes mast crops available to waterfowl. Managed wetlands like the Prisock moist-soil areas are also manipulated to benefit waterfowl. These impoundments are either disced or mowed to encourage the growth of natural waterfowl foods, or they are planted with such crops as millet to serve as a food source. Although providing waterfowl habitat is often the driving force in managing lakes and wetlands, benefits extend far beyond waterfowl. Hundreds of other wildlife species such as wading birds, water birds, reptiles, and amphibians benefit from the management of these wetland areas.

Another key function of refuge forests is to sustain natural flood events. Protecting and restoring natural-like flooding regimes is essential to conserving riparian areas, ephemeral wetlands, and moisture gradients that are crucial to maintaining habitat diversity.

Sport fish species found in refuge waters include largemouth bass, crappie, bream, and catfish. These populations can be enhanced by active management such as stocking, creel, and size limits. Sportfishing is a very important public use on the refuge, and some controversies arise when fishery management conflicts with waterfowl management.

Numerous non-game species are found in aquatic and wetland habitats on the refuge. Comprehensive surveys of fish, mussels,



*Noxubee  
National Wildlife Refuge*

**Section A.  
Final Comprehensive  
Conservation Plan**

**CHAPTER IV -  
Management Direction**

amphibians, and reptiles are needed to improve management of these species. At least six threatened and/or endangered mussel species are known to occur in nearby waters, and may possibly occur on the refuge. Previous mussel surveys documented more than twenty-two species occurring in refuge waters. A shell of the threatened orange-nacre mucket was also found in refuge waters.

Hollis Creek receives treated sewage from the city of Starkville's sewage ponds, and the Browning Creek floodplain contains a concentrated animal feeding facility directly upstream of the refuge. For these reasons, these waterways are considered to have a high risk of possible contamination or pollution and are currently monitored.

Long-term land-use changes are occurring in the Noxubee watershed as urban development continues, additional highways are built, and shifts occur in farming and forestry practices. These land-use changes affect local hydrology, and ultimately affect the overall hydrology of Noxubee River, Oktoc Creek, and other refuge waters. Such changes in the frequency, duration, and amplitude of flooding can greatly impact bottomland hardwood forests and other floodplain habitats. Currently, the nearest water gauge monitoring these changes is located on the Noxubee River near Macon, Mississippi.

*Strategies:*

- A.3.1 Manipulate water levels to favor moist soil-plant production.
- A.3.2 Disc, plow, and plant units.
- A.3.3 Control exotic, invasive, and nuisance plant species where appropriate.
- A.3.4 Control beaver populations and remove dams where appropriate.
- A.3.5 Continue monitoring of herpetofauna and mussel populations.
- A.3.6 Develop water quality monitoring program assessing the impact of environmental contaminants affecting the refuge.
- A.3.7 Work with U.S. Geological Survey to install water gauge on Noxubee River.

*Objective A.4. Fields/Grasslands*

Maintain fields and grasslands, including restoration of 958 acres of grassland/prairie habitat (grasses and light- and heavy-seeded broadleaf and tuberous perennials) at Morgan Hill.

*Discussion:* In 1993, the refuge embarked on a prairie restoration project with the assistance of Mississippi State University. A refuge field, Morgan Hill, is located on the western edge of the Alabama Blackbelt Prairie. Before settlement, this area consisted of a tall grass prairie where the dominant vegetation was big bluestem, little bluestem, switchgrass, and Indian grass interspersed with cedar and oak/hickory groves (Harper-Lore e. 1999). It is reported that buffalo once roamed this area. Test plots of Indian, switch, and big bluestem grasses were sown in 1993. No formal follow-up on these plots has been done since planting. Henslow's sparrows were recorded in the upper field. This is a significant find of this species,

*Noxubee*  
*National Wildlife Refuge*

**Section A.**  
**Final Comprehensive**  
**Conservation Plan**

**CHAPTER IV -**  
**Management Direction**



*Prairie warbler*  
*USFWS Photo*

which usually winters farther south  
(<http://www.mbr-pwrc.usgs.gov/id/framlst/i5470id.html>).

Over the long term, the refuge can support restoration of prairie grassland habitat at Morgan Hill by using surface fires (fires that burn litter and other live and dead fuels at or near the ground, mostly by flaming combustion) to mimic a historic fire disturbance regime, as well as mowing and planting. As in any native plant community, vigilant monitoring of invasive exotic species is a necessity, along with strategies for their suppression or removal.

In addition to Morgan Hill, the refuge maintains about 1,276 acres of open fields to provide habitat for edge- and field-dependent species. These field habitats are maintained in a variety of ways such as mowing, burning, and farming.

*Strategies:*

- A.4.1 Maintain open nature of fields and grasslands using prescribed fire, mowing, and farming.
- A.4.2 Supplement natural food production using traditional farming operations, the current cooperative farming program, and integrated pest management practices.
- A.4.3 Re-establish heavy-seeded and tuberous perennials to complete restoration at Morgan Hill.

*Objective A.5 Research Natural Areas and Wilderness*

Continue current management of two research natural areas and one wilderness study area within the guidelines of the Fish and Wildlife Service Manual and complete a wilderness review and study for the wilderness study area (research natural areas = 46-acre bald cypress swamp and 67-acre red cedar/pine/hardwood; wilderness study area = 1,090 acres).

*Discussion:* Wilderness study areas are inventoried refuge lands and waters within the planning area that meet the eligibility criteria for wilderness as defined by the Wilderness Act. The Wilderness Study Area at Noxubee refuge was designated as such in 1976, by the Director of the Fish and Wildlife Service.

Research natural areas and wilderness study areas are part of a national network of reserved areas under various ownerships (i.e., Fish and Wildlife Service, Forest Service, National Park Service). This network is the result of a designation system recognized by other federal land administering agencies.

Research natural areas are intended to represent the full array of North American ecosystems, biological communities, and habitats. They are areas where natural processes are allowed to predominate without human intervention. However, under certain circumstances, deliberate manipulation is used to maintain unique features that the research natural area was established to protect. Activities include research, study, observation, monitoring, and educational pursuits.

*Noxubee  
National Wildlife Refuge*

**Section A.  
Final Comprehensive  
Conservation Plan**

**CHAPTER IV -  
Management Direction**

Presently, the refuge has two areas established by the Society of American Foresters as research natural areas. The Old Robinson Road Research Natural Area was designated in 1959, and contains 46 acres of bald cypress swamp. The Morgan Hill Research Natural Area was designated in 1973, and contains 67 acres of red-cedar/pine/hardwood forest. There has been some interest in evaluating two additional areas for potential status—Pete's Slough and Douglas Bluff. Both of these areas exhibit habitats supporting unique, rare, and restricted plant species. The Douglas Bluff area has at least 85 species of herbs, shrubs, vines, and trees including uncommon and regionally rare chinkapin oak and fringe trees, pachysandra, early saxifrage, and bloodroot.

The Wilderness Study Area at Noxubee refuge was designated under a planning process described in the Department of the Interior, Final Environmental Impact Statement, Proposed Noxubee Wilderness Area, Mississippi. The Draft Environmental Impact Statement was submitted to the Council on Environmental Quality and the public on February 28, 1974, but final legislated designation did not occur. Since that time, the Service has protected and managed the wilderness attributes of this site. The Draft Environmental Impact Statement recommended 1,200 acres of seasonally flooded and timbered bottomland hardwoods as Wilderness within the National Wilderness Preserve System. In 2000, a wilderness inventory was conducted on the refuge, using a field review and the Service's Geographic Information System to calculate the boundary, as illustrated in the 1974 Draft Environmental Impact Statement. The decision was made to remove a portion along the eastern side of the refuge that had been previously impacted by timber harvesting and construction of a levee, and because it was very close to a private in-holding. The revised mapping indicated a total of 1,090 acres instead of the previous 1,200 acres recommended in the 1974 report.

A wilderness review is the process the Service uses to determine whether or not to recommend to Congress that refuge lands and waters be designated as Wilderness. The Service evaluates lands and waters that meet certain minimum criteria for wilderness, and then further evaluates the resulting wilderness study area to determine if it merits recommendation to the Secretary of the Interior for inclusion in the Wilderness System. The wilderness review process has three phases which include inventory, study, and recommendation. The refuge has conducted the preliminary inventory phase of the wilderness review. A wilderness study is conducted to analyze all values in a designated wilderness study area. Recommendations are made in an Environmental Impact Statement with input from the public.

*Strategies:*

- A.5.1 Coordinate research efforts with scientists and the research community.

Section A.  
Final Comprehensive  
Conservation Plan

CHAPTER IV -  
Management Direction

- A.5.2 Continue to manage the area as wilderness until all three phases of the wilderness review process have been completed.
- A.5.3 Coordinate future wilderness review with the public.
- A.5.4 Develop research objectives and management strategies for research natural areas.
- A.5.5 Evaluate Pete's Slough and Douglas Bluff as candidates for research natural area designations.

*Goal B: Fish and Wildlife Populations*

Continue to protect, maintain, and enhance populations of trust and native plant and animal species within the guidelines of the Central Gulf Ecosystem Five-Year Action Plan, the Red-Cockaded Woodpecker Recovery Plan, the North American Waterfowl Plan, the Partners-in-Flight Plan, and the Noxubee National Wildlife Refuge Forest Management Plan.

*Objective B.1 Trust Species*

Monitor and maintain healthy populations of red-cockaded woodpeckers, waterfowl, and other migratory birds (with emphasis on late-successional migratory birds), and conduct refuge inventory and monitoring to evaluate and improve management practices for trust species on refuge lands.

*Discussion:* Present refuge management of trust species includes red-cockaded woodpeckers, wood storks, eagles, waterfowl, and neotropical migratory birds. Biological integrity, diversity, and environmental health of trust species on the refuge are surveyed and monitored through cooperation, assistance, and continued partnerships from others. Noxubee refuge plays an instrumental role in the recovery of the red-cockaded woodpecker and managing for wood ducks, mallards, and other waterfowl populations.

Population management activities, even those implemented to benefit single species, can to the extent practical, contribute to broad diversity of indigenous flora and fauna. Forests that support the red-cockaded woodpecker also support a variety of migratory bird and resident wildlife species.

Several neotropical migratory bird species are imperiled through habitat loss, and can benefit from active habitat management. Refuge management can be directed to benefit different groups of bird species, such as those dependent on interior forest habitats or those dependent on early-successional habitats.

*Strategies:*

- B.1.1 Continue monitoring, cavity augmentation, and predator control of red-cockaded woodpeckers to reach or exceed population target of 88 groups.
- B.1.2 Monitor waterfowl populations as part of the Service's efforts to track continental populations and to determine responses to management actions. This will include regular

*Noxubee*  
*National Wildlife Refuge*

**Section A.**  
**Final Comprehensive**  
**Conservation Plan**

**CHAPTER IV -**  
**Management Direction**

- waterfowl surveys as well as maintaining and monitoring wood duck boxes.
- B.1.3 Monitor populations of other migratory birds through breeding bird point counts as part of the Service's Partners-in-Flight program to determine species responses to management actions.
  - B.1.4 Monitor wading birds as appropriate.
  - B.1.5 Maintain approximately 150 wood duck nest boxes.
  - B.1.6 Annually band 200 pre-season wood ducks in support of Service monitoring efforts.
  - B.1.7 Continue monitoring populations of cormorant roosts in cooperation with U.S. Department of Agriculture, Division of Wildlife Services.

*Objective B.2 Resident and Other Species*

Manage to maintain healthy, resident wildlife populations including white-tailed deer (average harvest range 400-600 deer) and turkey.

*Discussion:* The refuge forests, wetlands, and grasslands are managed to ensure healthy, viable resident wildlife populations consistent with sound biological principles and other objectives of this plan.

White-tailed deer have the potential to adversely affect habitats unless their numbers are kept at or slightly below the carrying capacity. The refuge hunt program is designed to maintain the herd while offering quality hunting opportunities to the public. The population of deer has remained fairly stable through a public hunt program. An appropriate harvest (related to habitat conditions) will be maintained with occasional fluctuations due to weather and habitat conditions. Population level indicators will include monitoring harvest data and conducting periodic health checks.

Other game mammals open for public hunting include raccoons, rabbits, squirrels, and the incidental taking of beavers, coyotes, and feral hogs. These species may also have an adverse impact on other species in the event of overpopulation. Nest predation on turkeys, wood ducks, and songbirds may become so great as to limit their reproductive success. Overpopulation may also facilitate the spread of canine distemper, a common close contact type disease, to other species such as foxes, coyotes, and domestic dogs. In an effort to prevent coyote overpopulation, the species is considered an incidental harvest species and may be taken during any open hunting season.

Populations of bobwhite quail and wild turkey remain stable on the refuge; however, quail populations have declined markedly throughout the southeast. Loss of early successional habitat is most commonly cited as causing the quail decline. Numerous other declining bird species, such as loggerhead shrikes, prairie warblers, and indigo buntings are associated with these habitats as well.

Reptiles, amphibians, and bats are abundant on the refuge and important indicators to evaluate the environmental health of the



**Section A.**  
**Final Comprehensive**  
**Conservation Plan**  
**CHAPTER IV -**  
**Management Direction**

ecosystem. Knowledge of which species occur on the refuge is fundamental to an understanding of the biological diversity of the area.

*Strategies:*

- B.2.1 Coordinate hunting regulations for resident wildlife with state agencies to maintain population health and stability.
- B.2.2 Monitor and manage the population of white-tailed deer and waterfowl at current levels.
- B.2.3 Identify and implement additional management activities to benefit bobwhite quail and other early successional wildlife species.
- B.2.4 Identify thresholds of disturbance and develop associated standards and techniques that can be applied, where appropriate, to reduce conflicts and achieve balance between the public and wildlife.
- B.2.5 Coordinate management and safety issues with Service public use specialists and game enforcement officials.

*Objective B.3 Exotic, Invasive, and Nuisance Plants and Animals*

Control exotic, invasive, and nuisance species (e.g., beaver) to levels that do not negatively affect trust species.

*Discussion:* American lotus is an invasive species found in refuge lakes and sloughs. Lotus plants form dense mats which shade out other more desirable plant species that have greater value to wildlife. In addition, lotus can impede water flow and recreational use. Lotus in refuge lakes has been moderately controlled with herbicides over the past 10 years.

Kudzu and cogon grass are exotic pest plants that affect refuge uplands. Where they occur, they often form thick monotypic stands that crowd out other desirable plants. These species have been controlled with herbicides over the past 4 years.

Bicolor lespedeza and Chinese privet are two additional exotic pest plant species which are so widespread over the refuge that control efforts are difficult. Water hyacinth is an aggressive exotic plant that occurs in the Tennessee-Tombigbee River and must be monitored more vigilantly.

Beavers are native to the refuge; however, their dam building activity can cause extensive flooding and kill large acreages of bottom-land hardwood forests. In addition, their habit of burrowing can damage refuge levees and roads. Feral hogs occasionally become a problem on the refuge, as their rooting destroys understory vegetation. Both beaver and hog populations have been controlled for more than 20 years.

*Strategies:*

- B.3.1 Maintain monitoring and control programs for exotic plant species that invade/compromise habitat quality.

**Section A.  
Final Comprehensive  
Conservation Plan**

**CHAPTER IV -  
Management Direction**

- B.3.2 Use integrated pest management techniques to reduce lotus, kudzu, and cogon grass infestations to levels that do not negatively affect trust resources.
- B.3.3 Develop an Integrated Pest Management Plan consistent with Beaver Control Plan.
- B.3.4 Coordinate results of information concerning success/failure of control treatments within and outside the agency, especially in regard to lotus and kudzu.
- B.3.5 Investigate control methods for Chinese privet and bicolor lespedeza.

***Goal C: Land Protection and Conservation***

Protect and improve conditions for fish, wildlife, habitats, special management areas, and wilderness through the use of current land protection programs, laws, policies, and partnerships.

*Discussion:* Included in the approved acquisition boundary of the refuge are 8,556 acres of non-refuge lands (Fig. 8). Of that, the Section 16 properties owned by the State of Mississippi and Mississippi State University's John Starr School Forest are permanently protected and will not be acquired by the Service. The remaining 4,263 acres of private in-holdings could potentially be acquired. If so, these properties would be managed by the Service to sustain the same values and functions of the refuge's existing habitats that help support native biological diversity.

Although funding for land acquisition can come from the Land and Water Conservation Fund and the Migratory Bird Conservation Fund, the Service often acquires available private land in-holdings using a land-for-timber exchange. Infrequently, it will use a land-for-land exchange. With land-for-timber exchanges, local timber contractors are contacted who will negotiate with the in-holder based on Service appraisal of the land. If the owner accepts the appraised value, the timber contractor will purchase the property. The refuge will then exchange a quantity of timber of equal value for the land. Timber selected for exchange is obtained from stands in need of thinning or regeneration for wildlife habitat.

Conservation easements and leases can sometimes be used to obtain minimum interests necessary to satisfy refuge objectives, if the refuge staff can adequately manage uses of the areas for the benefit of wildlife. The Service can negotiate management agreements with local and state agencies, and accept conservation easements. Some parcels within the approved refuge acquisition boundary may be owned by other public or private conservation organizations. The Service can work with interested agencies to identify additional areas needing protection or landowners needing technical assistance. The acquisition of private lands is entirely contingent on the landowner's willingness to participate. The refuge is responsible for nine Farmers Home Administration Conservation Easements in six counties totaling 796.05 acres. To meet compliance standards, these easements are reviewed on an annual basis by Service staff.

*Objective C.1 Land Acquisition and Conservation Easements*

Seek to acquire 4,263 acres of private land in-holdings within the existing approved acquisition boundary and work to expand acquisition boundary to allow acquisition of an additional 5,200 acres outside the current boundary. Also continue managing nine Farmers Home Administration Conservation Easements.

*Discussion:* The proposed expansion areas include approximately 5,200 acres of privately owned lands to the north and east sections of the refuge (Fig. 8 ). The expansion area of approximately 2,600 acres is north of U.S. Highway 25, in Oktibbeha County. The east expansion area of approximately 2,500 acres is primarily northeast of the Noxubee River in Noxubee County. These lands will assist in increasing populations of species associated with upland pine forests (i.e., pine warbler). The endangered red-cockaded woodpecker is found on refuge lands near the northern boundary. The proposed expansion area on the east side of the refuge includes species associated with bottomland and riverine habitats (i.e., prothonotary warbler).

The north expansion area is primarily short rotation loblolly pine plantations while the east expansion area is a mixture of cutover forest land, pine plantations, and pasture land. The vegetational community consists primarily of grasses, sedges, shrubs, young trees, and unharvested cull trees. Natural forest vegetation consists primarily of oaks, hickories, blackgum, and sweetgum. Mid-story trees or shrubs consist of possum haw, paw-paw, ironwood, wax myrtle, and wild azalea. Other smaller vegetative species that occur include poison ivy, common elderberry, blackberry, trumpet vine, palmetto, and green briars.

*Strategies:*

- C.1.1 Establish a new acquisition boundary that would encompass an additional 5,169 acres.
- C.1.2 Establish acquisition priorities based upon habitat values and/or possible threats to existing resources.
- C.1.3 Initiate and continue contact with all landowners within the refuge acquisition boundary to determine landowner interest and willing-seller status.
- C.1.4 Continue to utilize and seek partnerships with conservation organizations and others to complete acquisitions.
- C.1.5 Work with loggers and timber companies to conduct timber-for-land exchanges.

*Objective C.2 Conservation Partnerships*

Develop and maintain new partnerships with states, tribes, nonprofit organizations, academia, private landowners, and businesses to broaden support for the refuge.

*Strategies:*

- C.2.1 Increase participation and coordination with the Service's private lands biologist in Jackson, Mississippi, to implement,





*Noxubee  
National Wildlife Refuge*

**Section A.  
Final Comprehensive  
Conservation Plan**

**CHAPTER IV -  
Management Direction**

locally, the Partners for Fish and Wildlife program, and other conservation programs available that offer incentives and technical assistance to landowners.

- C.2.2 Increase communication to promote wildlife conservation with landowners and community groups.
- C.2.3 Continue outreach techniques using Internet web page, newsletters, and local events.
- C.2.4 Participate in National Wildlife Refuge System outreach events and other system activities.

***Goal D. Education and Visitor Services***

Develop, maintain, and support recreation and education opportunities that promote fish and wildlife conservation consistent with Service mission, refuge purpose, and Service policy.

*Discussion:* Noxubee refuge has an excellent reputation, regionally, as a steward of public lands. The refuge has created education and visitor service programs that give the public an opportunity to learn about and enjoy fish and wildlife resources. In fact, education and recreation are playing key roles in assisting the refuge to integrate biodiversity education and recreation programs, such as hunting and environmental education. (See Figure 9, Existing and Proposed Visitor Facilities.)

Consistent with the provisions outlined in the National Wildlife Refuge System Improvement Act of 1997, the Service provides recreation opportunities that reflect the unique qualities and features of national wildlife refuges. Refuge programs provide the public with an opportunity to learn about, enjoy, and appreciate fish and wildlife. These activities are increasing visitor use, but should, if properly managed, be able to continue without impacting the natural environment.

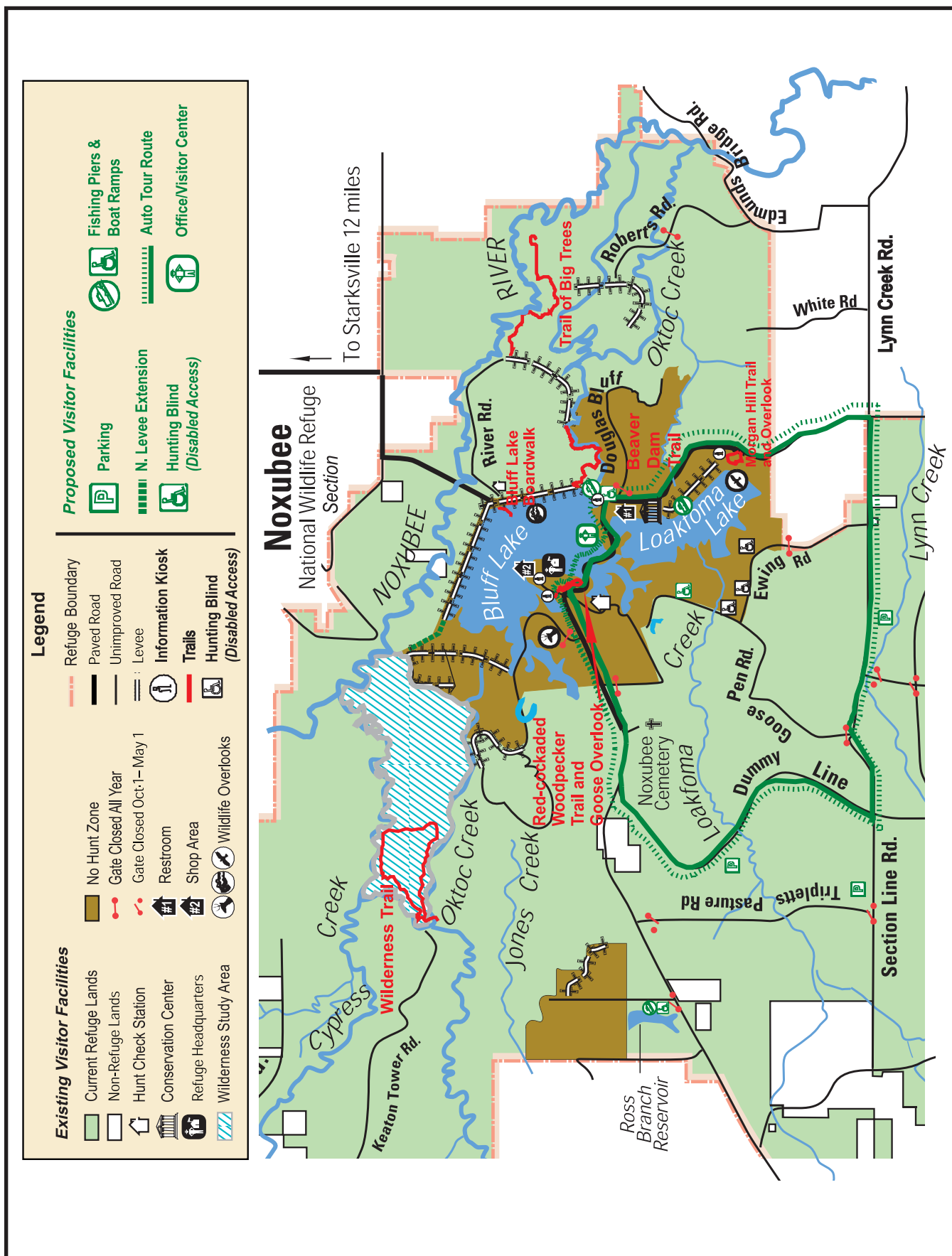
***Objective D.1 Hunting***

Where appropriate, provide hunting opportunities to manage deer populations (average annual harvest range 400-600 deer), and provide small game and waterfowl hunting opportunities.

*Discussion:* Hunting is a tool used extensively throughout the National Wildlife Refuge System to manage wildlife populations, and is one of the six priority public uses identified in the National Wildlife Refuge System Improvement Act of 1997. If properly conducted, hunting provides a biologically sound form of outdoor recreation. Refuge management provides habitat for a wide variety of game species. Management of these species is a collaborative effort with the Mississippi Department of Wildlife, Fisheries, and Parks. Achievement of habitat and population management objectives is primary in establishing hunting opportunities. In 1994, the Service adopted a hunt plan that describes management for white-tailed deer, small game, and turkey. The plan ensures that animals are taken only from populations capable of sustaining harvests. The hunting program is coordinated annually with the Mississippi Department of Wildlife, Fisheries, and Parks. Deer hunting is one



Figure 9. Existing and Proposed Visitor Facilities



**Section A.  
Final Comprehensive  
Conservation Plan**

**CHAPTER IV -  
Management Direction**

of the most popular recreational activities on the refuge and deer seasons are held for archery, primitive weapons, modern firearms, and youth/adult gun hunts. Hunting activities are managed so as not to cause disturbance to the endangered red-cockaded woodpecker.

Greentree reservoirs provide some opportunity to allow waterfowl hunting without causing disturbance to waterfowl using the refuge's moist-soil units. Waterfowl hunting is managed on the refuge and there could be potential to expand hunting opportunities where appropriate and compatible.

*Strategies:*

- D.1.1 Monitor deer populations via harvest data and periodic health checks to maintain a healthy population and sustainable harvest.
- D.1.2 Maintain well-defined boundaries around areas closed to hunting to ensure the safety of refuge visitors and provide a high quality experience for the hunter.
- D.1.3 Annually review hunt regulations in coordination with Mississippi Department of Wildlife, Fisheries, and Parks' biologists to assist in achieving balanced and healthy game populations.
- D.1.4 Evaluate potential impacts of hunting on other refuge activities and programs.
- D.1.5 Develop additional hunting blinds for disabled hunters.
- D.1.6 Develop vehicle parking areas to facilitate safe access to hunting areas.

*Objective D.2 Fishing*

Maintain sufficient game fish populations at Bluff and Loakfoma lakes to support an annual average of 13,000 angler-use days through natural reproduction, habitat management, regulated harvest, and stocking when appropriate.

*Discussion:* Game fish conservation is not a primary purpose of this refuge, although it is a very popular managed use. Bluff Lake (1,200 acres), Loakfoma Lake (600 acres), Ross Branch Reservoir, creeks, and the Noxubee River harbor substantial fisheries. The primary game fish species include largemouth bass, crappie, bream, and channel catfish. The fishing season runs from March 1 through October 31 on all waters except the Noxubee River, which is open year-round. Bluff Lake, Ross Branch, and Loakfoma Lake have special bass regulations in effect. Personnel from Private John Allen Fish Hatchery in Tupelo, Mississippi, periodically restock largemouth bass, bream, and catfish in refuge lakes. Bow fishing for non-game fish only is permitted, with nighttime bow fishing allowed during April through August.

*Strategies:*

- D.2.1 Evaluate fishery resource annually using staff from Mississippi State University.

Section A.  
Final Comprehensive  
Conservation Plan

CHAPTER IV -  
Management Direction

- D.2.2 Coordinate stocking needs with Private John Allen National Fish Hatchery.
- D.2.3 Develop fishing piers at Bluff Lake for wheelchair access.
- D.2.4 Renovate docks and boat ramps and provide wheelchair access at Bluff and Loakfoma lakes.

*Objective D.3 Wildlife Observation and Photography*

Restore and improve overlooks, boardwalks, and trails, provide special guided and education program tours each season, and seek funding to develop an auto tour route with interpretive panels to provide observation opportunities and develop key resource awareness.

*Discussion:* Wildlife observation and photography are very popular managed uses and the demand for services and improved or new facilities is growing year-to-year on the refuge. Concentrations of waterfowl during the winter, egrets in spring and summer, and deer and red-cockaded woodpeckers attract numerous visitors year-round. Special programs to observe owls, alligators, and red-cockaded woodpeckers are conducted by the staff. Butterfly and dragonfly observation also has become increasingly popular in recent years.

*Strategies:*

- D.3.1 Maintain nature trails.
- D.3.2 Support Audubon Christmas Bird Count and other birding events.
- D.3.3 Support Xerces Fourth of July Butterfly Count.
- D.3.4 Advertise and maintain guided interpretive tours.
- D.3.5 Seek funding for auto tour route

*Objective D.4 Interpretation*

Increase interpretation activities to at least 15 events annually.

*Discussion:* Interpretation often plays a key role in helping refuge staff integrate conservation into the overall purpose of the refuge. Many opportunities exist for special events and volunteer guided programs, such as night hikes, bird tours, etc. The refuge manages a variety of services with limited staff and volunteers to support interpretation, including opportunities to discuss, teach, and demonstrate sustainable wildlife practices. Emphasis is also placed on providing teacher assistance, developing resource awareness, and encouraging community involvement and environmental stewardship.

Existing interpretive programs cover all types of resources including wildlife, forest, and cultural. Night prowls are held to give visitors the opportunity to view certain nocturnal wildlife such as owls and alligators. During Mississippi Archaeology Month, interpretive demonstrations are held whereby archaeological sites are excavated under the supervision of the Service's Archaeologist. Species interpretive programs are also held such as "Bluebird Workshops" in which children learn about the life history of bluebirds and actually construct a nest box.

*Noxubee  
National Wildlife Refuge*

**Section A.  
Final Comprehensive  
Conservation Plan**

**CHAPTER IV -  
Management Direction**

The refuge newsletter is another excellent tool for interpretation. Issued quarterly, it provides updates on nearly all refuge programs explaining the "how" and "why" behind many refuge management programs.

Interpretive panels are also located at key public use locations throughout the refuge, explaining what visitors may see at that location, as well as other visitor facilities located on the refuge.

*Strategies:*

- D.4.1 Maintain restrooms and potable water faucets for visitors.
- D.4.2 Maintain interpretive and directional signs, Internet web site, brochures, newsletters, public updates of events, and conservation awareness and activities.
- D.4.3 Construct a pull-off and information kiosk on Highway 25.
- D.4.4 Construct information kiosk at Morgan Hill Overlook.

*Objective D.5 Environmental Education*

Coordinate with Starkville School District, Mississippi State University, and other groups to teach required curriculum, share expertise, and host meetings at the Environmental Education Center, refuge outdoor classroom, and off-site locations to support 15,000 students annually. Initiate and support a Refuge Friends Group.

*Discussion:* In 1999, the Starkville School District and the refuge entered into a valuable long-term partnership. The school district built the Noxubee Conservation Center on refuge lands to provide environmental education within its district. The Service entered into a 50-year lease agreement and partnership with the school district. The Service owns the facility and it is operated and maintained by the school district. The school district supplies the director, seasonal interns, equipment, and curriculum, which are paid partly out of a grant from the Environmental Protection Agency. The curriculum addresses a wide selection of environmental topics to meet requirements. The part-time staff assists with teaching and curriculum development. Grant monies are managed through a special account administered by the refuge. The Service provides seasonal interns to assist the center's extremely limited staff which otherwise would be unable to support the various activities. Strong volunteer recruitment and training will remain important to support ongoing environmental education activities.

*Strategies:*

- D.5.1 Seek funding to construct and operate the additional phases of the Noxubee Conservation Center.
- D.5.2 Maintain facilities and manage programs to support education activities.
- D.5.3 Increase number of off-site programs and demonstrations to school groups, garden clubs, conservation clubs, retired citizens, etc.
- D.5.4 Develop teaching materials and host teacher workshops to promote environmental education and basic curriculum in local schools.

Section A.  
Final Comprehensive  
Conservation Plan

CHAPTER IV -  
Management Direction



USFWS Photo

- D.5.5 Encourage the development of a Refuge Friends Group and solicit volunteers to support environmental education programs.

*Goal E. Cultural Resources*

Identify and protect cultural resources in accordance with state and federal historic preservation legislation and regulations.

*Discussion:* Several themes are consistently present in cultural resource and historic preservation laws. They include: (1) each agency should inventory "historic sites" and assess the site's eligibility for the National Register of Historic Places; (2) consideration of impacts to cultural resources during the agency's management activities; (3) protection of cultural resources from looting and vandalism; and (4) consultation with groups such as Native American tribes and African American communities to address how management activities might impact archaeological sites deemed important to these groups.

*Objective E.1 Surveys and Investigations*

Conduct a refuge-wide archaeological survey by the year 2006.

*Strategies:*

- E.1.1 Conduct a comprehensive archaeological survey of the refuge and develop a GIS layer for the cultural resource sites.
- E.1.2 Produce an annotated bibliography of scientific reports and articles.

*Objective E.2 Protection*

Develop and implement planning and law enforcement procedures to protect the refuge's cultural resources and diminish site destruction due to looting and vandalism.

*Strategies:*

- E.2.1 Ensure that full-time refuge law enforcement officer completes Archaeological Resources Protection Act training course.
- E.2.2 Ensure that pertinent refuge staff complete the Section 106/Cultural Resources for Managers' training course.

*Objective E.3 Management and Education*

Manage known cultural resources in a manner that preserves their historical integrity and implement an educational program that will provide an understanding and appreciation of the human influence on the region's ecosystems.

*Strategies:*

- E.3.1 Establish an archaeologist position at the refuge to implement a comprehensive cultural resources management



**Section A.  
Final Comprehensive  
Conservation Plan**

**CHAPTER IV -  
Management Direction**

- program. This position would compliment the existing Regional Archaeologist position and be shared with other stations on the west side of the Service's Southeast Region.
- E.3.2 Plan management activities so they prevent or minimize disturbance to known cultural resources, such as the Old Robinson Road National Historic Landmark, graveyards, encampments, church sites, home sites, etc.
  - E.3.3 Design environmental education and basic interpretive programs that explain refuge history and resources in the context of human influences.
  - E.3.4 Work with local Native- and African-American communities to develop an education program regarding their cultural heritages.

*Objective E.4 Cultural Resource Partnerships*

Facilitate partnerships to manage cultural resources with pertinent state and federal agencies, State Historic Preservation Office, professional archaeologists, Native- and African-American communities, and the general public.

*Strategies:*

- E. 4.1 Seek a Memorandum of Understanding with the U.S. Forest Service and Mississippi Department of Wildlife, Fisheries, and Parks to enhance law enforcement of the Archaeological Resources Protection Act, the Native American Grave Protection and Repatriation Act, and Section 50 of the Code of Federal Regulations, as well as to facilitate investigations of Archaeological Resources Protection Act violations and unpermitted artifact collection on the refuge.
- E.4.2 Approach the Choctaw Nation and other pertinent Native-American groups for information on and input into the management of significant cultural and sacred sites located within the refuge.
- E.4.3 Identify potential avenues of archaeological and historic investigations and promote interdisciplinary research, such as the Jenkins' and Krause's investigations in the Tennessee-Tombigbee River Watershed.
- E.4.4 Negotiate an agreement with appropriate entities for the permanent curation of archaeological collections and associated documentation derived from archaeological investigations on the refuge.
- E.4.5 Expand existing partnership with Mississippi State University's Department of Anthropology to include more extensive surveys and research, and potentially the sponsorship of a graduate intern on the refuge.

*Goal F. Refuge Administration*

Develop, rehabilitate, implement, and maintain a comprehensive refuge facility, operations, and maintenance program responsive to supporting the management of fish and wildlife resources and the safety and experience of visitors.



Section A.  
Final Comprehensive  
Conservation Plan

CHAPTER IV -  
Management Direction

*Discussion:* Administration of the full range of refuge programs requires a collection of staff, equipment, facilities, and infrastructure. Maintaining and improving these resources are keys to effectively implementing refuge programs.

*Objective F.1 Equipment and Facilities*

Improve equipment, fleet, computer and communication systems, refuge entrance roads, buildings, structures, trails, and signs as appropriations allow and through existing partnerships. Seek additional partnerships to fund improvements.

*Discussion:* Operating the refuge at any level requires a basic infrastructure of buildings, roads, water control structures, etc., and a basic fleet of equipment to perform maintenance operations. Buildings are necessary to provide office space, house refuge employees, perform maintenance activities, and store equipment and supplies. Structures such as levees and water control structures are necessary for managing wildlife habitat. A variety of heavy and light equipment is needed to perform basic maintenance and habitat management activities such as grading roads, cleaning canals, installing firebreaks, conducting farming operations, etc.

Communication and data processing equipment has become more important to refuge operations over time. Communications equipment is now critical to providing adequate emergency response services such as law enforcement, fire control, and medical emergencies. Data processing equipment has become increasingly important to many refuge programs for purposes such as analyzing biological trends, conducting GIS and mapping activities, and general administration such as tracking budgets and processing personnel actions.

*Strategies:*

- F.1.1 Improve and maintain all refuge facilities to comply with safety standards and support biological, education, and visitor service program objectives.
- F.1.2 Continue cooperating with local and state highway officials to improve and maintain roadways.
- F.1.3 Educate local officials and Regional Office regarding refuge needs.
- F.1.4 Conduct Congressional briefings on issues affecting the refuge.

*Objective F.2 Operations and Maintenance*

Increase staff and seek funding to address inadequacies and improve expertise in all program areas. These measures are necessary to ensure adequate funding and support for managing trust species and public use programs.

*Discussion:* The refuge employs 17 full-time staff necessary to carry out refuge programs. Positions are designed to address all program areas such as biology, forestry, public use, law enforcement, fire

**Section A.  
Final Comprehensive  
Conservation Plan**

**CHAPTER IV -  
Management Direction**

management, facility maintenance, and administrative support. Each position requires a set of skills unique to that position. The refuge still lacks key staff positions to manage comprehensive biological, education, recreation, and cultural resource programs. The refuge's volunteer and intern programs have grown substantially over the past 5 years, primarily benefitting the biological and environmental education programs. Future growth will require additional permanent staff positions as well as increases in volunteers and interns.

*Strategies:*

- F.2.1 Add 14 staff positions necessary to fully implement management programs.
- F.2.2 Manage a comprehensive employee training program to ensure good working knowledge of program areas.
- F.2.3 Manage volunteer and student intern programs in such a manner that they compliment existing staff efforts, as well as provide meaningful and educational opportunities.
- F.2.4 Seek increases in refuge funding to support additional operations and maintenance activities as identified for each program area.
- F.2.5 Encourage the development of a Refuge Friends Group to support environmental education and other programs.

*Noxubee*  
*National Wildlife Refuge*

**Section A.**  
**Final Comprehensive**  
**Conservation Plan**

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**CHAPTER IV -**  
**Management Direction**

Section A.  
Final Comprehensive  
Conservation Plan

CHAPTER V -  
Plan Implementation

## V. PLAN IMPLEMENTATION

### Background

Refuge lands are managed as directed under the National Wildlife Refuge System Improvement Act of 1997, Fish and Wildlife Service Manual, proven scientific practices, sound biological principles, and up-to-date research. Congress has defined a clear legislative mission of wildlife conservation for all national wildlife refuges, which unlike other public lands, are dedicated to the conservation of the Nation's fish and wildlife resources. Recreational uses are accom-

modated where appropriate and compatible, while still meeting the Congressional mandates of wildlife first. Priority projects emphasize the protection and enhancement of fish and wildlife species first and foremost, but consideration is given to addressing the needs and demands for recreation and environmental education when appropriate and compatible.

### Proposed Projects and Personnel

The proposed projects reflect the basic needs identified by Service staff, the public, and planning team members for the management of fish and wildlife populations, habitats, visitor

services, general administration, land protection, and conservation. Among these projects is a list of step-down management plans to be developed. Step-down plans are individual and specific management plans. The refuge operates under a number of these plans which outlines proposed actions, as well as their benefits and potential. Some specific plans may need revisions, while others will need to be developed. The Service prepares step-down plans in conjunction with the provisions set forth in the National Environmental Policy Act of 1969.

Annual funding for staff, facilities, operations, and maintenance is an integral part of project implementation. General cost estimates are provided in Figure 10. These figures will be updated and adjusted annually. Essential needs are addressed such as reducing or eliminating significant biological threats and problems, meeting National Wildlife Refuge System mission requirements, and fulfilling the purpose for which the refuge was established. There are no estimates of potential land purchases, because land values are subject to time of sale and market value at time of purchase. There are no assurances that these projects will be either fully or partially funded. However, with the help and cooperation of conservation



*Prairie warbler*  
USFWS Photo

Section A.  
Final Comprehensive  
Conservation Plan

CHAPTER V -  
Plan Implementation



*Paddlefish monitoring*  
USFWS Photo

partners, the Service will use this plan to focus attention on funding the operation and maintenance needs of the refuge.

All of the lands acquired at Noxubee refuge over the last 10 years have been through timber-for-land exchanges. It is anticipated that this will continue to be the primary method of acquiring lands for the refuge including the proposed expansion areas. Timber-for-land exchanges do not require the use of appropriated funds for land acquisition. The administration of lands acquired within the proposed expansion areas will not require any additional operational or management funds.

For the purpose of achieving the goals and objectives developed for the refuge, the plan has grouped management strategies into specific projects. This plan describes 20 potential projects for development and management. Also, additional staff are listed to implement the projects. Partnership agreements benefitting the refuge and other entities also are discussed.

The reader will note that a RONS or MMS number has been assigned to each project. The Refuge Operations Needs System (RONS) is a national database which contains the unfunded operational needs of each refuge. Projects included are those required to implement approved plans and meet goals, objectives, and legal mandates. The Maintenance Management System (MMS) is a computerized database and management tool for planning and budgeting maintenance, capital improvements, and equipment replacement projects. The strategies linked to specific projects also are listed. (See Figures 10 and 11 for a proposed project and personnel cost summary and for the number of personnel needed to fully implement the comprehensive conservation plan.)

#### **Staff for Office/Visitor Center - Four Positions**

Additional positions such as a Janitor (WG-05); Program Coordinator (GS-07); Secretary (GS-05); and a Receptionist (GS-04) will be necessary to provide an appropriate level of visitor services as well as maintain a new visitor center.

#### ***RONS00009 and Strategy F.2.1***

#### **Avifauna Survey**

Standardized protocols and systematic surveys of refuge bird species will be conducted to determine presence and distribution and provide baseline data to help managers evaluate the effectiveness of forest management and restoration practices. This information is critical to implementing programs, formulating habitat management, and developing adaptive management strategies for non-game wildlife management and neotropical migratory bird management.

#### ***RONS97002 and A.2.4.***

#### **Mollusk Survey**

A systematic survey of refuge mollusk species (primarily freshwater mussels) will be conducted to establish species presence and distribution in order to guide management decisions. Previous surveys have

**Section A.  
Final Comprehensive  
Conservation Plan**

**CHAPTER V -  
Plan Implementation**

been limited in nature, and have not provided the type of comprehensive information needed to conduct appropriate management of this species group. Such a survey would verify their presence or absence and serve as a first step towards appropriate management.

***RONs97004 and Strategy A.3.5.***

**Amphibian and Reptile Survey**

A systematic survey of refuge herpetofauna will occur to establish species presence and distribution. Much emphasis is now being placed on non-game and lesser-known species, and appropriate management of these species is impossible without this type of basic information.

***RONs97003 and Strategy A.3.5.***

**Invertebrate Survey**

A systematic survey of refuge invertebrates (primarily insects) will be conducted to establish species presence and distribution to help guide management decisions. Surveys of butterflies and moths conducted by the local Audubon Society indicate extremely high diversities of these insect groups on the refuge.

***RONs97005 and Strategy A.2.5.***

**Botanical Survey**

A systematic survey of plant species on refuge lands will be conducted to establish species presence and distribution to help guide management decisions. For example, the Price's potato-bean, listed as a threatened species under the Endangered Species Act, occurs relatively close to the refuge; however, there have been no formal surveys for this plant on the refuge. Documenting its presence or absence would be very beneficial in planning future management activities.

***RONs97006 and Strategy A.2.5.***

**Archaeological Survey**

A comprehensive inventory and procurement of information on historic sites, and their eligibility for the National Register of Historic Places, will occur as appropriate. A systematic archaeological survey of refuge lands will occur to establish location and content of archaeological sites. From this survey, a GIS overlay will be developed to help with planning refuge management activities.

Information collected will serve as the foundation for a database on refuge archaeological resources.

***RONs96008 and Strategy E.1.1.***

**Wheelchair-Accessible Fishing Pier at Bluff Lake**

The demand for improved access to fishing opportunities is constantly increasing. Constructing a wheelchair-accessible fishing pier at Bluff Lake would be an excellent step towards improving these opportunities. There are no access points designed specifically for the numerous disabled individuals who enjoy fishing at the refuge.

***RONs97010 and D.2.3.***



Section A.  
Final Comprehensive  
Conservation Plan

CHAPTER V -  
Plan Implementation

### **Boat Ramp and Dock at Loakfoma Lake**

As previously mentioned, access to fishing opportunities at the refuge is constantly increasing. Loakfoma Lake is one of the most popular fishing lakes on the refuge, and currently, the only public access facility existing is a graveled boat ramp. Access to this lake could be dramatically improved by the construction of a concrete ramp and boat dock.

***RONs97026 and D.2.4.***

### **Auto Tour Route**

An auto tour route is needed to provide an established route for visitors to see the various habitats and wildlife on the refuge. No such route exists to guide visitors through the 47,000-acre refuge, thus most visitors simply visit the areas near the office. An auto tour route could guide visitors to other parts of the refuge, thus exposing them to the public use facilities and varieties of habitat and wildlife that the refuge has to offer. The project would involve developing vehicle pull-offs, signs, brochures, and audio tapes.

***RONs97023 and D.3.4.***

### **Water Control Management Capability**

The ability to manage water levels is critical to the refuge mission. Migratory waterfowl, water birds, wintering eagles, and numerous fish species depend on managed water levels. Neglecting more than 20 water control structures and approximately 20 miles of levees has left a backlog of maintenance projects (\$352,000) that could have been avoided. This is a recurring restoration cost if operations and maintenance funds are not increased.

***RONs0001 and Strategies B.2.1, B.2.2, and B.2.3.***

### **Water Contaminants Investigations and Monitoring**

The large amount of suburban growth around the refuge, combined with two significant threats already identified (high density hog farm, and municipal sewage lagoons), makes it imperative for the refuge to monitor its water quality. Some evidence of contaminant problems, such as abnormal hormone levels in fish, has already been found in preliminary studies. Further investigation of these problem areas is needed, along with the establishment of a permanent monitoring program.

***RONs98015 and Strategy A.3.8***

### **Red-Cockaded Woodpecker Habitat Restoration with Mississippi State University**

The development of a Safe Harbor Agreement with Mississippi State University's John Starr Forest, located adjacent to the refuge, would enhance the refuge's population of red-cockaded woodpeckers. The John Starr forest managers are interested in restoring up to three red-cockaded woodpecker clusters on their property using habitat management techniques such as shearing, prescribed burning, and installing artificial cavities. This project would involve refuge staff assisting with development of the Safe Harbor Agreement, as well with the actual habitat management.

***RONs00007 and Strategy B.1.1.***

**Section A.  
Final Comprehensive  
Conservation Plan**

**CHAPTER V -  
Plan Implementation**

**Equipment Operator Position**

The refuge owns approximately 100 miles of improved dirt roads that provide both public and administrative access to refuge lands. In an average year, approximately 15 miles of roadway must be repaired to prevent an excessive maintenance backlog. This position would be an equipment operator capable of operating road graders, tractors and mowers, backhoes, and several other pieces of equipment needed to properly maintain roadways.

***RONS98006 and Strategies F.1.1 and F.2.1***

**Volunteer Coordinator Position**

This position would complement existing public use staff, and allow more effective use of volunteers in accomplishing all types of refuge work. Although the refuge has utilized volunteers for more than 10 years to assist in a variety of programs, it has only begun to tap the volunteer resources that are available. With the recent construction of a modern bunkhouse, the refuge has eliminated one of the major problems associated with the effective use of volunteers—that of providing housing. The next important step is to provide a dedicated person for recruiting and coordinating volunteers. With additional coordination, the volunteer program would be capable of greatly enhancing numerous programs such as surveys and monitoring, habitat enhancement, general maintenance, and public use management.

***RONS98010 and Strategies F.2.1 and F.2.4***

**Archaeologist Position**

Currently the Southeast Region of the Fish and Wildlife Service has only two archaeologists responsible for the needs of all field stations. This project would add an archaeologist to the staff of the refuge, making that person available to work with other field stations in the region. Responsibilities of this position would include accomplishing a refuge-wide archaeological survey, coordinating resource protection with other agencies, and coordinating activities with interested ethnic groups. Such a position would greatly improve the understanding and management of cultural resources on Noxubee and other refuges.

***RONS98005 and Strategies E.3.1 and F.2.1***

**Bluff Lake Road Paving (Oktibbeha County)**

This road serves as one of three major entrances. The road was paved in 2001, but it will require periodic overlays of pavement as maintenance. This project entails applying a tar and gravel overlay to 1.3 miles of roadway. A memorandum of understanding is already in place with Oktibbeha County to allow the refuge to jointly maintain the roadway.

***MMS00004 and Strategy F.1.2***

**Brooksville-Louisville Road Paving (Noxubee County)**

This road serves as one of three major entrances. The road was paved in 2001, but it will require periodic overlays of pavement as maintenance. This project entails applying a tar and gravel overlay to 4.9 miles of roadway. A memorandum of understanding is

Section A.  
Final Comprehensive  
Conservation Plan

CHAPTER V -  
Plan Implementation

already in place with Noxubee County to allow the refuge to jointly maintain the roadway.

***MMS00005 and Strategy F.1.2***

**Bluff Lake Road Paving (Winston County)**

This road serves as one of three major refuge entrances. Improving general access to the refuge has been identified as a high priority refuge need. This project proposes to improve 9 miles of county-owned Bluff Lake Road by adding clay-gravel base, topping with crushed limestone, and paving with a chip-and-seal type pavement. A memorandum of understanding is already in place with Winston County to allow the refuge to jointly maintain the road.

***MMS00006 and Strategy F.1.2***

**Additional Vehicle Parking Areas**

This project would entail constructing additional vehicle parking areas (i.e., pull-offs) along roadways throughout the refuge to improve public access. Lack of such parking areas results in numerous vehicles becoming stuck in the mud during the refuge's hunting season, and to a lesser extent throughout the year. This project would involve grading, placing fill, and graveling small parking areas at key places throughout the refuge.

***RONs96002 and Strategy D.1.6***

**Funding and Personnel**

Implementation of this plan will require increased funding and personnel support that will come from a variety of internal and external sources. New projects are identified in RONS, while maintenance needs for existing facilities and projects are identified through MMS. This plan outlines proposed projects that are substantially above current budget allocations. The plan does not constitute a commitment (from Congress) for staffing increases, operational and maintenance increases, or funding for future land acquisition, but represents wildlife resource needs based on sound biological science and input from the public.

According to predictions based on the RONS database, the refuge staff will need to increase from a total of 17 in Fiscal Year 2001, to a total of 30 by Fiscal Year 2014. This increase in staff will also necessitate an increase in base funding above standard yearly increases that allow only for inflation.

**Volunteers**

Private citizens contributing volunteer services are involved in just about every aspect of refuge management. These volunteers fortify the refuge staff with skills and energy, and by becoming knowledgeable about the refuge and its wildlife, they become advocates in the local community. There is a long history of volunteers working on the refuge to accomplish tasks that otherwise would go undone. The volunteer program is constantly growing, and it's expected to grow even faster in the future as the refuge prepares to make better use of volunteer help. Two recent advances in the volunteer program have been the addition of a public use specialist to the

*Noxubee*  
*National Wildlife Refuge*

**Section A.**  
**Final Comprehensive**  
**Conservation Plan**

**CHAPTER V -**  
**Plan Implementation**

staff, and the recent construction of a bunkhouse. The public use specialist will be able to devote more time to coordinating with volunteers, thus making more efficient use of their time. Likewise, the bunkhouse provides volunteers with a place to stay while working on the refuge, thus opening the door to more volunteers from distant places, rather than just the local commuting area. Even greater utilization of volunteers would be possible if the proposed volunteer coordinator position is funded.



*USFWS Photo*

**Figure 10. Proposed Project and Personnel Cost Summary**

Project Title	Initial Cost	Annual Cost	First Year Cost
Visitor Center Staff (4)	260,000	178,000	438,000
Avifauna Survey	100,000	-----	100,000
Mollusk Survey	100,000	-----	100,000
Herptifauna Survey	100,000	-----	100,000
Invertebrate Survey			
Botanical Survey	100,000	-----	100,000
Archaeological Survey	200,000	-----	200,000
Fishing Pier-Bluff Lake	100,000	1,000	101,000
Boat Ramp & Dock-Loakfoma Lake	160,000	1,000	101,000
Auto Tour Route	50,000	1,000	51,000
Water Control Management Capability	130,000		130,000
Investigate/Monitor Water Contaminants	95,000	25,000	20,000
RCW Habitat Restoration with Mississippi State University	40,000	10,000	50,000
Equipment Operator Position	65,000	53,000	118,000
Volunteer Coordinator Position	65,000	49,000	114,000
Archaeologist Position	65,000	58,000	123,000
Bluff Lake Road (Oktibbeha County)	200,000	-----	200,000
Brooksville-Louisville Road (Nobubee County)	1,030,000	90,000	1,030,000
Bluff Lake Road (Winston County)	1,710,000	14,000	1,710,000
Vehicle Pull-Offs	100,000	10,000	110,000
<b>TOTAL</b>	<b>4,620,000</b>	<b>490,000</b>	<b>4,896,000</b>

Initial costs include construction and start-up costs;  
Annual costs include salary/benefits, utilities, Service contracts, supplies, facility leases, training, travel, and maintenance; First year costs are typically a combination of initial and annual costs.

### Partnership Opportunities

Public outreach entails a variety of services and support that refuges provide to the public, special groups, other government agencies, and individuals. It includes technical assistance to state agencies on special problems, publications, and presentations to local civic groups and schools.

Many biologists and private citizens, as well as environmental organizations, scientific organizations and other agencies, have expressed a great interest in becoming involved with the manage-



*Noxubee  
National Wildlife Refuge*

**Section A.  
Final Comprehensive  
Conservation Plan**

**CHAPTER V -  
Plan Implementation**

ment of the refuge. Developing and maintaining partnerships will enable the refuge to achieve its goals and objectives, minimize costs, share funding, and bridge relationships with others. To maintain and enhance wildlife outside of the refuge, the Service will focus its efforts on continuing to develop partnerships with the following: Mississippi Department of Wildlife, Fisheries, and Parks; Forest Service; Park Service; Starkville School District; Mississippi State Historic Preservation Office; and Mississippi State University. Although the Service does not have management responsibilities for those lands outside the refuge, it is important to articulate the wildlife resource needs area wide. Collaboration with colleges and universities and with conservation organizations will enable the refuge to carry on its extensive plans for research, monitoring, and education. To create awareness and expand environmental education efforts in the community, partnerships will be established with local organizations and school systems.

Implementation of the plan will rely on partnerships formed with landowners in the local area, volunteers and interested citizens, farmers and conservation organizations, and with appropriate government agencies. Cooperating landowners within the local area may be offered incentives and/or compensated through cost-sharing agreements for applying conservation and environmental farming practices and for creating, maintaining, or enhancing habitat for wildlife.

**Figure 11. New Personnel Needed to Fully Implement Plan**

Position	Strategy No.	RONS Project No.	FTE's
Janitor	D.5.2	03003	1
Programs Coordinator	D.5.3; D.5.4	03002	1
Secretary	F.2.1	00009	1
Receptionist	F.2.1	03001	1
Equipment Operator	F.1.1	98006	1
Tractor Operator	A.4.1	98007	1
Biological Technician	A.2.4	97022	1
Biological Technician	B.1.1; B.1.3	97008	1
Wildlife Biologist	B.1.2; B.2.2	98009	1
Forester	A.1.1; A.2.1	00015	1
Volunteer Coordinator	F.2.4	98010	1
Refuge Operations Specialist	F.2.1	00014	1
Archaeologist	E.3.1	98005	1
Law Enforcement Officer	F.2.1	03000	1

**Section A.  
Final Comprehensive  
Conservation Plan**

**CHAPTER V -  
Plan Implementation**

**Step-Down Plans**

Refuge policy (Refuge Manual, Part 4, Chapter 3) requires that specific management plans be developed for each refuge. Some plans require annual revisions and others are on a 5- to 10-year schedule for revision. Refuge staff will continue to seek public and professional input in the development, revision, and implementation of step-down plans. Some of these plans are already in place, while others have yet to be developed. Existing step-down plans that do need some level of modification or updating to implement the direction of the comprehensive conservation plan, or that require periodic review and revision under the plan, are listed below. Presently, Noxubee National Wildlife Refuge has 15 step-down plans. The following plans require updating:

<b>Plan</b>	<b>Fiscal Year Completion Date</b>
Wildlife Monitoring	2003
Fishery Monitoring	2003
Refuge Hunting	2003
Cropland Management	2004
Grassland Management	2004
Forest Management	2005
Habitat Management for Endangered Species	2005
Moist-Soil/Water Management	2007
Fire Management	2008

Step-down plans that need to be developed:

<b>Plan</b>	<b>Fiscal Year Completion Date</b>
Special Management Areas	2003
Research Natural Areas; Wilderness Study Areas, etc.	
Disease Prevention and Control	2004
Integrated Pest Management	2005
Visitor Services Plan	2005

**Monitoring and Adaptive Management**

Wildlife population monitoring (i.e., involving primarily red-cockaded woodpecker, white-tailed deer, waterfowl, and paddlefish) and habitat monitoring will be emphasized. Wildlife monitoring will include surveys during the hunting and breeding season, brood surveys, collar observations, species richness measurements, and relative abundance figures. Habitat monitoring will primarily involve the amount and distribution of forested wetland habitats, vegetation and water quality surveys, community composition and structure, and representative components and habitat parameters addressed in plan objectives.

*Noxubee*  
*National Wildlife Refuge*

**Section A.**  
**Final Comprehensive**  
**Conservation Plan**

**CHAPTER V -**  
**Plan Implementation**

Management of projects is dependent on monitoring and evaluating to sustain the function and dynamics of wildlife habitats, to maintain biological diversity, to protect target species, and to provide a variety of wildlife-dependent recreation and education experiences of value to visitors. Information derived will enable managers to test and adjust the management objectives outlined in this plan.

Adaptive management is a flexible approach to long-term management of biotic resources which is directed over time by the results of ongoing monitoring activities and other information. It is also a process in which projects are implemented within a framework of scientifically driven experiments to test predictions and assumptions as outlined in this plan. The biological programs are systematically evaluated to determine management effects on wildlife populations. This information is used to refine approaches and to determine how effectively goals and objectives are being accomplished. Evaluations will be conducted on a regular basis to provide feedback to stakeholders and partners. If monitoring and evaluation yield undesirable effects for target and non-target species and/or communities, management projects will be altered and the comprehensive conservation plan will be revised.



*Kentucky warbler*  
*USFWS Photo*

*Noxubee*  
*National Wildlife Refuge*

**Section A.**  
**Final Comprehensive**  
**Conservation Plan**

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**CHAPTER V -**  
**Plan Implementation**

**Section B.**  
**Environmental Assessment**

**CHAPTER I - Background**

# I. BACKGROUND

## Introduction

This Environmental Assessment for Noxubee National Wildlife Refuge has been prepared in compliance with the National Environmental Policy Act. It discusses the purpose and need for the comprehensive conservation plan for the refuge, and provides an analysis of the impacts that could be expected from each of the management proposals outlined in the plan. This analysis assists the Fish and Wildlife Service in determining if it will need to prepare an Environmental Impact Statement or a Finding of No Significant Impact for the refuge.



*Fishing in flooded  
bottomland forest*  
USFWS Photo

The Fish and Wildlife Service is the nation's primary conservation agency concerned with the protection and long-term management of wildlife resources. The Service administers the National Wildlife Refuge System, a system of more than 540 national wildlife refuges covering over 93 million acres, much of which is primarily managed for the enhancement of migratory bird populations and federally listed threatened/endangered fish, wildlife, and plants. Of particular interest in the Central Gulf Ecosystem is the plight of resi-

dent and migratory bird resources, including the endangered red-cockaded woodpecker. Significant loss of old growth and mature pine forests is the cause. As a result, the Service is directing management emphasis on the recovery of these species at Noxubee National Wildlife Refuge.

## Purpose and Need for the Plan

The purpose of the plan is to specify a management direction for Noxubee National Wildlife Refuge and to provide long-term guidance in relation to management decisions. Both direction and guidance are described in detail through a set of goals, objectives, and strategies in the Comprehensive Conservation Plan for Noxubee National Wildlife Refuge. Also, the plan is needed to address current management issues and to satisfy the legislative mandates of the National Wildlife Refuge System Improvement Act of 1997, which requires preparation of a comprehensive conservation plan for all national wildlife refuges.

The environmental assessment is needed to determine and evaluate a range of management alternatives. Each alternative has the potential to be fully developed into a comprehensive conservation

Section B.  
Environmental Assessment

CHAPTER I - Background

plan and describes the predicted biological, physical, social, and economic impacts of managing the refuge.

The Service identified issues, concerns, and needs through discussions with the public, agency managers, conservation partners, and others. In particular, the Service's planning team identified a range of alternatives, evaluated the possible consequences of implementing each alternative, and recommended Alternative 2 as the action that would provide the best approach to managing the refuge.

The former comprehensive plan that identified priorities and ensured consistent and integrated management was the master plan, written in 1961, and revised as needed. Over time, the master plan has become increasingly outdated, thus necessitating the need for the comprehensive conservation plan.

#### Decisions to be Made

Based on the assessment described in this document, the Fish and Wildlife Service will select an alternative to implement the Comprehensive Conservation Plan for Noxubee National Wildlife Refuge. A Finding of No Significant Impact will be prepared to determine if the selected alternative is a major federal action significantly affecting the quality of the human environment, thus requiring the preparation of an Environmental Impact Statement. Assuming no significant impacts are found, implementation of the plan will begin and will be monitored annually and revised when necessary.

#### Planning Study Area

The Noxubee National Wildlife Refuge planning study area is located in east-central Mississippi, 13 miles south of Starkville, Mississippi (Fig. 12). The planning study area for this environmental assessment includes lands outside the existing refuge acquisition boundary that are being studied for inclusion in the refuge system and/or partnership planning efforts. It also includes portions of the Central Gulf Watershed. The Fish and Wildlife Service presently owns and manages 47,049 acres within the 56,451-acre refuge acquisition boundary. Approximately 8,000 acres of in-holdings are also within the refuge's proposed acquisition boundary; however, only 4,263 acres are privately owned. The remaining 3,737 acres are either state-owned Section 16 properties or owned by the John Starr State Forest, and these lands will never be acquired by the Service. The Service will continue seeking to acquire, from willing sellers, the acres in private ownership. This environmental assessment will identify management on refuge lands, as well as on those lands proposed to be acquired.

#### Comprehensive Conservation Planning Process

The Service developed this plan using a systematic decision-making approach and ensured public involvement in management decisions throughout the planning process. After the planning team was assembled, the Service contacted a wide array of people including federal agencies, state conservation agencies, tribal and local governments, conservation organizations, landowners, and other members of the public. Announcements stating the location, date, and



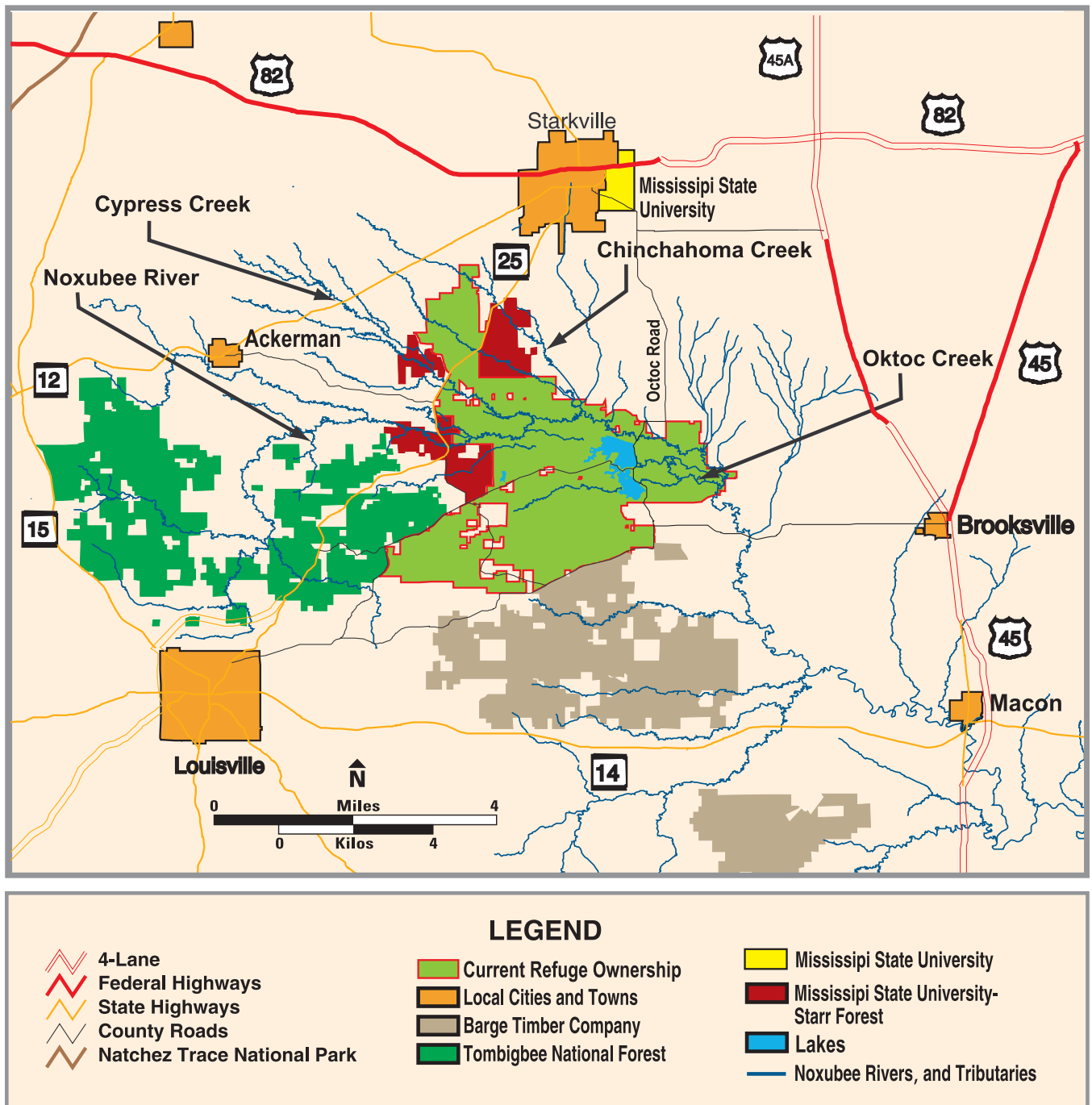
# *Noxubee* National Wildlife Refuge

## Section B. Environmental Assessment CHAPTER I - Background

time for the first scoping meeting were furnished to local residents. At the scoping meeting the staff explained the refuge's purpose, history, and laws and regulations governing management, as well as purpose and need for the plan, and management activities and issues.

Input obtained from attendees at the the scoping meeting and discussions held with state and local officials, civic groups, and conservation organizations were used to develop the plan. Issues and concerns were developed by the planning team and expanded to include comments generated by local citizens and others from the scoping meeting. The refuge received 85 responses regarding a variety of activities and issues.

Figure 12. Planning Study Area



**Section B.  
Environmental Assessment**

**CHAPTER I - Background**

The planning team developed and analyzed three management alternatives, including the current management plan. Management alternatives describe resource conditions and visitor experiences as integrated sets of goals, objectives, and strategies for specific geographic areas or specific resource types wherever they occur refuge wide. Alternative 2 has been tentatively selected as the proposed action and is described in Section B, Chapter II. Each alternative addresses significant resource problems and is crafted to achieve the mission and purpose(s) for which the refuge was established. The comments received from the internal agency review, as well as anticipated responses from the public following review of this plan, will assist the Service in refining each alternative. Several key issues or problems formed the basis for the development of the different alternatives as described in Chapter II.

The policies of the Fish and Wildlife Service, the National Wildlife Refuge System Improvement Act of 1997, and the National Environmental Policy Act require the Service to actively seek public involvement in the preparation of environmental documents. The National Environmental Policy Act also requires the Service to give serious consideration to all reasonable alternatives for managing refuges, including a "no action" alternative, which represents continuation of current conditions and management practices. Alternative management scenarios were developed as part of the planning process described in this environmental assessment.

Key steps in the Fish and Wildlife Service's comprehensive conservation planning process include:

- Forming the planning team and conducting preplanning;
- Initiating public involvement and scoping;
- Identifying issues and formulating or revising vision, goals, and objectives;
- Developing alternatives and assessing their environmental effects;
- Identifying the proposed action;
- Publishing the draft plan and environmental documents;
- Revising the draft plan and publishing a final plan; and
- Implementing the plan.

**Public Involvement in Planning**

Public involvement is an essential component of the comprehensive conservation planning process. The Service announced the initiation of the planning effort for Noxubee National Wildlife Refuge on June 3, 1998, through a newspaper article published in the "Starkville Daily News," along with press releases to several other newspapers. A public workshop was held on May 12, 1998, in Starkville, Mississippi, to inform the public of the planning process and to solicit, for a 30-day period, public comments.

Initially, the staff identified issues, concerns, and opportunities followed by issue identification with the public during scoping meetings in 1998. Addressing significant issues plays a role in determining future conditions of the refuge and will be considered in the

long-term management plan. The following descriptions present issues, concerns, and opportunities summarized from all public input received during the scoping process. The public workshop and written comment period are collectively referred to as the scoping process.

Many of the resource problems and management challenges facing the refuge are also reflected on a larger scale within the Central Gulf Ecosystem. These problems, both individually and cumulatively, play a significant role in determining future conditions on this refuge. For the sake of clarity, these resource problems and management challenges, detailed in the following sections, are briefly summarized in the following paragraphs:

#### *Wildlife and Habitat Management*

Many people were concerned about the loss of wildlife habitat and felt that protecting, restoring, and enhancing wildlife populations and habitats should be a refuge priority. Managing and restoring older-aged forests to support red-cockaded woodpeckers were discussed as significant issues. Development of a database containing pertinent information on specific types of research was suggested. Some people recommended a rigorous biological assessment and inventory of all plant, fish, and wildlife species present on the refuge, including birds and invertebrates. One person felt that the refuge should limit prescribed burning because it interferes with the managed turkey hunt. One commenter wanted to see a decrease in timber cutting to improve habitats, while another wanted an increase to support the local timber industry. Control of invasive species and continual management of the grassland/prairie restoration project were expressed as concerns. The effects resulting from the suppression of prescribed fire, as well as the difficulty of the public to accept it as a management tool, were expressed as issues. Managing water levels in the lakes for production of food for waterfowl can have a detrimental effect on fish populations, thus there were opposing views on the necessity of water level draw-downs.

One respondent would like to see two areas nominated as research natural areas. One commenter wanted to see the proposed wilderness area officially designated by Congress as Wilderness. There is an overall concern to proceed with the designations of two research natural areas, and to develop inventories and long-term protection for cultural resources.

#### *Recreation and Public Use*

Public comments included concerns over recreation use, including both access issues and issues related to impacts. Some respondents felt that hunting and fishing were over-emphasized while wildlife viewing and environmental education and interpretation should be emphasized more, and that facilities should be improved as well as built to support these activities. Some recommended the expansion of hunting and fishing opportunities and facilities. An investigation to determine impacts on non-target species resulting from recreational use was requested.

**Section B.  
Environmental Assessment**

**CHAPTER I - Background**

The need for additional funding to support hunting, fishing, wildlife viewing, and environmental education is a concern which was expressed by several people. Some comments suggested paving entrance roads and improving buildings, roads, trails, and signs to enhance visitor experiences. The number of staff would have to be increased to support additional visitors and activities. This is a concern since operational funding at its present level cannot support increases. One person felt that providing funds and staff to support recreation activities could deter funds and staff from fish and wildlife management programs and activities.

*Land Protection and Conservation*

One respondent wanted the refuge to purchase all the remaining private lands identified within the approved refuge acquisition boundary, and to consider expanding the acquisition boundary to protect more wildlife habitats, especially pine and grassland, for species with declining populations.

*Refuge Administration and Management*

Increasing and balancing staff numbers and obtaining the expertise and funding to support a backlog of maintenance activities are major concerns. The need for more scientific research and monitoring was a continuing issue expressed by several respondents. Some people felt that the public's understanding of the Service was poor and they would like to see increased communication and outreach, thereby enlarging support and appreciation of refuge resources and management issues.



Section B.  
Environmental Assessment

CHAPTER II - Alternatives

## II. ALTERNATIVES

### Formulation of Alternatives

Alternatives are different approaches or combinations of management objectives and strategies designed to achieve the refuge purpose, vision, and goals identified in the comprehensive conservation plan; the priorities and goals of the Central Gulf Ecosystem Team; the goals of the National Wildlife Refuge System; and the mission of the Fish and Wildlife Service. Alternatives are formulated to

address the significant issues, concerns, and problems identified by the Service and the public during the scoping process.

The three alternatives identified and evaluated represent different approaches to provide permanent protection, restoration, and management of fish, wildlife, plants, habitats, and other resources. A major consideration in the formulation of alternatives is the Service's ability to obtain sufficient proprietary interests to manage forests and forested wetlands necessary to serve as stop-over and breeding habitat for important wildlife species. Private landowners and wildlife managers recognize the multiple ecological, social, and economic values of functional forest ecosystems.



Controlled burn  
*USFWS Photo*

The staff assessed biological conditions and analyzed external relationships affecting the refuge. This information contributed to the development of goals and objectives and, in turn, alternative formulation. As a result, each alternative presents different sets of objectives and strategies for reaching long-term goals. Each alternative was evaluated based on how much progress it could make and how it could address core habitat issues, problems, and wildlife threats.

Problems and threats provide important perspective and guidance in developing alternatives. Trends in habitat and wildlife uses were evaluated, as was the capability of refuge habitat to support these uses. The vegetative change of forest structure from previous logging activities and various water development projects before the refuge was established contributed to the loss of wildlife habitat. Overall, the greatest risks to fish, wildlife, plants, and wildlife habitats in the Central Gulf Ecosystem are characterized by changes in forest structural composition and connectivity, and in the natural processes of the rivers and streams. As a result, the Service has identified restoration of forest structure and water management as important to address these risks.

Section B.

Environmental Assessment

CHAPTER II - Alternatives

**Description of Alternatives**

Serving as a basis for each alternative, goals and sets of objectives and strategies were developed that lead to the fulfillment of the refuge purpose and the National Wildlife Refuge System mission. Objectives are desired conditions or outcomes that are grouped into sets, and for this planning effort, consolidated into three alternatives. These alternatives, overall, represent a range of different approaches for managing the refuge. Plans are revised every 15 years, or earlier if monitoring and evaluating indicate that changes are needed. A list of goals follows the summary descriptions which is the same for each alternative, with varying objectives and strategies formulated for each alternative. The three management alternatives are described in the following paragraphs:

***Alternative 1: (No Action) Manage wildlife and habitat with emphasis on old growth forest communities, maintaining education and recreation programs at current levels.***

This alternative represents the status quo; e.g., no change from current management of the refuge. The refuge would continue with its existing forest management plan that emphasizes older-aged classes of trees and late successional wildlife communities (Fig. 13). This alternative would maintain 26,470 acres of pine and pine/hardwood forest habitats. Of this, approximately one percent would be regenerated every year to ensure an adequate distribution of age classes. This is equivalent to a rotation age of 100 to 120 years for all pine and pine/hardwood stands. This management provides more than adequate habitat for red-cockaded woodpeckers and other species dependent on mature pine habitat. Stands would continue to be thinned as necessary to guard against catastrophic southern pine beetle attacks and to provide optimum habitat for red-cockaded woodpeckers. Understory hardwoods would be controlled primarily by prescribed burning on a 1- to 4-year cycle.

Management under this alternative would maintain 15,308 acres of hardwood forest habitat. This forest type would be regenerated at approximately 0.5 percent per year, which is equivalent to a rotation age of 200 to 300 years. This management emphasizes providing habitat for forest nesting birds dependent on mature hardwood forests and adequate habitat for resident and migratory waterfowl. Stands would be thinned when necessary to remove less desirable hardwood species in favor of hard- and soft-mast producing species. Hydrology in bottom-land hardwoods would be maintained primarily by controlling beaver populations and removing their dams when needed.

Waters and wetlands would be managed under current policies. This includes manipulating water levels in both Bluff and Loakfoma lakes (total of 1,900 acres) to provide waterfowl food plants. Moist-soil areas (total of 300 acres) would be disced, planted, and flooded as necessary to provide waterfowl foods and habitat conditions. Water levels in the four greentree reservoirs (total of 1,150 acres) would be managed to provide habitat for wintering waterfowl. The current water quality monitoring program would continue with stations at Hollis and Browning creeks. Exotic and invasive species such as water lotus would be controlled as needed to maintain habitat diversity.

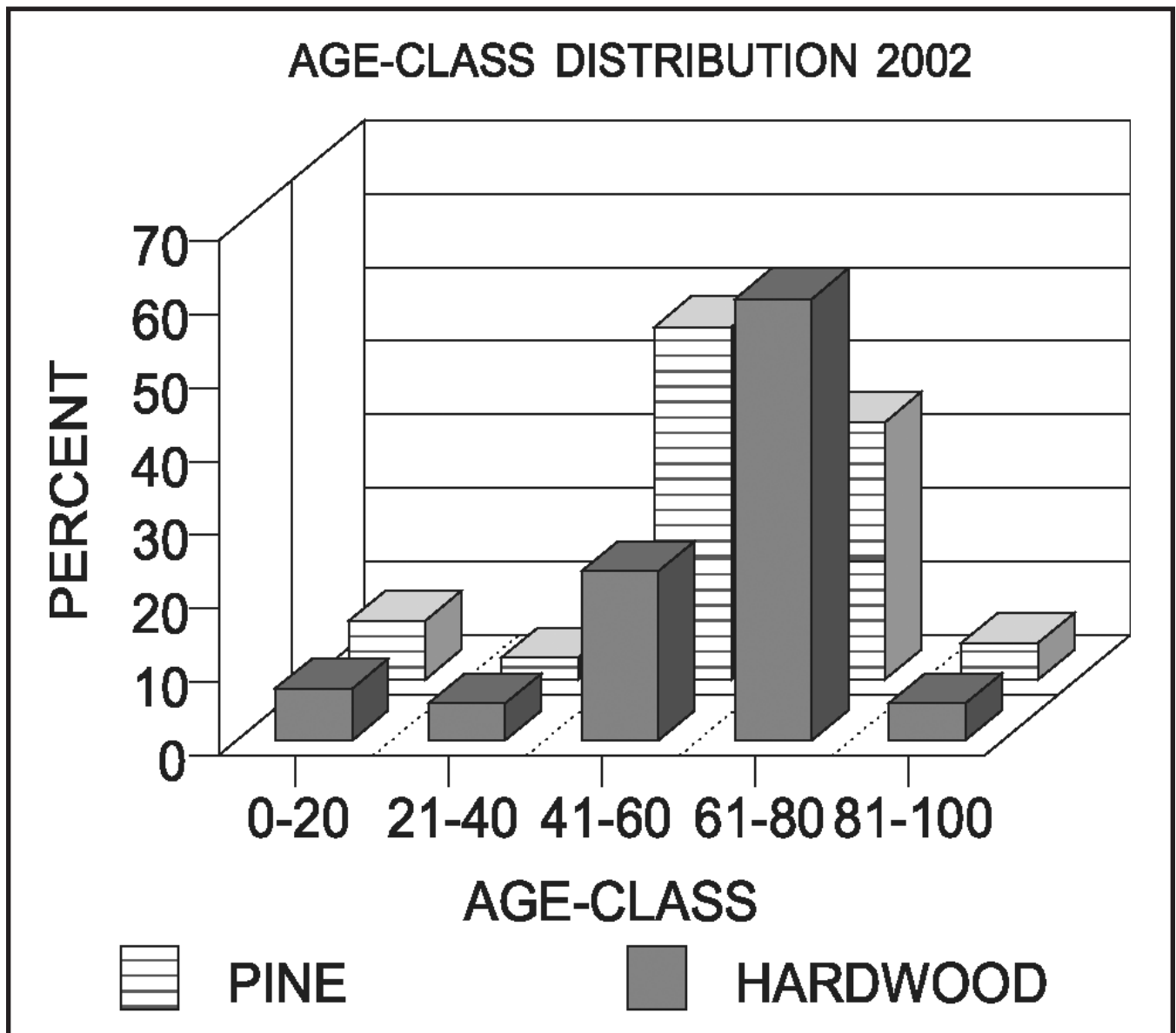


**Section B.**  
**Environmental Assessment**  
**CHAPTER II - Alternatives**

Field and grassland habitats would be maintained in current conditions. Morgan Hill Prairie Restoration Area would be maintained in a partially restored state that includes many native grasses and light-seeded broadleaf plants, but lacks heavy-seeded tuberous species. Other field areas would be maintained by mowing and burning, and by the current cooperative farming program. Force account farming would continue as a means of providing additional wildlife foods, such as millet, sorghum, winter rye, and wheat.

Management of the two established research natural areas would continue at the current level. The Old Robinson Road Research Natural Area was designated in 1959, and contains 46 acres of bald cypress forest. The Morgan Hill Research Natural Area was established in 1973, and contains 67 acres of red-cedar, pine, and hardwood forest. Both areas are currently excluded from active management (i.e., no timber management or prescribed fire is allowed) to preserve their natural character.

**Figure 13. Alternative 1, Current Conditions**



**Section B.**

**Environmental Assessment**

**CHAPTER II - Alternatives**

The proposed wilderness would continue to be maintained as it has since 1974, when the proposal was transmitted to Congress for "Wilderness" designation. Final legislation to designate the area has not been forthcoming. In 2000, a wilderness inventory was conducted to review lands for potential wilderness characteristics. At that time, the proposed wilderness was mapped using Geographic Information System equipment. The decision was made to remove a portion along the eastern end that had been previously impacted by timber harvesting and construction of a levee, and that was situated very close to a private in-holding. The revised mapping indicated a total of 1,090 acres instead of the previous 1,200 indicated in a 1974 Environmental Impact Statement submitted to the Council on Environmental Quality and the public.

Fish and wildlife populations would continue to be managed at the current level. Management would continue to focus on trust species such as the endangered red-cockaded woodpecker and migratory birds such as waterfowl and late successional neotropical migrants. Current efforts to enhance the red-cockaded woodpecker population would continue, such as nest monitoring, cavity augmentation, and predator control—all directed towards reaching or exceeding a goal of 88 groups. Wood duck banding and nest box programs would continue in support of Service-wide efforts to monitor and enhance habitat for this waterfowl species. Neotropical migratory birds would be monitored as funds and staffing allow. Monitoring programs that track wading birds nesting in the rookeries in Bluff Lake as well as cormorants that roost there would continue.

White-tailed deer are the most prominent resident game species and their population would continue to be monitored through health checks and collection of harvest data. Population control is achieved through public hunting. This alternative includes forest management practices which are expected to maintain a deer population that can sustain an annual harvest of 400-600 per year. Wild turkey populations also are monitored by collecting harvest data, and current management provides for an annual harvest of approximately 50 turkeys per year. Harvest data are not collected for other types of game animals. The hunting program would continue to be coordinated with the Mississippi Department of Wildlife, Fisheries, and Parks to ensure that it is biologically sound and compatible with state regulations.

Other resident wildlife species such as amphibians, reptiles, and invertebrates would be monitored as funds and staff permit. No comprehensive surveys for these groups are included in this alternative.

Invasive, exotic, and nuisance plant and animal species would be controlled as needed to ensure they do not affect trust species. Currently, this includes controlling beaver and nutria populations through trapping, and controlling lotus, kudzu, and cogon grass with herbicides. Control programs are coordinated with state and federal agencies to ensure that the most effective methods are used.

Land acquisition would continue within the existing acquisition boundary to acquire the remaining 4,263 acres of private in-holdings. Landowners would continue to be contacted on a regular basis to determine interest and willing-seller status. No formal prioritization would be done for remaining acquisitions, rather they would continue as opportunities present themselves. Acquisitions through timber-for-land exchanges would continue as the refuge finds opportunities to work with loggers and timber companies.

Current partnerships that assist the refuge in accomplishing conservation objectives would continue. Partnerships have been established with several state and federal agencies, non-profit organizations, academic institutions, and private land managers. Existing partnerships include: Georgia Pacific; Barge Lumber Company; U.S. Forest Service including Tombigbee National Forest; Mississippi Forestry Commission; Natchez Trace Parkway; Natural Resources Conservation Service; Farm Service Agency; Starkville City School District; Mississippi State University; Ducks Unlimited; Quails Unlimited; and the Sierra Club.

Existing recreation and education program activities and facilities would continue under this "no action" alternative. For example, the refuge would continue to provide a range of hunting and sport fishing opportunities. Similarly, wildlife observation and photography would occur at current levels. Recreational use would likely remain stable, and because of the on-going partnership with Starkville School District, environmental educational would likely increase.

Cultural resources would be managed at current levels. Cultural resource surveys would be conducted on an as-needed basis, as there has been no comprehensive survey or mapping of cultural resource sites.

Staff numbers and activities would be managed at current levels (Fig. 14). New construction to enhance environmental education, major maintenance projects, and equipment replacements would continue as funding is allocated.

The "no action" alternative provides a baseline against which the two action alternatives can be compared. This alternative reflects a continuation of existing programs and activities until such time the plan is revised.

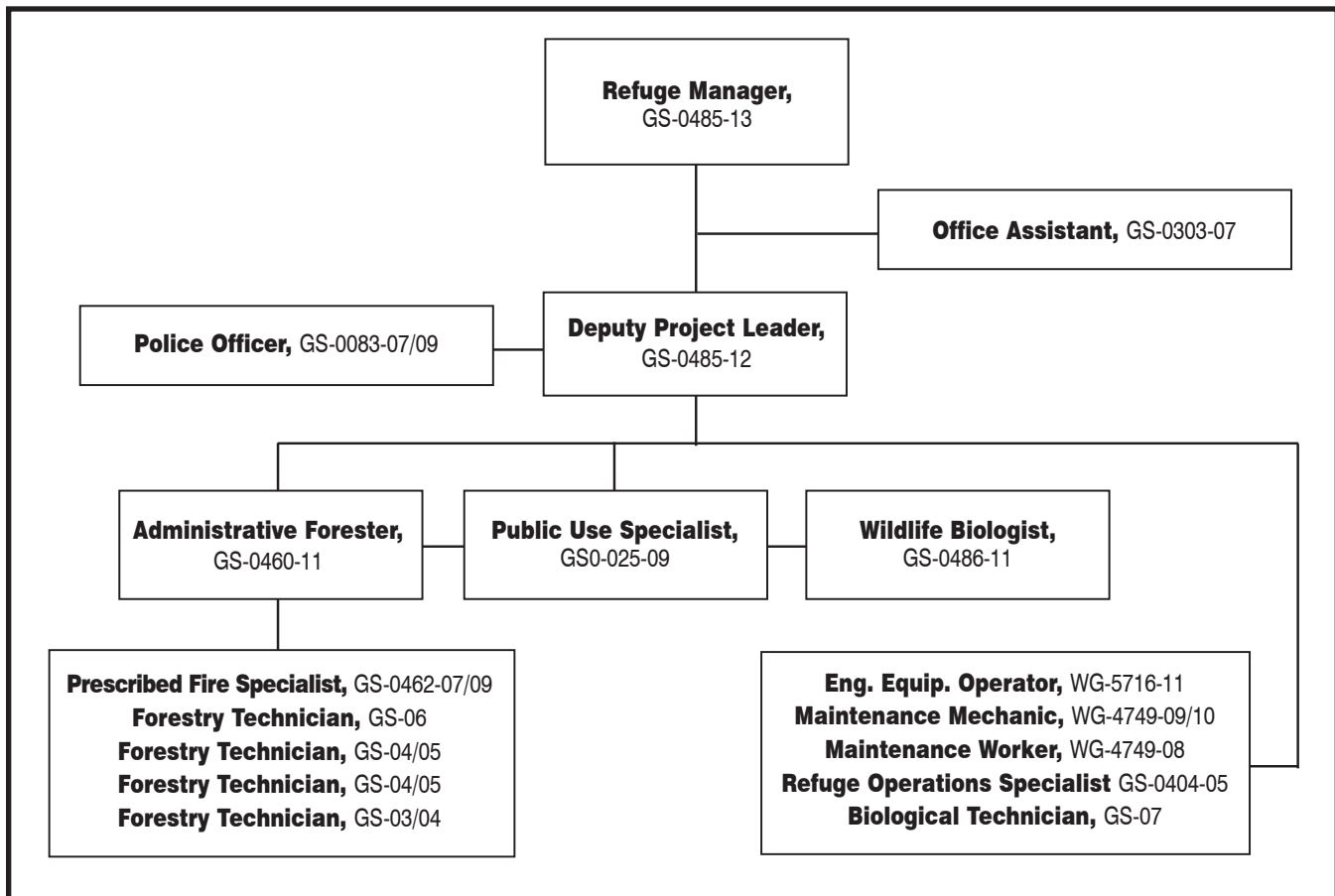
**Section B.  
Environmental Assessment  
CHAPTER II - Alternatives**

**Alternative 2: (Proposed Action) Manage wildlife and habitat with emphasis on old growth forest communities, increasing education and recreation programs.**

This alternative represents the Service's proposed management action. Under this alternative, all current management activities would continue, and some programs would be substantially expanded. The refuge would continue with its existing forest management plan that emphasizes older-aged classes of trees and late-successional wildlife communities (Fig.15).

This alternative would maintain 26,470 acres of pine and pine/hardwood forest habitats. Of this, approximately 1 percent would be regenerated every year to ensure an adequate distribution of age classes. This is equivalent to a rotation age of 100 to 120 years for all pine and pine/hardwood stands. This management provides more than adequate habitat for red-cockaded woodpeckers, as well as other species dependent on mature pine habitat. Stands would continue to be thinned as necessary to guard against catastrophic southern pine beetle attacks and to provide optimum habitat for red-cockaded woodpeckers. Understory hardwoods would be controlled primarily by prescribed burning on a 1- to 4-year cycle.

**Figure 14. Alternative 1, Staffing Chart**

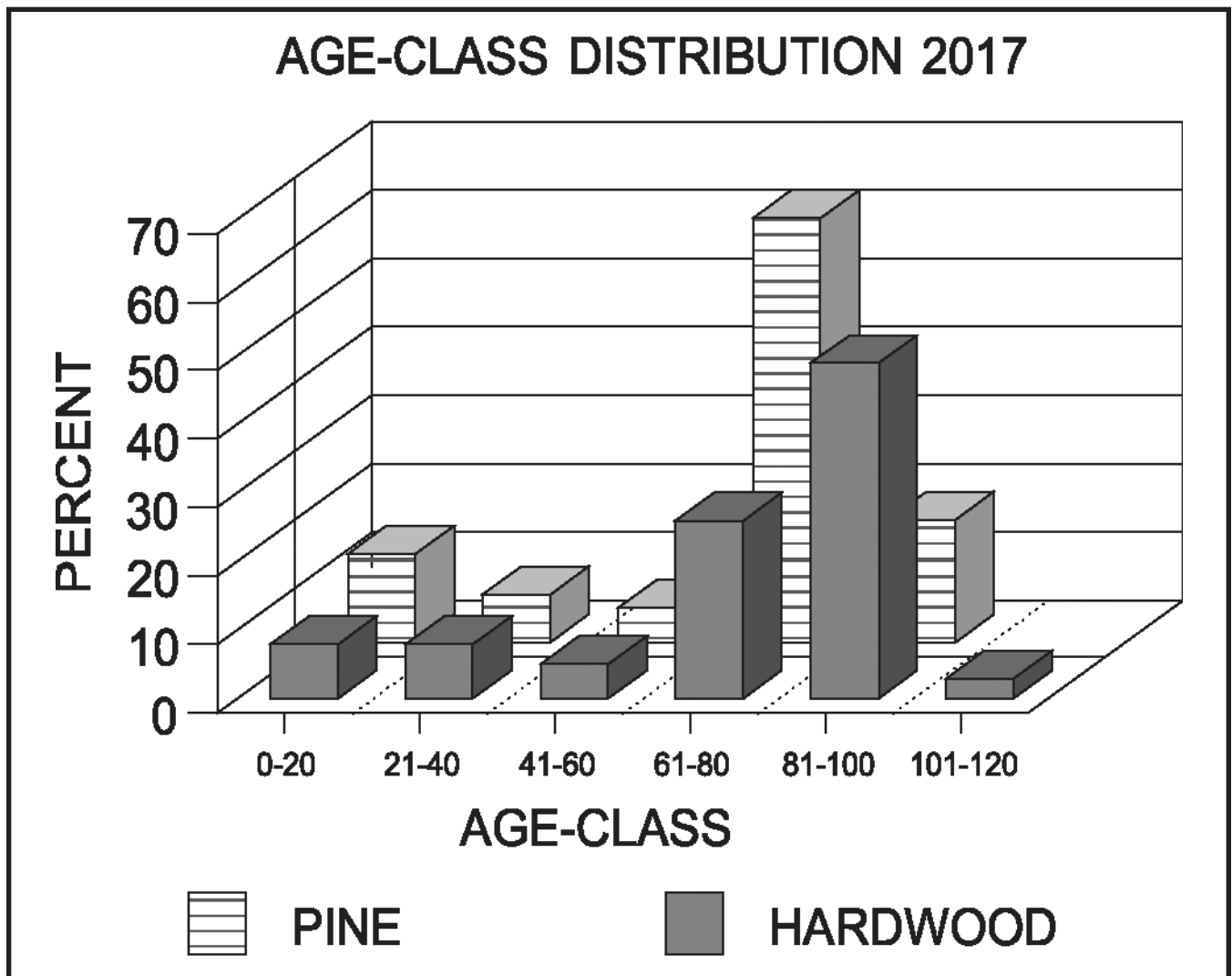


**Section B.**  
**Environmental Assessment**  
**CHAPTER II - Alternatives**

This alternative would maintain 15,308 acres of hardwood forest habitat. This forest type would be regenerated at approximately 0.5 percent per year, which is equivalent to a rotation age of 200 to 300 years. This management emphasizes providing habitat for forest nesting birds dependent on mature hardwood forests and adequate habitat for resident and migratory waterfowl. Stands would be thinned when necessary to remove less desirable hardwood species in favor of hard- and soft-mast producing species. Hydrology in bottomland hardwoods would be maintained primarily by controlling beaver populations and removing their dams when needed.

Waters and wetlands would be managed under current policies. In addition to the activities described under Alternative 1, two new projects would be implemented. The North Levee extension at Bluff Lake would be constructed to improve water management capabilities and restore historical water flows to Oktoc Creek. The water quality monitoring program would be expanded beyond Hollis and Browning creeks to include all major waterways on the refuge.

**Figure 15. Alternative 2, Proposed Conditions**



**Section B.**

**Environmental Assessment**

**CHAPTER II - Alternatives**



*American lotus*  
*USFWS Photo*

Field and grassland habitats would be maintained essentially the same as in Alternative 1. However, there would be new projects designed to fully restore the Morgan Hill Prairie Restoration Area by reintroducing some of the heavier seeded tuberous plant species.

Management of the two established research natural areas would continue as in Alternative 1. However, this alternative would also include the evaluation of two additional areas, Pete's Slough and Douglas Bluff, as possible research natural areas. Also, formal research objectives and management strategies would be developed for all research natural areas.

Management of the proposed wilderness would be identical to Alternative 1.

Fish and wildlife populations would be managed as proposed in Alternative 1, except there would be additional surveys and monitoring for other resident wildlife species such as amphibians, reptiles, and invertebrates.

Current efforts to control invasive, exotic, and nuisance plant and animal species would continue under this alternative, and there would be additional efforts directed towards controlling Chinese privet and bicolor lespedeza, two species which are becoming increasingly abundant on the refuge.

This alternative would involve substantial changes in the land protection program. Not only would the refuge continue efforts to acquire the remaining 4,263 acres of private in-holdings remaining within the existing acquisition boundary, it would expand the boundary to include an additional 5,169 acres. The proposed expansion area on the north side of the refuge includes species associated with upland pine forests such as the pine warbler. The endangered red-cockaded woodpecker is found near the northern refuge boundary. The proposed expansion area on the east side of the refuge includes species associated with bottomland and riverine habitats.

Current partnerships that assist the refuge in accomplishing its conservation objectives would continue under this alternative, as would coordination with the Service's private lands' biologist to implement the Partners for Fish and Wildlife Program and other conservation programs. Communication with local landowners and community groups to promote wildlife conservation also would continue.

The existing recreation and education programs would continue under this alternative; however, some programs would be substantially expanded. New projects would include constructing additional hunting blinds and a fishing pier for people with disabilities, renovating the boat ramps at both Bluff and Loakfoma lakes, and developing additional vehicle pull-offs and parking areas to facilitate safe access for hunters, anglers, and other visitors. Wildlife observation and photography opportunities would be enhanced under this alternative by the addition of an auto tour trail.



Interpretive and educational programs would expand under this alternative. The refuge would increase the number of on-site interpretive events annually from 5-10 to approximately 15. There would also be an increase in programs delivered off-site. Additional interpretive kiosks would be constructed along Highway 25 and at Morgan Hill. The ongoing partnership with the Starkville School District to provide environmental education would expand as staff from both the refuge and school district would seek funding for additional construction phases (dormitory and cafeteria). Under this alternative, emphasis would also be placed on developing a Refuge Friends Group and increasing the number of refuge volunteers, both to assist with environmental education programs and other management programs.

This alternative includes numerous changes to the cultural resource management program. For instance, rather than conducting individual cultural resource surveys for specific projects, a comprehensive refuge-wide survey would be accomplished by the year 2005. In addition, a bibliography of scientific reports and articles pertaining to the area's cultural resources would be assembled. Law enforcement and managerial staff would receive additional training in cultural resource law. An archaeologist would be added to the staff to implement a comprehensive cultural resource management program including a greatly expanded educational component. Partnerships would be developed with other agencies and ethnic groups (e.g., Choctaw Nation, African American groups, etc.), to improve management of cultural resources.

Substantial increases in equipment and facilities would be required to implement this alternative. A total of 12 additional staff positions are identified.

***Alternative 3: (Proposed Action) Manage wildlife and habitat with emphasis on early successional forest communities, increasing education and recreation programs.***

This alternative emphasizes providing early successional forest habitat and increases in certain education and recreation programs. Under this alternative, forest management on 22,000 acres of pine and pine/hardwood forests would be directed towards providing old-growth pine habitat adequate to support the refuge's goal of 88 red-cockaded woodpecker groups. However, management on the remaining 4,470 acres of pine and pine/hardwood forests would be directed towards providing early successional habitat for neotropical migrant birds and certain game species. Similarly, management of the 15,308 acres of hardwood forests would also be directed towards providing early successional habitat. In both cases, this increase would be accomplished by decreasing the rotation age of these forest stands to approximately half the current age, thereby regenerating approximately twice as much acreage per year (Fig. 16).

Waters and wetlands management is identical to the description found in Alternative 2.

**Section B.**  
**Environmental Assessment**  
**CHAPTER II - Alternatives**

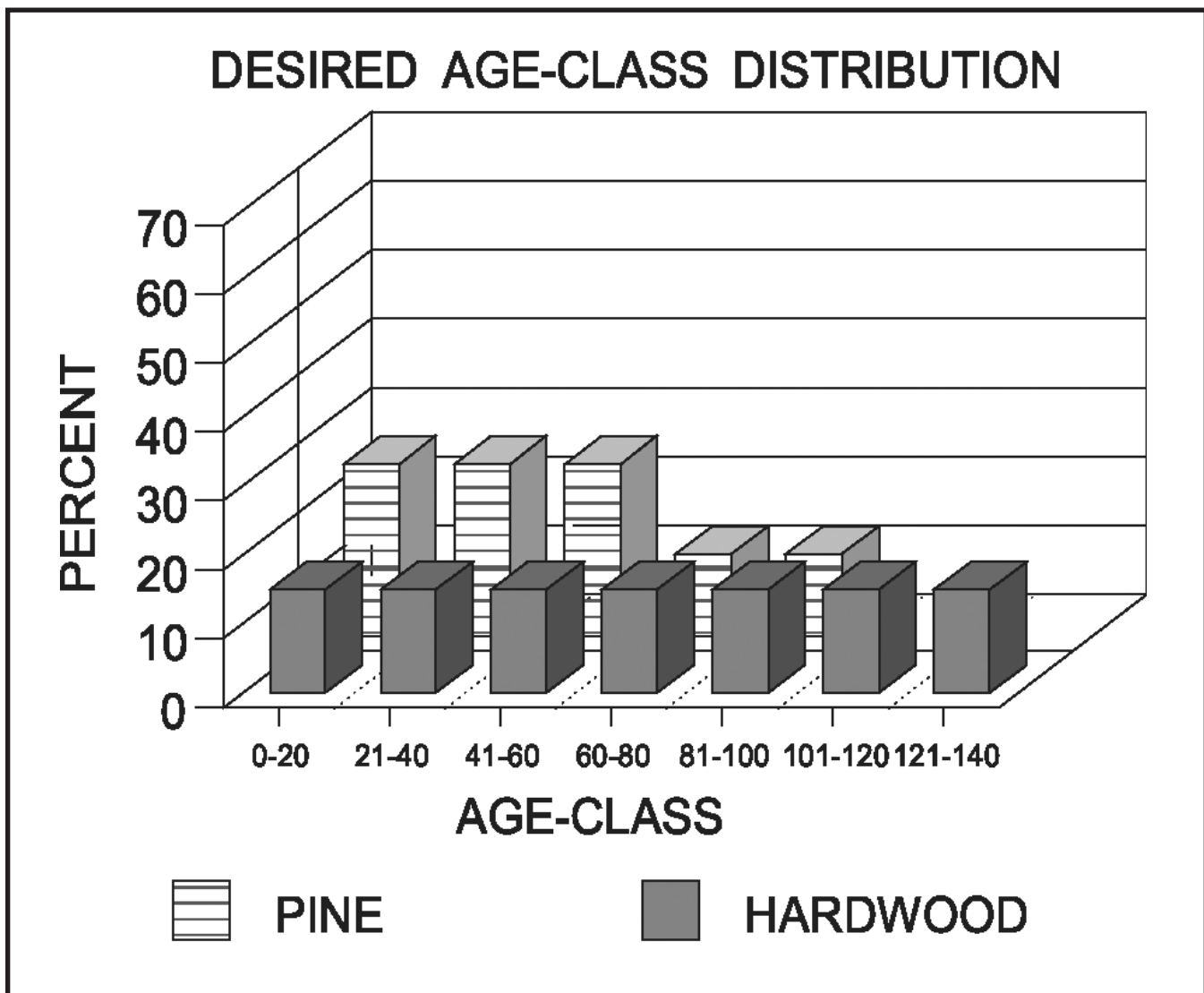
Grassland and field management is identical to the description found in Alternative 2; however, an attempt would be made to increase the cooperative farming program, thus reducing the amount of staff farming.

Management of the proposed wilderness would be identical to Alternatives 1 and 2.

Management of the research natural areas would differ from Alternative 1, in that specific research objectives and strategies would be established for them. Unlike Alternative 2, this alternative includes no provisions for evaluating additional areas for research natural area status.

Population levels of some trust species would differ from levels under the other two alternatives. As described in the habitat management objectives A.1 and A.2, management of 22,000 acres of pine and pine/hardwood forests would be directed towards providing

**Figure 16. Alternative 3, Proposed Conditions**



adequate habitat for the refuge goal of 88 groups of red-cockaded woodpeckers, but would preclude any chance of exceeding this goal. Management of remaining acreage would be directed at creating early successional habitat for neotropical migratory birds such as prairie warblers, Kentucky warblers, yellow-billed cuckoos, gray catbirds, hermit thrush, etc. Population levels of other trust species, such as waterfowl, would be the same as Alternative 2. Monitoring efforts for all species and species groups would be the same as Alternative 2.

As mentioned before, some resident species such as deer would probably benefit from the forest management described in this alternative. The increase in early successional vegetation would probably elevate the deer population to a level that would require an increased harvest of 500-700 per year. The wild turkey population would likely remain the same, capable of sustaining a harvest of approximately 50 per year. The quail and rabbit population also would likely increase, but there would probably be a decrease in the squirrel population. Monitoring efforts for all resident species would be the same as Alternative 2.

Control of invasive, exotic, and nuisance plants and animals would be the same as Alternative 2.

Land protection and conservation efforts would be the same as Alternative 2.

Conservation partnerships would be managed the same as Alternative 2.

The hunting program would be managed identical to Alternative 2, except there would be increased hunting opportunities for deer, quail, and rabbit, and less opportunity for squirrel.

The fishing program would be managed similar to Alternative 2, except there would be an increase in stocking to maintain sufficient game fish populations capable of sustaining increased fishing pressure.

Opportunities for wildlife observation, wildlife photography, and environmental education and interpretation would remain the same as Alternative 2.

Cultural resources would be managed the same as Alternative 2.

Administrative needs, such as equipment, facilities, and staff would be identical to Alternative 2.

**Section B.  
Environmental Assessment  
CHAPTER II - Alternatives**

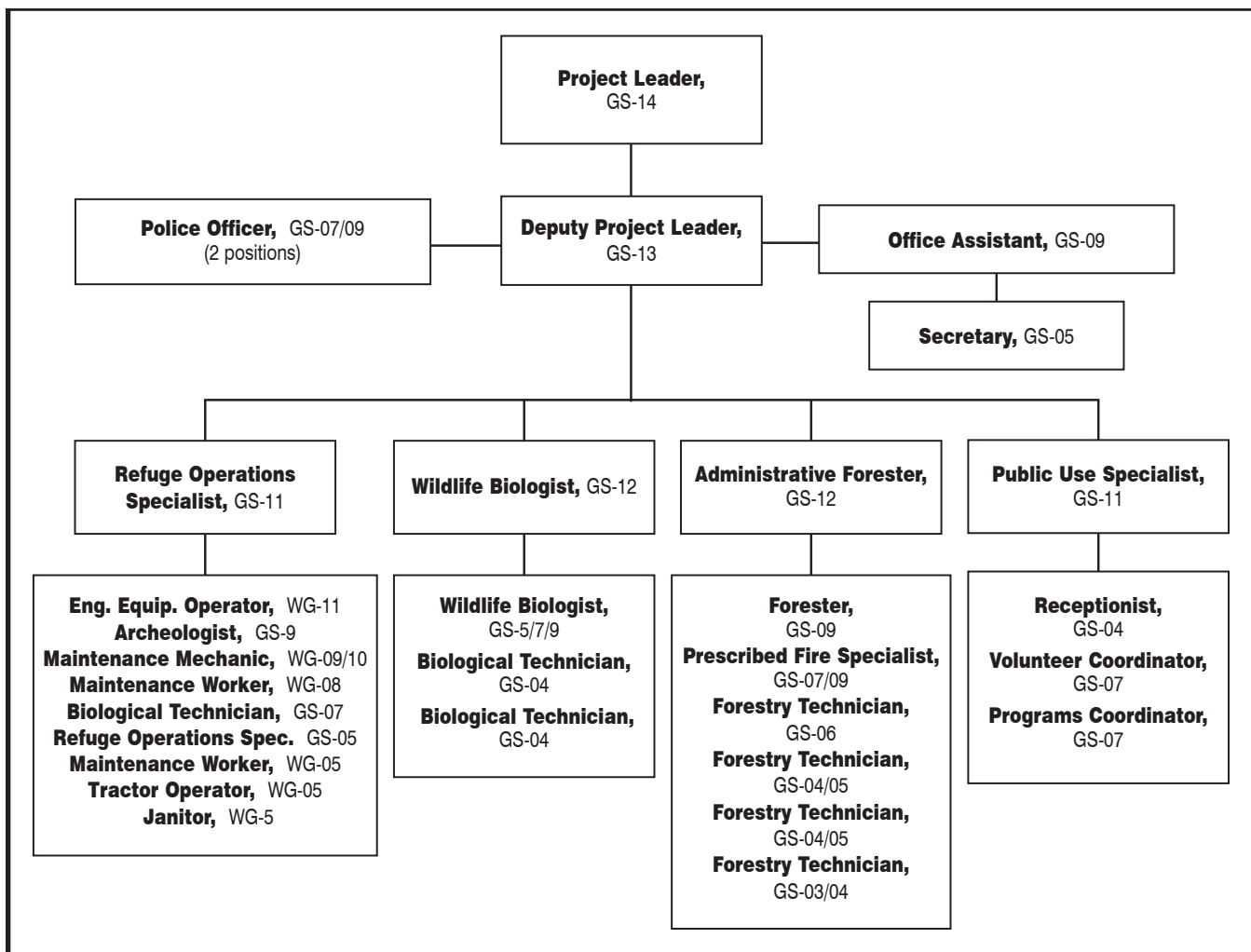
**Features Common to All Alternatives**

All three alternatives, including the "no action" alternative, incorporate several concepts and management techniques intended to achieve the species, habitat, education, and recreation goals of the refuge.

These include the following:

- Restoring native habitats;
- Establishing, maintaining, and improving partnerships with landowners and local, state, and federal agencies and organizations;
- Coordinating management actions with local and state land and resource management agencies;
- Monitoring breeding red-cockaded woodpecker populations in partnership with others;
- Removing non-native invasive plants;
- Encouraging scientific research on the refuge; and,
- Exploring expansion of the refuge boundary.

**Figure 17. Alternatives 2 and 3, Staffing Chart**



Under the National Wildlife Refuge System Improvement Act of 1997, specific management direction is expressed in terms of objectives and strategies. Refuge goals are broad, open-ended statements of refuge emphasis and direction. In contrast, refuge objectives are concise statements of what will be achieved to help meet a particular refuge goal. When possible, refuge objectives should be measurable, clear, specific, and feasible within the 15-year time frame of the comprehensive conservation plan. Refuge strategies describe specific actions or combinations of actions that can be used to meet an objective. In some cases, strategies describe specific projects in enough detail to assess funding and staffing needs. In other cases, further site-specific detail is required to implement a strategy, usually in the form of a step-down management plan.

Refuge goals are common among all alternatives. The summary of alternatives on the following pages represents different combinations of objectives and strategies. The proposed objectives and strategies in the summary apply to each common goal.

Serving as a basis for each alternative, goals and sets of objectives and strategies were developed to fulfill the refuge purpose and the National Wildlife Refuge System mission. Objectives are desired conditions or outcomes that are grouped into sets for this planning effort, and consolidated into three alternatives. These alternatives, overall, represent a range of different management treatments or approaches for managing the refuge over a long-term period with plan review occurring every 5 years, and revised as needed.

#### **Comparison of Alternatives**

The following table provides a detailed comparison of Alternative 2, the proposed action, and the alternatives to the proposed action.

**Figure 18. Comparison of Alternatives**

<b>Habitats</b>  <b>Goal A.</b> Perpetuate a diversity of high quality, more natural-like communities as habitats for trust and resident species  <b>Objective A.1</b> Pine and Pine/Hardwood Forest Stands		
Alternative 1 (No Action)	Alternative 2 (Proposed Action)	Alternative 3 (Proposed Action)
<p>Maintain 26,470 acres of pine and pine/hardwood forests with emphasis on providing habitat for the red-cockaded woodpecker and other wildlife dependent on late successional pine habitat.</p> <p><b>Strategies:</b></p> <p>Evaluate pine and pine/hardwood compartments every 10 years;  Ensure regeneration of approximately 1 percent of pine and pine/hardwood acreage every year;  Monitor active and artificial cluster areas and regulate basal areas to 50-80;  Monitor remaining area, and when basal area exceeds 100, thin to 75-85, primarily to guard against devastating attacks by southern pine beetles;  Reduce and prevent mid-story development primarily through prescribed burning on a 1- 4-year cycle and using mechanical control when necessary. Continue to research effects of prescribed burning on individual plant and animal species and on natural communities.</p>	<p>Same as Alternative 1</p> <p><b>Strategies:</b></p> <p>Same as Alternative 1</p>	<p>Maintain 22,000 acres of older age class pine and pine/hardwood forests to support red-cockaded woodpecker populations, and emphasize early successional age classes on remaining 4,470 acres in support of migratory birds and resident wildlife.</p> <p><b>Strategies:</b></p> <p>Evaluate pine and pine/hardwood compartments every 10 years;  Ensure regeneration of approximately 2 percent of pine/hardwood acreage each year;  Monitor active and artificial cluster areas and regulate basal areas to 50-80;  Monitor remaining area, and when basal area exceeds 100, thin to 75-85, primarily to guard against devastating attacks by southern pine beetles;  Reduce and prevent mid-story development through mechanical means and prescribed burning on a 1- to 6-year cycle;  Continue to research effects of prescribed burning on individual plant and animal species, as well as effects on natural communities.</p>



**Objective A.2** Hardwood Forests

Alternative 1 (No Action)	Alternative 2 (Proposed Action)	Alternative 3 (Proposed Action)
<p>Maintain species diversity within 15,308 acres of hardwood forest stands and increase overall mast production and regeneration of mast producing species. This would follow the current Forest Management Plan designed to emphasize older age classes that support late successional migratory birds and resident wildlife.</p> <p><b>Strategies:</b></p> <p>Evaluate bottomland hardwood compartments every 15 years;            Ensure regeneration of approximately 0.5 percent of hardwood acreage per year;            Regulate stand composition to favor hard- and soft-mast producing trees;            Restore hydrology where needed (through beaver control and dam removal) to minimize water retention during the growing season.</p>	<p>Same as Alternative 1</p> <p><b>Strategies:</b></p> <p>Same as Alternative 1</p>	<p>Maintain species diversity within 15,308 acres of hardwood forest stands and increase overall mast and browse production. This would include revising the current Forest Management Plan so as to emphasize younger-aged classes that support early successional migratory birds and resident wildlife.</p> <p><b>Strategies:</b></p> <p>Evaluate bottomland hardwood compartments every 15 years;            Ensure regeneration of approximately 1 percent of hardwood acreage per year;            Regulate stand composition to favor hard- and soft-mast producing trees;            Restore hydrology where needed (through beaver control and dam removal) to minimize water retention during the growing season</p>

### **Objective A.3 Waters and Wetlands**

<b>Alternative 1 (No Action)</b>	<b>Alternative 2 (Proposed Action)</b>	<b>Alternative 3</b>
<p>Maintain existing species diversity of 300 acres of moist-soil impoundments, 1,900 acres of lakes, and 1,150 acres of greentree reservoirs with emphasis on supporting habitat for migratory birds (e.g., wood ducks and mallards), colonial nesting birds and native aquatic fauna; continue quality monitoring of Hollis and Browning creeks.</p> <p><b>Strategies:</b></p> <p>Manipulate water levels to favor moist-soil plant production; Disc, plow, plant units; Control exotic, invasive, and nuisance plant species where appropriate; Control beaver populations and remove dams where appropriate; Continue monitoring of herpti-fauna and mussel populations; Continue monitoring water quality at Hollis and Browning creeks.</p>	<p>Maintain existing species diversity of 300 acres of moist-soil impoundments, 1,900 acres of lakes, and 1,150 acres of greentree reservoirs with emphasis on supporting habitat for migratory birds (e.g., wood ducks and mallards), colonial nesting birds, and native aquatic fauna; restore historical water flow to Oktoc Creek below Bluff Lake spillway to enhance paddlefish populations; and develop a comprehensive water quality monitoring program refuge-wide.</p> <p><b>Strategies:</b></p> <p>Manipulate water levels to favor moist-soil plant production; Disc, plow, plant units; Control exotic, invasive, and nuisance plant species where appropriate; Control beaver populations and remove dams where appropriate; Continue monitoring of herpti-fauna and mussel populations; Develop water quality monitoring program assessing the impact of environmental contaminants affecting the refuge; Work with USGS to install water gauge on Noxubee River.</p>	<p>Same as Alternative 2.</p> <p><b>Strategies:</b></p> <p>Same as Alternative 2.</p>

**Objective A.4** Fields/Grasslands

Alternative 1 (No Action)	Alternative 2 (Proposed Action)	Alternative 3
<p>Maintain fields and grasslands, including 958 acres of partially restored prairie habitat (grasses and light-seeded broadleaf) at Morgan Hill.</p> <p><b>Strategies:</b></p> <p>Maintain open nature of fields and grasslands using prescribed fire, mowing, and farming; Supplement natural food production using traditional farming operations, the current cooperative farming program, and integrated management practices.</p>	<p>Maintain fields and grasslands and continue restoration of 958 acres of grassland/prairie habitat (grasses and light- and heavy-seeded broadleaf and tuberous perennials) at Morgan Hill.</p> <p><b>Strategies:</b></p> <p>Maintain open nature of fields and grasslands using prescribed fire, mowing, and farming; Supplement natural food production using traditional farming operations, the current cooperative farming program, and integrated pest management practices; Re-establish heavy-seeded and tuberous perennials to complete restoration at Morgan Hill.</p>	<p>Same as Alternative 2.</p> <p><b>Strategies:</b></p> <p>Maintain open nature of fields and grasslands using prescribed fire, mowing, and farming; Supplement natural food production using traditional farming operations, an increased cooperative farming program, and integrated pest management practices; Re-establish heavy-seeded and tuberous perennials to complete restoration at Morgan Hill.</p>

## **Objective A.5** Research Natural Areas and Wilderness

<b>Alternative 1 (No Action)</b>	<b>Alternative 2 (Proposed Action)</b>	<b>Alternative 3</b>
<p>Continue current management of two research natural areas (46-acre bald cypress swamp and 67-acre red cedar/pine/hardwood) and one wilderness study area (1,090 acres) within the guidelines of the Fish and Wildlife Service Manual and complete a wilderness review and study for the wilderness study area</p> <p><b>Strategies:</b></p> <p>Coordinate research efforts with scientists and the research community; Prohibit forest management in research natural areas and wilderness study area; Maintain foot trail access to wilderness study area; Coordinate wilderness review with the public.</p>	<p>Same as Alternative 1</p> <p><b>Strategies:</b></p> <p>Coordinate research efforts with scientists and the research community; Prohibit forest management in research natural areas and wilderness study area; Maintain foot trail access to wilderness study area; Coordinate wilderness review with the public; Develop research objectives and management strategies for research natural areas; Evaluate Pete's Slough and Douglas Bluff as candidates for research natural area designations.</p>	<p>Same as Alternative 1</p> <p><b>Strategies:</b></p> <p>Coordinate research efforts with scientists and the research community; Prohibit forest management in research natural areas and wilderness study area; Maintain foot trail access to wilderness study area; Coordinate wilderness review with the public; Develop research objectives and management strategies for research natural areas.</p>

## Fish and Wildlife Populations

**Goal B.** Continue to protect, maintain, and enhance populations of trust and native plant and animal species within the guidelines of the Central Gulf Ecosystem Five-Year Action Plan, the Red-Cockaded Woodpecker Recovery Plan, the North American Waterfowl Plan, Partners-In-Flight Plan, and the Noxubee National Wildlife Refuge Forest Management Plan.

### **Objective B.1** Trust Species

Alternative 1 (No Action)	Alternative 2 (Proposed Action)	Alternative 3
<p>Monitor and maintain healthy populations of red-cockaded woodpeckers, waterfowl, and other migratory birds (with emphasis on late-succession neotropical migratory birds) and conduct refuge inventory and monitoring to evaluate and improve management practices for trust species on refuge lands.</p> <p><b>Strategies:</b></p> <p>Continue monitoring, cavity augmentation, and predator control for red-cockaded woodpeckers to reach or exceed population target of 88 groups; Monitor waterfowl populations as part of the Service's efforts to track continental populations and to determine responses to management actions, to include regular waterfowl surveys as well as monitoring wood duck boxes; Monitor populations of other migratory birds through breeding bird point counts as part of the Service's Partners-in-Flight program and to determine species responses to management actions (emphasis on late-succession neotropical migrant birds); Monitor wading birds as appropriate; Maintain approximately 150 wood duck nest boxes; Annually band 200 pre-season wood ducks in support of Service monitoring efforts; Continue monitoring populations of cormorant roosts in cooperation with USDA, Division of Wildlife Services.</p>	<p>Same as Alternative 1</p> <p><b>Strategies:</b></p> <p>Same as Alternative 1</p>	<p>Monitor and maintain healthy populations of red-cockaded woodpeckers, waterfowl, and other migratory birds (with emphasis on early-successional neotropical migratory birds), and conduct refuge inventory and monitoring to evaluate and improve management practices for trust species on refuge lands.</p> <p><b>Strategies:</b></p> <p>Continue monitoring, cavity augmentation, and predator control for red-cockaded woodpeckers to reach population target of 88 groups; Monitor waterfowl populations as part of the Service's efforts to track continental populations and to determine responses to management actions, to include regular waterfowl surveys as well as monitoring wood duck boxes; Monitor populations of other migratory birds through breeding bird point counts as part of the Service's Partners-in-Flight program and to determine species responses to management actions (emphasis on early-successional neotropical migrant birds); Monitor wading birds as appropriate; Maintain approximately 150 wood duck nest boxes; Annually band 200 pre-season wood ducks in support of Service monitoring efforts; Continue monitoring populations of cormorant roosts in cooperation with Animal Damage Control.</p>



## **Objective B.2** Resident and Other Species

<b>Alternative 1 (No Action)</b>	<b>Alternative 2 (Proposed Action)</b>	<b>Alternative 3</b>
<p>Manage to maintain healthy, resident wildlife populations including white-tailed deer (average harvest range 400-600 deer) and turkey.</p> <p><b>Strategies:</b></p> <p>Coordinate hunting regulations for resident wildlife with state agencies to maintain population health and stability;  Monitor and manage the population of white-tailed deer and waterfowl at current levels;  Identify and implement management activities to benefit bob-white quail and other early-successional wildlife species;  Identify thresholds of disturbance and develop associated standards and techniques that can be applied, where appropriate, to reduce conflicts and achieve balance between the public and wildlife;  Coordinate management and safety issues with Service public use specialists and game enforcement officials.</p>	<p>Same as Alternative 1.</p> <p><b>Strategies:</b></p> <p>Same as Alternative 1.</p>	<p>Manage to maintain healthy resident wildlife populations, and enhance white-tailed deer (average harvest range 500-700 deer) and turkey.</p> <p><b>Strategies:</b></p> <p>Coordinate hunting regulations for resident wildlife with state agencies to maintain population health and stability;  Monitor and manage the population of white-tailed deer and waterfowl at higher levels, primarily as a result of increased early successional habitat;  Identify thresholds of disturbance and develop associated standards and techniques that can be applied, where appropriate, to reduce conflicts and achieve balance between the public and wildlife;  Coordinate management and safety issues with Service public use specialists and game enforcement officials.</p>

**Objective B.3** Exotic, Invasive, and Nuisance Plants and Animals

Alternative 1 (No Action)	Alternative 2 (Proposed Action)	Alternative 3
Control exotic, invasive, and nuisance species (e.g., beaver) to levels that do not negatively affect trust species.	Same as Alternative 1.	Same as Alternative 2.
<b>Strategies:</b>  Maintain monitoring and control programs for exotic plant species that compromise habitat quality; Use integrated pest management techniques to reduce lotus, kudzu, and cogon grass infestations to levels that do not negatively affect trust resources or impede recreational uses of water bodies; Coordinate with the State to implement control programs; Coordinate results of information concerning success/failure of control treatments within and outside the agency, especially in regard to lotus and kudzu.	<b>Strategies:</b>  Maintain monitoring and control programs for exotic plant species that invade/compromise habitat quality; Use integrated pest management techniques to reduce lotus, kudzu, and cogon grass infestations to levels that do not negatively affect trust resources; Develop an Integrated Pest Management Plan consistent with Beaver Control Plan; Coordinate results of information concerning success/failure of control treatments within and outside the agency, especially in regard to lotus and kudzu; Investigate control methods for Chinese privet and bicolor lespedeza.	<b>Strategies:</b>  Same as Alternative 2.

## Land Protection and Conservation

**Goal C.** Protect and improve conditions for fish, wildlife, habitats, special management areas, and wilderness through the use of current land protection programs, laws, policies, and partnerships.

**Objective C.1** Land Acquisition and Conservation Easements

Alternative 1 (No Action)	Alternative 2 (Proposed Action)	Alternative 3
<p>Seek to acquire 4,263 acres of private land in-holdings within the existing approved acquisition boundary and continue managing nine Farmers Home Administration Conservation Easements.</p> <p><b>Strategies:</b></p> <p>Continue to utilize and seek partnerships with conservation organizations and others to complete acquisitions; Work with loggers and timber companies to conduct timber for land exchanges; Continue contact with all landowners within the refuge acquisition boundary to determine landowner interest and willing-seller status.</p>	<p>Seek to acquire 4,263 acres of private land in-holdings within the existing approved acquisition boundary and work to expand acquisition boundary to allow purchase of an additional 5,169 acres outside the current boundary. Also continue managing nine Farmers Home Administration Conservation Easements.</p> <p><b>Strategies:</b></p> <p>Establish a new acquisition boundary that would encompass an additional 5,169 acres; Establish acquisition priorities based upon habitat values and/or possible threats to existing resources; Initiate and continue contact with all landowners within the refuge acquisition boundary to determine landowner interest and willing-seller status; Continue to utilize and seek partnerships with conservation organizations and others to complete acquisitions; Work with loggers and timber companies to conduct timber-for-land exchanges.</p>	<p>Same as Alternative 2.</p> <p><b>Strategies:</b></p> <p>Same as Alternative 2.</p>

## **Objective C.2** Conservation Partnerships

<b>Alternative 1 (No Action)</b>	<b>Alternative 2 (Proposed Action)</b>	<b>Alternative 3</b>
<p>Maintain conservation and research partnerships with state, nonprofit organizations, academia, and private land managers on the refuge and within the region.</p> <p><b>Strategies:</b></p> <p>Continue coordination with the Service's private lands biologist located in Jackson, Mississippi, to implement, locally, the Partners for Wildlife Program and other conservation programs available that offer incentives and technical assistance to landowners; Continue communication to promote wildlife conservation with landowners and community groups; Continue outreach techniques using Internet web page, newsletters, and local events; Participate in refuge system centennial outreach events and activities.</p>	<p>Maintain and develop new partnerships with states, tribes, nonprofit organizations, academia, private land managers, and businesses to broaden support for the refuge.</p> <p><b>Strategies:</b></p> <p>Increase participation and coordination with the Service's private lands biologist located in Jackson, Mississippi, to implement, locally, the Partners for Fish and Wildlife Program and other conservation programs available that offer incentives and technical assistance to landowners; Increase communication to promote wildlife conservation with landowners and community groups; Continue outreach techniques using Internet web page, newsletters, and local events; Participate in refuge system centennial outreach events and activities.</p>	<p>Same as Alternative 2.</p> <p><b>Strategies:</b></p> <p>Same as Alternative 2.</p>

## Recreation and Education

**Goal D.** Maintain, develop, and support recreation and education opportunities that promote fish and wildlife conservation consistent with the Service mission, refuge purpose, and Service policy.

### **Objective D.1** Hunting

Alternative 1 (No Action)	Alternative 2 (Proposed Action)	Alternative 3
<p>Where appropriate, provide hunting opportunities to manage deer populations (average annual harvest range 400-600 deer) and provide small game and waterfowl hunting opportunities.</p> <p><b>Strategies:</b></p> <p>Monitor deer populations via harvest data and periodic health checks to maintain a healthy population and sustainable harvest;</p> <p>Maintain well-defined boundaries around areas closed to hunting to ensure the safety of other refuge visitors and provide a high quality experience for the hunter;</p> <p>Annually review hunt regulations in coordination with Mississippi Department of Wildlife, Fisheries, and Parks' biologists to assist in achieving balanced and healthy game populations;</p> <p>Evaluate potential impacts of hunting on other refuge activities and programs;</p>	<p>Same as Alternative 1.</p> <p><b>Strategies:</b></p> <p>Monitor deer populations via harvest data and periodic health checks to maintain a healthy population and sustainable harvest;</p> <p>Maintain well-defined boundaries around areas closed to hunting to ensure the safety of refuge visitors and provide a high quality experience for the hunter;</p> <p>Annually review hunt regulations in coordination with Mississippi Department of Wildlife, Fisheries, and Parks' biologists to assist in achieving balanced and healthy game populations;</p> <p>Evaluate potential impacts of hunting on other refuge activities and programs;</p> <p>Develop additional hunting blinds for disabled hunters;</p> <p>Develop vehicle pull-offs and parking areas to facilitate safe access to hunting areas.</p> <p>Provide opportunities for youth to hunt waterfowl.</p>	<p>Where appropriate, provide hunting opportunities to manage deer populations (average annual harvest range 500-700 deer) and provide small game and waterfowl hunting opportunities.</p> <p><b>Strategies:</b></p> <p>Same as Alternative 2.</p>

**Objective D.2** Fishing

Alternative 1 (No Action)	Alternative 2 (Proposed Action)	Alternative 3
<p>Maintain sufficient game fish populations at Bluff and Loakfoama lakes to support an annual average of 13,000 angler-use days through natural reproduction, habitat management, regulated harvest, and stocking when appropriate.</p> <p><b>Strategies:</b></p> <p>Evaluate fishery resource annually using staff from Mississippi State University; Coordinate stocking needs with Private John Allen National Fish Hatchery.</p>	<p>Same as Alternative 1.</p> <p><b>Strategies:</b></p> <p>Evaluate fishery resource annually using staff from Mississippi State University; Coordinate stocking needs with Private John Allen National Fish Hatchery; Develop fishing piers for wheelchair access; Renovate docks and boat ramps and provide access for the disabled persons at Bluff and Loakfoama lakes and Ross Branch Reservoir.</p>	<p>Same as Alternative 2.</p> <p><b>Strategies:</b></p> <p>Same as Alternative 2.</p>



**Objective D.3** Wildlife Observation and Photography

Alternative 1 (No Action)	Alternative 2 (Proposed Action)	Alternative 3
<p>Maintain overlooks, boardwalks, and trails, and provide special guided education tours each season.</p> <p><b>Strategies:</b></p> <p>Maintain hiking trails; Support Audubon Christmas Bird Count and other birding events; Support Xerces Fourth of July Butterfly Count; Advertise and maintain guided interpretive tours.</p>	<p>Restore and improve overlooks, boardwalks, and trails; provide special guided and education program tours each season; and seek funding to develop an auto tour route with interpretive panels to provide observation opportunities and develop key resource awareness.</p> <p><b>Strategies:</b></p> <p>Maintain hiking trails; Conduct Audubon Christmas Bird Count and other birding events; Advertise and maintain guided interpretive tours; Seek funding for auto tour route.</p>	<p>Same as Alternative 2.</p> <p><b>Strategies:</b></p> <p>Same as Alternative 2.</p>

**Objective D.4** Interpretation

Alternative 1 (No Action)	Alternative 2 (Proposed Action)	Alternative 3
<p>Continue managing interpretation opportunities including 5 to 10 events annually.</p> <p><b>Strategies:</b></p> <p>Conduct guided tours; Maintain restrooms and potable water faucets for visitors; Maintain interpretive and directional signs, Internet web site, brochures, newsletters, and public updates of upcoming events and conservation awareness and activities.</p>	<p>Increase interpretation activities by up to 15 events annually.</p> <p><b>Strategies:</b></p> <p>Conduct guided tours; Maintain restrooms and potable water faucets for visitors; Maintain interpretive and directional signs, Internet web site, brochures, newsletters, public updates of events, and conservation awareness and activities; Construct a vehicle pull-off and information kiosk on Highway 25; Construct information kiosk at Morgan Hill Overlook.</p>	<p>Same as Alternative 2.</p> <p><b>Strategies:</b></p> <p>Same as Alternative 2.</p>

**Objective D.5** Environmental Education

Alternative 1 (No Action)	Alternative 2 (Proposed Action)	Alternative 3
<p>Coordinate with Starkville School District, Mississippi State University, and civic groups to teach required curriculum, share expertise, and host meetings at the Environmental Education Center, refuge outdoor classroom, and off-site locations to support 10,000 students annually.</p> <p><b>Strategies:</b></p> <p>Maintain facilities and manage programs to support education activities; Continue providing off-site demonstrations and loaning portable exhibits to local garden clubs, school groups, retired citizens, and local nursing home and other groups.</p>	<p>Coordinate with Starkville School District, Mississippi State University, and civic groups to teach required curriculum, share expertise, and host meetings at the Environmental Education Center, refuge outdoor classroom, and off-site locations to support 15,000 students annually; initiate and support a Refuge Friends Group.</p> <p><b>Strategies:</b></p> <p>Seek funding to construct and operate the additional phases of the Environmental Education Center; Maintain facilities and manage programs to support education activities; Increase number of off-site programs and demonstrations to school groups, garden clubs, conservation clubs, retired citizens, etc.; Develop teaching materials and host teacher workshops to promote environmental education and basic curriculum in local schools; Encourage the development of a Refuge Friends Group and solicit volunteers to support environmental education programs.</p>	<p>Same as Alternative 2.</p> <p><b>Strategies:</b></p> <p>Same as Alternative 2.</p>

## Cultural Resources

**Goal E.** Identify and protect cultural resources in accordance with state and federal historic preservation legislation and regulations.

**Objective E.1** Surveys and Investigations

Alternative 1 (No Action)	Alternative 2 (Proposed Action)	Alternative 3
<p>Maintain inventory of cultural resource sites located on the refuge.</p> <p><b>Strategies:</b></p> <p>Continue to collect and catalog information about cultural resource sites located on the refuge. Refuge staff will continue to gather such information, incidental to carrying out their primary duties.</p>	<p>Conduct a refuge-wide archaeological survey by the year 2005.</p> <p><b>Strategies:</b></p> <p>Conduct a comprehensive archaeological survey of the refuge and develop a GIS layer for the cultural resource sites; Produce an annotated bibliography of scientific reports and articles.</p>	<p>Same as Alternative 2.</p> <p><b>Strategies:</b></p> <p>Same as Alternative 2.</p>

**Objective E.2** Protection

Alternative 1 (No Action)	Alternative 2 (Proposed Action)	Alternative 3
<p>Minimize impacts to cultural resources resulting from management activities and protect cultural resources from looting and vandalism.</p> <p><b>Strategy:</b></p> <p>Maintain current levels of law enforcement to protect the refuge's cultural resources from looting and vandalism.</p>	<p>Develop and implement planning and law enforcement procedures to protect the refuge's cultural resources and diminish site destruction due to looting and vandalism.</p> <p><b>Strategies:</b></p> <p>Ensure that full-time refuge law enforcement officer completes Archaeological Resources Protection Act training course; Ensure that pertinent refuge staff complete the Section 106/Cultural Resources for Managers' training course.</p>	<p>Same as Alternative 2.</p> <p><b>Strategies:</b></p> <p>Same as Alternative 2.</p>

**Objective E.3** Management and Education

Alternative 1 (No Action)	Alternative 2 (Proposed Action)	Alternative 3
<p>Manage known cultural resources in a manner that preserves their historical integrity.</p> <p><b>Strategy:</b></p> <p>Continue coordinating management activities with Service's Regional Archaeologist and State Historic Preservation Office.</p>	<p>Manage known cultural resources in a manner that preserves their historical integrity and implement an educational program that will provide an understanding and appreciation of the human influence on the region's ecosystems.</p> <p><b>Strategies:</b></p> <p>Establish an archaeologist position at the refuge to implement a comprehensive cultural resources management program. This position would compliment the existing Regional Archaeologist position and be shared with other stations on the west side of the refuge;  Plan management activities so they prevent or minimize disturbance to known cultural resources, such as the Old Robinson Road National Historic Landmark, graveyards, encampments, church sites, home sites, etc.;  Design environmental education and basic interpretive programs that explain refuge history and resources in the context of human influences;  Work with local Native- and African-American communities to develop an education program regarding their cultural heritages.</p>	<p>Same as Alternative 2.</p> <p><b>Strategies:</b></p> <p>Same as Alternative 2.</p>



## Objective E.4 Cultural Resource Partnerships

Alternative 1 (No Action)	Alternative 2 (Proposed Action)	Alternative 3
<p>Continue coordinating with Native- and African-American groups through the State Historic Preservation Office when planning management activities.</p> <p><b>Strategy:</b></p> <p>Seek and evaluate the sentiments of Native American, African American, and other ethnic groups prior to implementing any management activity that may impact a site or landscape important to that group.</p>	<p>Facilitate partnerships to manage cultural resources with the pertinent state and federal agencies, the State Historic Preservation Office, professional archaeologists, Native American and African American communities, and the general public.</p> <p><b>Strategies:</b></p> <p>Seek a Memorandum of Understanding with the U.S. Forest Service and Mississippi Department of Wildlife, Fisheries, and Parks to enhance law enforcement of the Archaeological Resources Protection Act, the Native American Grave Protection and Repatriation Act, and Section 50 of the Code of Federal Regulations, as well as facilitate investigations of Archaeological Resources Protection Act violations and unpermitted artifact collecting; Approach the Choctaw Nation and other pertinent Native American groups for information on and input into the management of cultural sites on the refuge; Identify potential avenues of archaeological and historic investigations and promote interdisciplinary research, such as the Jenkins' and Krause's investigations in the Tennessee-Tombigbee River Watershed; Expand existing partnership with Mississippi State University's Department of Anthropology to include more extensive surveys and research, and potentially the sponsorship of a graduate intern on the refuge. Negotiate an agreement with appropriate facilities for the permanent curation of archaeological collections and associated documentation derived from investigations on the refuge.</p>	<p>Same as Alternative 2.</p> <p><b>Strategies:</b></p> <p>Same as Alternative 2.</p>

## Refuge Administration

**Goal F.** Develop, rehabilitate, implement, and maintain a comprehensive refuge facility, operations, and maintenance program responsive to supporting the management of fish and wildlife resources and the safety and experience of visitors

**Objective F.1** Equipment and Facilities

Alternative 1 (No Action)	Alternative 2 (Proposed Action)	Alternative 3
<p>Maintain and replace equipment, fleet, computer and communication systems, and upgrade refuge entrance roads and bridges, buildings, structures, trails, and signs as appropriations allow, and by utilizing existing partnerships to assist with funding.</p> <p><b>Strategies:</b></p> <p>Improve and maintain facilities to comply with safety standards and support biological, education, and visitor service program objectives; Continue cooperating with local and state highway officials to maintain and improve roadways; Educate local officials and Regional Office about refuge needs;</p>	<p>Improve and maintain equipment, fleet, computer and communication systems, refuge entrance roads, buildings, structures, trails, and signs as appropriations allow, and by utilizing existing partnerships and seeking additional ones to assist with funding.</p> <p><b>Strategies:</b></p> <p>Improve and maintain facilities to comply with safety standards and support biological, education, and visitor service program objectives; Continue cooperating with local and state highway officials to maintain and improve roadways; Update local officials and Regional Office as to refuge needs; Conduct Congressional briefings and tours as needed to communicate refuge needs.</p>	<p>Same as Alternative 2.</p> <p><b>Strategies:</b></p> <p>Same as Alternative 2.</p>

## **Objective F.2** Operations and Maintenance

<b>Alternative 1 (No Action)</b>	<b>Alternative 2 (Proposed Action)</b>	<b>Alternative 3</b>
<p>Utilize current funding and staff to support biological programs as appropriations allow and continue using adaptive management and research to evaluate effectiveness of wildlife conservation programs.</p> <p><b>Strategies:</b></p> <p>Utilize current staff to implement the best management programs at current levels; Manage volunteer and student intern programs in such a manner that they compliment existing staff efforts as well as provide meaningful and educational opportunities of volunteers and interns; Provide employee training as necessary to meet mandatory requirements.</p>	<p>Increase staff and seek funding to improve expertise, address inadequacies, orient research to articulate funding shortfalls, and ensure adequate funding support for management of trust species.</p> <p><b>Strategies:</b></p> <p>Add 12 staff positions necessary to fully implement management programs;            Manage a comprehensive employee training program to ensure adequate expertise in all program areas;            Manage volunteer and student intern programs in such a manner that they complement existing staff efforts, as well as provide meaningful and educational opportunities;            Seek increases in refuge funding to support additional operations and maintenance activities as identified for each program area;            Encourage the development of a Refuge Friends Group to support environmental education and other programs.</p>	<p>Same as Alternative 2.</p> <p><b>Strategies:</b></p> <p>Same as Alternative 2.</p>

### **Proposed Action**

Once several feasible management alternatives have been developed, the planning policy that guides implementation requires the Service to select a preferred alternative that becomes its proposed action under the National Environmental Policy Act. The written description of this proposed action is effectively the comprehensive conservation plan. Alternative 2 has been chosen as the proposed management action for the refuge because the Service believes it best meets the following criteria:

- Achieves the mission of the National Wildlife Refuge System;
- Is consistent with the Service's Central Gulf Ecosystem goals;
- Achieves the purposes of the Noxubee National Wildlife Refuge;

- Will be able to achieve the vision and goals outlined for the refuge;
- Restores and maintains the ecological integrity of the habitats and populations on the refuge;
- Addresses the important issues identified during the scoping process;
- Addresses the legal mandates of the Service and the refuge; and
- Is consistent with the scientific principles of sound fish and wildlife management and endangered species recovery.

The management action ultimately selected and described in the comprehensive conservation plan will be determined, in part, by the comments received on the draft version of the plan. The action may or may not be the proposed action contained in the draft plan, but could be a modification of one of the alternatives presented in this environmental assessment.

#### **Alternatives Considered but Eliminated from Detailed Analysis**

The alternative's development process under the National Environmental Policy Act and the National Wildlife Refuge System Improvement Act is designed to allow the planning team to consider the widest possible range of issues and feasible management solutions. These management solutions are then incorporated into one or more alternatives evaluated in the environmental assessment process and considered for inclusion in the comprehensive conservation plan.

Actions and alternatives that are infeasible or that may cause substantial harm to the environment are usually not considered in an environmental assessment. Similarly, an action or an alternative containing the action should generally not receive further consideration if it is illegal; it does not fulfill the mission of the National Wildlife Refuge System; it does not relate to or achieve one of the goals of the refuge unit; or its environmental impacts have already been evaluated in a previously approved National Environmental Policy Act document.

During the process of developing alternatives, the planning team considered a wide variety of potential actions on the refuge. The following actions were ultimately rejected and excluded from the alternatives proposed because they did not achieve refuge purposes or were incompatible with one or more goals:

- Substantially increasing wilderness areas and research natural areas;
- Introducing new types of public use such as camping;
- Increasing timber harvesting for economic development; and
- Substantially increasing non-consumptive public uses without increasing management of natural resources.

#### **Compatible Secondary Uses**

The National Wildlife Refuge System Administration Act of 1966, as amended by the National Wildlife Refuge System Improvement Act of 1997, states that national wildlife refuges must be protected from incompatible or harmful human activities to ensure that Americans

**Section B.**

**Environmental Assessment**

**CHAPTER II - Alternatives**

can enjoy refuge system lands and waters. Before activities or uses are allowed on a national wildlife refuge, the uses must be found to be compatible. A compatible use "... will not materially interfere with or detract from the fulfillment of the mission of the refuge system or the purposes of the refuge." "Wildlife-dependent recreational uses may be authorized on a refuge when they are compatible and not inconsistent with public safety."

**Other Management**

All management activities that could affect natural resources, including subsurface mineral reservations, utility lines and easements, soil, water and air, and cultural resources will be managed to comply with all laws and regulations. The Service has a legal responsibility to comply with all laws and regulations and to consider the effects its actions have on cultural resources. Under all alternatives, the Service would manage these resources in accordance with public law and agency policy. Individual projects would require additional consultation with the Advisory Council on Historic Preservation and the State of Mississippi Historic Preservation Office. Additional consultation, surveys, and clearance would be required where project development would be conducted on the refuge or when activities would affect properties eligible for the National Register of Historic Places.

**Section B.**

**Environmental Assessment**

**CHAPTER III -**

**Affected Environment**

## ***III. AFFECTED ENVIRONMENT***

Background information, as well as a description of the environment affected by the proposed management action and activities, can be found in Section A, of the Comprehensive Conservation Plan for Noxubee National Wildlife Refuge.

**Section B.  
Environmental Assessment**

**CHAPTER IV -  
Environmental  
Consequences**

## **IV. ENVIRONMENTAL CONSEQUENCES**

### **Overview**

This chapter analyzes the direct, indirect, and cumulative environmental impacts of the three alternatives described in Chapter II. Outlined are the predicted impacts that could result from the implementation of proposed actions described in Alternatives 1, 2, and 3. Each alternative portrays expected outcomes for fish and wildlife species, varying in magnitude to the amount of land proposed to be acquired and the intensity of management. Alternative 1, the "no action" alternative,

represents a continuation of current management practices; it serves as the baseline against which Alternatives 2 and 3 are compared.



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Analyses of impacts related to human presence on the refuge assume that overall use would increase slightly as population in the surrounding counties grows. Hunting and fishing use is expected to increase less rapidly than non-consumptive uses (environmental education and interpretation, wildlife observation) and may remain stable because these uses already are permitted on most of the refuge.

### **Effects Common to All Alternatives**

The three alternatives were developed to address the issues, concerns, and opportunities identified during the planning process. Many of the predicted impacts are common to the alternatives.

Each alternative would protect habitat types important to migratory birds, mammals, reptiles, amphibians, fish, and invertebrates including threatened and endangered species. All alternatives would provide equal protection of wilderness character (undisturbed bottomland hardwood forest) in the wilderness study area. Implementation of all alternatives would benefit and not likely adversely affect threatened or endangered species or habitats.

Overall, refuge foraging habitat would remain stable for waterfowl under all alternatives. Each alternative would protect sites important to neotropical migratory birds and populations of the red-cockaded woodpecker.

Logging and recreation activities including hunting, fishing, and small fishing craft can be a disturbance to bald eagles and colonial nesting birds. Hunting is primarily a winter season activity.



**Section B.  
Environmental Assessment**

**CHAPTER IV -  
Environmental  
Consequences**

Logging and recreation activities would be located to minimize disturbance to bald eagles and colonial nesting birds. Larger numbers of people on the refuge during the winter months and hunting season can cause increased impacts. However, without the use of hunting as a management tool, increased deer browsing would greatly impact area-sensitive forest birds.

Old growth and old-aged trees are extremely rare in the Central Gulf Ecosystem. Under all alternatives, the refuge would fully protect existing old growth or old-aged timber from timber harvests. Timber harvesting to benefit wildlife is covered under each alternative, however, the harvest is always done in young or intermediate-aged stands (i.e., 15-80 years old).

All alternatives include deer population control through a hunt program. The deer population on the refuge is currently at a healthy carrying capacity and forest management practices under all alternatives could increase the deer population. Refuge forests and adjacent forests and croplands provide rich sources of forage for deer. The number of hunting days as well as hunters may vary depending upon deer populations. High deer numbers are recognized as a problem, causing extensive habitat and crop damage.

Integrated pest management strategies would be implemented under all alternatives. Alternative 1 would provide the least management, while Alternatives 2 and 3 would provide the most management. Whenever possible, all alternatives would use techniques other than pesticides to control these species. However, some quantity of pesticides would be used on a periodic basis.

All alternatives would positively impact the water quality in individual streams. Other positive impacts would result from the protection of groundwater recharge areas, runoff prevention, sediment retention, and minimization of non-point source pollution.

Under all alternatives, the level of recreation use and ground based disturbance from pedestrians would be largely concentrated to the boardwalks, trails, and refuge facilities.

Visitor use management on refuges concentrates on the experience, not on the number of visitors. The type and intensity of visitor activities would vary from tract-to-tract depending on size, habitat type(s), and wildlife uses.

Wildlife-dependent recreation under all alternatives supports slight increases in economic activities. Economic benefits from the increased visitation should directly improve the value of goods and services to local communities. Portions of the refuge may be closed occasionally because of the sensitivity of habitat and its importance to nesting birds.

Under all alternatives, refuge visitation to support priority public uses would generally increase over time as funding is provided for

**Section B.  
Environmental Assessment**

**CHAPTER IV -  
Environmental  
Consequences**

operation, maintenance, and facilities. Much of the refuge usage is expected from local, county, and state residents, although an increase in the number of spring and fall tourists is predicted for bird watching.

Environmental impacts by resource or management area are outlined in the following pages.

**Biological Resources**

Under Alternative 1, continuation of current management activities would have beneficial impacts on wildlife, including endangered species. For example, emphasis would be placed on forest breeding birds where management is designed to maintain late successional forest stands. Species such as the red-cockaded woodpecker and the Bachman's sparrow should demonstrate significant increases in population due to forest management practices. Annual management of water levels in moist-soil units would continue to result in an abundance of seeds, insects, crustaceans, and mollusks, all of which are favored foods of migratory waterfowl, wading birds, and shorebirds. Flooding of greentree reservoirs provides favorable waterfowl and wading bird habitat. Continued burning in old-aged loblolly pine stands would provide beneficial impacts to support red-cockaded woodpeckers.

Localized disturbance of wildlife would occur when timber is cut or vegetation is removed. Timber management is the most effective means to modify wildlife habitat on a large scale. Generally, higher timber production in Alternative 3 would produce a younger forest and favor those species that thrive in early seral stages.

Alternatives 1 and 2 favor a higher percentage of mid- and late-seral stages, which results in higher numbers of cavity nesters. All alternatives provide for an old growth component to meet the needs of red-cockaded woodpeckers.

There would be no effect on fishery resources under Alternative 1.

Under Alternative 1, the current control of invasive species would have a beneficial impact on native habitats. Without invasive species control, the refuge wildlife populations could be adversely affected by exotic and invasive species.

Recreational use of the refuge is expected to gradually increase as the population of this region grows. Roosting birds may be flushed by increased public use (i.e., visitors, hunters, and fishermen). Disturbance by visitors may limit bald eagle use, and visitors who walk off trails may disturb ground nesting birds, reptiles, and amphibians.

Limited waterfowl hunting opportunities would continue to be available under Alternative 1, and could result in several types of disturbances to wildlife. Hunters accessing the hunt area may disturb wildlife in the refuge's riparian and aquatic habitats, and hunters may accidentally take non-target species. In addition, litter discarded by hunters and other refuge users could be ingested or entangle wildlife, resulting in injury or death.

**Section B.  
Environmental Assessment**

**CHAPTER IV -  
Environmental  
Consequences**

Implementation of Alternative 2 would result in numerous beneficial impacts and potentially some adverse impacts on wildlife. Management actions would have a beneficial impact on wildlife including red-cockaded woodpeckers in mature and old-aged loblolly pines. Under this alternative, predators of the red-cockaded woodpecker would continue to be managed. As a result, the fledgling rate is expected to increase. In addition, restricted access to nesting habitat and education of refuge visitors about the species would continue to reduce impacts to this species. Alternatives 1 and 2 provide the highest degree of vegetative age and type diversity adding to ecosystem heterogeneity.

Under Alternative 2, the increased presence of Service staff on the refuge may also deter illegal activities, such as underage drinking, littering, and night-time disturbance, which would benefit wildlife. Additions and improvements to education and recreation facilities, including trails, would have minimal direct impacts because these facilities already exist. However, the construction of a new visitor center and office complex would bring more visitors closer to Bluff and Loakfoma lakes, potentially increasing disturbance to waterfowl, other birds, and alligators that use the lakes.

Under Alternatives 2 and 3, visitor use of the refuge would gradually increase as the improved facilities are utilized and program activities are implemented. For example, the refuge's improved interpretive displays and wheelchair accessible fishing facilities would likely attract slightly more users than would visit under Alternative 1. Therefore, implementation of Alternatives 2 and 3 may have adverse effects on fish and wildlife species as compared to Alternative 1. This increase would be controlled through a combination of more enforcement of user restrictions (through greater presence of refuge staff) and facilities to better control public use. Improved access to and through the refuge would likely increase the number of users. This would have adverse impacts on wildlife near viewing areas, facilities, lake shorelines, and trails. Greater numbers of walkers and children playing may increase disturbance. Construction of the proposed visitor center adjacent to Loakfoama Lake would take place between 2002 and 2004. Construction and annual movement along the lake could adversely affect wildlife on the lake. However, Alternative 2, overall, should have beneficial impacts to wood ducks, mallards, late-succession neotropical migratory birds, and native game fish.

**Physical Resources**

None of the activities proposed under Alternatives 1, 2, and 3 would have an adverse effect on local hydrology.

Under all alternatives, non-native vegetation would be removed from the refuge. Removal would be accomplished through a combination of chemical and mechanical means, including herbicide spraying, prescribed burning, and use of heavy equipment. Removal would be carried out at times to avoid adversely affecting nesting and breeding seasons. Depending on the terrain, surfaces

**Section B.**  
**Environmental Assessment**

**CHAPTER IV -**  
**Environmental**  
**Consequences**

exposed by vegetation removal could erode and increase sediment loss until vegetation recovers.

Herbicides would usually be applied by hand to target exotic plants; and be applied by aerial spraying only when necessary and practical, such as when treating American lotus. There could be adverse impacts on non-target plants from pesticide drift, but these effects are expected to be minimal due to the small quantities that would be used and the precautionary methods that would be taken.

Herbicides would be selected based on the characteristics of each treatment site and location relative to aquatic and wetland habitats. No spraying would take place when wind velocities exceed 5 mph, when vegetation is wet, or when precipitation is forecast in the following 24-36 hours. No spraying would occur in areas where endangered plants or animals occur. Invasive non-natives in these areas would be mechanically removed.

Alternatives 2 and 3 include building or improving visitor facilities to improve access throughout the refuge as well as education and interpretation opportunities. Site preparation and construction activities associated with boardwalk installation could increase delivery of sediment to local wetlands. This increase in sediment delivery is expected to be temporary and small because the terrain is flat. Therefore, construction would not significantly affect water quality.

Improving roads and parking lots could increase runoff of oil and grease during storms. Although adverse, this reduction in water quality is not expected to be significant because the flat terrain slows runoff rates, and the roads and parking lots are very small relative to the size of the watershed.

None of the activities proposed under any of the alternatives would change drainage patterns on the refuge.

Under all alternatives, continuation of current refuge farming and logging practices would result in some soil erosion and compaction. Timber is usually harvested using power saws, rubber-tired articulated skidders, and mechanical loaders. The wood is trucked off the refuge for processing. A temporary increase in localized soil movement can be expected due to vegetation removal and use of logging equipment. Soil nutrient losses would be negligible in terms of long-term productivity. Major nutrient losses are caused by erosion resulting from site preparation. Timber harvesting activities, including site preparation using fire, mechanical, or hand methods to reduce hardwood competition, may result in soil compaction and short-term loss of soil productivity.

All alternatives would use prescribed burns to control non-native vegetation and the spread of woody vegetation in the pine and grassland habitats. The prescribed burn program is outlined in the Fire Management Plan for the refuge. This plan describes the year's burn unit(s) and their predominant vegetation; the pri-



**Section B.**  
**Environmental Assessment**

**CHAPTER IV -**  
**Environmental**  
**Consequences**



*USFWS Photo*

mary objectives of the unit(s) and the fire(s); the acceptable range of results; site preparation requirements; weather requirements; safety considerations and measures to protect sensitive features; burn-day activities; communications and coordination for burns; ignition techniques; smoke management procedures; and post-burn monitoring.

Prescribed burning temporarily reduces air quality by reducing visibility and releasing several components through combustion. The four major components are carbon monoxide, carbon dioxide, hydrocarbons, and particulates. Varying amounts of particulate content are generated in different types of burns (e.g., wildlife habitat improvement burns vs. fuel reduction burns). Clean Air Act standards would be met during all prescribed burns under all alternatives.

Under Alternatives 2 and 3, the Service would build or improve several facilities, generating construction-related vehicle emissions. Implementation of Alternatives 2 and 3 may result in increased vehicle-related emissions. Visitor use is expected to increase if the office/visitor center and additional phases of the education center are built. However, the corresponding increase in vehicle traffic would be limited to current roads and facilities. Likewise, tour groups and planned visitor activities would be limited to the visitor center and environmental education center parking areas. Increased vehicle emissions under Alternatives 2 and 3 are not expected to have a significant impact on air quality of the refuge.

**Social and Economic Resources**

The forest management program has a very direct impact on the local economy. To accomplish needed habitat management, the refuge will typically thin about 200-600 forest acres per year. Likewise, approximately 100-200 acres are harvested per year to regenerate new stands of trees. Sometimes additional timber harvests occur to salvage trees damaged by storms or southern pine beetle infestations. Collectively, these timber harvests often amount to more than a million board feet of sawtimber and several thousand cords of pulpwood per year. The value of these raw products is several hundred thousand dollars per year. Timber harvests not only provide raw material for regional saw mills and pulp mills, they also provide employment for local loggers, foresters, etc. Alternatives 1 and 2 would have no effect on the local economy as far as forest management activities are concerned. Alternative 3 should have a positive effect due to increased timber harvest.

None of the alternatives would have an adverse effect on local agricultural operations.

Under Alternative 1, visitor use is not expected to show an increase greater than that expected at present. Thus, under this alternative, there would be no adverse impact on local traffic or transportation systems. Under Alternatives 2 and 3, visitor use is expected to increase slightly because of improved access and additional facilities. This increase would generate a small amount of additional traffic to the refuge, however, it would not be significant.

**Section B.  
Environmental Assessment**

**CHAPTER IV -  
Environmental  
Consequences**

Implementation of Alternative 1 would maintain current refuge recreational uses and would have no impact on existing recreation.

Implementation of Alternatives 2 and 3 may have several beneficial impacts on enhancing hunting, fishing, wildlife observation, and environmental education and interpretation opportunities. Current refuge operations would be maintained with increases in the number of hunters and fishermen, but would have greater positive effects on the experience of refuge visitors other than hunters and fishermen. Visitor access for education and interpretation would improve. Additional facilities, including a visitor center and disabled access, would provide greater opportunities and encourage more people to visit, which would have a positive impact on recreation. Increased public use will benefit local economies with increased spending on lodging, food, fuel, and other needs of visitors.

Under Alternative 1, current management practices would continue to be followed and no change in refuge staffing would be required, thus having no impact on local employment conditions.

Under Alternatives 2 and 3, current management practices would continue, but natural resource and public use management would be increased. This would require the Service to increase the staff of the refuge by 12 positions. In addition, visitation would be expected to increase under Alternatives 2 and 3. This increase could benefit the local economy and local employment conditions. Alternatives 2 and 3 could thus result in a small positive impact on local employment conditions.

No activities proposed in any of the alternatives would have a disproportionate negative impact on low-income or minority populations.

No activities proposed under Alternatives 1, 2, and 3 would have a negative impact on the economic well-being of the local community. Alternative 3 would have beneficial impacts on the local economy by providing additional revenues from increased timber sales, and if the expected additional visitors patronized local businesses.

**Cultural Resources**

No comprehensive cultural resource surveys have been conducted on the refuge, although there have been limited compliance surveys prior to construction projects and land exchanges. Ground-disturbing activities and use of prescribed fire could result in adverse impacts to any cultural resources that may be present.

All of the alternatives incorporate ground-disturbing activities. They have the potential to disturb cultural resources. The nature and degree of the impacts would depend on the specific activities undertaken, the nature of the resources present, the nature of previous management activities on the site, and the severity of any previous impacts. All ground-disturbing activities would require review by the Service's Regional Archaeologist, who would determine appropriate procedures to protect cultural resources and



**Section B.  
Environmental Assessment**

**CHAPTER IV -  
Environmental  
Consequences**

would specify any necessary mitigation, guided by the State Historic Preservation Office.

All alternatives afford additional land protection and low levels of development, thereby producing little negative effect on cultural resources. Potentially negative impacts could include logging, prescribed burning, constructing new facilities and parking areas, and maintaining water impoundments. In most cases, these management actions would require review by the Regional Archaeologist and consultation with the Mississippi State Historic Preservation Office, as mandated by Section 106 of the National Historic Preservation Act. Determining whether a particular action within an alternative has the potential to affect cultural resources is an on-going process that would occur during the planning stages of every project.

As required by the Native American Graves Protection and Repatriation Act, any construction or ground-disturbing activity with the potential to disturb human remains, burial objects, sacred objects, or objects of cultural patrimony would be planned and implemented in consultation with the affected tribes.

**Unavoidable Adverse Impacts**

The selection of any alternative would have no unavoidable adverse impacts, either direct or indirect, on the environmental parameters evaluated in this chapter, including biological resources. Adverse effects identified in this chapter have been reduced to the maximum extent possible.

**Irreversible and Irretrievable Commitment of Resources**

Most management actions identified in this document would require a commitment of funds that would be unavailable for use on other Service projects. At some point, commitment of funds to these projects would be irreversible, and once used, would be irretrievable. Non-renewable or non-recyclable resources committed to projects identified in this plan, such as fuel for refuge vehicles or supplies used in management or maintenance activities (e.g., herbicide, signs, buildings, etc.), would also represent an irreversible and irretrievable commitment of resources.

**Short-Term Uses Versus Long-Term Productivity**

An important goal of the National Wildlife Refuge System is to maintain the long-term ecological productivity and integrity of biological resources on national wildlife refuges. This system-wide goal is the foundation for the goals presented in this plan. Compared to Alternative 1, Alternatives 2 and 3 attempt to balance issues by providing some short-term uses (i.e., education and recreational opportunities), while fostering the long-term productivity of biological resources.

Section B.  
Environmental Assessment

CHAPTER V -  
Consultation and  
Coordination

## V. CONSULTATION AND COORDINATION

The team responsible for leading the comprehensive conservation planning effort included Service staff from the Noxubee National Wildlife Refuge and staff from the Service's Regional Office in Atlanta, Georgia. Figure 19 lists the members of the planning team. The planning team considered the interest and expertise of the Mississippi Department of Wildlife, Fisheries, and Parks, as well as many other agencies and organizations.

**Figure 19. Comprehensive Conservation Planning Team for Noxubee National Wildlife Refuge.**

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Andrea Dunstan, Public Use Specialist  
Noxubee National Wildlife Refuge

Jim Hall, former Deputy Refuge Manager  
Noxubee National Wildlife Refuge

Rose Hopp, Ascertainment Biologist-Planner  
Regional Office

Deborah Jerome, Refuge Planner  
Regional Office

Rick Kanaski, Regional Archaeologist  
Savannah National Wildlife Refuge Complex

Randy Musgraves, Visual Information Specialist  
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Evelyn Nelson, Writer/Editor  
Regional Office

David M. Richardson, Wildlife Biologist  
Noxubee National Wildlife Refuge

Richard E. Smith, Forester  
Noxubee National Wildlife Refuge

Jim Tisdale, Refuge Manager  
Noxubee National Wildlife Refuge

Phillip West, Planning Intern  
Noxubee National Wildlife Refuge

Larry Williams, Deputy Refuge Manager  
Noxubee National Wildlife Refuge

*Noxubee*  
*National Wildlife Refuge*

**Section B.**  
**Environmental Assessment**

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**CHAPTER V -**  
**Consultation and**  
**Coordination**

# Appendix A. Glossary

<i>Adaptive Management</i>	The process of implementing flexible management and policy that is responsive to results of continuous biological monitoring and scientific experimentation. The analysis of the outcome of project implementation helps managers determine whether current management should continue as is or whether it should be modified to achieve desired conditions.
<i>Alternative</i>	Alternatives are different means of accomplishing refuge purposes, goals and objectives, and contributing to the National Wildlife Refuge System. A reasonable means to fix the identified problem or satisfy the stated need.
<i>Approved Acquisition Boundary</i>	A project boundary that the Director of the Fish and Wildlife Service approves upon completion of a detailed planning and environmental compliance process.
<i>Augmentation</i>	Increasing the size of a population by translocating individuals between populations.
<i>Biological Diversity</i>	The variety of life and its processes, including the variety of living organisms, the genetic differences among them, and the communities and ecosystems in which they occur. The National Wildlife Refuge System focus is on indigenous species, biotic communities, and ecological processes.
<i>Canopy</i>	A layer of foliage; generally the upper-most layer, in a forest stand. It can be used to refer to mid- or under-story vegetation in multi-layered stands. Canopy closure is an estimate of the amount of overhead tree cover (also canopy cover).
<i>Categorical Exclusion</i>	A category of actions that do not individually or cumulatively have a significant effect on the human environment and have been found to have no such effect in procedures adopted by a federal agency pursuant to the National Environmental Policy Act.
<i>CFR</i>	Code of Federal Regulations.
<i>Cluster</i>	The aggregation of cavity trees previously and currently used and defended by a group of woodpeckers. For management purposes, the minimum area encompassing the cluster is 4 ha (10 acres). Use of the term cluster is preferred over colony because colony implies more than one nest (as in a colonial breeder).
<i>Compatible Use</i>	A wildlife-dependent recreational use or any other use of a refuge that, in the sound professional judgment of the refuge manager, will not materially interfere with, or detract from, the fulfillment of the mission or the purposes of the refuge. A compatibility determination

supports the selection of compatible uses and identifies stipulations or limits necessary to ensure compatibility.

<i>Comprehensive Conservation Plan</i>	A document that describes the desired future conditions of the refuge; provides long-range guidance and management direction for the refuge manager to accomplish the purposes, goals, and objectives of the refuge; and contributes to the mission of the National Wildlife Refuge System and to meet relevant mandates.
<i>Conservation Easement</i>	A legal document that provides specific land-use rights to a secondary party. A perpetual conservation easement usually grants conservation and management rights to a party in perpetuity.
<i>Cooperative Agreement</i>	A simple habitat protection action in which no property rights are acquired. An agreement is usually long term and can be modified by either party. Lands under a cooperative agreement do not necessarily become part of the National Wildlife Refuge System.
<i>Corridor</i>	A route that allows movement of individuals from one region or place to another.
<i>Cover Type</i>	The present vegetation of an area.
<i>Cultural Resources</i>	The remains of sites, structures, or objects used by people of the past.
<i>Cypress and Tupelo Swamp</i>	Found in low lying areas, such as swales and open ponds that hold water for several months, if not all of the year. Large hollow trees are used as bear den sites.
<i>Deciduous</i>	Pertains to perennial plants that are leafless for sometime during the year.
<i>Early Succession</i>	Describes vegetative communities which have been recently disturbed, thus consisting of herbaceous plants, shrubs, and brush. As succession continues over time, this vegetation will be replaced by small trees, saplings, and eventually mature trees.
<i>Ecological Succession</i>	The orderly progression of an area through time in the absence of disturbance from one vegetative community to another.
<i>Ecosystem</i>	A dynamic and interrelating complex of plant and animal communities and their associated non-living environment.
<i>Ecosystem Management</i>	Management of natural resources using system-wide concepts to ensure that all plants and animals in ecosystems are maintained at viable levels in native habitats and basic ecosystem processes are perpetuated indefinitely.
<i>Edge Effect</i>	The tendency (in a transitional zone) between communities to contain a greater variety of species and more dense populations of

species than any surrounding community. Such is the case between wildlife communities that occupy dense bottomland hardwood forests and wildlife found in open, cultivated agricultural lands or monoculture plantations.

*Even-aged Forests*

Forests that are composed of trees with a time span of less than 20 years between oldest and youngest individuals.

*Even-aged Management*

A silvicultural method designed primarily for timber production, in which all trees in a stand are of one age/size class. The forest is regulated by developing equal areas in each age/size class.

*Emergent Growth/Re-vegetation*

Farmland or logged timber that has been reforested (early succession) or may be naturally re-vegetated.

*Endangered Species*

A plant or animal species listed under the Endangered Species Act that is in danger of extinction throughout all or a significant portion of its range.

*Endemic Species*

Plants or animals that occur naturally in a certain region and whose distribution is relatively limited to a particular locality.

*Environmental Assessment*

A concise document, prepared in compliance with the National Environmental Policy Act, that briefly discusses the purpose and need for an action, alternatives to such action, and provides sufficient evidence and analysis of impacts to determine whether to prepare an environmental impact statement or finding of no significant impact.

*Fauna*

All the vertebrate or invertebrate animals of an area.

*Federal Trust Species*

All species where the Federal Government has primary jurisdiction including federally threatened or endangered species, migratory birds, anadromous fish, and certain marine mammals.

*Fee Title*

The acquisition of most or all of the rights to a tract of land. There is a total transfer of property rights with the formal conveyance of a title. While a fee title acquisition involves most rights to a property, certain rights may be reserved or not purchased, including water rights, mineral rights, or use reservation (the ability to continue using the land for a specified time period, or the remainder of the owner's life).

*Finding of No Significant Impact*

A document prepared in compliance with the National Environmental Policy Act, supported by an environmental assessment, that briefly presents why a federal action will have no significant effect on the human environment and for which an environmental impact statement, therefore, will not be prepared.

*Flood Plain Woods/Bottomland Hardwood Forest*

Consist of hardwoods (old-growth and mid-succession age timber) and cypress tupelo stands found on low ridges that drain



slowly and are subject to flooding, i.e., overcup, willow and water oaks, sweetgum, green ash. Old growth typically exceeds 120 years of age.

<i>Fragmentation</i>	The process of reducing the size and connectivity of habitat patches. The disruption of extensive habitats into isolated and small patches.
<i>Goal</i>	Descriptive, open-ended, and often broad statements of desired future conditions that convey a purpose but does not define measurable units.
<i>Geographic Information System</i>	A computer system capable of storing and manipulating spatial data.
<i>Ground Story (flora)</i>	Vascular plants less than one meter in height, excluding tree seedlings.
<i>Group</i>	The social unit in red-cockaded woodpeckers, consisting of a breeding pair with one or more helpers, a breeding pair without helpers, or a solitary male.
<i>Habitat</i>	The place where an organism lives. The existing environmental conditions required by an organism for survival and reproduction.
<i>Home Range</i>	The area supporting the daily activities of an animal, generally throughout the year.
<i>Indicator Species</i>	A species of plant or animals that is assumed to be sensitive to habitat changes and represents the needs of a larger group of species.
<i>Indigenous</i>	Living or native to a specific area or environment.
<i>In-holding</i>	Privately owned land inside the boundary of a national wildlife refuge.
<i>Issue</i>	Any unsettled matter that requires a management decision.
<i>Late Succession</i>	Describes vegetative communities which have passed through the early stages of herbaceous plants, shrubs and brush, and now consist of mature trees and understory plants typical of a mature forest.
<i>Metapopulation</i>	A set of interacting populations.
<i>Mid-story</i>	A layer of foliage intermediate in height between canopy and groundcover, litter layer, or soil surface.
<i>Mid-succession Forest</i>	A forest generally characterized by even-aged structure resulting from human disturbance such as timber harvest. Mid-succession forests may contain mature trees but as a whole do not exhibit functional or structural characteristics associated with old growth conditions.
<i>Migratory</i>	Pertaining to the seasonal movement from one area to another and back again.

<i>Mitigation</i>	Reduction of negative impacts.
<i>Monitoring</i>	The process of collecting information to track changes of selected parameters over time.
<i>National Environmental Policy Act of 1969</i>	Requires all federal agencies, including the Service, to examine the environmental impacts of their actions, incorporate environmental information, and use public participation in the planning and implementation of all actions. Federal agencies must integrate this Act with other planning requirements, and prepare appropriate policy documents to facilitate better environmental decision-making
<i>National Wildlife Refuge</i>	A designated area of land, water, or an interest in land or water within the National Wildlife Refuge System.
<i>National Wildlife Refuge System</i>	Various categories of areas administered by the Secretary of the Interior for the conservation of fish and wildlife, including species threatened with extinction, all lands, waters, and interests therein administered by the Secretary as wildlife refuges, wildlife ranges, game ranges, wildlife management areas, or waterfowl production areas.
<i>Native Species</i>	Species that historically live and thrive in a particular ecosystem.
<i>Neotropical Migratory Bird</i>	A bird species that breeds north of the United States/Mexican border and winters primarily south of that border, which includes Mexico, West Indies, Central America and part of South America.
<i>Natural Levee</i>	Embankment created by soil deposited as a stream over-tops its banks. Located adjacent to a stream, a natural levee is often the highest ground in a bottomland or swamp type area.
<i>Objective</i>	An objective is a concise quantitative (where possible) target statement of what will be achieved. Objectives are derived from goals and provide the basis for determining management strategies. Objectives should be attainable and time-specific.
<i>Old Growth Forest</i>	Forested areas lacking frequent disturbance to vegetation, usually characterized by dominant species entered into a late successional stage; usually associated with high diversity of species, specialization, and structural complexity.
<i>Planning Area</i>	A planning area may include lands outside existing refuge planning unit boundaries that are being studied for inclusion in the unit and/or partnership planning efforts. It may also include watersheds or ecosystems that affect the planning area.
<i>Potential Breeding Group</i>	An adult female and adult male that occupy the same cluster, whether or not they are accompanied by a helper, attempt to nest, or successfully fledge young.

<i>Planning Team</i>	A planning team prepares the comprehensive conservation plan. Planning teams are interdisciplinary in membership and function. A team generally consists of a planning team leader; refuge manager and staff biologists; staff specialists or other representatives of Service programs, ecosystems or regional offices; and state partnering wildlife agencies, as appropriate.
<i>Preferred Alternative</i>	This is the alternative determined by the decision maker to best achieve the refuge purpose, vision, and goals; contributes to the refuge system mission, addresses the significant issues, and is consistent with principles of sound fish and wildlife management.
<i>Primary Cavity Nester</i>	Species that nest in cavities they created.
<i>Proposed Wilderness</i>	An area of the National Wildlife Refuge System that has been recommended to Congress for inclusion in the National Wilderness Preservation System.
<i>Refuge Boundary</i>	Lands acquired by the Fish and Wildlife Service within the current approved acquisition boundary.
<i>Refuge Operating Needs System</i>	This is a national database that contains the unfunded operational needs of each refuge. Projects included are those required to implement approved plans and meet goals, objectives, and legal mandates.
<i>Refuge Purposes</i>	The purposes specified in or derived from the law, proclamation, Executive Order, agreement, public land order, donation document, or administrative memorandum establishing, authorizing, or expanding a refuge, refuge unit, or refuge subunit.
<i>Regeneration</i>	A silvicultural method of simultaneously harvesting and establishing reproduction in trees.
<i>Rotation</i>	In even-aged management of forests, the number of years between regeneration events.
<i>Silviculture</i>	The theory and practice of controlling the establishment, composition, structure, and growth of forests to achieve management objectives. Silviculture was developed primarily for the purpose of timber production, but can be used for other purposes including biological conservation.
<i>Snag</i>	A standing dead tree.
<i>Source</i>	A habitat in which local reproductive success exceeds local mortality for a given species.
<i>Source Population</i>	A population in a high-quality habitat in which birth rate greatly exceeds death rate and the excess individuals leave as migrants.

<i>Step-Down Management Plans</i>	Step-down management plans provide the details necessary to implement management strategies and projects identified in the comprehensive conservation plan.
<i>Strategy</i>	A specific action, tool, or technique or combination of actions, tools, and techniques used to meet unit objectives.
<i>Threatened Species</i>	Species listed under the Endangered Species Act that are likely to become endangered within the foreseeable future throughout all or a significant portion of their range.
<i>Translocation</i>	The artificial movement of wild organisms between or within populations to achieve management objectives. Originally, translocation referred to the movement of animals from captive to wild populations, but the term has been expanded to include movements (by artificial means) within and between wild populations.
<i>Understory</i>	Any vegetation with canopy below or closer to the ground than canopies of other plants.
<i>Uneven-aged Management</i>	A silvicultural method designed primarily for timber production, in which trees of a least three age classes are present in the same stand. Stands are regulated by size, class, structure, or volume.
<i>Wildlife-Dependent Recreation</i>	A use of a refuge involving hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation. The National Wildlife Refuge System Improvement Act of 1997 specifies that these are the six priority general public uses of the system.
<i>Wilderness Study Area</i>	An area created by a federal agency following the inventory component of a wilderness review.

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# *Appendix C. Relevant Legal Mandates*

## **National Wildlife Refuge System Authorities**

The mission of the Fish and Wildlife Service is to conserve, protect, and enhance the Nation's fish and wildlife and their habitats for the continuing benefit of the American people. The Service is the primary federal agency responsible for migratory birds, endangered plants and animals, certain marine mammals, and anadromous fish. This responsibility to conserve our Nation's fish and wildlife resources is shared with other federal agencies and state and tribal governments.

As part of this responsibility, the Service manages the National Wildlife Refuge System. This system is the only nationwide system of federal land managed and protected for wildlife and their habitats. The mission of the National Wildlife Refuge System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.

The Noxubee National Wildlife Refuge is managed as part of this system in accordance with the National Wildlife Refuge System Administration Act of 1966, as amended by the National Wildlife Refuge System Improvement Act of 1997, the Refuge Recreation Act of 1962, Executive Order 12996 (Management and General Public Use of the National Wildlife Refuge System), and other relevant legislation, Executive Orders, regulations, and policies.

## **Key Legislation/Policies for Plan Implementation**

The Noxubee National Wildlife Refuge Comprehensive Conservation Plan describes and illustrates management area projects with standards and guidelines for future decision-making, and may be adjusted through monitoring and evaluation as well as amendment and revision. The plan establishes conservation and land protection goals, objectives, and specific strategies for the refuge and its expansion. Compatible recreation uses specific to the refuge have been identified and approved by the refuge manager. This plan provides for systematic stepping down from the overall direction, as outlined, when making project- or activity-level decisions. This level involves site-specific analysis (e.g., Forest Habitat Management Plan) to meet National Environmental Policy Act requirements for decision making.

Antiquities Act (16 U.S.C. 431 - 433) - The Act of June 8, 1906, (34 Stat. 225) authorizes the President of the United States to designate as National Monuments objects or areas of historic or scientific interests on lands owned or controlled by the United States. The Act required that a permit be obtained for examination of ruins, excavation of archaeological sites and the gathering of objects of antiquity on lands under the jurisdiction of the Secretaries of Interior, Agriculture, and Army, and provided penalties for violations.

Migratory Bird Treaty Act (1918): Designates the protection of migratory birds as a federal responsibility. This Act enables the setting of seasons and other regulations including the closing of areas, federal or non-federal, to the hunting of migratory birds.

Migratory Bird Conservation Act (1929): Establishes procedures for acquisition by purchase, rental, or gift of areas approved by the Migratory Bird Conservation Commission.

Migratory Bird Hunting and Conservation Stamp Act (16 U.S.C. 718-718j, 48 Stat. 452), as amended: The "Duck Stamp Act," of March 16, 1934 requires each waterfowl hunter, 16 years of age or older, to possess a valid federal hunting stamp. Receipts from the sale of the stamp are deposited in a special Treasury account known as the Migratory Bird Conservation Fund and are not subject to appropriations.

Historic Sites, Buildings and Antiquities Act (16 U.S.C. 461-462, 464-467) - The Act of August 21, 1935, (49 Stat. 666) popularly known as the Historic Sites Act, as amended by Public Law 89-249, approved October 9, 1965, (79 Stat. 971), declared it a national policy to preserve historic sites and objects of national significance, including those located on refuges. It provided procedures for designation, acquisition, administration and protection of such sites. Among other things, National Historic and Natural Landmarks are designated under authority of this Act. As of January 1989, 31 national wildlife refuges contained such sites.

Refuge Revenue Sharing Act (16 U.S.C. 715s) Section 401 of the Act of June 15, 1935, (49 Stat. 383) provided for payments to counties in lieu of taxes, using revenues derived from the sale of products from refuges. Public Law 88-523, approved August 30, 1964, (78 Stat. 701) made major revisions by requiring that all revenues received from refuge products, such as animals, timber and minerals, or from leases or other privileges, be deposited in a special Treasury account and net receipts distributed to counties for public schools and roads. Public Law 93-509, approved December 3, 1974, (88 Stat. 1603) required that money remaining in the fund after payments be transferred to the Migratory Bird Conservation Fund for land acquisition under provisions of the Migratory Bird Conservation Act. Public Law 95-469, approved October 17, 1978, (92 Stat. 1319) expanded the revenue sharing system to include National Fish Hatcheries and Service research stations. It also included in the Refuge Revenue Sharing Fund receipts from the sale of salmonid carcasses. Payments to counties were established as follows: on acquired land, the greatest amount calculated on the basis of 75 cents per acre, three-fourths of one percent of the appraised value, or 25 percent of the net receipts produced from the land; and on land withdrawn from the public domain, 25 percent of net receipts and basic payments under Public Law 94-565 (31 U.S.C. 1601-1607, 90 Stat. 2662). This amendment also authorized appropriations to make up any difference between the amount in the fund and the amount scheduled for payment in any year. The stipulation that payments be used for schools and roads was removed, but counties were required to pass payments along to other units of local government within the county that suffer losses in revenues due to the establishment of Service areas.

Land and Water Conservation Fund Act of 1948: This act provides funding through receipts from the sale of surplus federal land, appropriations from oil and gas receipts from the outer continental shelf, and other sources of land acquisition under several authorities. Appropriations from the fund may be used for matching grants to states for outdoor recreation projects and for land acquisition by various federal agencies, including the Fish and Wildlife Service.

Wilderness Act of 1954: Public Law 88-577, approved September 3, 1964, directed the Secretary of the Interior, within 10 years, to review every roadless area of 5,000 or more acres and every roadless island (regardless of size) within National Wildlife Refuge and National Park Systems for inclusion in the National Wilderness Preservation System.

Fish and Wildlife Act (1956): Established a comprehensive national fish and wildlife policy and broadened the authority for acquisition and development of refuges.

Fish and Wildlife Coordination Act (1958): Allows the Fish and Wildlife Service to enter into agreements with private landowners for wildlife management purposes.

National and Community Service Act of 1960 (42 U.S.C. 12401:104 Stat. 3127), Public Law 101-610, signed November 16, 1990, authorizes several programs to engage citizens of the United States in full- and/or part-time projects designed to combat illiteracy and poverty, provide job skills, enhance educational skills, and fulfill environmental needs. Several provisions are of particular interest to the Fish and Wildlife Service.

Archaeological and Historic Preservation Act (16 U.S.C. 469- 469c) - Public Law 86-523, approved June 27, 1960, (74 Stat. 220), and amended by Public Law 93-291, approved May 24, 1974, (88 Stat. 174), directed federal agencies to notify the Secretary of the Interior whenever a federal, federally assisted, or licensed or permitted project may cause loss or destruction of significant scientific, prehistoric or archaeological data. The Act authorized use of appropriated, donated and/or transferred funds for the recovery, protection, and preservation of such data.

Refuge Recreation Act of 1962: This Act authorizes the Secretary of the Interior to administer refuges, hatcheries, and other conservation areas for recreational use, when such uses do not interfere with the area's primary purposes. It authorizes construction and maintenance of recreational facilities and the acquisition of land for incidental fish and wildlife oriented recreational development or protection of natural resources. It also authorizes the charging of fees for public uses.

Land and Water Conservation Fund Act (1965): Uses the receipts from the sale of surplus federal land, outer continental shelf oil and gas sales, and other sources for land acquisition under several authorities.

National Historic Preservation Act of 1966 (16 U.S.C. 470-470b, 470c-470n) - Public Law 89-665, approved October 15, 1966, (80 Stat. 915) and repeatedly amended, provided for preservation of significant historical features (buildings, objects and sites) through a grant-in-aid program to the states. It established a National Register of Historic Places and a program of matching grants under the existing National Trust for Historic Preservation (16 U.S.C. 468-468d). The Act established an Advisory Council on Historic Preservation, which was made a permanent independent agency in Public Law 94-422, approved September 28, 1976 (90 Stat. 1319). That Act also created the Historic Preservation Fund. Federal agencies are directed to take into account the effects of their actions on items or sites listed in, or eligible for listing in, the National Register of Historic Places. As of January 1989, 91 such sites on national wildlife refuges are listed in this Register.

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-668ee. (Refuge Administration Act): Defines the National Wildlife Refuge System and authorizes the Secretary of the Interior to permit any use of a refuge provided such use is compatible with the major purposes for which the refuge was established. The Refuge Improvement Act clearly defines a unifying mission for the refuge system; establishes the legitimacy and appropriateness of the six priority public uses (hunting, fishing, wildlife observation, wildlife photography and environmental education and interpretation); establishes a formal process for determining compatibility; established the responsibilities of the Secretary of the Interior for managing and protecting the System; and requires a Comprehensive Conservation Plan for each refuge by the year 2012. This Act amended portions of the Refuge Recreation Act and National Wildlife Refuge System Administration Act of 1966.

National Environmental Policy Act (1969). Title I of the 1969 National Environmental Policy Act requires that all federal agencies prepare detailed environmental impact statements for "every recommendation or report on proposals for legislation and other major federal actions significantly affecting the quality of the human environment." The 1969 statute stipulated the factors to be considered in environmental impact statements, and required that federal agencies employ an interdisciplinary approach in related decision-making and develop means to ensure that unquantified environmental values are given appropriate consideration, along with economic and technical considerations. Title II of this statute requires annual reports on environmental quality from the President to the Congress, and established a Council on Environmental Quality in the Executive Office of the President with specific duties and functions.

Rehabilitation Act (1973): Requires that programmatic and physical accessibility be made available in any facility funded by the Federal Government, ensuring that anyone can participate in any program.

Endangered Species Act of 1973 (16 U.S.C. 1531-1544, 87 Stat. 884), as amended: Public Law 93-205, approved December 28, 1973, repealed the Endangered Species Conservation Act of December 5, 1969 (P.L. 91-135, 83 Stat. 275). The 1969 act amended the Endangered Species Preservation Act of October 15, 1966 (P.L. 89-669, 80 Stat. 926). The 1973 Endangered Species Act provided for the conservation of ecosystems upon which threatened and endangered species of fish, wildlife, and plants depend, both through federal action and by encouraging the establishment of state programs. The Act authorizes the determination and listing of species as threatened and endangered; prohibits unauthorized taking, possession, sale, and transport of endangered species; provides authority to acquire land for the conservation of listed species, using land and water conservation funds; authorizes establishment of cooperative agreements and grants-in-aid to states that establish and maintain active and adequate programs for threatened and endangered wildlife and plants; authorizes the assessment of civil and criminal penalties for violating the Act or regulations; and authorizes the payment of rewards to anyone furnishing information leading to arrest and conviction of anyone violating the Act and any regulation issued thereunder.

Executive Order 11988, Flood plain Management: The purpose of this Executive Order, signed May 24, 1977, is to prevent federal agencies from contributing to the "adverse impacts associated with occupancy and modification of floodplains" and the "direct or indirect support of flood plain development." In the course of fulfilling their respective authorities, federal agencies "shall take action to reduce the risk of flood loss, to minimize the impact of floods on human safety, health and welfare, and to restore and preserve the natural and beneficial values served by flood plains."

Clean Water Act (1977): Requires consultation with the U.S. Army Corps of Engineers for major wetland modifications.

Fish and Wildlife Improvement Act of 1978: This Act was passed to improve the administration of fish and wildlife programs and amends several earlier laws, including the Refuge Recreation Act, the National Wildlife Refuge System Administration Act, and the Fish and Wildlife Act of 1956. It authorizes the Secretary of the Interior to accept gifts and bequests of real and personal property on behalf of the United States. It also authorizes the use of volunteers on Service projects and appropriations to carry out volunteer programs.

Archaeological Resources Protection Act (16 U.S.C. 470aa - 47011) - Public Law 96-95, approved October 31, 1979, (93 Stat. 721) largely supplanted the resource protection provisions of the Antiquities Act for archaeological items. This Act established detailed requirements for issuance of permits for any excavation for or removal of archaeological resources from Federal and Indian lands. It also established civil and criminal penalties for the unauthorized excavation, removal, or damage of any such resources; for any trafficking in such resources removed from Federal and Indian lands in violation of any provision of federal law; and for interstate and foreign commerce in such resources acquired, transported, or received in violation of any state or local law.

Emergency Wetland Resources Act of 1986: This Act authorized the purchase of wetlands from Land and Water Conservation Fund, removing a prior prohibition on such acquisitions. The Act also requires the Secretary of the Interior to establish a National Wetlands Priority Conservation Plan, requires the states to include wetlands in their Comprehensive Outdoor Recreation Plans, and transfers to the Migratory Bird Conservation Fund an amount equal to import duties on arms and ammunition. Executive Order 12996, Management and General Public Use of the National Wildlife Refuge System (1996): Defines the mission, purpose, and priority public uses of the National Wildlife Refuge System. It also presents four principles to guide management of the system.



Public Law 100-588, approved November 3, 1988, (102 Stat. 2983) lowered the threshold value of artifacts triggering the felony provisions of the Act from \$5,000 to \$500, made attempting to commit an action prohibited by the Act a violation, and required the land managing agencies to establish public awareness programs regarding the value of archaeological resources to the nation.

North American Wetlands Conservation Act (103 Stat. 1968; 16 U.S.C. 4401~4412) Public Law 101-233, enacted December 13, 1989, provides funding and administrative direction for implementation of the North American Waterfowl Management Plan and the Tripartite Agreement on Wetlands between Canada, the United States, and Mexico. The Act converts the Pittman-Robertson account into a trust fund, with the interest available without appropriation through the year 2006, to carry out the programs authorized by the Act, along with an authorization for annual appropriation of \$15 million plus an amount equal to the fines and forfeitures collected under the Migratory Bird Treaty Act. Available funds may be expended, upon approval of the Migratory Bird Conservation Commission, for payment of not to exceed 50 percent of the United States' share of the cost of wetlands conservation projects in Canada, Mexico, or the United States (or 100 percent of the cost of projects on federal lands). At least 50 percent and no more than 70 percent of the funds received are to go to Canada and Mexico each year.

Environmental Education Act of 1990 (20 U.S.C. 5501-5510; 104 Stat. 3325): Public Law 101-619, signed November 16, 1990, established the Office of Environmental Education within the Environmental Protection Agency to develop and administer a federal environmental education program. Responsibilities of the Office include developing and supporting programs to improve understanding of the natural and developed environment and the relationships between humans and their environment; supporting the dissemination of educational materials; developing and supporting training programs and environmental education seminars; managing a federal grant program; and administering an environmental internship and fellowship program. The Office is required to develop and support environmental programs in consultation with other federal natural resource management agencies, including the Fish and Wildlife Service.

Federal Noxious Weed Act (1990): Requires the use of integrated management systems to control or contain undesirable plant species and an interdisciplinary approach with the cooperation of other federal and state agencies.

Americans With Disabilities Act (1991): Prohibits discrimination in public accommodations and services.

Executive Order 13007, Indian Sacred Sites (1996): Directs federal land management agencies to accommodate access to and ceremonial use of Indian sacred sites by Indian religious practitioners, avoid adversely affecting the physical integrity of such sacred sites, and where appropriate, maintain the confidentiality of sacred sites.

National Wildlife Refuge System Improvement Act (1997): Public Law 105-57, amended the National Wildlife Refuge System Act of 1966 (16 U.S.C. 668dd-ee), and provided guidance for management and public use of the refuge system. The Act mandates that the refuge system be consistently directed and managed as a national system of lands and waters devoted to wildlife conservation and management. The Act establishes priorities for recreational uses of the refuge system. Six wildlife-dependent uses are specifically named in the Act: hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation. These activities are to be promoted on the refuge system, while all non-wildlife-dependent uses are subject to compatibility determinations. A compatible use is one that, in the sound professional judgment of the Refuge Manager, will not materially interfere with, or detract from, fulfillment of the National Wildlife Refuge System Mission or refuge purpose(s). As stated in the Act, "The mission of the system is to administer a national network of lands and waters for

the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans." The Act also requires development of a Comprehensive Conservation Plan for each refuge and that management be consistent with the plan. When writing a plan for expanded or new refuges, and when making management decisions, the Act requires effective coordination with other federal agencies, state fish and wildlife or conservation agencies, and refuge neighbors. A refuge must also provide opportunities for public involvement when making a compatibility determination.



# Appendix D. Biota

## Common Name

Three-ridge  
Flat Floater  
Rock Pocketbook  
Asiatic Clam  
Elephant-ear  
Southern Pigtoe  
Fat Mucket  
Southern Pocketbook  
Orange-nacre Mucket  
Yellow Sandshell  
Alabama Heel-splitter  
Fragile Papershell  
Washboard  
Threehorn Warty Back  
Southern Hickorynut  
Bleufer  
Giant Floater  
Southern Mapleleaf  
Alabama Orb  
Ridged Mapleleaf  
Lilliput  
Pistol Grip  
Pondhorn  
Little Spectaclecase  
Southern Rainbow

## Mussels

### Scientific Name

*Amblema plicata*  
*Anodonta suborbiculata*  
*Arcidens confragosus*  
*Corbicula fluminea*  
*Elliptio crassidens*  
*Fusconaia cerina*  
*Lampsilis claibornensis*  
*L. ornat*  
*L. perovalis*  
*L. teres*  
*Lasmigona complanata*  
*Leptodea fragilis*  
*Megalonaias giganta*  
*Obliquaria reflexa*  
*Obovaria jacksoniana*  
*Potamilus purpuratus*  
*Pyganodon grandis*  
*Quadrula apiculata*  
*Q. asperata*  
*Q. rumphiana*  
*Toxolasma parvus*  
*Tritogonia verrucosa*  
*Unio merus tetralasmus*  
*Villosa lienosa*  
*V. vibex*

## Fish

Bass, Hybrid Stripped  
Largemouth  
Shadow  
Bowfin  
Buffalo, Bigmouth  
Smallmouth  
Crappie, Black  
Crappie, White  
Carp, Common  
Catfish, Black Bullhead  
Catfish, Blue  
Catfish, Channel  
Catfish, Flathead  
Catfish, Yellow Bullhead  
Gar, Longnose  
Gar, Spotted

*Morone chrysops* X *Morone saxatilis*  
*Micropterus salmoides*  
*Ambloplites ariommus*  
*Amia calva*  
*Ictiobus cyprinellus*  
*Ictiobus bubalus*  
*Pomoxis nigromaculatus*  
*Pomoxis annularis*  
*Cyprinus carpio*  
*Ameiurus melas*  
*Ictalurus furcatus*  
*Ictalurus punctatus*  
*Pylodictus olivaris*  
*Ameiurus natalis*  
*Lepisosteus osseus*  
*L. oculatus*

## Fish (Cont'd)

<u>Common Name</u>	<u>Scientific Name</u>
Drum, Freshwater	<i>Aplodinotus grunniens</i>
Darter, Freckled	<i>Percina lenticula</i>
Darter, Harlequin	<i>Etheostoma histrio</i>
Darter, Johnny	<i>Etheostoma nigrum</i>
Darter, Redfin	<i>Etheostoma whipplei</i>
Eel, American	<i>Anguilla rostrata</i>
Herring, Skipjack	<i>Alosa chrysochloris</i>
Madtom, Speckled	<i>Noturus leptacanthus</i>
Minnow, Bluntnose	<i>Pimephales, notatus</i>
Mosquitofish, Western	<i>Gambusia affinis</i>
Paddlefish	<i>Polyodon spathula</i>
Perch, Pirate	<i>Aphredoderus sayanus</i>
Pickrel, Chain	<i>Esox niger</i>
Redhorse, Blacktail	<i>Moxostoma poecilurum</i>
Sauger	<i>Stizostedion canadense</i>
Shad, Gizzard	<i>Dorsoma cepedianum</i>
Shad, Threadfin	<i>Dorsoma petenense</i>
Shiner, Blacktail	<i>Cyprinella venusta</i>
Shiner, Emerald	<i>Notropis atherinoides</i>
Shiner, Golden	<i>Notemigonus crysoleucas</i>
Shiner, Pretty	<i>Lythrurus bellus</i>
Shiner, Redfin	<i>Notropis umbratilis</i>
Shiner, Weed	<i>Notropis texanus</i>
Silverside, Brook	<i>Labidesthes sicculus</i>
Silverside, Mississippi	<i>Menidia audens</i>
Sucker, White	<i>Catostomus commersoni</i>
Sunfish, Banded Pygmy	<i>Elassoma zonatum</i>
Sunfish, Bluegill	<i>Lepomis macrochirus</i>
Sunfish, Green	<i>Lepomis cyanellus</i>
Sunfish, Longear	<i>Lepomis megalotis</i>
Sunfish, Spotted	<i>Lepomis punctatus</i>
Sunfish, Redear	<i>Lepomis microlophus</i>
Sunfish, Warmouth	<i>Lepomis gulosus</i>
Topminnow, Blackspotted	<i>Fundulus olivaceus</i>

## Mammals

Bat, Little Brown	<i>Myotis lucifugus</i>
Southeastern Myotis	<i>Myotis austro</i>
Gray Myotis	<i>Myotis grisescens</i>
Keen's Myotis	<i>Myotis keenii</i>
Indiana Myotis	<i>Myotis sodalis</i>
Silver Haired	<i>Lasionycteris noctivagans</i>
Eastern Pipistrelle	<i>Pipistrellus subflavus</i>
Big Brown	<i>Eptesicus fuscus</i>
Red	<i>Lasiurus borealis</i>
Hoary	<i>Lasiurus cinereus</i>
Seminole	<i>Lasiurus seminolus</i>
Evening	<i>Nycticius humeralis</i>

## Mammals (Cont'd)

<u>Common Name</u>	<u>Scientific Name</u>
Eastern Big Eared	<i>Plecotus rafinesquii</i>
Beaver	<i>Castor canadensis</i>
Bobcat	<i>Lynx rufus</i>
Coyote	<i>Canis latrans</i>
Fox, Red	<i>Vulpes vulpes</i>
Gray	<i>Urocyon cinereoargenteus</i>
Mink	<i>Mustela vison</i>
Mole, Eastern	<i>Scalopus aquaticus</i>
Mouse, Fulvous Harvest	<i>Reithrodontomys fulvescens</i>
White footed	<i>Peromyscus leucopus</i>
Golden	<i>Ochrotomys nuttalli</i>
House	<i>Mus musculus</i>
Eastern Harvest	<i>Reithrodontomys humulis</i>
Old field	<i>Peromyscus polionotus</i>
Cotton	<i>Peromyscus gossypinus</i>
Muskrat	<i>Ondatra zibethicus</i>
Nutria	<i>Myocastor coypus</i>
Opossum	<i>Didelphis virginiana</i>
Otter, River	<i>Lutra canadensis</i>
Pig, Wild	<i>Sus scrofa</i>
Rabbit, Swamp	<i>Sylvilagus aquaticus</i>
Eastern cottontail	<i>Sylvilagus floridanus</i>
Raccoon	<i>Procyon lotor</i>
Rat, Marsh Rice	<i>Oryzomys palustris</i>
Eastern Woods	<i>Neotoma floridana</i>
Black	<i>Rattus rattus</i>
Cotton	<i>Sigmodon sp.</i>
Norway	<i>Rattus norvegicus</i>
Shrew, Least	<i>Cryptotis parva</i>
Short-Tailed	<i>Blarina brevicauda</i>
Southeastern	<i>Sorex longirostris</i>
Skunk, Striped	<i>Mephitis mephitis</i>
Spotted	<i>Spilogale putorius</i>
Squirrel, Southern flying	<i>Glaucomys volans</i>
Gray	<i>Sciurus carolinensis</i>
Fox	<i>Sciurus niger</i>
Vole, Pine	<i>Microtus pinetorum</i>
Weasel, Long-tailed	<i>Mustela frenata</i>
White-tailed deer	<i>Odocoileus virginianus</i>

## Herptifauna

Alligator, American	<i>Alligator mississippiensis</i>
Amphiuma, Three-toed	<i>Amphiuma tridactylum</i>
Anole, Green	<i>Anolis carolinensis</i>
Cooter, River	<i>Chrysemys concinna concinna</i>
Frog, Bull	<i>Rana catesbeiana</i>
Squirrel Treefrog	<i>Hyla squirella</i>
Green Treefrog	<i>Hyla cinerea</i>

## Herptifauna (Cont'd)

<u>Common Name</u>	<u>Scientific Name</u>
Eastern Gray Treefrog	<i>Hyla versicolor</i>
Western Bird-voiced Treefrog	<i>Hyla avivoca</i>
Upland Chorus	<i>Pseudacris feriarum</i>
Northern Spring Peeper	<i>Pseudacris crucifer crucifer</i>
Southern Cricket	<i>Acris gryllus</i>
Northern Cricket	<i>Acris crepitans</i>
Southern Leopard	<i>Rana sphenoccephala utricularius</i>
Bronze	<i>Rana clamitans clamitans</i>
Northern Crawfish	<i>Rana areolata circulosa</i>
Pickerel	<i>Rana palustris</i>
Green	<i>Rana clamitans melanota</i>
Lizard, Eastern Slender Glass	<i>Ophisaurus attenuatus longicaudus</i>
Northern Fence Lizard	<i>Sceloporus undulatus hyacinthinus</i>
Six-lined Racerunner	<i>Cnemidophorus sexlineatus</i>
Mudpuppy	<i>Necturus maculosus</i>
Newt, Broken-striped	<i>Notophthalmus viridescens dorsalis</i>
Central	<i>Notophthalmus viridescens louisianensis</i>
Salamander, Dusky	<i>Desmognathus</i>
Marbled	<i>Ambystoma opacum</i>
Mississippi Slimy	<i>Plethodon mississippi</i>
Mole	<i>Ambystoma talpoideum</i>
Smallmouth	<i>Ambystoma texanum</i>
Southern Red	<i>Pseudotriton ruber vioscai</i>
Southern Two-lined	<i>Eurycea cirrigera</i>
Spotted	<i>Ambystoma maculatum</i>
Eastern Tiger	<i>Ambystoma tigrinum</i>
Southern Longtail	<i>Eurycea longicauda longicauda</i>
Siren, Lesser	<i>Siren intermedia</i>
Skink, Broadhead	<i>Eumeces laticeps</i>
Ground	<i>Scincella lateralis</i>
Five-lined	<i>Eumeces fasciatus</i>
Southeastern Five-lined	<i>Eumeces inexpectatus</i>
Snake, Eastern Ribbon	<i>Thamnophis sauritus</i>
Gray Rat	<i>Elaphe obsoleta spiloides</i>
Timber Rattlesnake	<i>Crotalus horridus</i>
Pigmy Rattlesnake	<i>Sistrurus miliarius</i>
Corn	<i>Elaphe guttata</i>
Diamond-backed Water	<i>Nerodia rhombifer</i>
Eastern Coachwhip	<i>Masticophis flagellum flagellum</i>
Eastern Garter	<i>Thamnophis sirtalis sirtalis</i>
Eastern Hognose	<i>Heterodon platirrhinos</i>
Florida Redbelly	<i>Storeria occipitomaculata obscura</i>
Midwest Worm	<i>Carphophis amornus vermus</i>
Midland Brown	<i>Storeria dekayi wrightorum</i>
Midland Watersnake	<i>Nerodia sipedon pleuralis</i>
Mississippi Ringneck	<i>Diadophis punctatus stictogenys</i>
Mole Kingsnake	<i>Lampropeltis calligaster rhombomaculata</i>
Northern Red-bellied Water	<i>Nerodia erythrogaster erythrogaster</i>

## Herptifauna (Cont'd)

<u>Common Name</u>	<u>Scientific Name</u>
Northern Scarlet	<i>Cemophora coccinea copei</i>
Queen	<i>Regina septemvittata</i>
Rainbow	<i>Farancia erythrogramma</i>
Rough Earth	<i>Virginia striatula</i>
Rough Green	<i>Opheodrys aestivus</i>
Smooth Earth	<i>Virginia valeriae</i>
Scarlet King	<i>Lampropeltis triangulum elapsoides</i>
Southeastern Crowned	<i>Tantilla coronata</i>
Southern Ringneck	<i>Diadophis punctatus punctatus</i>
Southern Black Racer	<i>Coluber constrictor priapus</i>
Southern Copperhead	<i>Agkistrodon contortrix contortrix</i>
Speckled Kingsnake	<i>Lampropeltis getula holbrooki</i>
Western Cottonmouth	<i>Agkistrodon piscivorus leucostoma</i>
Western Mud	<i>Farancia abacura reinwardtii</i>
Yellowbellied Water	<i>Nerodia erythrogaster flavigaster</i>
Toad, American	<i>Bufo americanus</i>
Eastern Spadefoot	<i>Scaphiopus holbrookii</i>
Eastern Narrow-mouthed	<i>Gastrophryne carolinensis</i>
Fowler's	<i>Bufo fowleri</i>
Southern	<i>Bufo terrestris</i>
Woodhouse's	<i>Bufo woodhousii</i>
Turtle, Alabama Map	<i>Gratemys pulchra</i>
Alligator Snapping	<i>Macrochelys temminckii</i>
Chicken	<i>Deirochelys reticularia</i>
Common Snapping	<i>Chelydra serpentina</i>
Eastern Mud	<i>Kinosternon subrubrum</i>
Red-eared Slider	<i>Trachemys scripta elegans</i>
Southern Painted	<i>Chrysemys picta dorsalis</i>
Spiny Softshell	<i>Apalone spinifera</i>
Loggerhead Musk	<i>Sternotherus minor minor</i>
Stinkpot(common musk)	<i>Sternotherus odoratus</i>
Three-toed Box	<i>Terrapene carolina triunguis</i>
Waterdog, Alabama	<i>Necturus alabamensis</i>

## Birds

Acadian Flycatcher	<i>Empidonax virescens</i>
American Avocet	<i>Recurvirostra americana</i>
American Woodcock	<i>Scolopax minor</i>
American Coot	<i>Fulica americana</i>
American Goldfinch	<i>Carduelis tristis</i>
American Wigeon	<i>Anas americana</i>
American Black Duck	<i>Anas rubripes</i>
American Bittern	<i>Botaurus lentiginosus</i>
American Pipit	<i>Anthus rubescens</i>
American Kestrel	<i>Falco sparverius</i>
American Robin	<i>Turdus migratorius</i>

## Birds (cont'd)

<u>Common Name</u>	<u>Scientific Name</u>
American Crow	<i>Corvus brachyrhynchos</i>
American Tree Sparrow	<i>Spizella arborea</i>
American Redstart	<i>Setophaga ruticilla</i>
Anhinga	<i>Anhinga anhinga</i>
Bachman's Sparrow	<i>Aimophila aestivalis</i>
Bald Eagle	<i>Haliaeetus leucocephalus</i>
Bank Swallow	<i>Riparia riparia</i>
Barn Swallow	<i>Hirundo rustica</i>
Barred Owl	<i>Strix varia</i>
Bay-breasted Warbler	<i>Dendroica castanea</i>
Belted Kingfisher	<i>Ceryle alcyon</i>
Bewick's Wren	<i>Thryomanes bewickii</i>
Black-and-white Warbler	<i>Mniotilta varia</i>
Black-bellied Plover	<i>Pluvialis squatarola</i>
Black Vulture	<i>Coragyps atratus</i>
Black Tern	<i>Chlidonias niger</i>
Black-crowned Night-Heron	<i>Nycticorax nycticorax</i>
Black-billed Cuckoo	<i>Coccyzus erythrophthalmus</i>
Black-throated Blue Warbler	<i>Dendroica caerulescens</i>
Black-throated Green Warbler	<i>Dendroica virens</i>
Blackburnian Warbler	<i>Dendroica fusca</i>
Blackpoll Warbler	<i>Dendroica striata</i>
Blue-winged Warbler	<i>Vermivora pinus</i>
Blue Grosbeak	<i>Guiraca caerulea</i>
Blue-gray Gnatcatcher	<i>Polioptila caerulea</i>
Blue Jay	<i>Cyanocitta cristata</i>
Blue-winged Teal	<i>Anas discors</i>
Bobolink	<i>Dolichonyx oryzivorus</i>
Bonaparte's Gull	<i>Larus philadelphia</i>
Brewer's Blackbird	<i>Euphagus cyanocephalus</i>
Broad-winged Hawk	<i>Buteo platypterus</i>
Brown-headed Cowbird	<i>Molothrus ater</i>
Brown-headed Nuthatch	<i>Sitta pusilla</i>
Brown Thrasher	<i>Toxostoma rufum</i>
Brown Creeper	<i>Certhia americana</i>
Buff-breasted Sandpiper	<i>Tryngites subruficollis</i>
Bufflehead	<i>Bucephala albeola</i>
Canada Warbler	<i>Wilsonia canadensis</i>
Canada Goose	<i>Branta canadensis</i>
Canvasback	<i>Aythya valisineria</i>
Carolina Chickadee	<i>Parus carolinensis</i>
Carolina Wren	<i>Thrythorus ludovicianus</i>
Caspian Tern	<i>Sterna caspia</i>
Cattle Egret	<i>Bubulcus ibis</i>
Cedar Waxwing	<i>Bombycilla cedrorum</i>
Cerulean Warbler	<i>Dendroica cerulea</i>
Chestnut-sided Warbler	<i>Dendroica pensylvanica</i>
Chimney Swift	<i>Chaetura pelagica</i>



## Birds (cont'd)

<u>Common Name</u>	<u>Scientific Name</u>
Chipping Sparrow	<i>Spizella passerina</i>
Chuck-will's-widow	<i>Caprimulgus carolinensis</i>
Cliff Swallow	<i>Hirundo pyrrhonota</i>
Common Nighthawk	<i>Chordeiles minor</i>
Common Tern	<i>Sterna hirundo</i>
Common Barn Owl	<i>Tyto alba</i>
Common Moorhen	<i>Gallinula chloropus</i>
Common Grackle	<i>Quiscalus quiscula</i>
Common Yellowthroat	<i>Geothlypis trichas</i>
Common Goldeneye	<i>Bucephala clangula</i>
Common Loon	<i>Gavia immer</i>
Common Snipe	<i>Gallinago gallinago</i>
Connecticut Warbler	<i>Oporornis agilis</i>
Cooper's Hawk	<i>Accipiter cooperii</i>
Dark-eyed Junco	<i>Junco hyemalis</i>
Dickcissel	<i>Spiza americana</i>
Double-crested Cormorant	<i>Phalacrocorax auritus</i>
Downy Woodpecker	<i>Picoides pubescens</i>
Dunlin	<i>Calidris alpina</i>
Eared Grebe	<i>Podiceps nigricollis</i>
Eastern Kingbird	<i>Tyrannus tyrannus</i>
Eastern Screech-Owl	<i>Otus asio</i>
Eastern Phoebe	<i>Sayornis phoebe</i>
Eastern Bluebird	<i>Sialia sialis</i>
Eastern Meadowlark	<i>Sturnella magna</i>
Eastern Wood-Pewee	<i>Contopus virens</i>
European Starling	<i>Sturnus vulgaris</i>
Evening Grosbeak	<i>Coccothraustes vespertinus</i>
Field Sparrow	<i>Spizella pusilla</i>
Fish Crow	<i>Corvus ossifragus</i>
Fox Sparrow	<i>Passerella iliaca</i>
Fulvous Whistling-Duck	<i>Dendrocygna bicolor</i>
Gadwall	<i>Anas strepera</i>
Glossy Ibis	<i>Plegadis falcinellus</i>
Golden-winged Warbler	<i>Vermivora chrysoptera</i>
Golden-crowned Kinglet	<i>Regulus satrapa</i>
Golden Eagle	<i>Aquila chrysaetos</i>
Grasshopper Sparrow	<i>Ammodramus savannarum</i>
Gray Catbird	<i>Dumetella carolinensis</i>
Gray-cheeked Thrush	<i>Catharus minimus</i>
Great Horned Owl	<i>Bubo virginianus</i>
Great Crested Flycatcher	<i>Myiarchus crinitus</i>
Great Blue Heron	<i>Ardea herodias</i>
Great Egret	<i>Casmerodius albus</i>
Greater White-Fronted Goose	<i>Anser albifrons</i>
Greater Yellowlegs	<i>Tringa melanoleuca</i>
Green-winged Teal	<i>Anas crecca</i>
Green Heron	<i>Butorides striatus</i>

## Birds (cont'd)

<u>Common Name</u>	<u>Scientific Name</u>
Hairy Woodpecker	<i>Picoides villosus</i>
Hermit Thrush	<i>Catharus guttatus</i>
Herring Gull	<i>Larus argentatus</i>
Hooded Merganser	<i>Lophodytes cucullatus</i>
Hooded Warbler	<i>Wilsonia citrina</i>
Horned Grebe	<i>Podiceps auritus</i>
House Finch	<i>Carpodacus mexicanus</i>
House Wren	<i>Troglodytes aedon</i>
Indigo Bunting	<i>Passerina cyanea</i>
Kentucky Warbler	<i>Oporornis formosus</i>
Killdeer	<i>Charadrius vociferus</i>
King Rail	<i>Rallus elegans</i>
Lark Sparrow	<i>Chondestes grammacus</i>
Le Conte's Sparrow	<i>Ammodramus leconteii</i>
Least Sandpiper	<i>Calidris minutilla</i>
Least Flycatcher	<i>Empidonax minimus</i>
Least Bittern	<i>Ixobrychus exilis</i>
Lesser Yellowlegs	<i>Tringa flavipes</i>
Lesser Scaup	<i>Aythya affinis</i>
Lincoln's Sparrow	<i>Melospiza lincolnii</i>
Little Blue Heron	<i>Egretta caerulea</i>
Loggerhead Shrike	<i>Lanius ludovicianus</i>
Long-billed Dowitcher	<i>Limnodromus scolopaceus</i>
Louisiana Waterthrush	<i>Seiurus motacilla</i>
Magnolia Warbler	<i>Dendroica magnolia</i>
Mallard	<i>Anas platyrhynchos</i>
Marsh Wren	<i>Cistothorus palustris</i>
Mourning Dove	<i>Zenaida macroura</i>
Mourning Warbler	<i>Oporornis philadelphus</i>
Nashville Parula	<i>Vermivora ruficapilla</i>
Northern Harrier	<i>Circus cyaneus</i>
Northern Mockingbird	<i>Mimus polyglottos</i>
Northern Oriole	<i>Icterus galbula</i>
Northern Parula	<i>Parula americana</i>
Northern Bobwhite	<i>Colinus virginianus</i>
Northern Flicker	<i>Colaptes auratus</i>
Northern Cardinal	<i>Cardinalis cardinalis</i>
Northern Pintail	<i>Anas acuta</i>
Northern Rough-winged Swallow	<i>Stelgidopteryx serripennis</i>
Northern Shoveler	<i>Anas clypeata</i>
Northern Waterthrush	<i>Seiurus noveboracensis</i>
Oldsquaw	<i>Clangula hyemalis</i>
Olive-sided Flycatcher	<i>Contopus borealis</i>
Orange-crowned Warbler	<i>Vermivora celata</i>
Orchard Oriole	<i>Icterus spurius</i>
Osprey Pandion	<i>haliaetus</i>
Ovenbird	<i>Seiurus aurocapillus</i>
Palm Warbler	<i>Dendroica palmarum</i>

**Birds (cont'd)**

<u>Common Name</u>	<u>Scientific Name</u>
Pectoral Sandpiper	<i>Calidris melanotos</i>
Philadelphia Vireo	<i>Vireo philadelphicus</i>
Pied-billed Grebe	<i>Podilymbus podiceps</i>
Pileated Woodpecker	<i>Dryocopus pileatus</i>
Pine Siskin	<i>Carduelis pinus</i>
Pine Warbler	<i>Dendroica pinus</i>
Piping Plover	<i>Charadrius melodus</i>
Prairie Warbler	<i>Dendroica pinus</i>
Prothonotary Warbler	<i>Protonotaria citrea</i>
Purple Finch	<i>Carpodacus purpureus</i>
Purple Gallinule	<i>Porphyryla martinica</i>
Purple Martin	<i>Progne subis</i>
Red-bellied Woodpecker	<i>Melanerpes carolinus</i>
Red-cockaded Woodpecker	<i>Picoides borealis</i>
Red-headed Woodpecker	<i>Melanerpes erythrocephalus</i>
Red-breasted Merganser	<i>Mergus serrator</i>
Red-winged Blackbird	<i>Agelaius phoeniceus</i>
Red-shouldered Hawk	<i>Buteo lineatus</i>
Red-breasted Nuthatch	<i>Sitta canadensis</i>
Red Crossbill	<i>Loxia curvirostra</i>
Red-tailed Hawk	<i>Buteo jamaicensis</i>
Red-eyed Vireo	<i>Vireo olivaceus</i>
Redhead	<i>Aythya americana</i>
Ring-billed Gull	<i>Larus delawarensis</i>
Ring-necked Duck	<i>Aythya collaris</i>
Rose-breasted Grosbeak	<i>Pheucticus ludovicianus</i>
Roseate Spoonbill	<i>Ajaia ajaja</i>
Ruby-crowned Kinglet	<i>Regulus calendula</i>
Ruby-throated Hummingbird	<i>Archilochus colubris</i>
Ruddy Duck	<i>Oxyura jamaicensis</i>
Rufous-sided Towhee	<i>Pipilo erythrophthalmus</i>
Rusty Blackbird	<i>Euphagus carolinus</i>
Sanderling	<i>Calidris alba</i>
Savannah Sparrow	<i>Passerculus sandwichensis</i>
Scarlet Tanager	<i>Piranga olivacea</i>
Sedge Wren	<i>Cistothorus plantensis</i>
Semipalmated Sandpiper	<i>Calidris pusilla</i>
Semipalmated Plover	<i>Charadrius semipalmatus</i>
Sharp-shinned Hawk	<i>Accipiter striatus</i>
Sharp-tailed Sparrow	<i>Ammodramus caudacutus</i>
Short-billed Dowitcher	<i>Limnodromus griseus</i>
Short-eared Owl	<i>Asio flammeus</i>
Snow Goose	<i>Chen caerulescens</i>
Snowy Egret	<i>Egretta thula</i>
Solitary Sandpiper	<i>Tringa solitaria</i>
Solitary Vireo	<i>Vireo solitarius</i>
Song Sparrow	<i>Melospiza melodia</i>
Sora	<i>Porzana carolina</i>

**Birds (cont'd)****Common Name****Scientific Name**

Spotted Sandpiper	<i>Actitis macularia</i>
Stilt Sandpiper	<i>Calidris himantopus</i>
Summer Tanager	<i>Piranga rubra</i>
Surf Scoter	<i>Melanitta perspicillata</i>
Swainson's Thrush	<i>Catharus ustulatus</i>
Swainson's Warbler	<i>Limnothlypis swainsonii</i>
Swamp Sparrow	<i>Melospiza georgiana</i>
Tennessee Warbler	<i>Vermivora peregrina</i>
Tree Swallow	<i>Tachycineta bicolor</i>
Tricolored Heron	<i>Egretta tricolor</i>
Tufted Titmouse	<i>Parus bicolor</i>
Tundra Swan	<i>Cygnus columbianus</i>
Turkey Vulture	<i>Cathartes aura</i>
Veery	<i>Catharus fuscescens</i>
Vesper Sparrow	<i>Pooecetes gramineus</i>
Virginia Rail	<i>Rallus limicola</i>
Warbling Vireo	<i>Vireo gilvus</i>
Western Sandpiper	<i>Calidris mauri</i>
Whip-poor-will	<i>Caprimulgus vociferus</i>
White-breasted Nuthatch	<i>Sitta carolinensis</i>
White Ibis	<i>Eudocimus albus</i>
White Pelican	<i>Pelecanus erythrorhynchos</i>
White-rumped Sandpiper	<i>Calidris fuscicollis</i>
White-throated Sparrow	<i>Zonotrichia albicollis</i>
White-crowned Sparrow	<i>Zonotrichia leucophrys</i>
White-eyed Vireo	<i>Vireo griseus</i>
Wild Turkey	<i>Meleagris gallopavo</i>
Wilson's Warbler	<i>Wilsonia pusilla</i>
Winter Wren	<i>Troglodytes troglodytes</i>
Wood Thrush	<i>Hylocichla mustelina</i>
Wood Stork	<i>Mycteria americana</i>
Wood Duck	<i>Aix sponsa</i>
Worm-eating Warbler	<i>Helmitheros vermivorus</i>
Yellow-bellied Sapsucker	<i>Sphyrapicus varius</i>
Yellow-billed Cuckoo	<i>Coccyzus americanus</i>
Yellow-breasted	<i>Chat Icteria virens</i>
Yellow-throated Warbler	<i>Dendroica dominica</i>
Yellow-throated Vireo	<i>Vireo flavifrons</i>
Yellow-rumped Warbler	<i>Dendroica coronata</i>
Yellow-crowned Night-Heron	<i>Nycticorax violaceus</i>
Yellow Warbler	<i>Dendroica petechia</i>





# Appendix E. Intra-Service Section 7 Biological Evaluation

## REGION 4

### INTRA-SERVICE SECTION 7 BIOLOGICAL EVALUATION

[Note: This form provides the outline of information needed for intra-Service consultation. If additional space is needed, attach additional sheets, or set up this form to accommodate your responses.]

**Originating Person:** Jim Tisdale

**Telephone Number:** 662-323-5548

**E-Mail:** jim\_tisdale@fws.gov

**Date:** March 15, 2002

### PROJECT NAME

**(Grant Title/Number):** Noxubee National Wildlife Refuge Comprehensive Conservation Plan

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#### I. Service Program:

☐ Ecological Services

☐ Federal Aid

☐ Clean Vessel Act

☐ Coastal Wetlands

☐ Endangered Species Section 6

☐ Partners for Fish and Wildlife

☐ Sport Fish Restoration

☐ Wildlife Restoration

☐ Fisheries

☒ Refuges/Wildlife

II. **State/Agency:** Mississippi/ U.S. Fish and Wildlife Service

III. **Station Name:** Noxubee National Wildlife Refuge

#### IV. Description of Proposed Action (attach additional pages as needed):

Implementation of the Comprehensive Conservation Plan for Noxubee National Wildlife Refuge by adopting the preferred alternative: Manage wildlife and habitat with emphasis on old growth forest communities; increase education and recreation programs. This plan will provide guidance, management direction, and operation plans for the next 15 years.

#### V. Pertinent Species and Habitat:

##### A. Include species/habitat occurrence map:

- American bald eagle occurs refuge-wide.
- American alligator occurs refuge-wide in lakes, ponds, sloughs and rivers.
- Red-cockaded woodpeckers occur throughout refuge uplands.
- Orange-nacre mucket mussels occur in rivers and creeks.



**B. Complete the following table:**

SPECIES/CRITICAL HABITAT	STATUS <sup>1</sup>
American bald eagle	T
American alligator (listed by similarity of appearance)	T
Red- cockaded woodpecker	E
Orange-nacre mucket (Lampsilis perovalis)	T

<sup>1</sup>STATUS: E=endangered, T=threatened, PE=proposed endangered, PT=proposed threatened, CH=critical habitat, PCH=proposed critical habitat, C=candidate species

**VI. Location (attach map):**

**A. Ecoregion Number and Name:** 29; Central Gulf Coast

**B. County and State:** Oktibbeha, Noxubee, and Winston Counties, Mississippi

**C. Section, township, and range (or latitude and longitude):**

Latitude: 33 16; Longitude: 88 47

**D. Distance (miles) and direction to nearest town:** 15 miles east to Brooksville, Mississippi

**E. Species/habitat occurrence:**

American bald eagles are frequently seen around refuge lakes and moist soil impoundments.

American alligators are common in refuge lakes, ponds, sloughs, and rivers.

Red-cockaded woodpeckers are fairly common in refuge pine forests.

A shell of an orange-nacre mucket was found in 2000. No extant populations have been found.

**Determination of Effects:**

**A. Explanation of effects of the action on species and critical habitats in item V. B (attach additional pages as needed):**

SPECIES/ CRITICAL HABITAT	IMPACTS TO SPECIES/CRITICAL HABITAT
American bald eagle	No negative impacts foreseen. Expect more protection.
American alligator	No negative impacts foreseen. Expect more protection.
Red-cockaded woodpecker	No negative impacts foreseen. Expect more protection.
Orange-nacre mucket	No negative impacts foreseen. Expect more protection.

**B. Explanation of actions to be implemented to reduce adverse effects:**

<b>SPECIES/ CRITICAL HABITAT</b>	<b>ACTIONS TO MITIGATE/MINIMIZE IMPACTS</b>
American bald eagle	Maintain and expand wetland and forested habitats.
American alligator	Maintain and expand wetland habitats.
Red-cockaded woodpecker	Maintain and expand pine forest habitat.
Orange-nacre mucket	Maintain and expand wetland and riverine habitats. Maintain water quality.

**VIII. Effect Determination and Response Requested:**

<b>SPECIES/ CRITICAL HABITAT</b>	<b>DETERMINATION<sup>1</sup></b>			<b>RESPONSE<sup>1</sup> REQUESTED</b>
	<b>NE</b>	<b>NA</b>	<b>AA</b>	
Red-cockaded woodpecker		X		Concurrence
American bald eagle		X		Concurrence
American alligator		X		Concurrence
Orange-nacre mucket		X		Concurrence

<sup>1</sup>DETERMINATION/RESPONSE REQUESTED:

NE = no effect. This determination is appropriate when the proposed action will not directly, indirectly, or cumulatively impact, either positively or negatively, any listed, proposed, candidate species or designated/proposed critical habitat. Response Requested is optional but a "Concurrence" is recommended for a complete Administrative Record.

NA = not likely to adversely affect. This determination is appropriate when the proposed action is not likely to adversely impact any listed, proposed, candidate species or designated/proposed critical habitat or there may be beneficial effects to these resources. Response Requested is a "Concurrence".

AA = likely to adversely affect. This determination is appropriate when the proposed action is likely to adversely impact any listed, proposed, candidate species or designated/proposed critical habitat. Response Requested for listed species is "Formal Consultation". Response Requested for proposed or candidate species is "Conference".

\_\_\_\_\_  
**Signature (originating station)**

\_\_\_\_\_  
**Date**

\_\_\_\_\_  
**Title (Refuge Manager)**

**IX. Reviewing Ecological Services Office Evaluation:**

**A. Concurrence \_\_\_\_\_ Nonconcurrence \_\_\_\_\_**

**B. Formal consultation required \_\_\_\_\_**

**C. Conference required \_\_\_\_\_**

**D. Informal conference required \_\_\_\_\_**

**E. Remarks (attach additional pages as needed):**

\_\_\_\_\_  
**Signature**

\_\_\_\_\_  
**Date**

\_\_\_\_\_  
**Title**

\_\_\_\_\_  
**Office**

# Appendix F. Compatibility Determinations

## Introduction

A compatibility determination documents the formal procedure used to determine if existing and proposed uses of national wildlife refuges are compatible with the purpose of each refuge and the mission of the National Wildlife Refuge System. Under the National Wildlife Refuge System Administration Act of 1966, the Refuge Recreation Act of 1962, and the National Wildlife Refuge System Improvement Act of 1997, the Service may not permit public recreational uses on national wildlife refuges unless the uses are determined to be compatible.

All lands of the National Wildlife Refuge System will be managed in accordance with an approved comprehensive conservation plan that will guide management decisions and set forth strategies for achieving refuge purposes. The management of all wildlife-dependent recreational activities on Noxubee National Wildlife Refuge is directed towards providing quality, compatible, wildlife-dependent recreational opportunities for visitors in a manner that does not negatively impact wildlife population levels or the natural diversity of the area. Public use opportunities are varied and may include both consumptive and non-consumptive uses.

The following compatibility determination's rely on best estimates of current public use levels. Information was obtained by the refuge staff during the first year of refuge-administered public use. The Service will continue, as indicated in the comprehensive conservation plan, to gather definitive public use data, conduct surveys to estimate wildlife populations, and assess public use impacts on the resources. If adverse impacts are identified, modifications to that particular public use activity will occur to minimize the impact. For additional details and to reference specific citations outlined, refer to the Comprehensive Conservation Plan and Environmental Assessment for Noxubee National Wildlife Refuge.

The Compatibility Determinations that follow used the Fish and Wildlife Service Manual, Standard Exhibit 2, 603 FW 2, for evaluating uses.

This Appendix documents compatibility determinations for both existing and proposed uses.

**Refuge Name:** Noxubee National Wildlife Refuge

**Establishing and Acquisition Authorities:** Executive Order 8444, dated June 14, 1940 (Rural Resettlement Administration; Public Land Order 205, dated January 27, 1944; Public Land Order 401, dated 1947.

**Refuge Purposes:** The primary establishing legislation for the refuge was Executive Order 8444, dated June 14, 1940, with the stated purpose "...as a refuge and breeding ground for migratory birds and other wildlife...." 16 U.S.C., 715 (Migratory Bird Conservation Act).

"...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. 668dd(a)(2) (National Wildlife Refuge System Administration Act).

"...for the development, advancement, management, conservation, and protection of fish and wildlife resources...." 16 U.S.C. 742f(a)(4).

"...for the benefit of the United States Fish and Wildlife Service, in performing its activities and services. Such acceptance may be subject to the terms of any restrictive or affirmative covenant, or condition of servitude...." 16 U.S.C 742f(b)(1) (Fish and Wildlife Act of 1956).

Subsequently, a small amount of land purchased with Migratory Bird Conservation Stamp monies held the following purpose "...for use as an inviolate sanctuary, or for any other management purpose, for migratory birds." 16 United States Code (USC)715d (Migratory Bird Conservation Act).

National Wildlife Refuge System Mission: The mission of the National Wildlife Refuge System is "to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans."

**Applicable Laws, Regulations, and Policies:** Development of a public use program that provides optimum opportunities for wildlife-dependent recreational uses, and for other uses and programs outlined below and evaluated in the following compatibility determinations, has negligible impacts on refuge resources. Allowing these uses to be developed and/or continued is not expected to be controversial regarding the impacts on refuge resources.

In assessing the potential impacts of refuge uses, all available tools were utilized (Fish and Wildlife Service 1986). A site-specific personal communication with the Mississippi Department of Wildlife, Fisheries, and Parks, data collection, development of the comprehensive conservation plan, environmental assessment and general references are considered to be sufficient bases on which to make these compatibility determinations.

Noxubee National Wildlife Refuge has been collecting trends' data for several years. As the public use program is fully implemented, the refuge will continue to assess any possible impacts it may have on resources and wildlife populations. Changes in the program will be implemented as needed to address any impacts, and to respond to anticipated wildlife population changes due to implementation of state-of-the-art wildlife management activities.

During the scoping phase of preparing the comprehensive conservation plan, a public meeting was held to solicit input and comments on all aspects of refuge management. Copies of the draft comprehensive conservation plan will be distributed for a 60-day review period to garner public comments, both written and verbal, on the draft plan. During this review period, an open house will be held to solicit comments on the draft plan.

*See Appendix C for relevant legal mandates.*

### **Public Review and Comment**

A compatibility determination has been prepared for the following proposed and existing uses for Noxubee National Wildlife Refuge:

- recreational hunting;
- recreational fishing;
- wildlife observation and photography;
- environmental education and interpretation;
- forest habitat management;
- haying; and
- research and collections.

## Description of Use

*Recreational Hunting (white-tailed deer, raccoons, and waterfowl)*

### Availability of Resources

Based on a review of the refuge's budget allocated for recreational hunting, there is adequate funding to ensure compatibility and to administer this use at its current level. However, additional funding would be needed to cover the costs of proposed hunting blinds for disabled hunters, as well as for vehicle pull-offs and parking areas to facilitate safe access to hunting areas. The proposed waterfowl hunt program (including a youth waterfowl hunt) would require funding to cover the costs of salary and benefits for one biological technician to assist in monitoring this activity.

### Anticipated Impacts of Use

The biological implications of an uncontrolled white-tailed deer population are well documented and accepted through research over a period of many years. Deer can become so numerous that they may adversely affect associated plant and animal communities, and hence alter ecological diversity and succession. This may result in significant negative impacts on both plant and animal communities including some of special concern or some for which the Fish and Wildlife Service has trust responsibility. The permitted use would result in approximately 500-700 deer being taken from the refuge herd each year. This reduction would help balance the population, limit ecosystem damage from overbrowsing, and help maintain good herd health by reducing disease and problems associated with nutrition. There would be some disturbance to other wildlife species, however, there are no documented biological problems affecting other species as a result of a managed hunt program.

Heavy predation of waterfowl nests are a documented concern of an overpopulated raccoon population. Through the use of a recreational managed hunt, it is estimated that approximately 200-300 raccoons are removed from the refuge each year. As can be imagined, without a raccoon hunt on the refuge, the population could balloon to a point where waterfowl production could cease to exist. Raccoons have been steadily hunted in the south for more than 200 years, and hunting has never significantly affected the population as a whole. A reduction in the number of raccoons on the refuge would assist in balancing its population with the environment, and would limit depredation of waterfowl nests. It should also be noted that when raccoon populations exceed the carrying capacity of a geographical area, distemper and rabies die-offs occur. These die-offs usually result in a significant portion of the population being removed. Unfortunately, both rabies and distemper pose a threat to humans, domestic animals, and other wildlife. Through the use of managed hunts, the frequency of rabies and distemper outbreaks is lessened.

Anticipated effects of upland game hunting are expected to be minimal.

### Determination (Check One Below)

- ☐ Use is Not Compatible  
☒ Use is Compatible with Following Stipulations

### Stipulations Necessary to Ensure Compatibility

- Data would be collected and analyzed to ensure that hunts are biologically sound and that the deer herd is being controlled to the point of preventing damage to the ecosystem.
- An annual hunt evaluation would be prepared by the refuge which would discuss compatibility, and would be reviewed and approved by the Service.
- Hunting season dates and regulations would be coordinated with the Mississippi Department of Wildlife, Fisheries, and Parks biologists, and with biologists from Mississippi State University.
- An active law enforcement program would ensure regulation compliance and would protect refuge resources.
- Vehicle use would be restricted to regularly maintained roads.



- Waterfowl populations on the refuge must exceed pre-1975 levels in order for a general hunt season to be held. However, special youth hunts could be held based on the refuge manager's discretion, and providing waterfowl population levels are sufficient.
- Hunting would be conducted in accordance with the provisions of the approved hunt plan. Harvest management strategies would be based on objectives of the hunt plan. Results of each hunting season would be thoroughly evaluated to ensure that harvest management remains dynamic and responsive to the needs of the refuge.

### **Justification**

As per 8 RM 5.3 (A) (1&2), the management purpose of Noxubee National Wildlife Refuge is governed under the rules of the Migratory Bird Conservation Commission, and as such not more than 40 percent of the refuge would be opened for the purpose of waterfowl hunting. Actually, only 18.75 percent of the the total wetland acreage has been opened for waterfowl hunting.

The Refuge Manual further states that the refuge's classification as an inviolate sanctuary imposes no restrictions or limitations on the hunting of non-migratory birds or other game mammals.

The big game and raccoon hunts are being used as management tools to protect the diverse refuge ecosystem from the damage which would result from too many animals. Not only would the habitat of resident wildlife be protected through the use of deer and raccoon hunts, but also that of many species of migratory birds. The hunting of raccoons would reduce the species, thereby lowering impacts on waterfowl nests. The upland game hunts are steeped in history and have caused no negative impacts to either the species involved or the ecosystem. Section 16 U.S.C., 668dd, 50 C.F.R., 26.31 states: "Public recreation will be permitted on National Wildlife Refuges as an appropriate incidental or secondary use, only after it has been determined recreational use is practical and not inconsistent with the primary objectives of which each particular area was established or with other authorized Federal operations." It has been determined that hunting is a compatible use of the refuge and would not violate any provisions of this code. A reduction in the number of deer on the refuge would help reduce the number of deer/car collisions that occur on and adjacent to the refuge, and also reduce the number of deer damage complaints from refuge neighbors. The only biological and cost effective method of balancing the deer population with its environment is through public hunting.

Upland game hunting on the refuge satisfies provisions of 50 C.F.R., and the Refuge Manual by providing a quality hunting experience and thousands of hours of wholesome outdoor recreation. There is good public involvement throughout the hunt planning and evaluation process with comments received from both hunting and non-hunting members of the public. Through the presentation of refuge programs, contacts with various groups, letters, publications, and hunter notes, the public is actively involved in the decision-making process.

**Mandatory 10- 15-Year Re-Evaluation Date:** \_\_\_\_\_

### **Description of Use**

*Recreational Fishing (Including fishing clinics, fishing derbies, and fishing tournaments)*

Recreational fishing is a common public use on the refuge and surrounding areas. Fishing is permitted on designated refuge lakes on a seasonal basis. The refuge fishing season begins on March 1 and ends on October 31, on all waters except the Noxubee River, which is open year round. Fish creel limits, boating safety, and license requirements are in accordance with the State of Mississippi regulations.

Bluff and Loakfoma lakes, Ross Branch Reservoir, Noxubee River, and several creeks harbor a substantial fishery. Primary game fish include largemouth bass, crappie, bream, and channel catfish. Night-time bowfishing is allowed for rough type fish species in Loakfoma and Bluff lakes, or other refuge waters as necessary. Gas- and electric-powered boats are allowed and used on both lakes.

### **Availability of Resources**

Based on a review of the refuge's budget allocated for recreational fishing, there is adequate funding to ensure compatibility and to administer the use at its current level. Additional fiscal resources would be needed to conduct this use as proposed. Personnel from Private John Allen Fish Hatchery in Tupelo, Mississippi, would continue to stock largemouth bass, bream, and catfish in the refuge lakes. As funding becomes available, additional parking, information kiosks, fishing piers, boat ramps, docks, and piers would be added. Creel surveys would be conducted and water quality analysis performed in order to provide a high quality fishing experience.

### **Anticipated Impacts of Use**

Recreational fishing should not adversely affect fishery resources, wildlife resources, or endangered species on the refuge. There may be some limited disturbance to certain species of wildlife and some trampling of vegetation; however, this disturbance should be short-lived and relatively minor and would not negatively impact wetland values. Known bird rookery sites do not occur at locations currently popular for fishing activities; therefore, disturbance should not be a problem. If disturbance at these sites is identified as a problem in future years, closed areas would be established during the nesting season. Bowfishing would only be allowed in the summer and early fall months so as not to disturb resting or feeding waterfowl.

During construction of parking areas, boat ramps, docks, and piers, some disturbance to the natural environment would occur. When the improvements are completed, public use of the water bodies would increase but the level of use is not expected to be detrimental to wildlife.

Gas powered motors are noisy and can be disturbing to other recreationists and to wildlife. They can add petroleum to the water and can produce an unpleasant smell. Electric motors do not add fuels to the water and are relatively quiet, but they may disturb birds.

### **Determination (Check One Below)**

- ☐ Use is Not Compatible  
☒ Use is Compatible with Following Stipulations

### **Stipulations Necessary to Ensure Compatibility**

- Current regulations would be necessary to ensure that this activity remains compatible with refuge purposes.
- The closure of refuge impoundments during the peak waterfowl migration period would continue to protect waterfowl from undue disturbance.
- Refuge management activities should always be focused toward refuge purpose, with fisheries management as an incidental management practice.
- The refuge manager would reserve the right to enact special regulations on the fishing program (i.e., 14" minimum length on largemouth bass).
- No special considerations would be given to tournaments, derbies, or clinics. Any use of the refuge by any group for the above-mentioned purposes would be at the same rights granted to any member of the general public (i.e., the lake would not be reserved for any one group, but rather open for general fishing). No commercial fishing activities would be allowed on the refuge.
- In addition to specific refuge regulations, all applicable state laws would apply to individuals fishing on the refuge.
- All construction activities would be carried out with appropriate permits under Section 404 of the

Clean Water Act and State Historic Preservation Officer review of cultural resources.

- Sediment retention barriers would be utilized during boat ramp construction and soil stabilization features would be incorporated into ramp design to minimize any potential future soil erosion.
- Time and space zoning of lake use would be utilized as necessary to minimize wildlife disturbance. Problems associated with littering and illegal take of fish would be controlled through law enforcement activities. Providing information to refuge visitors about rules and regulations, along with increased law enforcement patrol, would keep these negative impacts to a minimum.
- Bowfishing seasons will be regulated by the Refuge Manager between the period of April 1st through September 30th of each year. This would reduce any undue disturbance to resting or feeding waterfowl during the winter migration period.
- Species considered for take would be only rough fish as described by laws enacted by the Mississippi Department of Wildlife, Fisheries, and Parks. The refuge manager may further restrict the take of any species at his/her discretion.
- Fishermen must comply with the laws of the Mississippi Department of Wildlife, Fisheries, and Parks, as well as refuge-specific regulations.
- All fishermen would be issued and required to complete and return a copy of the Special Use Permit for bow fishing. This would enable the refuge to maintain records of use and harvest.
- Special Use Permits would only be used for up to a 2-day period.
- The closure of refuge impoundments during peak waterfowl migration would continue to protect waterfowl from undue disturbance.
- The refuge manager would reserve the right to enact special regulations in regards to recreational boating on the refuge.
- In addition to refuge-specific regulations, all applicable state laws would apply to individuals boating on the refuge.

### **Justification**

Recreational fishing has been allowed on Noxubee National Wildlife Refuge since it was established. Portions of the refuge were officially opened for public fishing through the Hunting and Fishing Plan of 1960. With current restrictive regulations, this use of the refuge resource is compatible with the purposes for which the refuge was established. Through the use of posters, informational signs, and personal contacts, refuge visitors can stay informed on other management practices on the refuge. Bow fishing for non-game fish only is permitted, with nighttime bow fishing allowed during April through August. Recreational boating, as a rule, goes hand-in-hand with the refuge fishing program. There are, however, those individuals who only want to pleasure boat. As long as the boating regulations are streamlined with the refuge fishing regulations, this use would remain compatible with refuge purposes.

**Mandatory 10- 15-Year Re-Evaluation Date:** \_\_\_\_\_

### **Description of Use**

#### *Wildlife Observation and Photography*

Currently, wildlife observation and photography occurs along the main refuge roads, some levees, and trails.

Visitors observe wildlife by walking or using motorized vehicles, motorized/non-motorized boats, and bicycles. Foot travel is generally allowed on refuge roadways, levees, and trails. Motorized vehicles are restricted to most refuge roadways (closed roads being marked), with most use occurring along Bluff Lake road and other county roads. Other areas of high public use are the Goose overlook, the Woodpecker trail, the Trail of Big Trees, and the trail adjacent to Greentree Reservoir No. 1. Boats are only allowed on Bluff and Loakfoma lakes from March 1 - October 31 of each year to prevent disturbance to migratory waterfowl. Bicycles are allowed on all open refuge and county roads. Horses are allowed only on the county roads (over which the refuge has no jurisdiction). The refuge proposes to add the following to improve wildlife observation and photography opportunities for all visitors: Auto

tour route, Wetlands boardwalk and nature trail at visitor center, and asphalt paving of Bluff Lake and Brooksville-Louisville roads.

#### **Availability of Resources**

Based on a review of the refuge's budget allocated for this activity, there is adequate funding to ensure compatibility and to administer the use at its current level. Additional fiscal resources would be needed to develop the proposed auto tour route, wetlands boardwalk and nature trail, and paving of roads.

#### **Anticipated Impacts of Use**

There would be some refuge wildlife killed or injured when crossing roadways in front of oncoming vehicles. There would be a significant amount of vegetation trampled, injured, and killed (the result of 110,000 visitors/year). However, the vegetation damaged would be widespread across the refuge and amounts would be difficult to assess. Generally, direct impacts would result from violations of refuge regulations; i.e., disturbing wildlife, removing plants, littering, and vandalism.

Wildlife photographers can, at times, get too close to animals in their quest to "get the best shot." This usually results in disturbance of the animal (i.e., permanent dislocation or death of the animal). There have been situations where young wading birds have jumped from their nests upon being too closely observed.

#### **Determination (Check One Below)**

- ☐ Use is Not Compatible  
☒ Use is Compatible with Following Stipulations

#### **Stipulations Necessary to Ensure Compatibility**

Photographers would be excluded from some areas of the refuge at all times, and other areas only during peak waterfowl migration. This should prevent unnecessary disturbance during this critical time. This exclusion would also provide sanctuary where wildlife can escape all human disturbance.

#### **Justification**

Most visitors come to the refuge to view wildlife. The refuge receives a large percentage of its public use from Mississippi State University students who come to the refuge to "see the animals" and relieve the tension of college life. Wildlife observation is not only a compatible use but a desired one.

"A picture is worth a thousand words." Probably as high as one-half of all visitors carry a camera and/or video camera to take photographic images while on the refuge. This type of public use is considered as an incidental type of use, usually combined with another activity (i.e. fishing, hunting, wildlife observation, etc.). Wildlife photography is ruled as consistent with the refuge purpose.

**Mandatory 10- 15-Year Re-Evaluation Date:** \_\_\_\_\_

#### **Description of Use**

##### *Environmental Education and Interpretation*

Environmental education and interpretation would include those activities which seek to increase the public's knowledge and understanding of wildlife and contribute to wildlife conservation. Traditional environmental education opportunities such as teacher-led or staff-led field trips; nature study, such as teacher and student workshops; interpretation of wildlife resources; and trips to support facilities such as visitor center and interpretive trails.

#### **Availability of Resources**

Based on a review of the refuge's budget allocated for this activity, there is adequate funding to ensure compatibility and to administer these uses at their current level. Additional funding would

be required to provide the level of programs, activities, and facilities as proposed in the comprehensive conservation plan.

### **Anticipated Impacts of Use**

The use of on-site, hands-on, action-oriented activities by groups of up to 50 students/teachers to accomplish environmental education objectives may impose a low-level impact on the sites used for these activities. These low-level impacts may include trampling of vegetation and temporary disturbance of wildlife species in the immediate area of the activity. It is not anticipated, however, that such impacts would be permanent or long lasting.

### **Determination (Check One Below)**

- ☐ Use is Not Compatible  
☒ Use is Compatible with Following Stipulations

### **Stipulations to Ensure Compatibility**

- Activities held on site would be held where minimal impact would occur.
- Periodic evaluations of sites and programs would be conducted to assess if objectives are being met and resources not being degraded.
- If evidence of unacceptable adverse impacts begin to appear, it may be necessary to rotate the location of outdoor classroom activity.
- Regulations to ensure the safety of all participants would be issued in writing to the teacher(s) responsible for the activities and reviewed before students begin the activities.
- Outdoor classroom areas would be confined to the same areas as the general public (i.e., away from resting waterfowl areas, closed areas, etc.).

### **Justification**

Facilities such as trails, information shelters, signs, etc., obviously take funding to build and maintain. These expenses are weighed against the objectives of the program. The Service feels the gains are more than worth the cost of operating the environmental education program.

The refuge utilizes environmental education to motivate citizens of all ages to action and understanding in protecting a healthy ecosystem. The environmental education program is a tool in building a land ethic, developing political support, lessening vandalism, littering, poaching, and becoming visible to the community in a positive way.

Through the use of environmental education, the refuge has a positive interpretive impact on approximately 110,000 people each year. These people are given insights into specific refuge problems, and the needs of specific species, such as:

- The endangered red-cockaded woodpecker, its habitat and specific needs;
- Wetlands management and its effect on the ecosystem;
- Refuge management techniques and why they are used; and
- The development of pride in the National Wildlife Refuge System to reduce littering, poaching, and vandalism, and increase public participation.

**Mandatory 10- 15-Year Re-Evaluation Date:** \_\_\_\_\_



## **Description of Use**

### *Forest Habitat Management*

Management and manipulation of forested wildlife habitat through the use of prescribed fire, wildlife suppression, forest silviculture, and commercial timber harvesting operations.

Commercial contractors would be used for some forest management activities including pre-commercial and commercial thinning and selective harvest. The purposes of each treatment are part of an effort to restore forest structure and composition to more natural conditions and may include any one or more of the following:

- Increase the proportion of mature forests;
- Maintain mature forest components;
- Prepare stands for reintroduction of low-intensity prescribed fire; and
- Reduce tree densities in overstocked stands by favoring mature and over-mature trees, and promoting diameter and height growth in the remaining stand.

Most trees designated for cutting would be less than 70 years old. For all sales of merchantable timber, the refuge would post a public notice in the newspaper. Special use permits would be issued to successful bidders.

## **Availability of Resources**

Based on a review of the refuge's budget allocated for this activity, there is adequate funding to ensure compatibility and to administer the use at its current level.

## **Anticipated Impacts of Use**

The effects of harvest operations are described in the refuge's forest management plan and environmental assessment dated December 1995. Disturbed sites from commercial timber harvests (i.e., skid trails, roads, loading areas), alter vegetation and soil components which are potential sites for the establishment of noxious weeds and invasive species.

The impacts of forest management on the refuge are generally positive. The forest habitat management plan is a tool used to manipulate, create, and maintain wildlife habitat. Through the use of techniques in the plan, the Service is able to create and maintain habitat for such species as the endangered red-cockaded woodpecker, wintering and resident waterfowl, resident wildlife, and a number of neotropical migratory birds. All forest habitat management activities are designed to meet either short- or long-term habitat objectives.

The use of prescribed fire and commercial timber harvesting would cause some vegetation and wildlife disturbance, as well as some soil compaction.

## **Determination (Check One Below)**

- ☐ Use is Not Compatible
- ☒ Use is Compatible with Following Stipulations

## **Stipulations Necessary to Ensure Compatibility**

All forest habitat management activities are strictly regulated as to timing and location to minimize potential negative impacts. Commercial timber harvesting operations are regulated by conditions stipulated in a special use permit. The permit strictly regulates the timing, methods, equipment, and quality of the required operations. Rehabilitation of log loading areas, skid trails, and logging roads is required to mitigate potential soil compaction.



Special provisions would be developed and enforced through the special use permit process for each timber sale. All federal and state regulations and refuge objectives must be followed. Most sales would occur between March and October to minimize disturbance to breeding and nesting wildlife and to minimize soil impacts and runoff. Harvests may be postponed during severe drought conditions to reduce the potential for wild fires.

### **Justification**

Effective forest habitat management operations allow for the creation and maintenance of conditions critical for the breeding and foraging success of the endangered red-cockaded woodpecker, and a diversity of habitat for migratory waterfowl, resident wildlife, and neotropical migratory birds.

Prescribed burning and commercial timber harvesting are the only practical tools available for the refuge to create and meet its long-term forest habitat goal of stands of 50 years or older. Some neotropical migratory birds prefer younger and more forested habitats. Upland species, such as wild turkey and bobwhite quail, use open forested areas during the year. The only way to provide this type of habitat through time is by careful use of prescribed fire and commercial timber harvesting.

It is not economically feasible for the refuge to complete commercial harvest operations to achieve forest management objectives. The funds needed for specialized equipment and required training on use of the equipment are not available. Local contractors already have the equipment and expertise as well as knowledge of mills, road system, weather patterns and other factors affecting timing and success of harvest operations.

**Mandatory 10- 15-Year Re-Evaluation Date:** \_\_\_\_\_

### **Description of Use**

#### *Haying*

Approximately 6 fields, totalling 200 acres, are maintained through haying by cooperative farmers. Grasses in these fields consist primarily of paspalum, bahia, dallis, and some bermuda. These fields provide important feeding areas for a variety of wildlife, especially wild turkeys and seed-eating birds. Turkeys also use the fields for strutting areas. A variety of small mammals, such as rabbits, mice, and rats, also use the fields. These species, in turn, support an array of predatory animals such as hawks, owls, foxes, and coyotes.

### **Availability of Resources**

Based on a review of the refuge's budget allocated for this activity, there is adequate funding to ensure compatibility and to administer the use at its current level.

### **Anticipated Impacts of Use**

The predominance of all anticipated impacts are expected to be of a positive nature. Haying is used as a management tool at the refuge to maintain open fields, thus preserving biodiversity. These areas would revert over time to primarily pine regeneration, and would be lost as open areas. Negative impacts include the possibility that small mammals and insects would be killed during the actual cutting and gathering of hay from the fields. It is also possible that larger mammals, such as deer fawns, could be killed or injured during the cutting process of the hay.

### **Determination (Check One Below)**

- ☐ Use is Not Compatible  
☒ Use is Compatible with Following Stipulations

### **Stipulations Necessary to Ensure Compatibility**

- The first cut from a field would be free to any participants. This would make the program attractive to the public. Any subsequent cuts from the same field would have to be preceded by an application of commercial fertilizer at a rate necessary to restore removed nutrients to the soil.
- All haying activity would be reviewed and approved/disapproved by the refuge manager or his delegate.

### **Justification**

Haying plays an important role in the management scheme of the refuge. It is used to maintain open areas for:

- Bugging grounds for neotropical migratory songbirds and wild turkey poults.
- Maintaining interspersed through haying program to promote biodiversity.
- Promoting populations of small rodents, rabbits and quail through maintenance of "edge effect."

**Mandatory 10- 15-Year Re-Evaluation Date:** \_\_\_\_\_

### **Description of Use**

#### *Research and Collections*

This use would allow university students and professors, non-governmental researchers, and government scientists access to the refuge to conduct both short- and long-term research projects. Efforts would be made to expand partnerships in order to conduct research associated with the recovery of threatened and endangered species. All scientific research and biological collections on the refuge, including research relating to wildlife or forest management or other environmental sciences, and collection of fauna, flora, and other organisms for systematic or museum studies, would be covered under this use.

### **Availability of Resources**

No additional fiscal resources would be needed to conduct this use. The existing staff can administer permits and monitor use as part of routine management duties.

### **Anticipated Impacts of Use**

The outcome of this research would result in better knowledge of our natural resources and improved methods to manage, monitor, and protect refuge resources. The anticipated impacts on the refuge associated with scientific and biological collections would be minimal. The loss of a small number of organisms or disturbance is likely in all research, but should not adversely affect the species or habitat as a whole. In general, research projects are developed to minimize disturbance to organisms and the surrounding environment. Scientific collections are regulated to ensure that only the smallest samples are taken to acquire needed information. Most research projects or biological collections are developed to address wildlife or forest management problems and also to provide base-line data to evaluate long-term changes of species abundance and distribution; therefore, this use should have general positive impacts.

### **Determination (Check One Below)**

- ☐ Use is Not Compatible  
☒ Use is Compatible with Following Stipulations

### **Stipulations Necessary to Ensure Compatibility**

Scientific research and biological collection would be evaluated and modifications to proposals would be made, when needed, prior to issuance of a special use permit to prevent or minimize disturbance to nesting or wintering waterfowl and the endangered red-cockaded woodpecker. The final decision to issue a permit to conduct research or collect biological organisms should be left to the discretion of the refuge manager.

Introduction of exotic plants or animals for research would not be permitted unless specific justification and provision for their control is adequately planned. Determination for introduction of exotics should be left to the discretion of the refuge manager.

Research projects involving large-scale habitat alterations to evaluate silviculture techniques would be allowed only when such treatments could be included as part of the normal forest management on the refuge. Determination for allowing this research would be left to the discretion of the refuge manager.

Research projects involving or affecting endangered species would be critically reviewed prior to issuance of a special use permit. A Section 7 Biological Evaluation would be conducted to determine any effects on threatened or endangered species.

### **Justification**

Scientific research and biological collections have been conducted on refuges since their inception. Annually, 10 to 15 projects are conducted on the refuge with no long-term impacts to the species studied or their environment. The basis for most management practices performed on refuges stems from research. In addition, long-term monitoring of many species (i.e., neotropical migratory birds) is necessary to evaluate population trends. The refuge consists of an array of unique habitats not readily located on private or state lands for such monitoring programs. In addition, these ecosystems represent especially important places to address wildlife and forestry management concerns. Moreover, they consist of certain microhabitats that contain rare or unusual organisms that can only be studied in their natural environment. Conservation and management of many organisms on the refuge and elsewhere will depend upon future research and biological collections.

**Mandatory 10- 15-Year Re-Evaluation Date:** \_\_\_\_\_

## Approval of Compatibility Determinations

This approval is for all compatibility determinations considered within the Comprehensive Conservation Plan for Noxubee National Wildlife Refuge. If one of the descriptive uses is considered for compatibility outside of the comprehensive conservation plan, the approval signature becomes part of that determination.

**Refuge Manager:**

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

**Regional Compatibility  
Coordinator:**

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

**Refuge Supervisor:**

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

**Regional Chief  
National Wildlife Refuge  
System**

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

## *Appendix G. Land Acquisition*

The Service acquires lands and interests in lands, such as easements and management rights, through leases or cooperative agreements consistent with legislation or other Congressional guidelines and Executive Orders, for the conservation of fish and wildlife and to provide wildlife-oriented public use for educational and recreational purposes.

These lands include national wildlife refuges, national fish hatcheries, research facilities, and other areas. The Service's policy is to acquire land from willing sellers, and only when other protective means, such as local zoning restrictions or regulations, are not appropriate, available, or effective. When land is needed to achieve fish and wildlife conservation objectives, the Service seeks to acquire the minimum interest necessary to reach those objectives. If fee title is required, the Service gives full consideration to extended use reservations, exchanges, or other alternatives that will lessen the impact on the owner and the community. Donations of desired lands or interests are encouraged.

The Service, like all federal agencies, has the power of eminent domain, which allows the use of condemnation to acquire lands and interests in lands for the public good. This power, however, requires Congressional approval and is seldom used. The Service usually acquires lands from willing sellers. In all fee title acquisition cases, the Service is required by law to offer 100 percent of the property's appraised market value, as set out in an approved appraisal that meets professional standards and federal requirements.

Planning for the acquisition of land, water, or other interests is initiated with the identification of a need to meet resource objectives that require a real property base. This draft comprehensive conservation plan proposes to protect additional habitat of up to 5,200 acres outside the refuge's current acquisition boundary. The acquisition of lands adjacent to Service-owned lands within the existing acquisition boundary and lands within the proposed northern expansion area would be given the highest priority.

The recommendations in this draft plan on the expansion of the refuge boundary define important and sensitive areas that could be protected and managed as part of the refuge system. During the review of the draft plan, the public will have an opportunity to respond by attending open houses, or by directing comments to the refuge manager before the final plan is approved.

Once the expanded acquisition boundary is approved and funds are available, the Service proceeds to contact all landowners within the boundary to determine if they are interested in selling their land. If the landowner expresses an interest in selling to the Service, a professional real estate appraiser will conduct an appraisal to determine the fair market value of the property. Once the value is determined, a meeting is held with the landowner and the Service presents its offer. If the landowner agrees with the offer, the purchase agreement is signed and the process of acquiring the land is set in motion.

Generally, the Service seeks to acquire the minimum interest necessary in the land to provide the level of protection needed to achieve management goals and needs.

The acquisition methods that could be used by the Service under the proposed action are described as follows:

### **Leases and Cooperative Agreements**

Potentially, the Service can protect and manage habitat through leases and cooperative agreements. Management control on privately owned lands could be obtained by entering into long-term renewable

leases or cooperative agreements with the landowners. Short-term leases can be used to protect or manage habitat until more secure land protection can be negotiated.

### **Conservation Easements**

Conservation easements give the Service the opportunity to manage lands for their fish and wildlife habitat values. Such management precludes all other uses that are incompatible with the Service's management objectives. Only land uses that would have minimal or no conflicts with the management objectives are retained by the landowner. In effect, the landowner transfers certain development rights to the Service for management purposes as specified in the easement.

Easements would likely be useful when: (1) most, but not all, of a private landowner's uses are compatible with the Service's management objectives, and (2) the current owner desires to retain ownership of the land and continue compatible uses under the terms set by the Service in the easement.

Land uses that are normally restricted under the terms of a conservation easement include:

- Development rights (agricultural, residential, etc.);
- Alteration of the area's natural topography;
- Uses adversely affecting the area's floral and faunal communities;
- Private hunting and fishing leases;
- Excessive public access and use; and
- Alteration of the natural water regime.

### **Fee Title Acquisition**

A fee title interest is normally acquired when (1) the area's fish and wildlife resources require permanent protection not otherwise assured; (2) land is needed for visitor use development; (3) a pending land use could adversely impact the area's resources; or (4) it is the most practical and economical way to assemble small tracts into a manageable unit.

Fee title acquisition conveys all ownership rights to the federal government and provides the best assurance of permanent resource protection. A fee title interest may be acquired by donation, exchange, transfer, or purchase.

All of the lands acquired at Noxubee Refuge over the last 10 years have been through timber-for-land exchanges. It is anticipated that this will continue to be the primary method of acquiring lands for the refuge, including the proposed expansion areas.

Lands acquired by the Service would be removed from the tax rolls. To offset the fiscal impact associated with removal of these lands from the public tax rolls, the Refuge Revenue Sharing Act of 1935, as amended in 1978, provides for payments in lieu of taxes. Revenue sharing payments for the parish would compare favorably with current tax rates. If fully funded, the revenue sharing rate is 1 percent of the fair market value of a property. Payment for acquired land is computed on whichever of the following formulas is greatest: (1) three-fourths of 1% of the fair market value of the lands acquired in fee title; (2) 25% of the net refuge receipts collected; or (3) 75 cents per acre of the lands acquired in fee title within the parish.

Lands subject to refuge revenue sharing payments are reappraised every 5 years. The appraisals set the fair market value of the land, based on the highest and best use. The appraised market value of the fee title lands within the refuge, and thus, the revenue sharing payments, would change over time in relation to the changing value of non-refuge lands.



The Service's proposed action (Alternative 2) would result in the acquisition of up to 5,200 acres of wildlife habitat as an expansion of the refuge, through the timber-for-land exchange program from willing landowners. The Service believes these are the minimum interests necessary to preserve and protect the fish and wildlife resources in the proposed area.

The private property has been prioritized for acquisition using the following criteria:

- Biological significance;
- Existing and potential threats;
- Significance of the area to refuge management and administration; and
- Existing commitments to purchase or protect land.

Two categories of land acquisition have been established, with the highest priority being the Priority I lands. A description of the lands within each of the two priority groups is given below. Figure 20 summarizes the Service's land protection priorities and proposed methods of acquisition. Figure 21 shows the locations of the project areas and their respective priority groups.

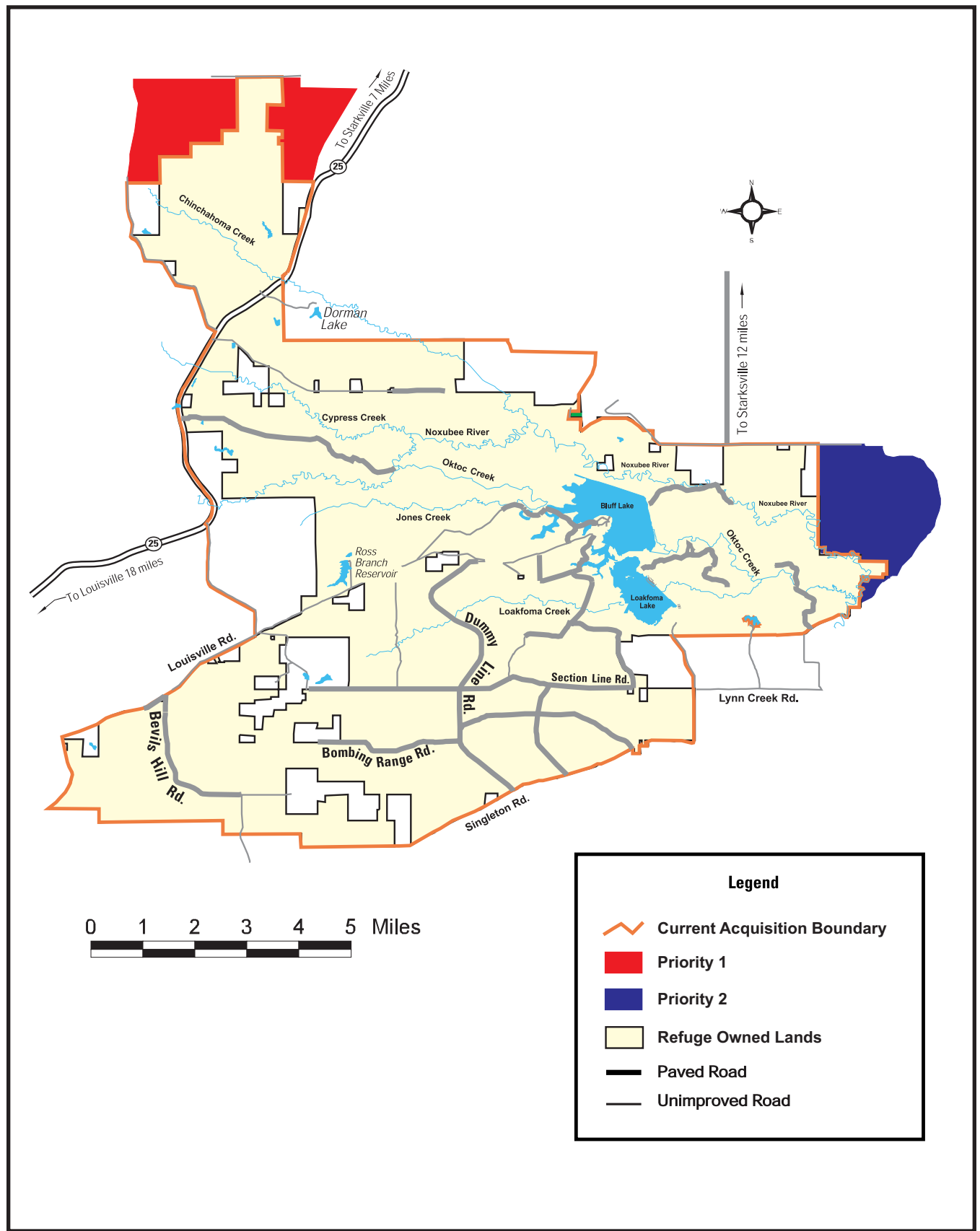
**Priority Group I** - Lands within this priority group would provide the opportunity to restore and protect pine habitats for the federally endangered red-cockaded woodpecker.

**Priority Group II** - Lands within this priority group are under the threat of development and refuge ownership would protect a section of the Noxubee River.

**Figure 20. Protection priorities for the proposed expansion at Noxubee National Wildlife Refuge and recommended methods of acquisition.**

Priority Group	No. of Landowners	Approx. Acreage	Type of Acquisition (minimum interest)
I	12	2,600	Lease, conservation easement, cooperative agreement, or fee title
II	18	2,500	Fee title, lease, conservation easement, or cooperative agreement

**Figure 21. Land Acquisition Priorities for the Proposed Expansion at Noxubee National Wildlife Refuge.**



# *Appendix H.*

## *Comments and Service Responses to the Draft Comprehensive Conservation Plan*

A part of the planning process was to solicit comments on a fully developed draft comprehensive conservation plan and environmental assessment. The document was made available for public comment for a 60-day period and an open house was held on June 26, 2003, 7- 9 p.m., at the Noxubee Conservation Center for the purpose of receiving comments. Media releases announced the event and invited anyone so desiring to submit written comments on the draft document to the Service. A total of 34 individuals attended the open house session and left numerous written comments. An additional 13 comments were received, including 10 by mail, 2 by telephone, and 1 by electronic mail. Each comment received, either in full text or summarized, is included in this appendix.

The following is a summary discussion of those comments, including the Service's response to each, grouped under the primary categories of Habitats, Fish and Wildlife Populations, Land Protection and Conservation, Education and Visitor Services, and Refuge Administration.

### **Habitats**

**Management of Pine and Pine/Hardwood Forests.** A variety of comments was received regarding management of the refuge's pine and pine/hardwood forests. These two forest types constitute about 55 percent of the refuge's total acreage, and provide key habitat for a variety of wildlife, most notably the red-cockaded woodpecker. Some of the comments included a desire to make sure that old pines are retained for the red-cockaded woodpecker; a desire to see even-aged management of pine stands continued, a desire for pine/hardwood forest types to be retained and not converted to pure pine, and there was a concern that using "operator-select" harvesting may degrade forests. Most of these comments came from individuals who were very familiar with refuge forest management programs, and two of the commenters were professional foresters.

**Service's Response.** The refuge's current Forest Management Plan was written in 1995, and with a central theme of providing adequate and long-term habitat for red-cockaded woodpeckers. The plan allows for regenerating approximately 1 percent of the pine and pine/hardwood areas each year, through either natural events such as storms or insect outbreaks, or through seed-tree regeneration cuts. Seed-tree cuts are a proven even-aged management technique that not only ensures adequate natural regeneration, but also provides some habitat diversity by way of the standing seed-trees.

Because these seed-tree cuts are always done in stands which are 50-60 years old, they remove acreage from an age class which is abnormally abundant on the refuge, and place it in younger-aged classes which are abnormally scarce. This approach is gradually pushing the refuge's pine forests towards a more even distribution of age classes, and doing so without harvesting any stands older than 60 years. This approach was designed to ensure both short- and long-term habitat for red-cockaded woodpeckers and related species.

The Forest Management Plan also explains that the pine/hardwood forest type is an important habitat and will be retained at current levels. This is accomplished primarily by planning seed-tree cuts so they include little or no pine/hardwood habitat. Furthermore, whenever pine/hardwood areas must be included

in a seed-tree cut, effort is made to ensure regeneration of the hardwood component as well as the pine component. Finally, another prime factor in maintaining pine/hardwood habitat is the exclusion of fire from such areas. The refuge's current fire management program actively works to keep fire out of these areas.

"Operator-select" timber harvesting is a technique occasionally used to thin overly dense pine stands. It involves a written contract developed between the refuge and a timber purchaser allowing the purchaser to harvest an established volume of timber from a specified stand. While the actual trees to be harvested are not physically marked, the contract contains rigorous language about which trees may be harvested, including specifications for species, diameter, relative health, spacing, etc. During the harvesting operation, refuge foresters inspect the harvest to ensure loggers are conforming to the contract specifications. Follow-up surveys are also done to ensure the appropriate trees are left on site. The refuge has used "operator-select" harvesting for several years, primarily in early "post" thinnings involving trees about 6-9 inches in diameter. In recent years a few "operator-select" sawtimber thinnings have been done as staff were unavailable to mark the trees to be harvested. Overall, the technique has saved hundreds of staff hours that would have otherwise been spent marking harvest trees, and so far there has been no apparent decline in tree quality. Because the technique appears to work well, its use will continue in these limited circumstances.

**Management of Hardwood Forests.** Two comments were received about hardwood management on the refuge. Hardwood forests (primarily bottomland hardwoods, plus a much smaller component of upland hardwoods) total about 15,000 acres on the refuge. They provide important habitat to a variety of wildlife including neotropical migratory birds, waterfowl, deer, turkey, and others. One comment expressed a desire to see more management of hardwood forests, especially in the sense of not allowing hardwood forests to become old and die. The second comment was a desire to see even-aged management of hardwoods.

**Service's Response.** In the early 1990s, the refuge stopped actively harvesting hardwood timber in even-aged blocks, as concern built over potential impacts to neotropical migratory birds. Since then, hardwood management has consisted largely of removing sweetgum to favor more desirable species such as oak, beech, and blackgum, along with occasional small patch clearcuts, most often associated with storm damage. The relative high amount of storm damage in recent years has regenerated a sufficient amount of hardwood acreage such that additional regeneration was unnecessary.

In recent years several studies have demonstrated that selective thinning and small regeneration cuts can improve habitat quality for neotropical migratory birds in hardwood forests, most likely because the effects mimic natural cycles of old-growth forests. Despite these studies, refuge management has refrained from initiating such practices on a large scale until the body of evidence promoting these practices is more established. In the meantime, management will continue on its present course.

**Improved Hydrologic Monitoring.** One comment received requested installation of a water gauge to monitor long-term changes in hydrology in the Noxubee River watershed. Land-use changes are occurring in the Noxubee watershed as urban development continues, additional highways are built, and shifts occur in farming and forestry practices. These land-use changes affect local hydrology, and ultimately affect the overall hydrology of the Noxubee River, Oktoc Creek, and other refuge waters. Such changes in frequency, duration, and amplitude of flooding can greatly impact bottomland hardwood forests and other floodplain habitats. Currently, the nearest water gauge monitoring these changes is located on the Noxubee River near Macon.

**Service Response:** To reflect this need to improve monitoring of long-term hydrology changes, a strategy was added (A.3.7) to Goal A stating "Work with U.S. Geological Survey to install a water gauge on the Noxubee River."

## Fish and Wildlife Populations

**Increased Management for Bobwhite Quail.** The most popular overall comment received (total of 8) involved concern for declining populations of bobwhite quail and a desire for increasing management of this species. A gradual decline in bobwhite quail populations is well documented in most of the Southeast. This decline is mostly attributed to habitat changes, as both farming and forestry practices have become more intensive, often eliminating old fields, overgrown fence rows, and similar brushy habitats needed by quail. At the same time, several other wildlife species such as loggerhead shrikes, indigo buntings, and cottontail rabbits, which also depend on early successional habitats, have experienced declines as well.

**Service Response:** While quail populations on lands adjacent to the refuge have decreased for the reasons above, the population on the refuge has fared better primarily due to the refuge's active burning program. To reflect this concern about quail populations, an additional strategy (B.2.3) was added under Goal B stating: "Identify and implement additional management activities to benefit bobwhite quail and other early successional wildlife species." As the refuge's current forest management program is already very conducive to quail, the most likely benefits can be gained by improving management of the refuge's field and grassland habitats.

## Land Protection and Conservation

**Expanded Acquisition Boundary.** The proposal to expand the refuge's acquisition boundary was the most popular topic at the open house meeting, primarily because some members of the public perceived an expanded acquisition boundary as a precursor to eminent domain actions. Surprisingly, very few written comments were received on the subject, perhaps because a lengthy discussion on the topic occurred at the open house. In that discussion, Service staff explained that a review of refuge and Service history demonstrates that such heavy-handed methods of land acquisition have never been used at Noxubee refuge, and only rarely used elsewhere. Furthermore, current federal law requires Congressional approval for the use of eminent domain authority, thus its use amongst all federal agencies has become extremely rare. The intention of the Service's current land acquisition program is to negotiate only with willing sellers, and always at fair market value. A lengthy appraisal and review process ensures these intentions are met.

**Ultimately, only two direct comments were received on the boundary expansion.** One came from a landowner whose property was in the expansion area, stated he was not in favor of the expansion. This commenter cited concerns that land in private ownership is more likely to move towards its "highest and best use as dictated by local market forces," while publicly owned land will not. He also questioned the actual value of habitats available in the expansion area. The other commenter indicated a desire to see the boundary expanded even further, in particular, that it should include a state-owned section 16 property which harbors red-cockaded woodpeckers.

**Service Response.** The mission of the National Wildlife Refuge System is to conserve wildlife species and their habitats for the benefit of present and future generations of Americans. Past history, both recent and long term, has demonstrated that refuge resources are threatened by development and land-use changes occurring outside the refuge boundary. The most valuable tool the refuge has to mitigate these outside forces is to maintain an active acquisition program. The proposed expansion areas have not only experienced increases in urban development and tract subdivision, they also contain several tracts which have recently been offered for sale to the refuge. Unfortunately, the former acquisition boundary precluded the refuge from purchasing them. Refuge plans are to finalize the expanded acquisition boundary as a step towards protecting refuge resources and the public use opportunities they support.



## Education and Visitor Services

**Recognize Butterfly Fauna as Watchable Wildlife.** One comment noted that the Xerces Fourth of July Butterfly Count had been held on the refuge annually since 1987, almost as long as the well-known Audubon Christmas Bird Count. The commenter asked that butterflies be considered under the objective for Wildlife Observation and Photography. Also, the commenter asked that butterflies be considered in the management of roadsides, fields, and prairies.

**Service Response.** The Xerces Butterfly Counts mentioned above demonstrated the high diversity of butterflies and moths present on the refuge, primarily due to the variety of available habitats. The 2000 year count yielded a total of 62 species, which was the highest of any count in the eastern United States. Similarly high numbers have been counted each year. To further recognize this high biological diversity and the attraction it holds for refuge visitors, a new strategy was added (D.3.3) to continue conducting these Xerces Butterfly Counts.

**Open Additional Roads to the Public.** Several comments were received at the open house requesting that additional refuge roads be opened to the public. Commenters often cited the fact that several of the closed roads were open 10 to 20 years ago, and some closures, such as Douglas Bluff Road, have occurred very recently. The reason most often cited for requesting the roads be opened was for the general pleasure of driving through different parts of the refuge, presumably for the scenic beauty and opportunity to see wildlife. The second most popular reason was to improve access to hunting.

**Service Response.** Over the past 30 years, additional roads have been closed for a variety of reasons. Many closures have resulted from administrative activities with which public entry is not compatible. Examples include the Dynamite Shed Road closed due to the storage of explosives and other refuge equipment; Goose Pen Road closed because of duck banding activity; and Douglas Bluff Road closed to provide a safe area (i.e., free of traffic and hunting) for children's environmental education programs. The Dickerson Arm Road was closed 10 years ago to prevent disturbance to the thousands of waterfowl utilizing Greentree Reservoirs 3 and 4, and also to decrease disturbance to deer and other wildlife which visitors view in the Goose Overlook field.

Despite these closures, the vast majority of refuge roads (more than 80 miles) remain open to public vehicle travel, and most of the closed roads remain open to foot, bicycle, and horseback travel. Public opinion on hunter access remains split, as refuge staff continually receive requests from hunters asking that individual roads be opened or closed. Obviously, there must be a balance between open and closed roads, and currently that balance seems to be met.

## Cultural Resources

**Expand Partnership with Mississippi State University's Department of Anthropology.** Two faculty members from Mississippi State University's Department of Anthropology suggested an expansion of the existing partnership between the refuge and their department. A basic partnership has existed since 2002, when a Memorandum of Understanding was developed to allow an archaeology student intern to work on the refuge.

**Service Response.** Most archaeological investigations on the refuge have been initiated by construction or seismic survey projects which are required to comply with cultural resource protection laws. Each of these investigations has indicated a wealth of cultural resources present on the refuge. Further investigation and documentation of these resources would not only allow for better planning of future construction and seismic projects, they would also increase the overall knowledge of human history in east Mississippi. To this end, a strategy (E.4.5) was added to expand the existing partnership with Mississippi State University's Department of Anthropology to include more extensive surveys and research, and potentially the sponsorship of a graduate intern on the refuge.



## **Refuge Administration**

**Additional Law Enforcement Staff.** Two comments were received requesting additional law enforcement staffing. One comment came from an adjacent landowner concerned about refuge visitors trespassing onto his land. The other comment came from a regular refuge visitor.

**Service Response.** On a nationwide basis, refuge law enforcement programs are moving towards less reliance on collateral officers, and more reliance on full-time officers. Currently, the refuge has one full-time officer and two collaterals. Future policies may call for an end to collateral officers, as emphasis is placed on improving the readiness and professionalism of law enforcement officers throughout the refuge system. Noxubee refuge has an existing RONS project (#03000) which calls for an additional full-time law enforcement officer to be added to the staff.



Natural Resources Conservation Service  
704 Taylor Street  
Starkville, MS 39759

June 12, 2003

Noxubee National Wildlife Refuge  
Attention: Larry Williams  
224 Office Road  
Brooksville, MS 39739

Dear Mr. Williams,

Thank you for the opportunity to comment on your Draft Comprehensive Conservation Plan and Environmental Assessment being developed for the Noxubee Refuge. I strongly support the National Wildlife Refuge system and commend the Fish and Wildlife Service for the outstanding job you are doing to balance natural resource management objectives with public use and enjoyment of these unique lands.

I have read through your Draft Plan and again commend the Noxubee Refuge Staff for all the time and effort that has gone into developing an impressive document. It is my opinion that your proposed Alternative 2 for future management represents a plan that will allow for achieving resource management goals and providing for broad public use. I am happy to see the Service is supporting this alternative as its choice for future action.

There is one major item I would like to recommend for consideration and inclusion in your plan. I offer this suggestion from my knowledge of interest and concerns among local landowners, sportsmen, and wildlife groups, and from a personal standpoint as both a professional natural resource manager and a sportsman and Refuge user.

**Include Quail as a major emphasis species for management.**

In reviewing your plan, I did not see specific emphasis given to quail as a species targeted for management. Here are some key reasons I feel quail should have major emphasis status in your plan:

- (1) In the South, quail has traditionally been regarded a premier wild game species and has significant importance both to southern culture and as an indicator species to the overall health of wildlife habitat.
- (2) Managing for quail and managing for Red Cockaded Woodpecker, one of your high priority endangered species, goes hand in hand, with both species benefiting from grassy, open understory in upland pine stands.
- (3) The Noxubee Refuge lands lend themselves ideally to intensive development for quail habitat with a high percentage of upland pine stands, large acreage of bottomland hardwoods, and interspersed open field areas.

The Natural Resources Conservation Service provides leadership in a partnership effort to help people conserve, maintain, and improve our natural resources and environment.

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Natural Resources Conservation Service  
704 Taylor Street  
Starkville, MS 39759

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Page 2 – Noxubee Wildlife Refuge – Review of Draft Conservation Plan

- (4) On-going research at the Mississippi State University's College of Forest Resources and Wildlife Research Center is available to assist with this specific objective. Their research shows habitat for quail in upland pine stands can be improved tremendously by adding chemical hardwood brush control as a companion practice to Prescribed Burning (a practice already being done on the Refuge). This research has demonstrated the highly effective and safe use of Imazapyr (Arsenal AC) in accomplishing "quality vegetative management". Use of this practice, along with woodland disking and fertilization can create high quality habitat that will benefit practically all upland game and non-game species on the Refuge.
- (5) Research at Mississippi State University has documented the current rapid decline in quail populations across the South and provides strong evidence and support for emphasizing quail habitat management.
- (6) The Noxubee Refuge can play an important role in promoting the adoption of quality habitat management among private landowners by providing a working demonstration for these management techniques.
- (7) There is a high level of local support among sportsmen and organized groups for a quail management initiative. An active local chapter of Quail Unlimited regularly supports habitat development activities on the Refuge and throughout Oktibbeha County.
- (8) And finally, the Noxubee Refuge is a part of the South. It's lands were at one time home to numerous farmsteads where interspersed land uses of crop production, pastures, and woodlots provided the ideal habitat where quail and other southern wildlife species flourished. It seems only natural that specific management for quail should be a key emphasis item in your plan.

I also want to voice my support for continued public hunting on the Refuge. In regard to quail hunting, I support a more restrictive hunting period, possibly January through February, with limited permitted hunting. This would provide better opportunity for quality hunts among all participants. I also support continuation of the present waterfowl hunting format and recommend hunting be allowed on GTR #2 to provide additional hunting opportunities.

The emphasis being placed on Environmental Education at the Refuge is outstanding and should continue. I also feel the recent addition of structures and programs for non-consumptive users is great and efforts should continue in this area. The Noxubee Refuge is a local treasure and its wealth of natural resources should be shared by everyone.

The Natural Resources Conservation Service provides leadership in a partnership effort to help people conserve, maintain, and improve our natural resources and environment.

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Natural Resources Conservation Service  
704 Taylor Street  
Starkville, MS 39759

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Page 3 – Noxubee Wildlife Refuge – Review of Draft Conservation Plan

Thanks again for allowing me to offer comments for consideration in developing your final Comprehensive Conservation plan.

Sincerely,

A handwritten signature in cursive script that reads "Tony Thompson".

Tony Thompson  
District Conservationist  
Starkville Field Office

The Natural Resources Conservation Service provides leadership in a partnership effort to help people conserve, maintain, and improve our natural resources and environment.

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909 Evergreen Street  
Starkville, MS 39759  
July 21, 2003

Mr. Jim Tisdale, Manager  
Noxubee National Wildlife Refuge  
224 Office Road  
Brooksville, MS 39739

Dear Jim:

The following are my comments on the Draft Comprehensive Conservation Plan and Environmental Assessment for the Noxubee National Wildlife Refuge. These comments follow pages in the book and are not in order of importance.

Page 13, last paragraph: Please include a list of bird species in Appendix D.

Page 14: Bobwhite quail are not "fairly abundant" on the refuge. The statement should be simply "are" on the refuge. On counts, we have a very difficult time finding quail; it is much easier to find turkey!

Page 14: The rookery contains breeding white ibis. They should be listed as being in the cattle egret rookery.

Page 15: Peregrine falcons are NOT winter residents of the refuge. They are seen in migration (mostly fall).

Page 25: While cogon grass is listed in other places, I believe it also should be listed on page 25.

Page 32: What does the statement that "management of RCW comes at the expense of other species" mean? I can think only that it might impact flying squirrels; management may impact timber harvest (although I don't think it does). So what does this mean? RCW management benefits quail, Bachman sparrows (if the burn isn't during their nesting season), turkey, deer. What harm does RCW management do? I truly question this and request that it be removed. RCW management may impact refuge personnel and staffing (i.e. economics). Yet, isn't that your mandate--to manage for endangered species. I see RCW management as your number one priority on this refuge. I believe that RCW management deserves and should be getting attention from the refuge manager. Then, this attention will translate down to all personnel that RCWs are an important resource at Noxubee.

Page 33: I believe that points one and two of Conservation Priorities should be reversed. While RCWs are mentioned in the paragraph, endangered species should come before migratory birds in

Page 1

the bullets. I believe shore bird habitat management should also be added--unless they are lumped under "migratory" birds. Noxubee's moist soil areas, rivers, and lakes could contribute significant habitat if managed correctly.

Page 41: Under Strategies: Regeneration of 1 percent of pine does not allow for 120 year old pine trees. Somehow some old pine trees need to remain. Where is this addressed? When can events like windstorms and tornadoes figure into the 1 percent so that older trees can remain? The 2002 tornado that crossed 8 miles of the refuge ought to be figured into the "thinning" formula?

Page 45: I was glad to see Pete's Slough and Douglas Bluff mentioned as natural areas. These should be designated as such and protected for their unique species. Please make adding these a priority.

Page 46: If goal B is to be reached, a second biologist must be added to the staff. There is simply too much for one biologist to handle now; there is no way that one individual can possibly do all the work that is required now.

Page 47: Bobwhite quail should be mentioned on this page.

Page 49 and 50: The proposed acquisition boundary should include the RCW cluster on the Noxubee county 16 Section land joining the south side of the refuge. Some land swap should be initiated to include those acres within the protection and ownership of the refuge. The Mississippi Secretary of State has been successful in working with land swaps for conservation. He should be contacted and encouraged to help the refuge acquire the RCW cluster. In fact, acquiring all that 16-section land south of the refuge would visually enhance the southern entrance to the refuge and remove a "pocket" that restricts straight boundaries. Surely there is another section in Noxubee county that the school would rather have. Perhaps some timber company would want to have a tax write-off or contribution for publicity. These areas need to be explored. Perhaps Friends of Noxubee or Audubon could help with this initiative. Regardless, that cluster/area needs to be in the "acquisition" area.

Page 50: The expansion area is north of Highway 25 rather than Highway 27 (4th line down).

Page 56: The Xerces Fourth of July Butterfly Count has been held at the refuge every year since 1987 and is providing valuable scientific information. Butterflies should be included under Wildlife observation and Photography. And, the butterfly count is just as important as the Christmas Bird Count. More importantly, the management of roadsides, fields, and the prairie need to be conducted to enhance butterfly survival. That's a management decision that needs to be addressed, too. A butterfly list would also be useful in Appendix D.

Page 72: I see wildlife population monitoring will be emphasized (i.e. RCWs). Yet, I learned this year that RCWs will not be color banded anymore. I cannot begin to tell you the information that will be lost because individual birds will not be identifiable. Counting "how many birds" you see



does not give information on survivability, sex, movements of bird, etc. All of that is critical information in monitoring RCWs. I cannot comprehend how banding 200 wood ducks is more important than banding RCWs. I believe that wood duck effort can not and could not be justified if you fail to band RCWs nestlings.

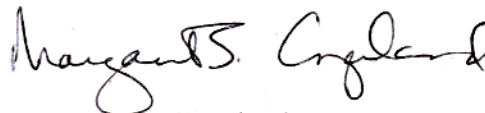
I recognize all too well the alternatives devised to justify the plan. Alternative 3 favors more logging and less RCW acreage. I cannot favor that. Alternative 1 favors "things like they are". I cannot favor that. What other choice is there? One has to support Alternative 2.

Page 167: I would like to see the 16 Section land listed as a Priority acquisition boundary.

Thank you for allowing comments on the plan. I appreciate the hard work and long hours that it took to prepare the document.

I look forward to continuing to volunteer at the refuge and particularly look forward to a time when RCW numbers are again on the up-swing.

Sincerely,

A handwritten signature in cursive script, reading "Margaret S. Copeland". The signature is written in dark ink and is positioned above the printed name.

Margaret S. Copeland



# Mississippi State UNIVERSITY

Department of Sociology, Anthropology, and Social Work

6/18/03

Drs. Evan Peacock and Janet Rafferty  
Department of Sociology, Anthropology, and Social Work  
Mississippi State University  
P.O. Box C  
Mississippi State, MS 39762

Larry Williams  
U.S. Fish and Wildlife Service  
224 Office Road  
Brooksville, MS 39379

Dear Mr. Williams,

Thank you for the chance to comment on the Draft Comprehensive Conservation Plan and Environmental Assessment for the Noxubee Wildlife Refuge. We would like to congratulate the planning team for assembling a very fine piece of work. A lot of effort and dedication are apparent in the draft plan, and we hope that our comments may be of some use during revision for the final version. We will limit our comments and suggestions to our particular area of expertise, cultural resources.

A few minor corrections should be made:

p. 31, first paragraph – “The earliest known site is located on the shore of Bluff Lake and dates back to the Gulf Formation through Miller periods (1000 B.C. – 1100 A.D.)...Although the Choctaw Indians inhabited this part of Mississippi at the time of first European contact, this site actually predates Choctaw culture. Numerous other Native American sites occur throughout the refuge, many of which are from the Choctaw culture.”

There are several incorrect statements or errors in this paragraph:

- 1) The earliest known site on the refuge is 22NO557, recorded by Rafferty in her 1979 survey report. Site 22NO557, located near Oktoc Creek, produced artifacts dating to the Early Archaic period, ca. 9000 – 7000 B.C.
- 2) “Gulf Formation” should be “Gulf Formational”.

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Sociology and Social Work (662) 325-2495 - Anthropology (662) 325-2013 - FAX (662) 325-4564  
Internet: Sociology@Soc.MsState.Edu

- 3) The Miller periods ended at about A.D. 1000, not 1100.
- 4) The Choctaw Indians did not exist as a tribe at the time of first European contact. There is excellent evidence to show that the Choctaw formed as a result of that contact, as remnants of other tribes decimated by introduced diseases came together to form a new political and ethnic body. This is clearly explained and substantiated in Dr. Patricia Galloway's book, *Choctaw Genesis 1500-1700* (University of Nebraska Press, 1995).
- 5) No sites have been found on the refuge that can be assigned to the "Choctaw culture." Such equations of artifacts and ethnic groups are always shaky, as artifact styles can easily transgress recognized ethnic boundaries. In this particular case, no site has been recorded on the refuge that has produced the kinds of artifacts, such as combed pottery, trade beads, or gunflints that might arguably be Choctaw. In fact, to the best of our knowledge no Historic period aboriginal artifacts of any kind have yet been reported from the refuge. The Choctaw Council House is on the refuge, but its exact location has not been established through archaeological investigation.

On p.56, 5<sup>th</sup> paragraph – "National Archaeology Week" should be "Mississippi Archaeology Month".

We have a few more general comments. **We strongly recommend the adoption of Alternative 2 or Alternative 3 for the refuge.** Alternative 1, the No Action alternative, is simply insufficient where compliance with national historic preservation legislation is concerned. You also are absolutely correct in stressing the positive impact of an archaeologist on the objectives listed under Protection, and Management and Education. Your Strategy E.3.1, to hire an archaeologist, is well reasoned and, in our opinion, addresses an absolutely critical need on several fronts.

We also would like to emphasize that we are ready and willing to work as partners with you as you move forward with improving your cultural resources program. You have mentioned a general partnership with Mississippi State University in various places. We would be pleased to have you specifically include us as potential partners, under "Cultural Resource Partnerships," for example (p. 112, Objective E.4). We are very interested in having a graduate intern placed under the supervision of a refuge archaeologist on a regular basis, and there are many other ways in which we can work cooperatively to help insure the success of your cultural resources program while augmenting the educational experience of our students in the Anthropology program at MSU. We could, for example, help to construct databases, compile bibliographies of pertinent literature and reference material, conduct Phase II testing of sites considered to be potentially eligible for inclusion on the National Register of Historic Places, design interpretive displays, conduct surveys, wash and catalog artifacts, and so on. We also are developing a remote sensing program designed to provide rapid assessment of sites in terms of significance (e.g., by locating and mapping subsurface features using magnetometry, conductivity, and other imaging technology), a program that could be of great benefit to the refuge on a project-by-project basis. Such technology can be



used in other ways as well, such as detecting unmarked graves in cemeteries on the refuge. We are unable to commit to such activities in any long-term fashion in the absence of a local refuge archaeologist, as the logistics of supervision, task assignment, oversight, and evaluation are simply too complex to be carried out at long distance. The details of such cooperative ventures can be worked out once you have an archaeologist in place, but we hope that you will consider us your partner in such endeavors. You should feel free to make specific mention of the Anthropology program at MSU in this regard.

Thank you again for the chance to comment. We greatly appreciate the efforts that you have made where cultural resources are concerned, and we hope that you will continue to show leadership on this issue by adopting Alternative 2 or Alternative 3. Please feel free to contact either of us if we may be of further assistance in any way.

Sincerely,



Dr. Evan Peacock



Dr. Janet Rafferty

July 17, 2003

Mr. Larry Williams, Asst. Mgr.  
Noxubee Wildlife Refuge  
224 Office Rd  
Brooksville, Ms 39379

Dear Mr. Williams:

Since I was not able to attend the Public meeting on 26 June 2003, please accept the following as my comments concerning the Draft Comprehensive Conservation Plan I recently received. These are essentially the same as my comments to you by phone earlier with some additional thoughts included.

- I. **Past and Present Use:** First, let me express my appreciation for the works you and your staff have done to improve facilities and programs at the Refuge in recent years. Certainly it is a valuable community asset that has provided much enjoyment to many people. The recent youth hunts and fishing rodeos you have sponsored are important to the future of our young people and their appreciation of the outdoors. However, when you recently drained and cleared-out Loakfoma Lake, you converted a pleasant, natural fishing lake into a barren, water-holding pond.
- II. **Proposed Future Mission:** The draft plan seems to emphasize improved access to the Refuge facilities for handicapped people and the general public. This will result in diminished recreational opportunities for every one unless corresponding improvements are made. Although hunting and fishing are the first two of six priority activities identified (pg. 140), no mention is made of any intent to improve or expand these resources. Also no mention is made of the general waterfowl hunt the Refuge personnel have been promising for the past few years. The Plan states that this cannot take place until numbers exceed pre-1975 levels (pg. 154), but give no authority for this.
- III. **Proposed Land Acquisition:** I am generally opposed to any additional conversion of land from private to public ownership. Land in private ownership will move toward its highest and best use as dictated by local market forces; while publicly owned land is locked into a non-economic use dictated by bureaucratic forces far removed from local influences. Since my home farm is located in the proposed acquisition area, I am certainly opposed to approval of these plans for expansion of Noxubee Refuge. The Draft Plan seeks to justify acquisition of the Northern area where my farm is located as being needed to expand the habitat of the Red Cockaded Woodpecker. This area is mostly open pasture - hay land or planted pine plantations, certainly not the mature old-growth pine needed. Anyway, I seriously question our tax money being used to

preserve a little bird few people have ever seen or ever will see, and which has no economic benefit to society.

- IV. **Draft Plan Document:** A serious problem with the Plan concerns the identification of the land area affected. Most land management analyses identify the affected area by use of rectangular survey descriptions. Yet, nowhere in this draft is there any mention of section, range, township data that would give a unique description of the area. The Plan depends on map figures to identify and describe the Refuge as it presently exists and the proposed acquisitions. This would probably be adequate for the purposes of the document if the maps were accurate and complete. However, on map figures 4 and 6, Ennis Road is identified as Longview Road, and Longview Road is **not** identified at all. On map figure 8 which shows the proposed acquisition areas, neither Ennis Road nor Longview Road are identified. This is a serious omission since Ennis Road is the western boundary and Longview Road the northern boundary of the north acquisition areas. Similar errors may well occur in other areas of these map figures with which I am not as familiar.
- V. **Summary:** Noxubee Wildlife Refuge is a valuable resource for this area. It offers many recreational and educational opportunities for residents and visitors, and the current staff seems committed to expanding these opportunities. I feel that any future changes should be designed to benefit the maximum number of people, primarily hunters and fishermen as indicated by current use numbers. I do not feel that the Draft Plan has made a sufficient case for further expansion of Noxubee Refuge by additional land acquisition. This is particularly true in light of the errors and omissions noted in map figures 4,6,and 8. I hope these were honest mistakes and not a deliberate attempt to confuse and mislead those landowners who would be affected by the proposed acquisition. Again, I oppose any further expansion of Noxubee Refuge and request that approval of land acquisition be denied.

Sincerely,



Mr. James H. Simpson





***Quail Unlimited, Inc.***  
***Oktibbeha County Chapter***  
***First Place Winner***  
***2002***  
***National Habitat Award***  
***(Div. 3)***

***P. O. Box 1143***  
***Starkville, MS 39760***  
***June 12, 2003***

***Mr. Larry Williams***  
***Assistant Manager***  
***Noxubee National Wildlife Refuge***  
***224 Office Road***  
***Brooksville MS 39739***

***Dear Larry,***

***I wish to comment on your Draft Conservation Plan and Environmental Assessment being developed for the Noxubee National Wildlife Refuge. As you know I am a friend of the Noxubee Refuge. For the last 10 years, we have had a Cooperative Agreement with you to enhance the habitat for quail and other related species on the Refuge. You have done this voluntarily and in good faith even though you were not obligated to do so by the previous management focus of the Refuge. It is my view that by our Chapter and the Refuge leadership jointly focusing on quail that great benefits have accrued. I believe there is a stable Quail population on the Refuge. This is truly remarkable in view of the decline in quail numbers across the Southeastern United States.***

***It is my view that the time is right to place major emphasis on management of quail on the Refuge. As you know, the 2002 Farm Bill has strong language in it in support of restoring wildlife habitat favorable for quail. ( Senator Cochran had a major role in this being placed in the Farm Bill. He is a great Conservationist.) What is needed at this time to encourage private landowners to make use of the Farm Bill funds are***



# *Quail Unlimited, Inc.*

*Oktibbeha County Chapter*

*First Place Winner*

*2002*

*National Habitat Award*

*(Div. 3)*

*valid demonstrations in varied wildlife habitats. The Refuge is clearly one place that this can be done.*

*The Oktibbeha County Chapter of Quail Unlimited is grateful for you previous support and we look forward to even greater things in the future.*

*Sincerely yours,*

A handwritten signature in cursive script that reads 'Ed'.

*Ed Lloyd  
Chapter Chairman*



MISSISSIPPI  
DEPARTMENT OF WILDLIFE, FISHERIES AND PARKS

SAM POLLES, Ph.D.  
Executive Director

June 23, 2003

Noxubee National Wildlife Refuge  
Attn: Larry Williams  
224 Office Rd.  
Brooksville, MS 39739

Mr. Williams,

Thank you for the opportunity to review the Draft Comprehensive Conservation Plan and Environmental Assessment for Noxubee National Wildlife Refuge (NNWR). Section A of Chapter 1 discusses the relationship between the NNWR and our agency. From my perspective, our working relationship has been excellent over the years, and we appreciate the significant interagency cooperation which can be seen in planning efforts, annual hunt coordination, and off-refuge partnerships such as the work we have accomplished together at Trim Cane WMA.

Clearly, there is much to be proud of in reviewing the work that has been accomplished at NNWR. This draft plan does an excellent job of describing the refuge and the significant past accomplishments there, while clearly outlining a vision for future management direction including alternatives to the proposed approach. We found the draft to be well written and very informative.

Regarding hunting opportunities on NNWR, we were excited about the inclusion of waterfowl hunting during recent years, and were encouraged that the plan indicates there could be potential to expand these opportunities. Concerning the management direction of resident wildlife species, we would like to see the plan provide some insight into your vision for impacting northern bobwhite quail on NNWR. Many of your current and proposed management practices have the potential to benefit this important game species. Given the long-term decline of this bird, and the emphasis state and federal conservation groups have placed on bobwhite population recovery, we would like to see the species addressed more specifically in your plan.

The plan suggests that there will considerable opportunity for continued dialog and input into the planning process as you move forward. Let me suggest that Major Dave Godwin of our Wildlife Technical Staff serve as a liaison between NNWR and our agency during this process. Maj. Godwin works from our office at MSU, and has worked with your staff on other projects in the past. He can be contacted by phone at 662-325-5119.

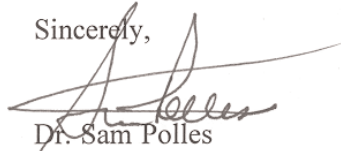
1505 Eastover Drive • Jackson, Mississippi 39211-6374 • (601) 432-2400

June 23, 2003

Page Two

Again, thank you for the opportunity to review this document and provide input. If I can provide additional assistance, feel free to contact me at 601-432-2000.

Sincerely,

A handwritten signature in dark ink, appearing to read "Dr. Sam Polles", written over a horizontal line.

Dr. Sam Polles

Executive Director, MDWFP



**Jim Tisdale**

06/04/03 11:08 AM

To: Larry Williams/R4/FWS/DOI@FWS  
cc:  
Subject: suggestion

----- Forwarded by Jim Tisdale/R4/FWS/DOI on 06/04/03 09:08 AM -----



**Rick Kaminski**  
<[rkaminski@CFR.MsState.Edu](mailto:rkaminski@CFR.MsState.Edu)>

06/04/03 06:35 AM

To: "jim\_tisdale@fws.gov" <jim\_tisdale@fws.gov>  
cc:  
Subject: suggestion

Jim

I've been reading and enjoying the draft conservation plan for Noxubee NWR. I have a suggestion. I suggest a need exists to install an accurate water-level gauge (perhaps USGS quality) in the Noxubee River on the bridge along the main road entering the Refuge. As you know with the 'clearing of Starkville' and modification of watersheds over the past 20 years, the hydrology of the Noxubee Bottoms has changed markedly. Frequency, amplitude, and duration of flooding are greatly increased. The river gauge at Macon is too far away to give an accurate picture of depth, extent, and distribution of flooding on the Refuge. Thus, I think there's ample justification to have a river gauge installed on the Refuge.

As I continue reading the Plan, I'll provide my thoughts. Thank you for listening.

Rick

Richard M. Kaminski

Department of Wildlife and Fisheries

Box 9690

Mississippi State, MS 39762

[rkaminski@cfr.msstate.edu](mailto:rkaminski@cfr.msstate.edu)

662.325.2623

**U.S. Government  
MEMORANDUM**

Date: June 4, 2003

From: Supervisory Wildlife Biologist, Migratory Bird Office, FWS, Jackson, MS

Subject: Comments on the Noxubee NWR CCP and EA

To: Deputy Refuge Manager, Noxubee NWR, FWS, Brooksville, MS

I read the draft Comprehensive Conservation Plan for Noxubee NWR and found it to be an excellent document, including an incredible amount of valuable information relating to management of the refuge. The Plan clearly demonstrates the importance of the refuge to wildlife and to the community. You are to be commended.

The following comments are offered for your consideration:

Page 11, **Refuge History**, paragraph 1, last sentence. I do not understand what is meant by "... and eliminating land requested by the Soil Conservation Service."

Page 22, *Fields*, paragraph 2. It seems that paragraph 2, which discusses greentree reservoirs, should be moved to the next section, entitled *Waterfowl Impoundments*.

Page 28, *Figure 7*. I was curious how you project a nearly 2-fold increase in public use at Noxubee NWR during the 5-year period from 2010 to 2015? A similar percentage increase was projected to occur during a 10-year period from 2000 to 2010.

Page 41, *Objective A.2 Hardwood Forests*, paragraph 3, last word. "reproduction" should be "production."

Page 41, *Objective A.2 Hardwood Forests*. Your stated objective is to maintain species diversity and increase mast production and regeneration of mast producing species by following your current Forest Management Plan, which focuses on emphasizing older-age classes that support late successional habitat for migratory birds and resident wildlife. Your discussion is good. It addresses the various age classes that are required by the diversity of migratory birds using the refuge. I have attached a copy of "General Recommendations for Hardwood Forest Management to Improve Wildlife Habitat in the Lower Mississippi River Valley" (copy attached) for your consideration and application during your next review/update of the Forest Management Plan. Although Noxubee NWR is not located in the LMV, I think that you will find these guidelines applicable and suitable for managing hardwood forests to meet refuge objectives for migratory birds.



Page 53, Objective D.1 Hunting. Hunting will likely be challenged more and more on refuges. I would add a sentence referencing hunting as a priority activity on refuges according to the National Wildlife Refuge System Improvement Act of 1997.

Page 55, Objective D.2 Fishing. If you work with the Mississippi Department of Wildlife, Fisheries, and Parks in managing your fishery resources, I would add them as a partner in your discussion and strategies.

Page 57, Objective D.4 Interpretation. I suggest that you add a strategy to “continue the refuge newsletter.” It is a very informative and educational way to reach a lot of refuge users.

Good job. Please call if you have any questions.

A handwritten signature in black ink, appearing to read "Robert W. Smith", with a long, sweeping horizontal line extending to the right.

Attachment



**NATIONAL RIFLE ASSOCIATION OF AMERICA**

**11250 Waples Mill Road  
Fairfax, VA 22030**

**Education & Training Division  
Hunter Services Department**

**Administration (703) 267-1500  
Fax (703) 267-3999**

May 21, 2003

Land Use Planning  
Noxubee National Wildlife Refuge  
224 Office Road  
Brooksville, MS 39739

Planning Staff:

The National Rifle Association is an organization of some 4 million members. Over 2 million are hunters and practically all are outdoors persons. We care about and appreciate the natural resource values and outdoor recreation opportunities made available in the National Wildlife Refuge System.

I have reviewed the Draft Comprehensive Conservation Plan and Environmental Assessment prepared for the Noxubee National Wildlife Refuge. While it is difficult to develop specific comments without having spent some time on the ground, the following general comments are offered.

The "Vision" statement on page 39 is excellent. It provides the public with a clear, concise statement of the management and development direction planned for the refuge.

We commend the determination of refuge staff to continue the use of prescribed burns and fire management to achieve resource management objectives and to reduce the threat of major wild fire impacts. Attention to the serious issue of exotic plants is most critical in ecosystems represented on the refuge. Finally, the commitment to hunting and fishing, as legitimate public uses of refuge resources is appreciated.

Thank you for the opportunity to participate in the land use planning process on the Noxubee.

Sincerely,

Billy R. Templeton  
Wildlife Management Specialist



# Mississippi Department of Archives and History

## Historic Preservation Division

PO Box 571 • Jackson, MS 39205-0571 • 601 / 359-6940 • Fax 601 / 359-6955 • [mdah.state.ms.us](http://mdah.state.ms.us)

June 9, 2003

Mr. Larry Williams  
U. S. Fish and Wildlife Service  
224 Office Road  
Brooksville, Mississippi 39379

Dear Mr. Williams:

RE: Noxubee National Wildlife Refuge, Draft Comprehensive Conservation Plan and Environmental Assessment

We have reviewed the Draft Comprehensive Conservation Plan referenced above. We support the plan as it pertains to cultural resources. We especially support the establishment of a permanent archaeologist position at the Refuge to implement a comprehensive CRM program and the proposed comprehensive archaeological survey.

Thank you for providing the draft plan to us for review. If you have any questions or need additional information, please contact Cliff Jenkins at 601-359-6940.

Sincerely,

Thomas H. Waggener  
Review and Compliance Officer



MISSISSIPPI  
DEPARTMENT OF WILDLIFE, FISHERIES AND PARKS

SAM POLLES, Ph.D.  
Executive Director

MEMO

TO: Larry Williams, USFWS, Noxubee Refuge  
FROM: Dave Godwin, MDWFP *Dave Godwin*  
RE: Noxubee NWR Plan  
DATE: 6/4/03

Larry,

Thanks for the opportunity to review the draft Comprehensive Conservation Plan and Environmental Assessment for the Noxubee National Wildlife Refuge (NWR). The plan is well written and provides an excellent vision for your agency's direction for management of this refuge.

One critical comment, I was surprised at the lack of information concerning management for northern bobwhites on Noxubee NWR. I understand that the service steers away from single-species management on the refuge system. However, given the regional concern raised by state and federal conservation interests regarding the 30-year decline in bobwhite populations, your staff's relationship with local quail interests (e.g., local Quail Unlimited - QU - Chapter, etc.), and the support of past research efforts demonstrating a positive relationship between northern bobwhites on Noxubee NWR and management efforts to benefit Red-Cockaded Woodpeckers (RCW) on the refuge, I would have expected some language in the plan outlining your vision for future management efforts that would directly or indirectly impact this important wildlife resource.

Currently, your burning program, the RCW work, cooperative work with QU, and other factors are benefitting the bobwhite population on Noxubee NWR to various degrees. I believe additional opportunities exist to further enhance bobwhite habitat on Noxubee NWR, and would have liked to see some text in the plan that addresses this species of concern directly.

Again, I thank you for the opportunity to comment on this plan, and applaud the efforts of the refuge staff in this planning effort and for encouraging this input into the process. If I can provide additional assistance, please contact me at anytime (662-325-5119).

