DRAFT COMPREHENSIVE CONSERVATION PLAN AND ENVIRONMENTAL ASSESSMENT FOR SAM D. HAMILTON NOXUBEE NATIONAL WILDLIFE REFUGE OKTIBBEHA, WINSTON, AND NOXUBEE COUNTIES, MISSISSIPPI

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U.S. Department of the Interior
Fish and Wildlife Service
Southeast Region
Atlanta, Georgia
August 2014

TABLE OF CONTENTS

SECTION A. DRAFT COMPREHENSIVE CONSERVATION PLAN

I. BACKGROUND 1

Introduction 1
Purpose And Need For The CCP 1
Fish and Wildlife Service 1
National Wildlife Refuge System 2
Legal and Policy Context 4
National and International Conservation Plans and Initiatives 5
Relationship to State Wildlife Agency 8

II. REFUGE OVERVIEW 11

Introduction 11
Refuge History and Purpose 11
Special Designations 18
Ecosystem Context 20
Regional Conservation Plans and Initiatives 23
Ecological Threats and Problems 23
Physical Resources 23
Climate 23
Geology and Topography 25
Soils 25
Hydrology 28
Air Quality 30
Biological Resources 32
Habitat 32
Wildlife 40
Cultural Resources 50
Socioeconomic Environment 51
Refuge Administration and Management 54
Land Protection and Conservation 54
Economy, Recreation, and Tourism 54
Visitor Services 55
Personnel, Operations, and Maintenance 60

III. PLAN DEVELOPMENT 63

Summary of Issues, Concerns, and Opportunities 64
Fish and Wildlife Population Management 65
Habitat Management 66
Resource Protection 68
Visitor Services 69
Refuge Administration 69
Wilderness Review 70

IV. MANAGEMENT DIRECTION 71

Introduction 71
Vision 72

Goals, Objectives, and Strategies 72
Fish and Wildlife Population Management 73
Habitat Management 87
Resource Protection 91
Visitor Services 95
Refuge Administration 103

V. PLAN IMPLEMENTATION 111

Introduction 111
Proposed Projects 111
Fish And Wildlife Population and Habitat Management 111
Partnership/Volunteer Opportunities 121
Step-Down Management Plans 121
Monitoring and Adaptive Management 122
Plan Review and Revision 122

I. BACKGROUND 123

Introduction 123
Purpose and Need for Action 123
Decision Framework 124
Planning Study Area 124
Authority, Legal Compliance, and Compatibility 124
Public Involvement and the Planning Process 125

II. AFFECTED ENVIRONMENT 127

III. DESCRIPTION OF ALTERNATIVES 129

Formulation of Alternatives 129
Features Common to all Alternatives 129
Description of Alternatives 130
Alternative A: Current Management (No Action) 130
Alternative B: Focus on Waterfowl and Federally Listed Species 133
Alternative C: Focus on Wildlife, Habitat Diversity, and Experiencing Nature (Proposed Action) 136

IV. ENVIRONMENTAL CONSEQUENCES 157

Overview 157
Topography and Geology 173
Soils 173
Climate Change 175
Air Quality 176
Hydrology and Water Quality 177
Noise 178
Effects on the Biological Environment 178
Habitats and Vegetation 178
Wildlife 181
Federally Listed Species 183
Effects on Socioeconomic Environment 185
Effects on the Physical Environment 187

Topography and Geology....187
Soils....188
Climate Change....189
Air Quality....190
Noise....192
Effects on the Biological Environment....192
Habitats and Vegetation....192
Wildlife....195
Federally Listed Species....198
Effects Common to All Alternatives....200
Unavoidable Impacts and Mitigation Measures....213
Water Quality and Soil Disturbance....213
Wildlife Disturbance....213
Vegetation Disturbance....215
User Group Conflicts....216
Effects on Adjacent Landowners....216
Land Ownership and Site Development....217
Cumulative Impacts....217
Effects on the physical environment....217
Effects on the biological environment....219
Effects on the socio-economic environment....220
Direct and Indirect Effects or Impacts....221
Short-term Uses versus Long-term Productivity....222

V. CONSULTATION AND COORDINATION....225
Overview....225

APPENDIX A. GLOSSARY....229

APPENDIX B. REFERENCES AND LITERATURE CITATIONS....239

APPENDIX C. RELEVANT LEGAL MANDATES AND EXECUTIVE ORDERS....253

APPENDIX D. PUBLIC INVOLVEMENT....267
Summary Of Public Scoping Comments....267

APPENDIX E. APPROPRIATE USE DETERMINATIONS....269

APPENDIX F. COMPATIBILITY DETERMINATIONS....295

APPENDIX G. INTRA-SERVICE SECTION 7 BIOLOGICAL EVALUATION....349

APPENDIX H. WILDERNESS REVIEW....369

APPENDIX I. REFUGE BIOTA....383

APPENDIX J. BUDGET REQUESTS....397

APPENDIX K. LIST OF PREPARERS....399

LIST OF FIGURES

Figure 1: Sam D. Hamilton Noxubee NWR location map 13
Figure 2: Major access routes to Sam D. Hamilton Noxubee NWR 14
Figure 3: Sam D. Hamilton Noxubee NWR, Mississippi, LANDFIRE Historic Forest Type 16
Figure 4: Forest type change from 1830 to 2012, Sam D. Hamilton Noxubee NWR, Mississippi 17
Figure 5: Proposed Wilderness Area 1974, Sam D. Hamilton Noxubee NWR, Mississippi 19
Figure 6: Location of Sam D. Hamilton Noxubee NWR within the Eastern Gulf Coastal Plain 22
Figure 7: Digital elevation model for Sam D. Hamilton Noxubee NWR 27
Figure 8: Major Soils found on Sam D. Hamilton Noxubee NWR..... 28
Figure 9: Hydrology on Sam D. Hamilton Noxubee NWR, Mississippi 31
Figure 10: Fuel loading 3-plus years and prescribed fire used within 3 years (as of 2013)..... 36
Figure 11: Visitor services' map for Sam D. Hamilton Noxubee NWR 56
Figure 12: Target locations for RCW cluster centers after 50-year period. 81
Figure 13. Sam D. Hamilton Noxubee NWR Complex Organizational Chart 2013 120

LIST OF TABLES

Table 1: Good quality foraging habitat criteria (Red-cockaded Woodpecker Recovery Plan, USFWS 2003).... 42
Table 2. Demographic characteristics for the local counties, Mississippi and the United States 2012..... 52
Table 3. Revenue sharing payments, 2007 to 2012..... 55
Table 4. Number of buck and doe deer harvested on Sam D. Hamilton Noxubee NWR, 2002-2011 58
Table 5: Good quality foraging habitat criteria and managed stability standard (Red-cockaded Woodpecker Recovery Plan, USFWS 2003) and current forest conditions 79
Table 6. Distribution in pine age within existing partitions, Sam D. Hamilton Noxubee NWR 2012 88
Table 7. Summary of Projects 116
Table 8. Additional new personnel identified to implement the CCP for Sam D. Hamilton Noxubee NWR..... 121
Table 9. Step-down management plans related to the goals and objectives of the Draft CCP 121
Table 10: Comparison of alternatives by management issues for Sam D. Hamilton Noxubee NWR..... 141
Table 11. Summary of environmental effects by alternative…….. 202

Section A. Draft Comprehensive Conservation Plan

I. Background

INTRODUCTION

This Draft Comprehensive Conservation Plan (Draft CCP) for Sam D. Hamilton Noxubee National Wildlife Refuge (hereinafter referred to as the Sam D. Hamilton Noxubee NWR or the refuge) was prepared to guide management actions and to provide direction for the refuge. Fish and wildlife conservation will receive first priority in refuge management; wildlife-dependent recreation will be allowed and encouraged as long as it is compatible with, and does not detract from, the mission of the refuge or the purposes for which it was established (602 FW 3, USFWS 2000).

A planning team developed alternatives that best meet the goals and objectives of the refuge and that can be implemented within the 15-year planning period. This Draft CCP, Environmental Assessment (EA), and attached Habitat Management Plan (HMP), Integrated Pest Management Plan (IPM), and the Visitor Services Plan describe the Fish and Wildlife Service's proposed plan, as well as other alternatives considered and their effects on the environment. The Draft CCP, EA, and HMP will be made available to state and federal government agencies, conservation partners, and the general public for review and comment. Comments from each entity will be considered in the development of the Final CCP.

PURPOSE AND NEED FOR THE CCP

The purpose of the Draft CCP is to develop a proposed action that best achieves the refuge purpose; attains the vision and goals developed for the refuge; contributes to the National Wildlife Refuge System mission; addresses key problems, issues, and relevant mandates; and, is consistent with sound principles of fish and wildlife management (602 FW 1, USFWS 2000).

Specifically, the plan is needed to:

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

FISH AND WILDLIFE SERVICE

The Fish and Wildlife Service (Service) traces its roots to 1871 and the establishment of the Commission of Fisheries that conducted research and fish culture. The once-independent commission was renamed the Bureau of Fisheries and placed under the Department of Commerce and Labor in 1903.

The Service also traces its roots to 1886 and the establishment of the Division of Economic Ornithology and Mammalogy in the Department of Agriculture. Research on the relationship of birds and animals to agriculture shifted to the delineation of ranges of plants and animals; consequently, the name was changed to the Division of the Biological Survey in 1896.

The Department of Commerce's Bureau of Fisheries was combined with the Department of Agriculture's Bureau of Biological Survey on June 30, 1940. It was transferred to the Department of the Interior as the Fish and Wildlife Service, renamed the Bureau of Sport Fisheries and Wildlife in 1956, and permanently designated the Fish and Wildlife Service in 1974.

The mission of the Service is *"working with others, to conserve, protect and enhance fish, wildlife, and plants and their habitats for the continuing benefit of the American people."* This is accomplished through federal programs relating to migratory birds, endangered species, inter-jurisdictional fish and marine mammals, and inland sport fisheries (142 DM 1.1).

As part of its mission, the Service manages the approximately 150-million-acre National Wildlife Refuge System, which encompasses more than 560 national wildlife refuges, thousands of small wetlands, and other special management areas. It also operates 70 national fish hatcheries, 9 fish health centers, 7 fish technology centers, a historic national fish hatchery, 63 fish and wildlife management offices, and 81 ecological services field stations. The Service enforces federal wildlife laws; administers the Endangered Species Act; manages migratory bird populations; restores nationally significant fisheries; conserves and restores wildlife habitat such as wetlands; and helps foreign governments with their conservation efforts. It also oversees the Federal Aid program, which distributes hundreds of millions of dollars in excise taxes on fishing and hunting equipment to state fish and wildlife agencies.

NATIONAL WILDLIFE REFUGE SYSTEM

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."

The National Wildlife Refuge System Improvement Act of 1997 (Improvement Act) established, for the first time, a clear legislative mission of wildlife conservation for the National Wildlife Refuge System (Refuge System). Actions were initiated in 1997 to comply with the direction of this new legislation, including an effort to complete comprehensive conservation plans for all refuges. These plans, which are completed with full public involvement, help guide the future management of refuges by establishing natural resource, recreation, and environmental education programs. Consistent with the Improvement Act, approved plans will serve as the guidelines for refuge management for a 15-year period following their approval. The Improvement Act states that each refuge shall be managed to:

- Fulfill the mission of the Refuge System;
- Fulfill the individual purposes 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;
- Maintain the biological integrity, diversity, and environmental health of the Refuge System;

- Recognize that wildlife-dependent recreation activities, including hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation, are legitimate and priority public uses; and, allow refuge managers authority to determine compatible public uses.

The following are examples of the national network of conservation lands:

Pelican Island National Wildlife Refuge, the first refuge, was established in 1903 for the protection of colonial nesting birds in Florida, such as the snowy egret (*Egretta thula*) and the brown pelican (*Pelecanus occidentalis*).

Western refuges were established for American bison (*Bison bison*) (1906), elk (*Cervus Canadensis*) (1912), prong-horned antelope (*Antilocapra Americana*) (1931), and desert bighorn sheep (*Ovis canadensis nelson*) (1936) after over-hunting, competition with cattle, and natural disasters decimated once-abundant herds.

The drought conditions of the 1930s "Dust Bowl" severely depleted breeding populations of ducks and geese. Refuges established during the Great Depression focused on waterfowl production areas (i.e., protection of prairie wetlands in America's heartland). The emphasis on waterfowl continued to include protection of wintering habitat and expanded to other migratory birds in response to a dramatic loss of bottomland hardwoods and wetlands.

Wildlife refuges are now home to more than 700 species of birds, 220 species of mammals, 250 reptile and amphibian species and more than 200 species of fish. Only 59, or just over 10 percent, of refuges have been established with a primary purpose of conserving threatened or endangered species and approximately 280 (23 percent) of the 1,200-plus federally listed threatened or endangered species in the United States are found on units of the Refuge System.

The 2011 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation shows that 90.1 million Americans, 38 percent of the United States' population 16 years and older, participated in wildlife-dependent recreation. The total national expenditures by hunters, anglers, and other wildlife recreationists in 2011 was $145 billion or 1 percent of gross domestic product (meaning that one out of every 100 dollars of all goods and services produced in the United States is due to wildlife-dependent recreation). In 2011, 13.7 million people hunted, spending $34 billion with an average of $2,484 spent per hunter. In 2011, 33.1 million people fished, spending $41.8 billion with an average of $1,262 spent per angler. In 2011, 71.8 million people participated in wildlife watching, spending $55 billion with an average of $766 spent per participant. Although the survey focuses on people 16 years of age and older who participated in wildlife-dependent recreation, it does include some information for 6- to 15-year olds, showing that in 2011 approximately 11.7 million watched wildlife, 8.5 million fished, and 1.8 million hunted (U.S. Fish and Wildlife Service 2012). According to a Department of the Interior Economic Contributions 2011 report, in 2010 national wildlife refuges generated more than $3.98 billion in economic activity and created more than 32,000 private sector jobs nationwide (U.S. Department of the Interior 2011).

The economic impacts of the Refuge System continue to grow. Since the 2006 Banking on Nature study, volunteer hours, Refuge System visitation, and associated economic activity have all increased (Carver et al. 2013). Volunteers continue to be a major contributor to the success of the Service. During Fiscal Year 2011, 46,880 volunteers donated more than 1.7 million hours. The value of their labor was more than $32 million, which is the equivalent of 775 full-time employees. Further, more than 200 Friends organizations also support the work of the Service. Refuge System visitation has grown with over 45.7 million visitors in 2011.

LEGAL AND POLICY CONTEXT

Legal Mandates, Administrative and Policy Guidelines

Administration of national wildlife refuges is guided by the mission and goals of the Refuge System, congressional legislation, presidential executive orders, and international treaties. 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. Select legal summaries of treaties and laws relevant to administration of the Refuge System and management of the Sam D. Hamilton Noxubee NWR are provided in Appendix C.

These treaties, laws, administrative guidelines, and policy guidelines assist the refuge manager in making decisions pertaining to soil, water, air, flora, fauna, and other natural resources; historical and cultural resources; and research and recreation on refuge lands. They also provide a framework for cooperation between the refuge and its partners, such as the Mississippi Department of Wildlife, Fisheries, and Parks (MDWFP), The Nature Conservancy (TNC), Ducks Unlimited (DU), Friends of Sam D. Hamilton Noxubee NWR, Mississippi State University (MSU), USDA Forest Service (USFS), USDA Animal and Health Inspection Service, National Park Service (NPS), Audubon Society, The Wilderness Society (TWS), National Wild Turkey Federation (NWTF), Starkville School District, Quail Forever, Mississippi Band of Choctaws, Jena Band of Choctaws, the Choctaw Nation, the Chickasaw Nation, and private landowners.

Other Special Considerations

The legal provision 16 U.S.C. 668dd-668ee states that lands within Refuge System are closed to the public use unless specifically and legally opened. No refuge use may be allowed unless it is determined to be compatible. A compatible use is one that, in the sound professional judgment of the refuge manager, will not materially interfere with or detract from the fulfillment of the mission of Refuge System or the purposes of the refuge. All programs and uses must be evaluated based on the mandates set forth in the Improvement Act as follows:

- 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 as those uses 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.

The Improvement Act further identifies six priority wildlife-dependent recreational uses. These uses are hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation. As priority public uses on the Refuge System, they receive priority consideration over other public uses in planning and management.

Biological Integrity, Diversity, and Environmental Health Policy

The Improvement Act directs the Service to ensure that the biological integrity, diversity, and environmental health of the Refuge System are maintained for the benefit of present and future generations of Americans. The policy is an additional directive for refuge managers to follow while achieving refuge purpose(s) and the Refuge System mission. It provides for the consideration and protection of the broad spectrum of fish, wildlife, and habitat resources found on refuges and associated

ecosystems. When evaluating the appropriate management direction for refuges, managers will use sound professional judgment to determine their refuges' contribution to biological integrity, diversity, and environmental health at multiple landscape scales. Sound professional judgment incorporates field experience, knowledge of refuge resources, the refuge role within an ecosystem, applicable laws, and best available science, including consultation with others both inside and outside the Service (601 FW 3, USFWS 2003).

NATIONAL AND INTERNATIONAL CONSERVATION PLANS AND INITIATIVES

Multiple partnerships have been developed among government and private entities to address the environmental problems affecting the different regions. There is a large amount of conservation and protection information that defines the role of the refuge at the local, national, international, and ecosystem levels. Conservation initiatives include broad-scale planning and cooperation between affected parties to address declining trends of natural, physical, social, and economic environments. The conservation guidance described below, along with issues, problems, and trends, was reviewed and integrated where appropriate into this Draft CCP.

This Draft CCP supports, among others, the Partners-in-Flight Plan, the North American Waterfowl Management Plan, the Western Hemisphere Shorebird Reserve Network, and the National Wetlands Priority Conservation Plan.

Conservation priorities for national wildlife refuges in the Central Gulf Ecosystem focus on threatened and endangered species, species for which the Service as statutory responsibility (trust species), and species of local concern. The goals and objectives in this Draft CCP are stepped down from the following plans:

<u>North American Waterfowl Management Plan (USFWS 2012)</u>

The North American Waterfowl Management Plan established a broad set of goals to stabilize or increase waterfowl to average fall flight populations of the 1970s. Under the direction of the plan, priority habitat areas were established to facilitate these goals. Sam D. Hamilton Noxubee NWR is not located in one of these targeted areas. However, the refuge contributes directly to the protection and enhancement of resident migrating and wintering waterfowl habitat, which is a key goal under the plan.

<u>Partners in Flight North American Landbird Conservation Plan (PIF 2004)</u>

The North American Landbird Conservation Plan provides a continental synthesis of priorities and objectives that will guide landbird conservation actions at national and international scales. At the refuge level, habitats that support conservation of high-priority neotropical migratory birds can be incorporated into these conservation actions. Examples of PIF's priority migratory birds on the refuge include wood thrush (*Hylocichla mustelina*) in the mixed pine/hardwood habitats and rusty blackbirds (*Euphagus carolinus*) overwintering in the bottomland hardwoods (http://www.blm.gov/wildlife/pl_04sum.htm).

North American Bird Conservation Initiative (NABCI)

The U.S. North American Bird Conservation Initiative (NABCI) Committee is a forum of government agencies, private organizations, and bird initiatives helping partners across the continent meet their common bird conservation objectives. The Committee is working to secure a bright future for North America's more than 1,150 species of birds, in conjunction with NABCI partners in Mexico and Canada. The refuge works under the direction of the Service leadership on the committee to further bird conservation. In particular, the refuge participates in a number of national surveys and monitoring activities to facilitate integrated bird conservation (http://www.nabci-us.org/plans.htm).

United States Shorebird Conservation Plan (Brown et al. 2001)

The foundation for shorebird conservation in the United States is guided by this plan and establishes prioritization of habitat needs to support this initiative. Regional plans have subsequently been developed to identify which species should receive special consideration in those regions and where habitat can or could be managed to support conservation. Given that Sam D. Hamilton Noxubee NWR is an interior, predominantly forested landscape, little habitat is readily available to support regional shorebird efforts along the coastal plain. However, the refuge does intermittently provide shallow water and mudflat areas in spring and summer that are utilized by migratory shorebirds.

Southeast United States Regional Waterbird Conservation Plan (Hunter et al. 2006)

This regional planning document is a step-down from the North American Waterbird Conservation Initiative. It attempts to place additional conservation measures on waterbirds excluded from the North American Waterfowl Management Plan and the U.S. Shorebird Conservation Plan. Within the Southeast, management is concerned with many waterbirds. Wood storks are a common summer resident; little blue herons and white ibis breed within rookeries on Bluff Lake. The 2012 refuge roost count recorded 22,119 cattle egrets, 747 little blue herons, 287 great egrets, 147 great blue herons, and 241 white ibis. Excessive population levels of double-crested cormorants (*Phalacrocorax aurtis*) and cattle egrets (*Bubulcus ibis*) is of concern. Cormorants typically are winter residents that utilize the refuge's lakes for food and roosting habitat.

Northern Bobwhite Conservation Initiative (NBCI) (Palmer et al. 2011)

The NBCI has a primary goal to reverse the decline in northern bobwhite (*Colinus virginianus*) numbers with emphasis on lands with improvable acres. Within the Southeastern bird conservation region (BCR 27), most of the initiative is placed on agricultural land conversion and improvement in pine plantations to favor grasses and forbs. This non-migratory gamebird is found throughout much of the refuge in areas managed to support the endangered red-cockaded woodpecker (*Picoides borealis*), as well as other areas. Northern bobwhite quail have been shown to respond positively to management for red-cockaded woodpeckers on the refuge, which supports NBCI recovery goals (Fuller 1974).

East Gulf Coastal Plain Joint Venture (EGCPJV) Plan (EGCPJV 2008)

The EGCPJV Plan is a partnership of various agencies with a mission of protecting and restoring bird populations of the EGCP. Within the plan, key species and habitats have been prioritized based on population declines. The plan establishes a framework to implement bird

conservation through habitat management and restoration. Many of the species identified are representative of other major initiatives (Partners in Flight, North American Waterfowl Plan) for which the refuge can play a role in conservation. The refuge provides significant habitat in support of these major initiatives. The plan supports an open pine habitat which is beneficial to Bachman's sparrow and other similar guild species.

Red-cockaded Woodpecker Recovery Plan (USFWS 2003)

The Red-cockaded Woodpecker Recovery Plan provides the framework for the recovery of the red-cockaded woodpecker based on population sizes, habitat condition, and geographic distribution of the species. All federal agencies are charged with recovery actions under Section 7 of the Endangered Species Act. Within the Red-cockaded Woodpecker Recovery Plan, the refuge has been identified as a support population. Though not essential to recovery of the species, the existence of smaller populations distributed across the ecological range of the bird is important.

Wood Stork Recovery Plan (USFWS 1996)

This plan establishes recovery criteria for the North American breeding population of wood storks found in Alabama, Florida, Georgia, and South Carolina. The delisting of the species is primarily based on the number of breeding colonies and average productivity over a 5-year period. Though no stork breeding occurs in Mississippi, the refuge serves as an important location for a portion of the population to summer. The refuge provides roosting and foraging habitat for these birds throughout the summer months through water level fluctuation (either natural or human manipulated) in the refuge's lakes, wetlands, streams, and ditches.

Lower Mississippi Alluvial Valley Joint Venture "Restoration, Management, and Monitoring of Forest Resources in the Mississippi Alluvial Valley: Recommendations for Enhancing Wildlife (LMVJV 2007)

The Lower Mississippi Alluvial Valley Joint Venture worked with partners to define recommendations for desired forest conditions in bottomland hardwood forests. The Desired Forest Conditions (DFC) is an outline designed to provide suitable habitat for foraging and cover within all dimensions of the forest and provide a desirable blend of regeneration, maturity, and senescence of forest trees that will address the habitat needs of priority wildlife species, with an emphasis on migratory birds.

Strategic Habitat Conservation – Gulf Coastal Plains and Ozark Landscape Conservation Cooperative (USFWS 2006)(GCPO 2013)

Landscape Conservation Cooperatives (LCCs) are applied conservation science partnerships focused on a defined geographic area which study on-the-ground strategic conservation efforts at landscape scales. LCCs will enable resource management agencies and organizations to collaborate in an integrated fashion within and across landscapes. LCCs will engage in biological planning, conservation design, inventorying and monitoring program design, and other types of conservation-based scientific research, planning, and coordination. As such, the refuge will work within the context of the defined LCC to support conservation efforts that meet the purpose of the refuge and mission of the Service (USFWS 2010b).

Mississippi Comprehensive Wildlife Conservation Strategy (CWCS) (MS CWCS 2005)

Congress mandated that all 50 states develop Comprehensive Wildlife Conservation Strategies as a condition for receiving state wildlife grant funds. Congress, as part of the State Wildlife Grants program and Wildlife Conservation and Restoration program, identified eight required elements. These elements include: distributions and abundance of wildlife species; locations and conditions of key habitats; identification of problems for wildlife/habitats; strategies for conserving wildlife/habitats; monitoring, review, and coordination with partners; and public participation. The Mississippi CWCS was developed in compliance with this congressional mandate and serves as Mississippi's blueprint for fish and wildlife conservation statewide for the next half century. The plan is a broad set of conservation strategies for wildlife and fish species and their key habitats in greatest need of conservation which are managed by the State of Mississippi. The State of Mississippi also identifies species of greatest conservation need associated with each habitat.

The North American Wild Turkey Management Plan (National Wild Turkey Federation 2010)

The North American Wild Turkey Management Plan is a compilation of regional, state, and provincial plans that will outline goals to help wildlife management agencies and the National Wild Turkey Federation's dedicated volunteers target the most important factors in wild turkey (*Meleagris gallopavo*) conservation and protect our hunting heritage. In support of the North American Wild Turkey Management Plan and the continued efforts of wild turkey conservation and the preservation of the hunting tradition, the National Wild Turkey Federation's Mississippi State Chapter and its members have spent more than $1.8 million in Mississippi since 1985. The money has been raised through hunting heritage banquets and administered jointly by the National Wild Turkey Federation, its state chapters and state wildlife agencies. The Mississippi State Chapter's priorities fall into five categories: Habitat Enhancement, Hunter Access, Wild Turkey Research, Education, and Outreach. The Mississippi State Chapter has awarded the refuge a Super Fund Project of $25,000 over 5 years to enhance wild turkey habitat with prescribed burning, herbicide, and field restoration. This project will benefit wild turkey and Northern bobwhite quail by creating useful foraging/brooding areas. These treatments would also be beneficial for many other species of interest, including the endangered red-cockaded woodpeckers, Bachman's sparrows, and brown headed nuthatches.

RELATIONSHIP TO STATE WILDLIFE AGENCY

A provision of the National Wildlife Refuge System Administration Act of 1966, 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 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 mission of the MDWFP 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. The state's participation and contribution throughout the comprehensive conservation planning process has provided for ongoing opportunities and open dialogue to improve the ecological integrity of fish and wildlife in Mississippi. For more information see website http://www.mdwfp.com. The MDWFP manages approximately 51 wildlife management agencies, 20 fishing lakes, and 25 state parks located throughout the state.

II. Refuge Overview

INTRODUCTION

National wildlife refuges provide an important support role in conserving threatened and endangered species and native habitats for many resident and migratory wildlife species, including mammals, birds, fish, amphibians, reptiles, and insects. In addition, refuges offer a wide variety of wildlife-dependent recreational opportunities, and many have visitor centers, wildlife trails, and environmental education programs.

This chapter provides an overview of the history and purposes of the refuge, its role within the ecosystem, and its recognized ecological threats and problems. This chapter describes the refuge's physical, biological, and cultural resources, and discusses the socioeconomic context, the administration, and management of the refuge.

REFUGE HISTORY AND PURPOSE

Sam D. Hamilton Noxubee NWR is located within three counties (Noxubee, Oktibbeha, and Winston) in east-central Mississippi, and is approximately 17 miles south-southwest of Starkville and approximately 120 miles north-northeast of Jackson, the capital city of Mississippi (Figure 1). There are four major access routes to the refuge: Oktoc Road from Starkville; Highway 25 by way of Loakfoma Road; the Brooksville-Louisville Road from Louisville; and, Lynn Creek Road from Brookville (Figure 2).

Refuge Purpose

The primary establishing legislation for the refuge is 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 of 1929). Additional purposes under which lands are managed include:

"...for use as an inviolate sanctuary, or for any other management purpose, for migratory birds." (16 U.S.C., 715d Migratory Bird Conservation Act of 1929)

"...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).

"...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 of 1966)

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

In accordance with Service policy (610 FW 4.23) the refuge is also tasked with management of the proposed wilderness (Wilderness Review, Appendix H) to achieve the purposes of the Wilderness Act of 1964 (Public Law 88-577).

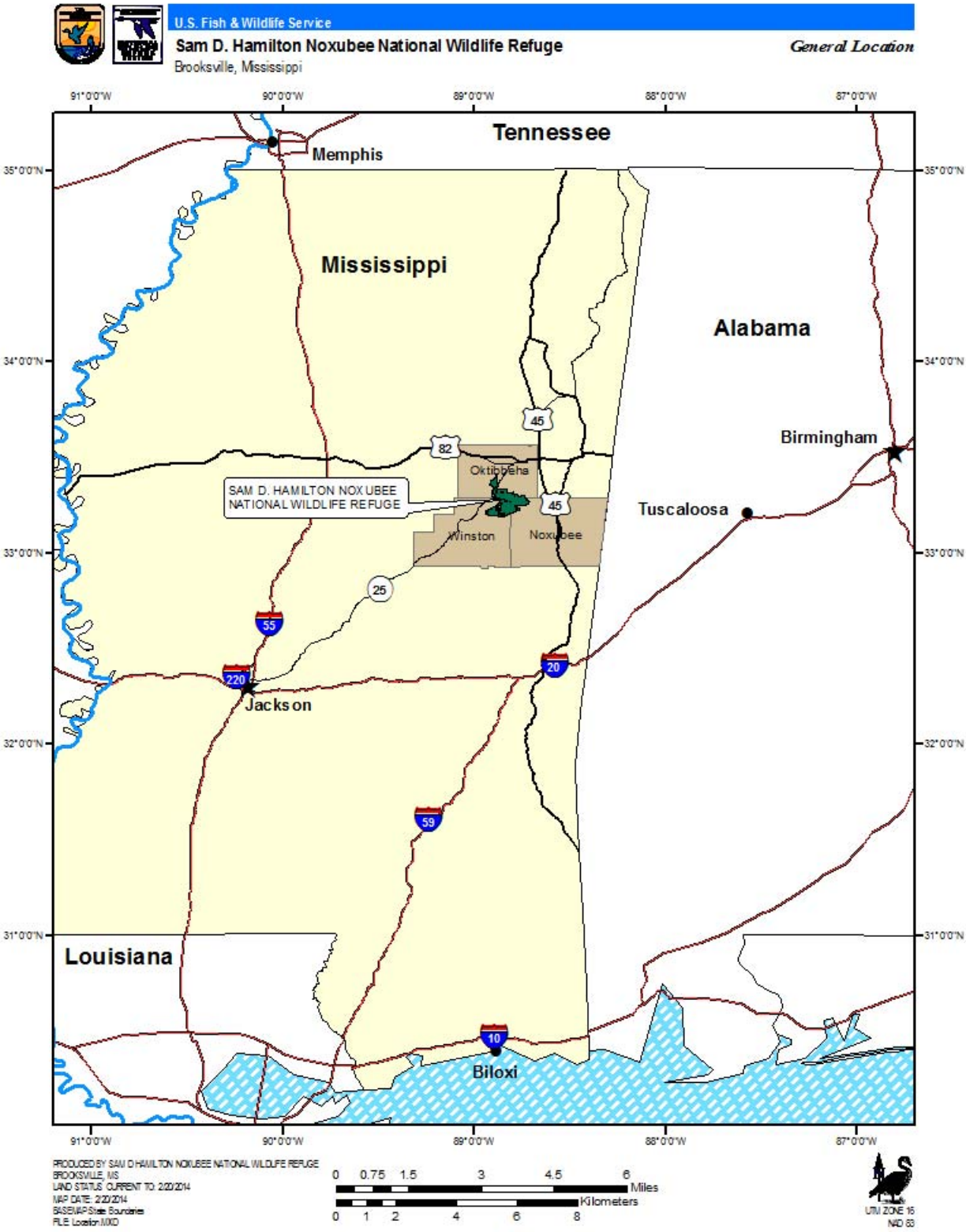

Figure 1: Sam D. Hamilton Noxubee NWR location map

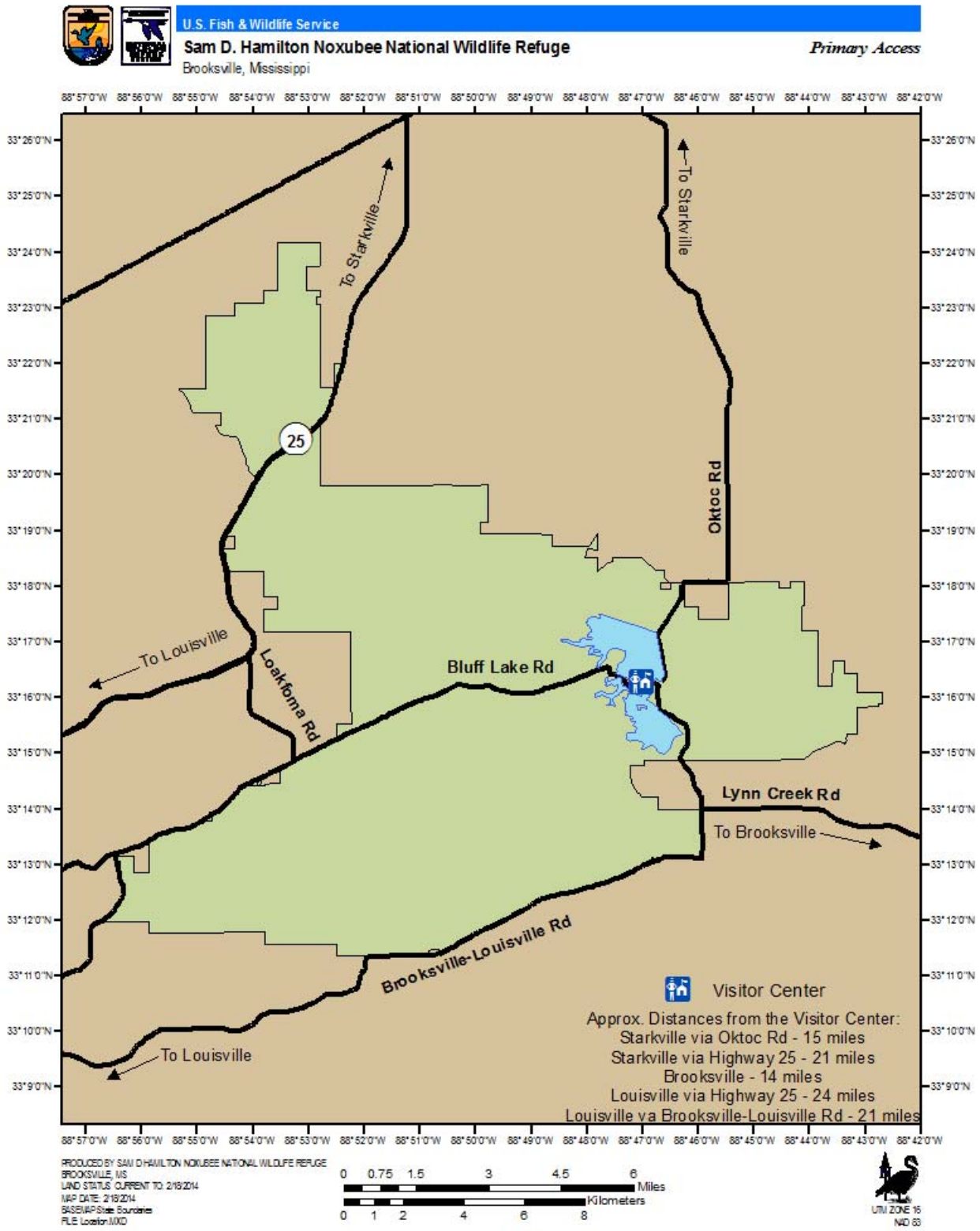

Figure 2: Major access routes to Sam D. Hamilton Noxubee NWR

Refuge History

Established as Noxubee NWR on June 14, 1940, the refuge was subsequently renamed Sam D. Hamilton Noxubee NWR by Public Law 112-279 on February 14, 2012. Prior to 1830 and settlement by early Euro-Americans, northeastern Mississippi was inhabited by several Native American tribes. By the sixteenth century (1700s), these Native Americans had impacted the region's extensive forests, savannas, and streams through the use of fire. These indigenous people used fire to enhance their food supplies through modification of forest composition and creation of grasslands and agricultural fields. These mound-building people also used fire as a hunting tool, as a symbolic part of ceremonies, and as part of their agriculture practices (i.e., growing corn, beans, and squash) near their settlements. These settlements periodically moved as the soil fertility declined and new agricultural areas were sought.

In 1798, the United States Congress created the Mississippi Territory. In 1830, the Choctaw Nation signed the Treaty of Dancing Rabbit Creek, relinquishing all claims to land in Oktibbeha, Noxubee, and Winston counties Mississippi, allowing for Euro-American settlement of the area. Past refuge archaeological investigations have uncovered a variety of cultural resources, ranging from early Native-American relics to old homesteads. The earliest known documented site is a Paleo site located by Dr. Janet Rafferty, Mississippi State University. The site near Oktoc Creek produced artifacts dating back to the early archaic period (ca.9000-7000 B.C.). Other investigations have revealed numerous Native-American sites occuring throughout the refuge, producing artifacts such as ceramic shards, projectile points, drill bits, hammer stones, and fire-cracked rocks. These sites are protected under the authority of the Archeological Resources Protection Act of 1979.

At the time of the Treaty of Dancing Rabbit Creek and prior to large scale settlement by Euro-Americans, the East Gulf Coast Plain (EGCP) ecoregion was covered with upland pine, mixed pine-hardwood, upland hardwood, and bottomland hardwood forests, cane breaks, grasslands, and prairies which created a diverse complex ecosystem. Depending on the frequency of fire, the upland forests were either hardwood forests or a mixture of both hardwoods and pines. Upland pine forests had a combination of loblolly (*Pinus taeda*), shortleaf (*Pinus echinata*), and longleaf (*Pinus palustris*) pines in the overstory and these areas were likely burned every one to two years. In areas frequently burned, the ground cover was open park-like grasses. The more hilly regions within the central and northern portions of the EGCP were predominately hardwoods with shortleaf pine on the ridges (Fickle 2001). A recent study used General Land Office (GLO) records from 1830 to model the historic forest conditions of the refuge (Fotinos and Ertel 2013). Witness trees and surveyor's notes were analyzed and it was determined for those species that could be analyzed that historical upland forests were dominated by post oak (*Quercus stellata*), pine (*Pinus* spp.), hickory (*Carya* spp.), and red and white oaks (*Quercus* spp.). Surveyor's notes listed much of the survey area as being open woods, predominantly associated with higher elevations and upland slopes. Lower areas and stream channels were described as having thick understory with "bushes," "briers," and "canes" (Schauwecker et al. 2011). The bottomland forests were comprised of various hardwoods such as: red and white oaks, sweetgum (*Liquidambar styraciflua*), American bald cypress (*Taxodium distichum*), sugarberry (*Celtis laevigata*), red maple (*Acer rubrum*), hickories, American sycamore (*Platanus occidentalis*), boxelder (*Acer negundo*), elm (*Ulmus* spp.) and ash (*Fraxinus* spp.). It also included small pockets of loblolly pine, longleaf pine, and shortleaf pine mixed with post oak, hickory, and white oak (*Quercus alba*). Openings created by fire, winds, beaver (*Castor canadensis*), or other natural events were scattered across the landscape (Fickle 2001). Figure 3 depicts historic forest conditions found in the LANDFIRE model and report produced by USFWS 2013, which is included in the appendix of this document.

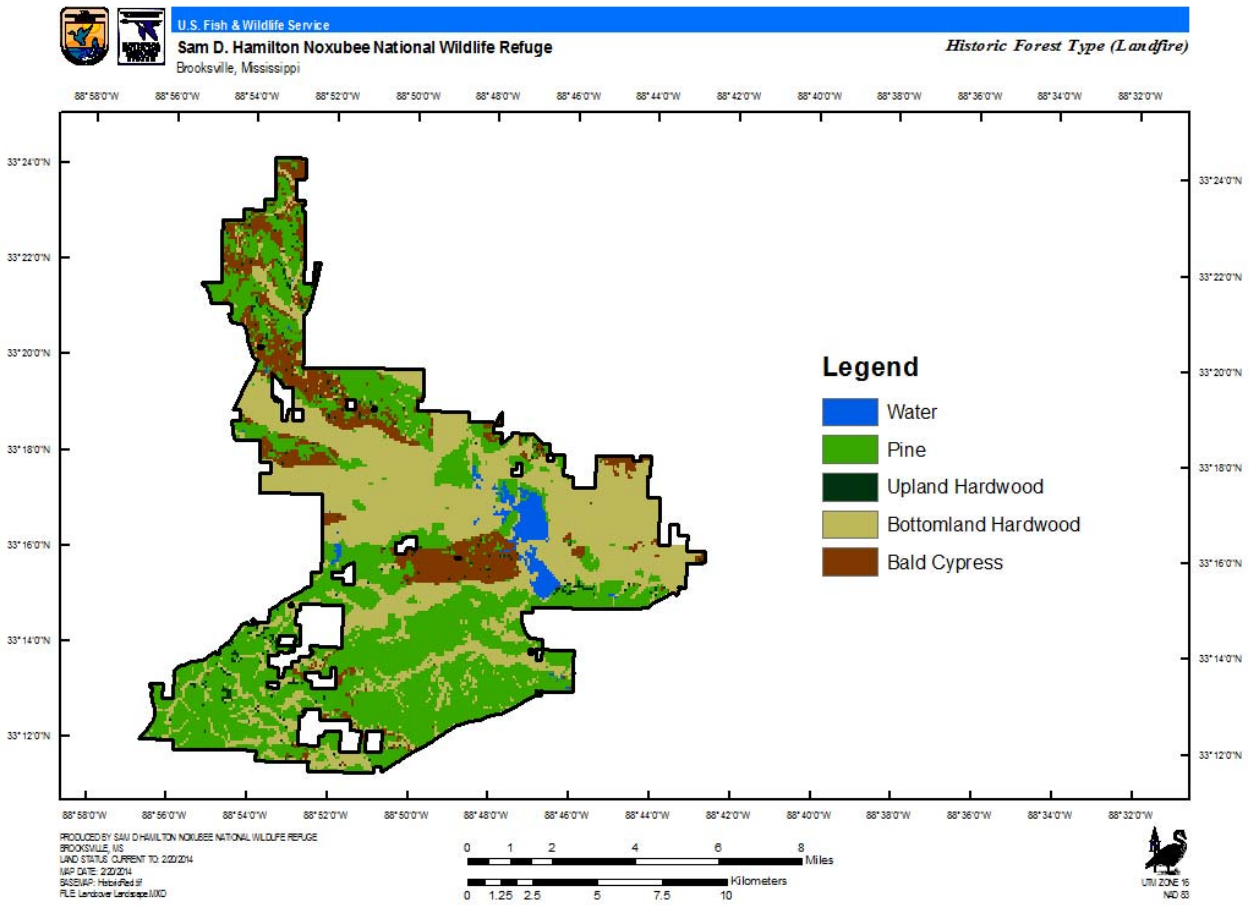

Figure 3: Sam D. Hamilton Noxubee NWR, Mississippi, LANDFIRE Historic Forest Type

Starting in 1830, agricultural development proceeded at a rapid pace. Pioneer farmers devoted a great deal of time, money, and energy to clearing land for cultivation. They removed a large amount of the forests for agriculture. Additionally, farming practices were locally intense and had long-term impacts on the land through soil depletion and erosion. Following the depletion of the land's fertility, the farmers and associated families abandoned the land or were no longer able to afford to hold the properties. Farmers and their families moved to more fertile forested areas and began the process again. By the 1930s, the swift settlement and intense farming practices were creating a landscape depleted of top soil and suffering from high erosion (Hickman 1962).

Evidence of early Euro-American settlements is also abundant on today's refuge, including remnents of roads, cemeteries, churches, schools, mill sites, cisterns, a WWII practice bombing range, and one diversion canal dating back to the late 1800s and early 1900s. Dating from 1821, Old Robinson Road was the original public highway from Jackson to Columbus, Mississippi. The road traverses the refuge from the current Bluff Lake Road northeasterly to the south end of the levee on greentree reservoir (GTR) 4 and leaves the refuge by crossing the Noxubee River and bisecting the proposed wilderness area. Old Robinson Road was built by Raymond Robinson to serve as a major route between Columbus and Jackson, Mississippi. The road was listed in the National Register of Historic Places in 1975. The Service's management policy is to protect the 16-foot-wide historic right-of-way.

Much like other areas settled since 1830, the land area within the present refuge boundary was intensively farmed and over-grazed by cattle. Figure 4 depicts the forest type change from LANDFIRE historic to current conditions. By 1936, the Rural Resettlement Administration through Title II of the National Industrial Recovery Act (NIRA) (1933), Emergency Appropriation Act of (1935) and Title III of the Bankhead-Jones Farm Tenant Act (1937) acquired much of the lands that would later become the refuge. When the resettlement administration acquired more than 100,000 acres of which over 40,000 acres would become the refuge, 25 percent was open fields with 75 percent reverting back to woodland. The Civil Conservation Corps (CCC) built Bluff Lake prior to establishment of the refuge. Along with the formation of the Service in 1940, Noxubee NWR 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 transferred lands to the Department of the Interior that had been reserved by Executive Order 8444. Public Land Order 401 (August 19, 1947) enlarged and modified the refuge's boundary.

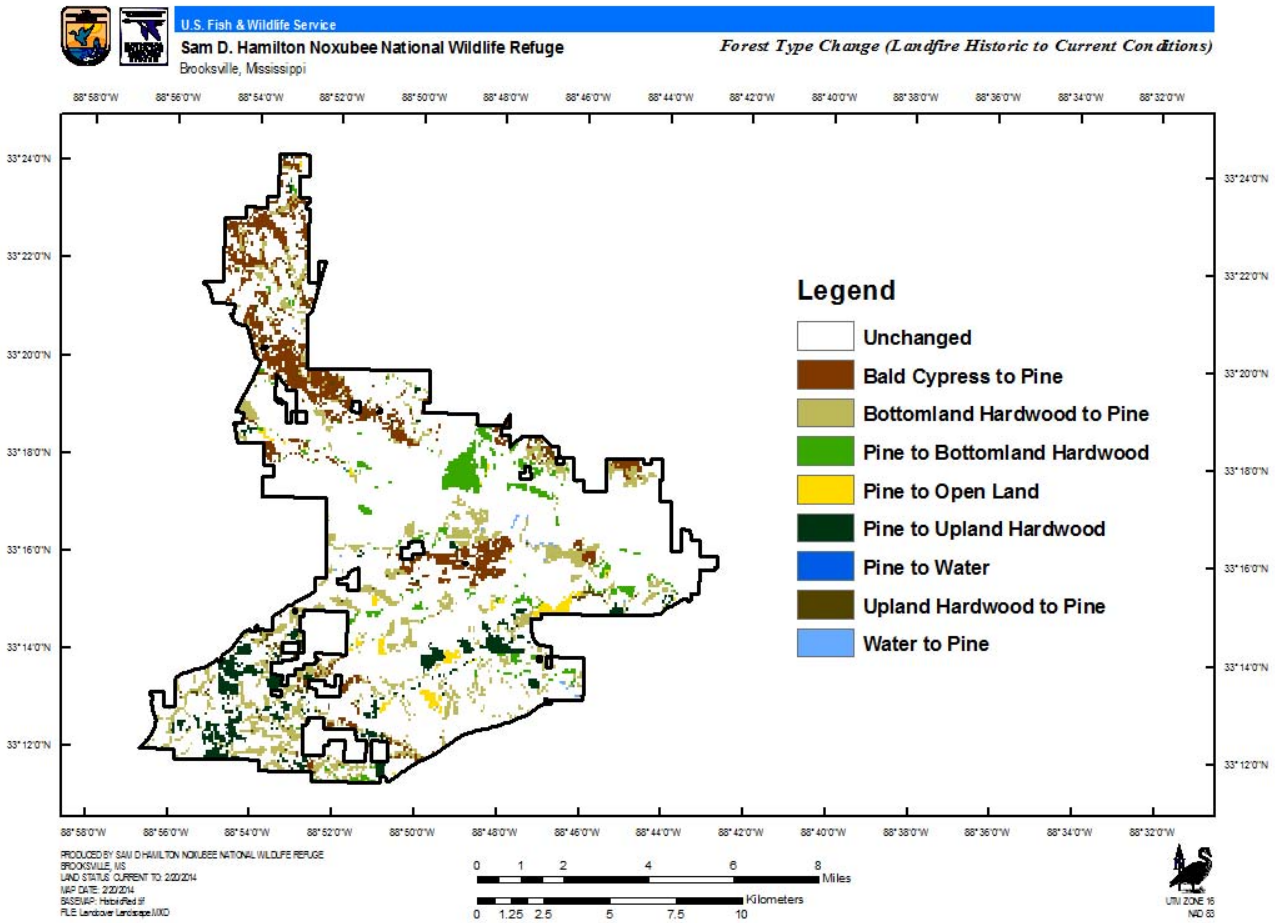

Figure 4: Forest type change from 1830 to 2012, Sam D. Hamilton Noxubee NWR, Mississippi

The refuge's initial goals were to rehabilitate the land and create more wildlife habitat through reforestation to reduce soil erosion. From the time of establishment until the early 1950s, the refuge planted thousands of acres in loblolly pine. Further alterations of the land, including the construction of erosion control structures, Loakfoma Lake, levees and water control structures, and four GTRs.

Roads and bridges were created and streams altered due to new construction. The new lakes, water control structures, and altered streams provided over 2,500 acres of habitat for migratory waterfowl, as well as creating aquatic habitats for fish. The forested areas provided new wildlife habitat. Over the years, the refuge has been restocked with numerous native wildlife species. Documented stocked species include white-tailed deer (*Odocoileus virginianus*), beaver (*Castor canadensis),* Canada geese *(Branta canadensis),* and American alligator (*Alligator mississippiensis*).

The National Wildlife Refuge System Administration Act of 1966 provides for the acquisition of land or interests in land in exchange for the right to remove products from acquired or public lands on refuges. Funds generated by a refuge through wildlife habitat management or other sources can be used, if approved by the Director of the Fish and Wildlife Service, for a product-for-land exchange. In the years following establishment, land-for-timber exchange has been the predominant source for acquiring lands from willing sellers. Since the 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 48,219 acres within the 61,715-acre approved acquisition boundary, leaving 13,496 acres in other ownerships. The current un-acquired inholdings include 3,437 acres of state land (640 acres - Section 16 properties; 2,797 acres - Mississippi State University), which will likely never be acquired. The remaining 7,262 acres consists of scattered, small privately owned tracts. The refuge also oversees nine Farm Service Agency Conservation Easements scattered throughout the surrounding counties.

Additional acquisition of land within the approved acquisition boundary of the refuge could possibly come from the Land and Water Conservation Fund, the Migratory Bird Conservation Fund, and U.S. Army Corps of Engineers mitigation programs. New lands can also be acquired through donations from conservation and private organizations or individuals. In addition to acquisitions, conservation easements and leases potentially could be used to obtain the minimum interests necessary to satisfy refuge objectives for the benefit of wildlife. The Service works with interested organizations to identify additional areas needing protection and provides technical assistance, if needed.

SPECIAL DESIGNATIONS

Proposed Wilderness Area

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 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.

In December 1974, a wilderness review was completed, resulting in a 1,200-acre proposed wilderness within the National Wilderness Preservation System at the refuge (Figure 5). The wilderness proposal (Appendix H) was transmitted to Congress on December 4, 1974. However, Congress has yet to act on the wilderness proposal. The proposed wilderness is bounded by the Noxubee River on the west and north, Oktoc Creek on the south, Bluff Lake on the southeast, and Bluff Lake Road on the east. Service policy requires that areas outside Alaska, pending congressional action, be managed to preserve the wilderness resource. The proposed wilderness at the refuge is managed under guidance found in the Service Manual (610 FW1-5), Wilderness Area Management.

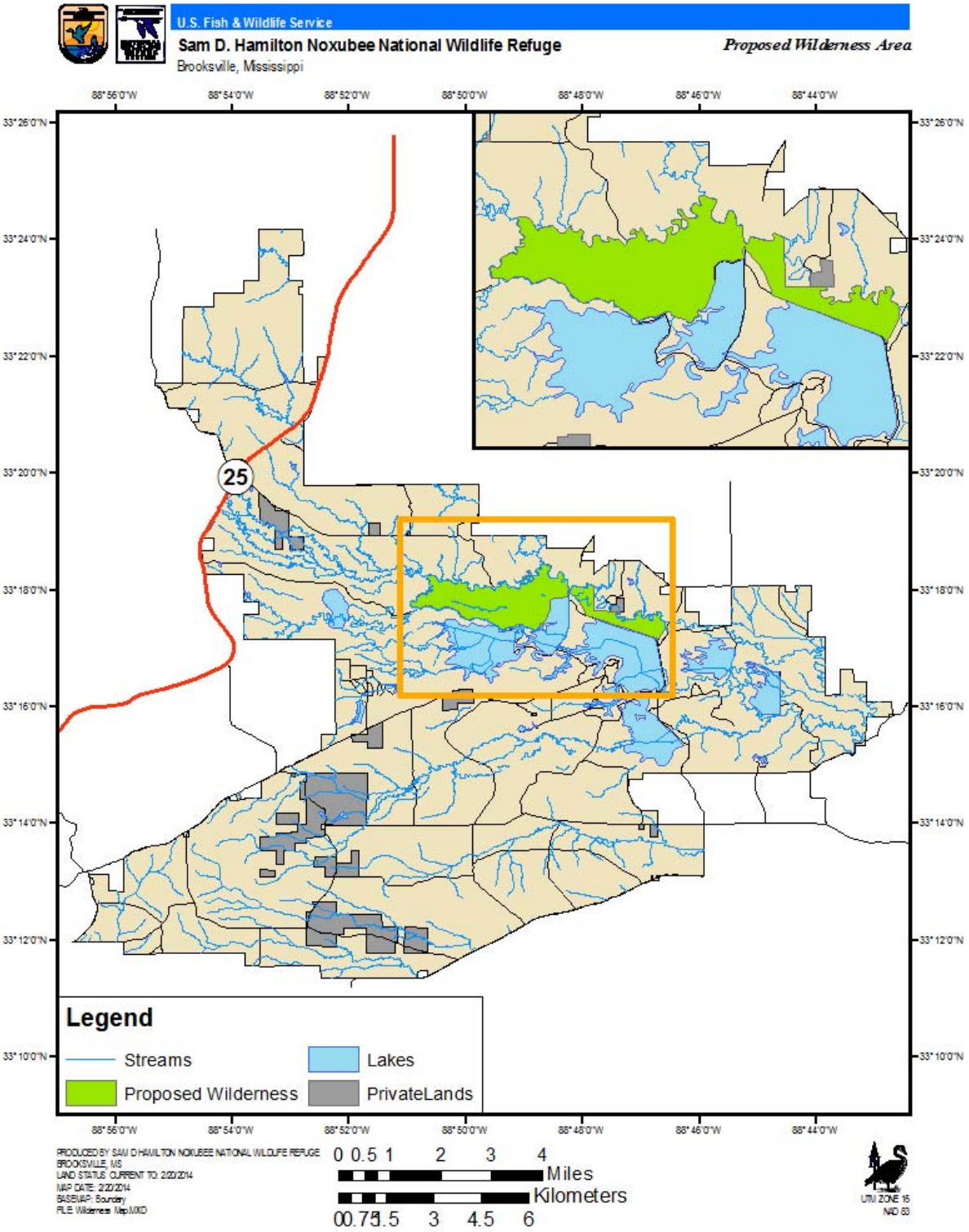

Figure 5: Proposed Wilderness Area 1974, Sam D. Hamilton Noxubee NWR, Mississippi

Areas of Special Consideration

One other "Area of Special Consideration" has been recognized previously by the refuge but no strategy or plan has been developed. The area, Pete's Slough, contains about 150 acres; the other four are relatively small (5-10 acres each). The boundaries to these areas were never officially defined.

Research Natural Areas

The Service administratively designated “Research Natural Areas” (RNAs) on refuges across the United States and its territories. Before discontinuing the program, there were 210 such areas on national wildlife refuges, totaling 1,955,762 acres. RNAs were part of a national network of reserved areas under various ownerships. RNAs were intended to represent the full array of North American ecosystems with their biological communities, habitats, natural phenomena, and geological and hydrological formations. As in designated wilderness, natural processes were allowed to predominate without human intervention. Under certain circumstances, deliberate manipulation could be used to maintain the unique features for which the RNA was established.

Currently, the refuge has two areas established by the Society of American Foresters (SAF) as RNAs. The "Old Robinson Road Research Natural Area," containing an estimated 46 acres of SAF 101 (bald cypress), was designated in July 1959. The other area, established in December 1973, is the "Morgan Hill Research Natural Area," consisting of an estimated 67 acres of SAF Type 49, Eastern Red Cedar-Pine Hardwood. The USDA Forest Service created RNAs under the authority of the Organic Administration Act of 1897 (16 U.S.C. 551). Today, the boundaries remain unmapped and unmarked, and no plans were ever established for management of these areas.

ECOSYSTEM CONTEXT

Central Gulf Ecosystem

The refuge is managed within the Service's biological watershed referred to as the Central Gulf Ecosystem (Figure 6). 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 and tree damage for bug infestation. Flood control, agricultural conversion, intense timber removal and 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 bottomland hardwood forests and open pine forests, has been 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 land management practices. Hardwoods can be dominant over pine in many stands depending on soil moisture, soil type, aspect, and past disturbance. Historically, pine forests were widely dominant on the Central Gulf Coastal Plain. The elimination of open pine habitats has decimated some associated wildlife species throughout the ecosystem. Species most adversely affected are fire sensitive or dependent on special habitat requirements.

Collaboration

The Service is increasing its efforts to adopt collaborative resource partnerships with private landowners and local communities, as well as state and federal governments, within ecosystems. The purpose is 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. The synergy of all federal, state, tribal, and private organizations, working together, will ensure that the Service not only protects the more important areas but also reduces redundancy and overlap.

Wildlife and Public Benefits

Resident wildlife, waterfowl, and many other migratory birds benefit from the food, protection, and sanctuary provided by the refuge's lands. Outdoor recreation, such as hunting, fishing, wildlife observation, and wildlife photography, is enhanced by refuge management programs. Water quality is enhanced by better management of hydrology on refuge wetlands.

There are 14 national wildlife refuges, 6 national forests, and 8 national parks within the state. There are three congressional designated wilderness areas in Mississippi; two are managed by Desoto National Forest and the other is managed by the National Park Service at Gulf Islands Seashore. The management of federal public lands is essential for sustaining and enhancing wildlife habitat used and enjoyed by growing numbers of people in Mississippi. State-managed lands play an additional and key role in the management of wildlife and in providing public recreational opportunities. The mission of the Mississippi Department of Wildlife, Fisheries, and Parks (MDWFP) is to conserve and enhance Mississippi's wildlife, fisheries, and parks; provide quality outdoor recreation; and engage the public in natural resource conservation. The MDWFP manages approximately 51 wildlife management areas, 20 fishing lakes, and 25 state parks located throughout the state.

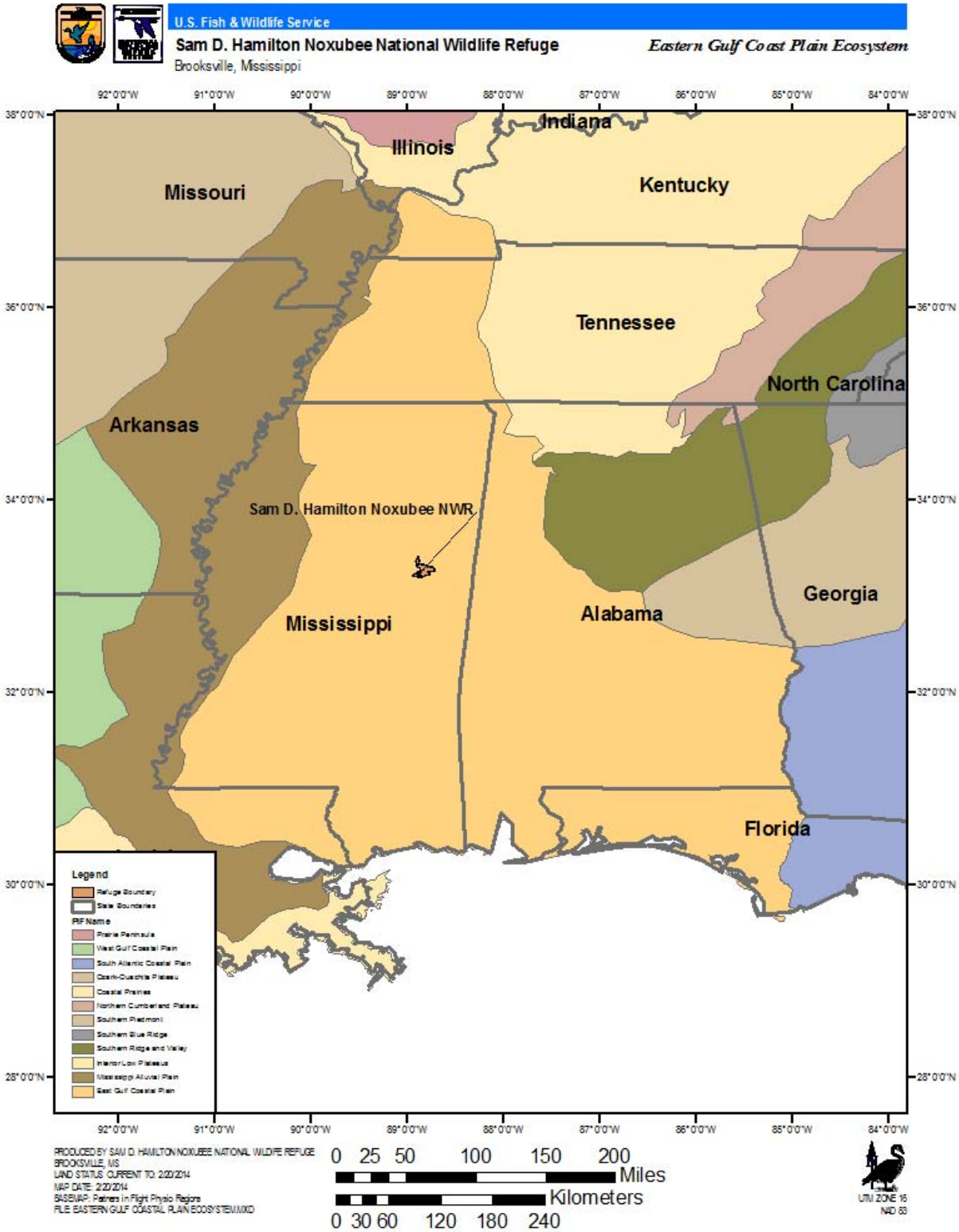

Figure 6: Location of Sam D. Hamilton Noxubee NWR within the Eastern Gulf Coastal Plain

REGIONAL CONSERVATION PLANS AND INITIATIVES

Mississippi Comprehensive Wildlife Conservation Strategy
The Mississippi Comprehensive Wildlife Conservation Strategy (MS CWCS 2005) was developed in compliance with this congressional mandate and serves as Mississippi's blueprint for fish and wildlife conservation statewide for the next half century as noted in Chapter I. The MS CWCS is a broad set of conservation strategies for wildlife and fish species and their key habitats in greatest need of conservation which are managed by the state of Mississippi. The State of Mississippi identifies 17 key wildlife habitat types with over 60 specific subtypes. The State of Mississippi also identifies species of greatest conservation needs associated with each of these habitats.

ECOLOGICAL THREATS AND PROBLEMS

The greatest ecological threats and problems are:

- loss of sustainable ecological communities;
- loss of connectivity between bottomland hardwood forest sites (e.g., forest fragmentation);
- simplification of the remaining wildlife habitats within the ecosystem and gene pools;
- cumulative habitat effects of land and water resource development activities;
- changes in habitat composition and species diversity due to fire suppression;
- control of destructive nonnative, invasive species (e.g., plants and animals) and mitigating impacts of nuisance wildlife;
- manipulation of water levels at the expense of fisheries and forestry resources;
- loss of large stands of over-mature forests;
- management of red-cockaded woodpeckers at the edge of their range;
- suppression of fire in forested and grassland habitats;
- access roads: disturbance to wildlife and corridor for nuisance species;
- water pollution and sedimentation generated from development upstream from habitats north and east of the refuge;
- loss of riverine habitat and degraded water quality from off-refuge discharge;
- increased demands on local water supplies;
- development and management of flood control systems;
- non-appropriate use of insecticides and herbicides;
- conversion of native grasslands to pasture/agriculture; and
- lack of funding to support staffing, long-term maintenance of habitats, and infrastructure.

PHYSICAL RESOURCES

CLIMATE

According to the Natural Resources Conservation Service Winston County Soil Survey (2007), the refuge area has a minimum average temperature of 32.9 degrees (F). The lowest temperature on record, which occurred on December 23, 1989, is -3 degrees (F). In summer, the average temperature is 78 degrees (F) and the average daily maximum temperature is 88.5 degrees (F). The highest recorded temperature, which occurred on August 27, 1943, was 107 degrees (F).

Precipitation is fairly heavy throughout the year, with prolonged droughts being rare. The total annual precipitation is about 58.8 inches. Of this, 31.2 inches, or 53 percent, usually fall in April through October. In 2 years out of 10, the rainfall in April through October is less than 13 .5 inches. The heaviest 1-day rainfall during the period of record was 10.3 inches on April 13, 1979. Thunderstorms occur on about 63 days each year and are most common in July.

The average seasonal snowfall is about 0.7-inch. The greatest snow depth at any one time during the period of record was 15 inches. Typically, no days of the year have at least 1 inch of snow on the ground. 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.

The average relative humidity in midafternoon is about 57 percent. Humidity is higher at night, and the average at dawn is about 90 percent. The sun shines 69 percent of the time possible in summer and 59 percent in winter. The prevailing wind is from the south. Average wind speed is highest, 9.2 miles per hour, in March.

The potential for rapid and lasting climate warming poses a significant challenge for fish and wildlife conservation. Species' abundance and distribution are dynamic, relative to a variety of factors, including climate. As the climate changes, the abundance and distribution of wildlife and fish will also change. Climate warming will be a particular challenge for threatened, endangered, and other "at risk" species (USFWS 2008a).

A changing climate will force change in the stewardship of the Refuge System. Potential challenges posed by a changing climate might include the following:

- Changing fire regimes;
- Changing patterns of rain and snowfall;
- Changing access to water resources;
- Altered hydrology in rivers and wetlands;
- Increased frequency of extreme weather events;
- Changes in plant community types;
- Changing abundance and distribution of fish, wildlife, and plant species; and
- Changes in the timing (phenology) of synchronized, interdependent phenomena, so that they no longer coincide.

Service managers already are seeing evidence of some of these effects in Alaska, where observed warming has been 2-4 times that of global averages and change has been more rapid and visible. Although the other regions of the Service likely will not be confronted with climate change impacts on the same scale or pace as Alaska, climactic changes in the lower 48 states will amplify current management challenges involving habitat fragmentation, urbanization, invasive species, disease, parasites, and water management. Highly specialized or endemic species are likely to be most susceptible to the additional stresses of changing climate.

The Refuge System is considering climate change in its comprehensive conservation plans, which provide a framework for guiding refuge management decisions. The Service is also looking at how projected sea level rise could affect selected coastal refuges and how wildfire could change as the result of a warming climate.

The Service is currently planning a series of regional forums to help collect information on the potential effects of climate change in coastal areas, mountains, prairies, and other landscapes, and to identify ways it might better prepare for managing the nation's valuable natural resources in the coming decades.

GEOLOGY AND TOPOGRAPHY

The majority of the refuge is in the Interior Flatwoods Region of the Upper Coastal Plain with elevations rarely varying more than 20 feet throughout the area. The extreme west and southwest portion of the refuge (Bevills Hill area) lies outside this region. This region is best described as hilly, and has the greatest variation in elevations found on the refuge. Elevations can vary as much as 100 feet over a distance of several hundred feet (Figure 7). A small portion of the southeast corner of the refuge (Morgan Hill area) is adjacent to 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 elevations range from 200 to 560 feet mean sea level.

The oldest sediments are a part of the Selma Group of Upper Cretaceous age and consist of Demopolis Chalk, Ripley Formation, and Prairie Bluff Chalk. The units are overlain by sediments of Tertiary age Formation and the Wilcox Formation. Older alluvial deposits associated with an earlier stage of drainage are found near the stream valleys. Varying bands of Cretaceous and Tertiary sediments crop out across the area (NRCS Soil Survey of Oktibbeha County, Mississippi (1973).

SOILS

The refuge lies within the coastal plain physical division and typically has soils that are acidic and poorly drained clays, silt loam, silty clay loam, and loam from the upper coastal plains (Miller 1967). Areas of the refuge exhibit deep, somewhat poorly drained soils on slightly elevated flood plains and a small but distinct area of moderately well drained to poorly drained silty soils with slopes ranging from 0 to 8 percent. Soil associations on the refuge are as follows (Figure 8):

Stough-Freest-Vimville: Upland soil on nearly level and gently sloping, somewhat poorly drained, moderately well drained, and poorly drained, loamy soils; on stream terraces and uplands

Falkner-Longview-Savannah: Upland soil on nearly level to sloping, somewhat poorly drained, silty soils and moderately well drained, loamy soils; on uplands and stream terraces

Kipling-Savannah-Oktibbeha: Somewhat poorly drained to moderately well drained soils that have dominantly a clayey subsoil that developed from chalk, and moderately well drained soils that have a loamy subsoil and a fragipan

Longview-Falkner-Prentiss: Somewhat poorly drained and moderately well drained soils that have a loamy to clayey subsoil

Mathiston-Urbo: Somewhat poorly drained, acid soils that have a loamy to clayey subsoil

Maben-Ruston-Savannah: Well drained to moderately well drained soils that have dominantly a loamy subsoil

Stough-Prentiss-Myatt: Poorly drained to moderately well drained soils that have dominantly a loamy subsoil

Sweatman-Boswell: Well and moderately well drained, steeply sloping soils that have clayey subsoils on side slopes and narrow ridges

Urbo-Mantachie Association: Deep, somewhat poorly drained soils on nearly level flood plains that are fine, mixed, acid, and thermic Aerie Haplaquepts

Wilcox: Somewhat poorly drained, steeply sloping soils that have clayey subsoils

Wilcox-Falkner: Somewhat poorly drained, nearly level to sloping soils that have clayey and silty subsoils

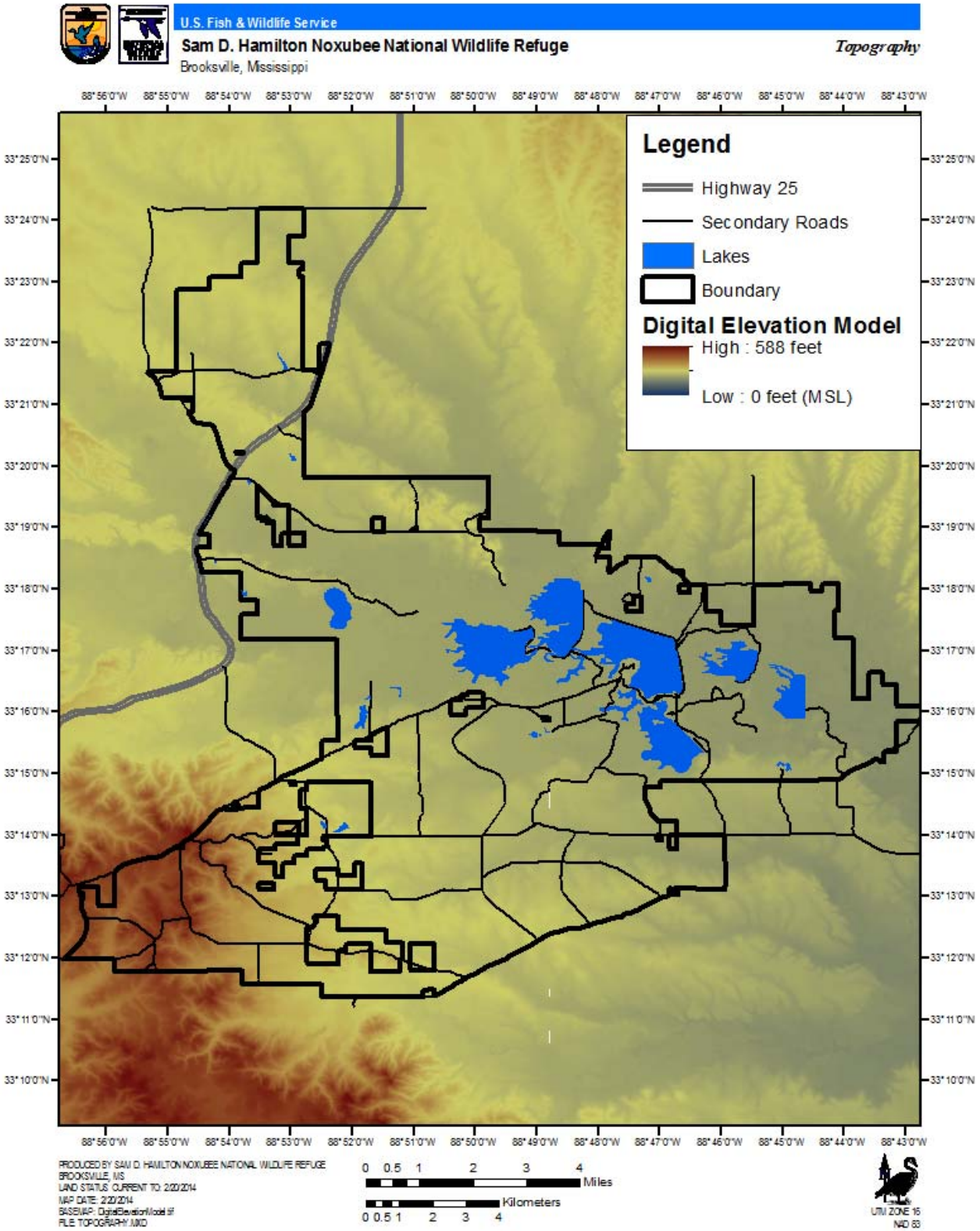

Figure 7: Digital elevation model for Sam D. Hamilton Noxubee NWR

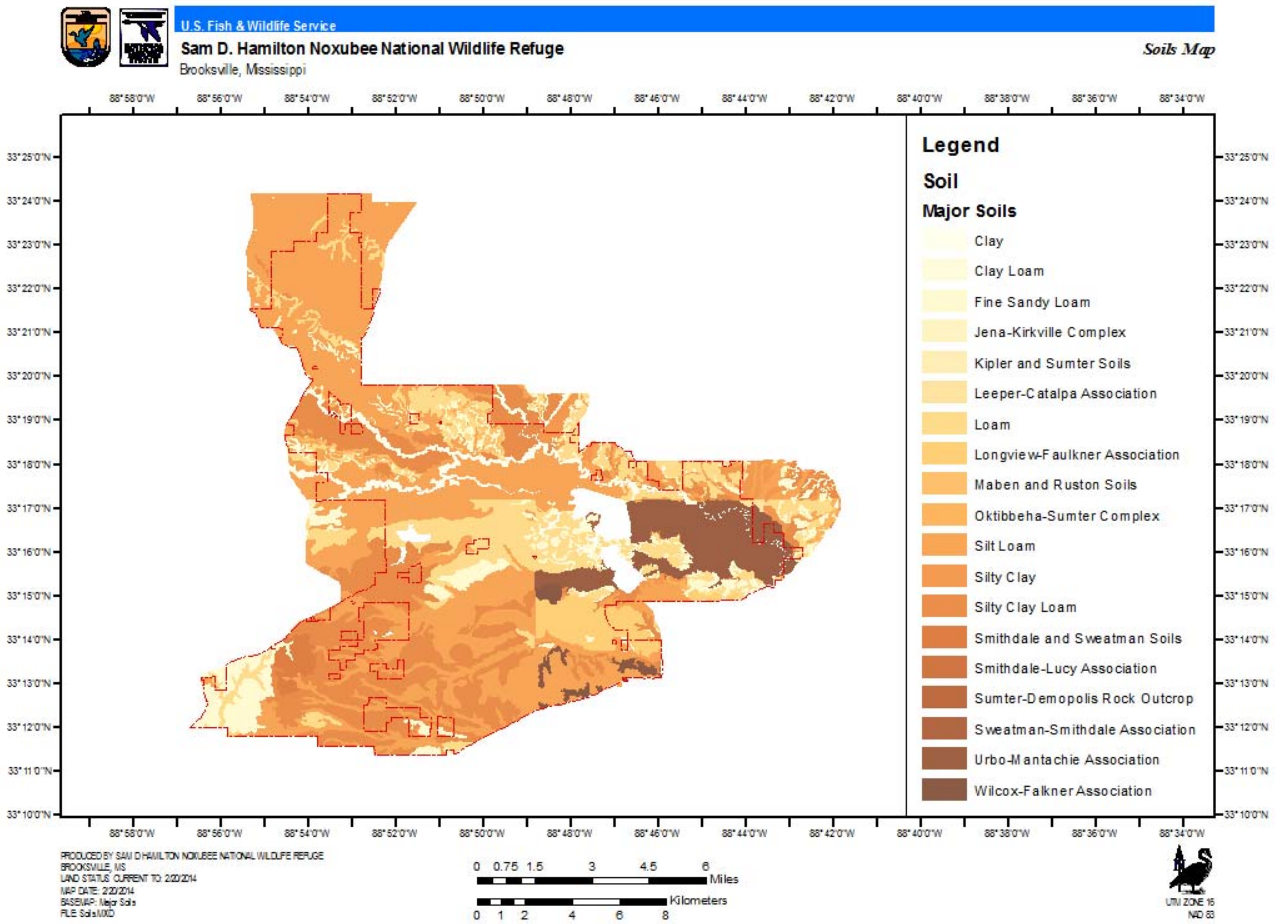

Figure 8: Major Soils found on Sam D. Hamilton Noxubee NWR.

HYDROLOGY

The waters of the refuge drain through the Noxubee River towards the southeast, into the Tennessee-Tombigbee Waterway. The Tombigbee River drains approximately 6,100 square miles of northeastern Mississippi and western Alabama into the Mobile River and the Gulf of Mexico. Refuge waters include more than 55 miles of streams and creeks, 20 miles of the Noxubee River, and 1,062 acres of lakes (primarily Bluff and Loakfoma) (Figure 9).

Water Quality and Quantity

Waters on the refuge are influenced by levee construction, channel modification, agricultural runoff, off-refuge cattle grazing, timber harvest, and invasion of nonnative species. Wetland habitats on the refuge include Bluff and Loakfoma Lakes, GTRs, and numerous acres of small ponds, both natural and man-made. The lakes' vegetation consists of emergent species, including cattail, smartweed, wild millet, American lotus, and bald cypress. Ross Branch Reservoir is also a small man-made impoundment with similar lake habitat; however, it has slightly deeper water due to its steep banks and its primary

purpose is to provide water for use within the refuge's waterfowl moist-soil management fields. 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 half of the 15,507 acres of bottomland hardwood forests found on the refuge. Prominent plant species found in aquatic environments include fragrant water lily (*Nymphaea odorata*), American lotus (*Nelumbo lutea*), *juncus* sp., swamp smartweed (*Polygonum hydropiperoides*), duckweed (*Lemna minor*), and wild millet (*Panicum miliaceum*).

A study on water quality on the refuge and its influence on paddlefish was conducted in 2011 by Drs. Daniel Aboagye and Peter Allen, Mississippi State University. Water temperatures ranged from <10°c to >30°c from February to September in all locations sampled on the refuge (Bluff Lake spillway, Oktoc Creek, Noxubee River, and Halbert Lake). Dissolved oxygen ranged from 13 mg/L to 3 mg/L at the Bluff Lake spillway and Oktoc Creek. Dissolved oxygen ranged from 13 mg/L to 5 mg/L in the Noxubee River and at Halbert Lake it ranged from 8 mg/L to 1 mg/L. Bluff Lake indicated that the pool below the radial gate spillway may provide a longer duration of dissolved oxygen concentrations than surrounding areas (Aboagye, D. et al. 2011). Among other factors, turbidity was measured at all four locations. The average turbidity throughout the year at each location was 22.6 NTU at Bluff Lake, 25.8 NTU at Oktoc Creek, 18.5 NTU at Halbert Lake, and 30.3 NTU at Noxubee River (Aboagye, D. et al. 2011).

Noxubee River

The Noxubee River headwaters originate in the hilly section of Winston County on portions of the Tombigbee National Forest and flow southeastwardly through Winston, Oktibbeha, and Noxubee counties. The Noxubee River has remained a naturally meandering river, and therefore, is an excellent example of a naturally functioning watershed. Twenty-five miles of the main river channel and 55 miles of tributary streams and creeks exist on the refuge. Noxubee River is a major tributary of the Tennessee-Tombigbee Waterway and is the only substantial stream within the refuge. Drainage of the refuge is by the Noxubee River and its tributaries. The drainage pattern flows from west to east via the Noxubee River and its tributaries. The principal small watersheds with their concourses within or immediately adjacent to refuge lands include Chinchahoma, Cypress, Dry, Sand, Oktoc, Jones, Loakfoma, Lynn, Yellow, Hollis, and Talking Warrior creeks. Oktoc Creek drains through Bluff Lake, thus affording the water supply for this lake, as well as for GTRs 1 and 2.

Bluff Lake

The 609-acre Bluff Lake was created in the late 1930s by construction of a levee by the Civilian Conservation Corps (CCC) across Oktoc Creek. Approximately 150 acres of managed moist-soil habitats are located in the upper portion of the lake. A large rookery is located in the center of the lake near the Bluff Lake Boardwalk and is significantly active. The rookery routinely contains approximately 20,000 birds including cattle egrets, little blue herons, snowy egrets, and white ibis during the nesting season.

Loakfoma Lake

Created by clearing bottomland hardwoods in the early 1960s, this 453-acre lake is managed primarily for waterfowl with secondary use for recreational fishing. The shallow water areas of the lake produce marginal stands of submerged and emergent vegetation consisting primarily of waterlily, sedges, pondweeds, and three square bulrushes (*Scirpus pungens*). The extensive coverage of emergent plants creates excellent habitat for brood rearing wood ducks (*Aix sponsa*), hooded mergansers (*Lophodytes cucullatus*), and gallinules (*Porphyrio spp.*). For several years the lake's recreational fishery has been hindered due to the establishment of dense stands of emergent (primarily American lotus) and submerged aquatic vegetation.

Ross Branch Reservoir

This lake is approximately 34 acres in size and was created in the 1960s primarily for the purpose of providing a water source for the moist-soil impoundments of the Jones Creek Unit. Today, recreational fishing opportunities exist and the reservoir has been stocked in the past by MDFWP and Service hatcheries.

AIR QUALITY

National Ambient Air Quality Standards (NAAQS) exist for six contaminants, referred to as criteria pollutants, and apply to the ambient air. Ambient air is the air that the general public is exposed to every day (USEPA 2008). These criteria pollutants include carbon monoxide, ozone, particulate matter, nitrogen oxides, sulfur dioxide, and lead.

Areas where the ambient air quality does not meet the NAAQS are said to be nonattainment areas. Areas where the ambient air currently meets the national standards are said to be in attainment. The three Mississippi counties in which the refuge is found are all in attainment for all six criteria pollutants (USEPA 2008).

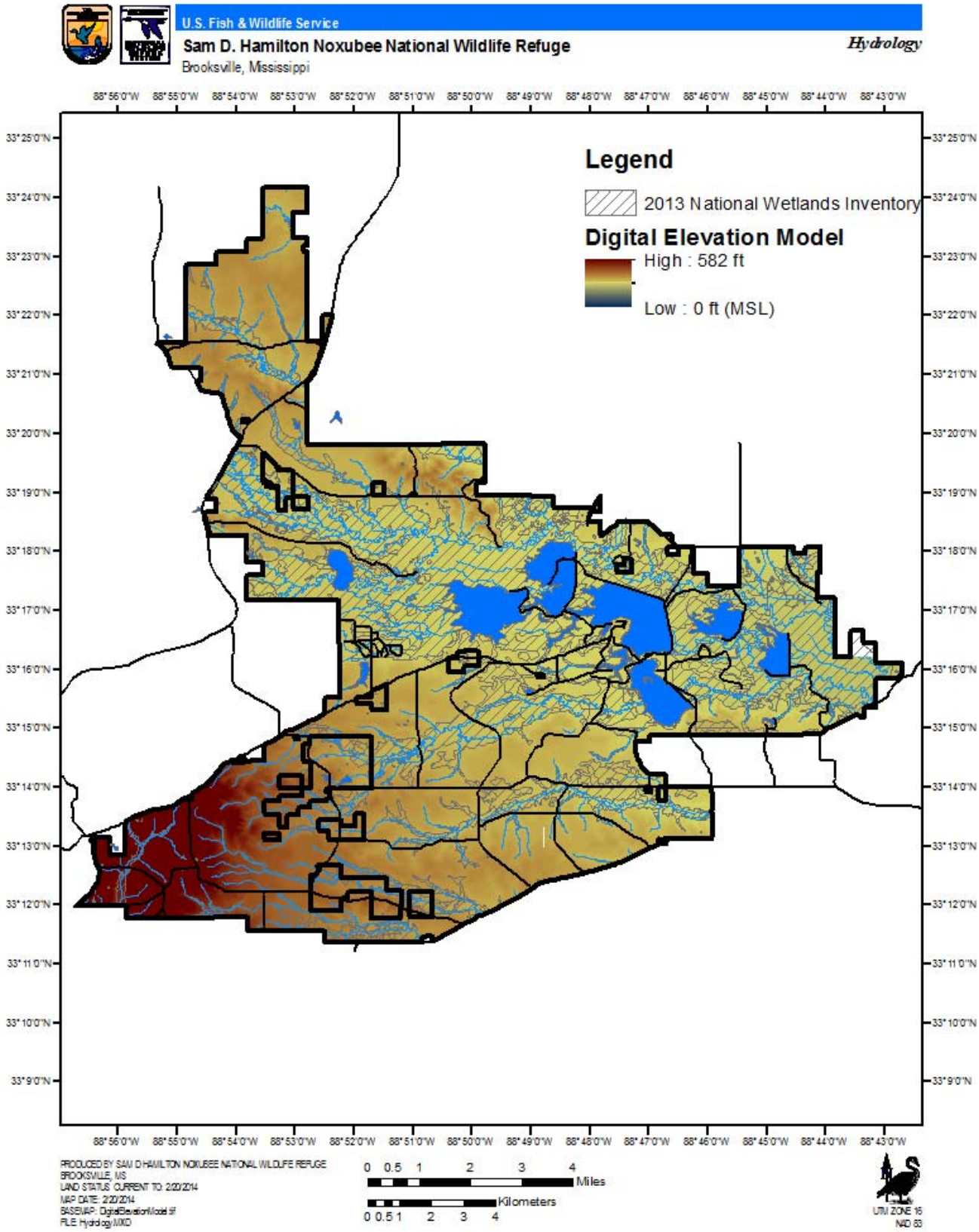

Figure 9: Hydrology on Sam D. Hamilton Noxubee NWR, Mississippi

BIOLOGICAL RESOURCES

HABITAT

Historically, the entire refuge was forested habitat in various successional stages (Figure 3). Forest conditions, for those species that were analyzed, supported hardwood forests consisting of 704 acres (2 percent) of white oak, post oak, southern red oak (*Quercus falcata*), and loblolly pine interspersed with oaks, hickories, blackgum (*Nyssa sylvatica*), and sweetgum. The area also supported shortleaf/ loblolly pine forests over approximately 21,304 acres (44 percent) of the refuge. The historic forest conditions analysis indicates approximately 19,306 acres (40 percent) of bottomland hardwood forests were within the refuge consisting of water oak (*Quercus nigra*), willow oak (*Quercus phellos*), cherrybark oak (*Quercus pagoda*), overcup oak (*Quercus lyrata*), American beech (*Fagus grandifolia*), blackgum, and sweetgum. Historic forest conditions depict bald cypress and gum swamp forests that were nearly pure stands of American bald cypress which constituted approximately 6,904 acres interspersed throughout the bottomland hardwood forests.

Since establishment of the refuge, approximately 36 percent (17,145 acres) of the refuge no longer represents the historical conditions (Figure 4). An estimated 1,117 acres of bottomland hardwoods and cypress forest, approximately 2 percent of the refuge, have been converted to lakes. Loblolly pine forests now cover the majority of upland sites on the refuge due to plantings that occurred in the late 1940s and 1950s. Prior to fire suppression, loblolly pine was a minor component of riparian and other mesic forests and a secondary component of mixed pine and pine hardwood forests in these interior uplands of Mississippi. Forests dominated by loblolly were rare and restricted to a part of southern Arkansas and perhaps eastern Virginia and northeastern North Carolina. Currently, because of the fire suppression of the past century, loblolly pine is the dominant pine throughout the southeast in areas that were historically covered by longleaf pine, shortleaf pine, and shortleaf - loblolly pine forests (USFWS 2003).

Forest Management

Currently, the majority of the refuge, 94 percent, consists of forested habitat; however, differences exist within the amounts and distribution of the forest types when compared to the historic forest conditions (Figure 4). Today, hardwood forests are overrepresented by 7,312 acres; shortleaf/loblolly pine forests are only slightly underrepresented by 331 acres; bottomland hardwood forests are underrepresented by approximately 3,727 acres; and, bald cypress and gum swamp forests are the most underrepresented forest type by approximately 5,775 acres. Non-forested lands consist of lakes, developed lands, rights-of-way, and roads.

A variety of silvicultural techniques are used to manage forests, with an emphasis on providing habitat for threatened and endangered species, migratory birds, and other resident wildlife. Commercial timber harvesting is frequently utilized where appropriate to accomplish larger scale silvicultural treatments such as forest stand improvements, stand regeneration, and disease control. Refuge staff may be used when conducting single tree or small group selection tree removals. Staff is also used when completing some other forms of timber stand improvement such as the use of herbicides.

Forest Management History

In the early 19th century, much of the current refuge property was cleared and converted to agricultural use by Euro-American settlers. By the late 1930s, many areas within the current refuge's boundary showed severe signs of soil erosion and was considered only marginal crop land. Between 1935 and 1940, more than 1,000 acres of cypress forest were cleared to create Bluff Lake. By the early 1950s,

refuge staff had created soil erosion barriers and 75 percent of the abandoned fields were reverting back to forest through yearly plantings of loblolly pine and nature regeneration of light seeded trees. Today, the majority of the refuge, 94 percent, consists of forested habitats. Three lakes and several small wetlands were created along with four GTRs. Management of the refuge's forested habitats has included prescribed fire, use of herbicides, and commercial harvest of timber since the establishment of the refuge. The six SAF Forest Cover Types under which the refuge has been managed include:

Upland Hardwood Forests - The upland hardwood forest is found on the refuge's gentle to moderate slopes near Douglas Bluff and Bevill's Hill. It consists of mixed oak, oak-pine, and mixed hardwood communities. Two forest cover types are recognized within the refuge's upland hardwood forests.

The first cover type, White Oak – Black Oak – Northern Red Oak (SAF Cover Type 52), is an upland xeric site association in which the species compositions change depending upon elevations. The oaks dominate the stand with hickories comprising a smaller component. Other tree species occurring are yellow poplar (*Liriodendron tulipifera*), blackgum, red maple, ash, elm, sweetgum, shortleaf pine, and loblolly pine. Dogwood (*Cornus* spp.), sassafras (*Sassafras albidum*), serviceberries (*Amelanchier* spp.), redbud (*Cercis canadensis*), hophornbean (*Ostrya virginiana*), American beech, witch-hazel (*Hamamelis* spp.), sparkleberry (*Vaccinium arboreum*), wild grapes (*Vitis* spp.), greenbriers (*Smilax* spp.), and poison-ivy (*Toxicodendron radicans*) are found in the midstory and understory. Common herbaceous species are mayapple (*Podophyllum peltatum*), trillium (*Trillium* spp.), wild ginger (*Alpinia* spp.), bellworts (*Uvulvaria* spp.), asters (*Aster* spp.), and goldenrod (*Solidago* spp.). The type is a subclimax or climax depending upon the geographic location and site index.

The second cover type, Loblolly Pine – Hardwoods (SAF Cover Type 82), dominates no more than 20 percent of the overstory. Within Mississippi, this cover type occurs on sites ranging from coastal swamps to xeric sites. The hardwood components consist of a mixture of sweetgum, water oak, cherrybark oak, swamp chestnut oak (*Quercus michauxii*), ash, yellow poplar, elm, red maple, and hickories. Shrubs and midstory trees include wax myrtle (*Morella cerifera*), American beautyberry (*Callicarpa americana*), possumhaw (*Ilex decidua*), sparkleberry, dogwood, and hawthorns (*Crataegus* spp.). Common vines include blackberries (*Rubus* spp.), greenbriers, grapes, and honeysuckle (*Lonicera japonica*). This cover type develops toward a hardwood climax (Mississippi Museum of Natural Science 2005).

A majority of the hardwood forests on the refuge are mature hardwood forest stands with less than 50 percent pine. Most of these forests are 70 to 90 years old. These upland forests have been passively managed and fire has been largely excluded over the past several decades. Throughout the upland hardwood forests, older trees are periodically lost from insects, lightning, wind-throw, diseases, and natural mortality, creating good vertical structure and species diversity in the midstory. The interspersion of vertical structure created by the over-story canopy gaps is desirable for many land birds.

Pine Forests - The refuge's pine forests occur on upland hills and flats. At present, these managed stands of pine form the dominant cover type on the refuge. The majorities of the refuge's loblolly pine stands are currently in the 70-year-age-class and originates from the plantings and regrowth of the forest following the refuge's establishment. The majority of loblolly pine on the refuge is expected to survive until the approximate age of 120 years. Shortleaf and longleaf pines also naturally occur on the refuge and can have two to three times the longevity of loblolly pine. Shortleaf and longleaf pine forests are an important part of the refuge's historic habitat structure. Historically, shortleaf pine communities included those without hardwoods and those with a small hardwood component (USFWS 2003). Longleaf pine exists within the shortleaf areas, but has not been dominate within the overstory. Without active management to regenerate new stands of loblolly pine the loblolly forest, as a whole,

will begin losing greater numbers of trees to natural mortality at approximately 90 years of age. If not replaced by new loblolly or shortleaf or longleaf pine, the ability of the forest to meet the needs of the red-cockaded woodpecker will decrease as the age of the stand increases. Several factors contribute to the timing of this approaching mortality to loblolly pine such as insects, lightning, wind-throw, and diseases. Within the pine areas, two forest cover types are currently managed.

One cover type, loblolly pine – shortleaf pine (SAF Cover Type 80), is comprised of a majority of loblolly pine, some locations containing longleaf and shortleaf pine. Other overstory species associated with the loblolly, longleaf and shortleaf pine include southern red oak, white oak, persimmon (*Diospyros virginiana*), blackgum, hickories, and flowering dogwood (*Cornus florida*). When prescribed fire is not used in an area, hardwoods species are common in the midstory. With prescribed fire, Panicums (*Panicum* spp.), sedges (*Carex* spp.), and little bluestem (*Schizachyrium scoparium*) are common undergrowth with little midstory being found. This cover type is transient and will convert to an upland oak climax without continued disturbance.

The other cover type, loblolly pine (SAF Cover Type 81), is composed of either pure stands of loblolly pine or various mixtures in which loblolly pine comprises the majority of the overstory. It occurs on a variety of soils from well-drained upland soils to somewhat poorly drained flatwood soils. The occurrence of the loblolly pine cover type is widespread on the refuge due to historic plantings of the species and active management for this cover type. The most common species associated with loblolly pine within this cover type include sweetgum, water oak, willow oak, cherrybark oak, red maple, hickories, and blackgum. The associated species are also common in the midstory. Dense, young stands support sparse herbaceous vegetation, but as the stand opens up, other species may appear. This cover type tends to be successional and temporary unless maintained through active management (Mississippi Museum of Natural Science 2005).

Bottomland Hardwood Forests - The refuge's bottomland hardwood forests are found within the small drainage ways, floodplains, stream terraces, and leveed GTRs. Areas along Noxubee River and its tributaries contain the majority of this habitat.

Within the bottomland hardwood forest, the refuge manages for one cover type, Sweetgum – Willow Oak (SAF Forest Cover Type 92). Species composition in this cover type is determined by soil condition. On well-drained first bottom ridges and terrace flats with silty clay soils, sweetgum will dominate the stand. Oaks will dominate on clay soils. Willow oak and water oak will be found on the first bottom ridges with better drainage. Nuttall oak (*Quercus texana*) occurs on the first bottom flats. Other species associated with this cover type are sugarberry, ash, elm, overcup oak, hickory, Eastern cottonwood (*Populus deltoides*), persimmon, red maple, and rarely bald cypress. The associate species also are the dominant midstory species. The herbaceous layer can commonly include greenbrier, poison-ivy, redvine (*Brunnichia ovata*), mayapple, jack-in-the-pulpit (*Arisaema triphyllum*), netted chainfern (*Woodwardia areolata*), and jumpseed (*Polygonum virginianum*) (Mississippi Museum of Natural Science 2005).

The majority of the lower slope and high-terrace hardwood forests are mature and beginning to sustain greater levels of tree mortality. Mast-producing species, such as oaks, are being lost without replacement from these locations at an alarming rate. Regeneration of shade-intolerant mast producing species requires a readily available seed source within the same forest. With seeds present, gaps within the forest canopy allow sunlight to reach the forest floor and new oaks to grow. Management and harvest of trees within bottomland hardwood stands can create conditions for the regeneration of shade-intolerant species, as well as provide cover, food, and structure for wildlife. Without the creation of canopy gaps, the shade-intolerant species will gradually be phased out of this system, only occasionally occurring at naturally disturbed locations such as storm blow-down sites. Location of

bottomland hardwood forests left undisturbed have shifted toward shade-tolerant tree species such as ironwoods, sugarberries, and elms. A forest made up of these shade-tolerant species provides limited food resources for a variety of wildlife.

Bald Cypress/Gum Swamp Forests - The refuge's Bald Cypress forests (SAF Cover Type 101) are found around oxbow lakes, low floodplain terraces, bottomland flats, and backwater areas of the man-made lakes and reservoirs. This cover type exists in areas that are seasonally to semi-permanently flooded and remain saturated for long periods throughout the year. Its major associates are water tupelo and blackgum. Minor associates include black willow (*Salix nigra*), cottonwood, ash, water hickory (*Carya aquatica*), and overcup oak. The midstory may include buttonbush (*Cephalanthus occidentalis*), eastern swampprivet (*Forestiera acuminate),* acuminate (*Forestiera acuminate*), and Virginia sweetspire (*Itea virginica*). The ground cover will contain species such as whitegrass (*Leersia virginica*), waterwillow (*Justicia americana*), swamp sedge (*Carex joorii*), and opposite-leaf spotflower (*Acmella oppositifolia*), depending upon the amount of shade (Mississippi Museum of Natural Science 2005).

Most of the refuge lakes and wetlands are classified under this cover type. Bald cypress is largely interspersed throughout the bottomland hardwood forests especially along streams. Like much of the forest, most of the bald cypress existing on the refuge is relatively young and estimated at approximately 90 years in age. Bald cypress is a long-living tree species, which has been known to survive over a thousand years. Bald cypress is an important wildlife tree species because of cavity development and nest and roost trees.

Prescribed Fire and Wildfires

Wildfires are documented to have occurred within refuge boundaries, but at present are very infrequent mainly due to management of fuel loads via prescribed fire with pine and pine-hardwood habitats. Most fuel load buildup within pine habitats on the refuge is less than three years (Figure 10). In pine-hardwood habitats with three or more years of fuel loading, some areas have more than seven years of fuel loading. The refuge's Fire Management Plan (2005) stipulates that wildfires causing direct threat to resource or assets will be confined to reduce unplanned damage.

Prescribed fire is an important tool in the management of unwanted hardwoods and other midstory vegetation within the pine habitats on the refuge. Prescribed fire has been used to treat approximately 6,000 acres of forested habitat each year for the benefit of the red-cockaded woodpecker (RCW) through the improvement of forage habitat conditions. The majority of this burning is accomplished in pine habitats and to a lesser extent in pine-hardwood habitats. Numerous wildlife species (e.g., RCW, Northern bobwhite, turkey, Henslow's sparrow, and butterflies) benefit from the increased production of grasses and forbs encouraged by the fire. Prescribed fire primarily retards succession in the mid- and lower-story woody vegetation as it eliminates shrubs and small trees, allowing increased growth of grasses and herbaceous plants. 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.

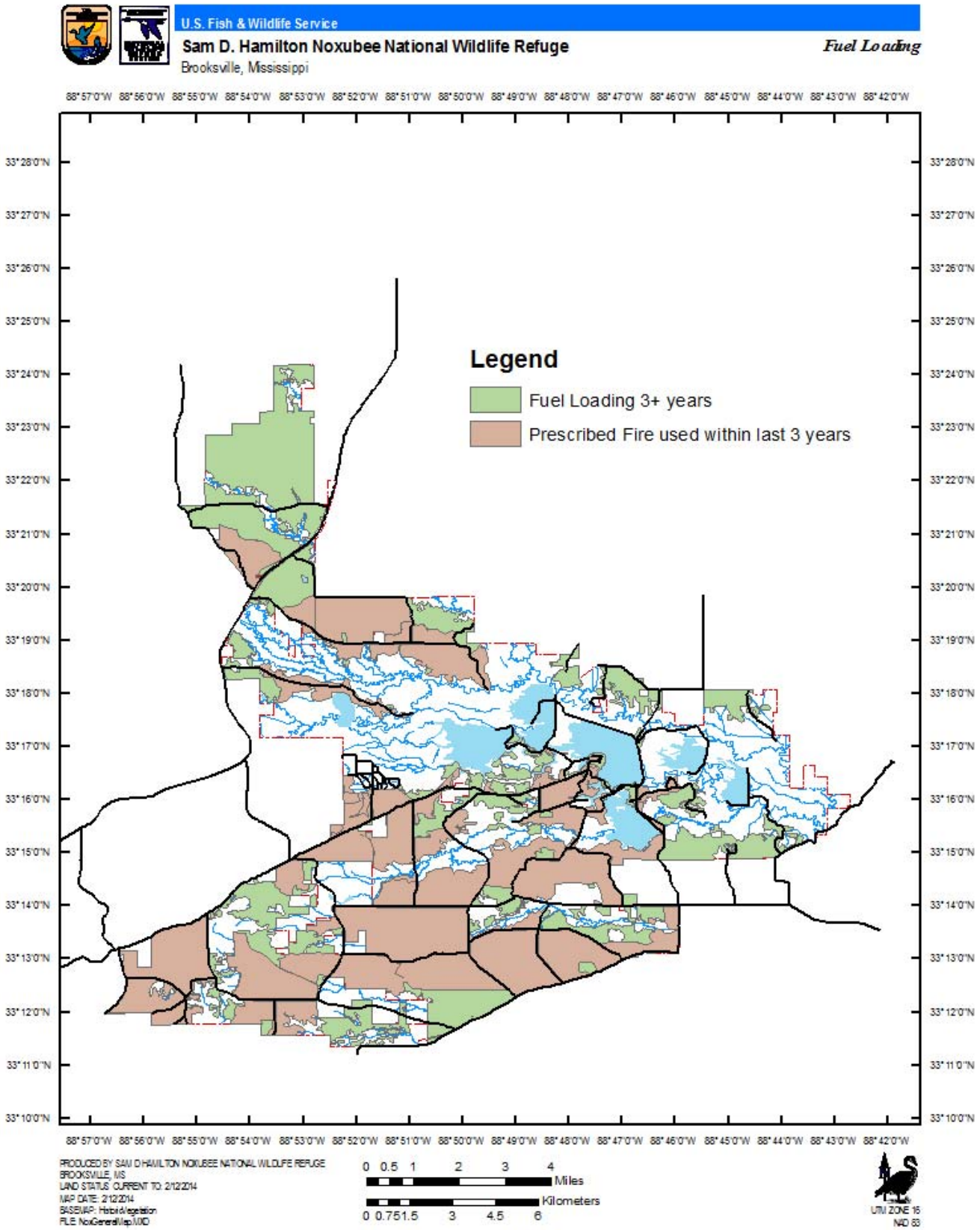

Figure 10: Fuel loading 3-plus years and prescribed fire used within 3 years (as of 2013)

Exotic and Pest Species

Exotic and pest species occur throughout the refuge, including terrestrial and aquatic systems. By definition, exotic species are nonnative to the region. Invasive also refers to introduced species that adversely affect the habitats and bioregions they invade both economically and environmentally. Nuisance species are native organisms that, given specific population levels or locations, cause or are likely to cause harm to the particular habitat under consideration. Collectively, this category of species interferes or has the potential to affect other natural plant and animal communities in which they share the habitat (750/751 FW 1, USFWS 2009).

There are many identified exotic and nuisance species of known threat to the refuge. Of these, seventeen plants and seven animal species are of particular concern (Volume II, Integrated Pest Management Plan). For example, beaver, considered a pest species, activity results in unwanted flooding of bottomland hardwood areas during the growing season, clogging of water control structures, and burrowing and digging into levees, which leads to breaches in the levee or leaks around water control structures. Feral hogs, an exotic species, are destructive both to habitat and wildlife and a newly detected fast-growing problem on the refuge.

Pest plants represent a large number of native species that under certain conditions interfere with management objectives. Native broadleaf plants can significantly compete with planted cereal grains and result in decreased yield or complete crop failure if not controlled. An example of this would be sicklepod (*Senna obtusifolia*) and rattlebox (*Sesbania spp.),* which are stimulated to sprout by soil disturbance and may be 4-6 inches tall before planted crops break ground. Other native plants can be classified as a nuisance after they have expanded beyond a desired density or acreage. This would include common moist-soil and aquatic plants that may compete with more desired plants for waterfowl or create dense floating mats of vegetation without an interspersion of open water.

Several invertebrates are considered exotic on the refuge. The major terrestrial exotic invertebrate animal is the red imported fire ant (*Solenopsis invicta*). Widely distributed on the refuge in all habitats, this ant is known to negatively affect native insects and animals. Unfortunately, large-scale control measures are not currently applicable. Within the aquatic system, the Asian clam (*Corbicula fluminea*) is considered an exotic species. This nonnative bivalve can be found in all permanently flowing streams on the refuge. At high concentrations, the mussel may displace native mussel populations by creating cobbled substrate not suitable for native species and create a solid bed of live and dead shells. Native pest invertebrates include fall armyworm (*Spodoptera frugiperda*) and southern pine beetles (*Dendroctonus spp., and Ips spp*.). Fall armyworm becomes a pest when levels interfere with early growth of planted grains. Initial attacks easily kill young growing plants. At higher levels, pesticide use may be warranted to minimize damage to maturing crops. Southern pine beetles are extremely beneficial to wildlife at endemic population levels. The mortality of individual or small groups of trees provides a substrate for invertebrates beneath the bark. These trees are heavily used by foraging woodpeckers and subsequently provide sites for primary cavity nesters. However, epidemic population levels can result in large-scale stand mortality. This cyclic population level results in loss of pine stands utilized by a large number of birds and other wildlife. The federally endangered RCW's life history is centered on the long-term stability of pine stands. Therefore, stand-level replacement caused by beetle infestations could pose a threat to habitat for RCWs.

Fields

Refuge fields are managed to produce a variety of early successional vegetation types. Many fields were previously 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 annual 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.

Old fields or fallow lands contain a variety of annual and perennial plants, including purpletop tridens (*Tridens flavus*), velvet panicum (*Dichanthelium scoparium*), bristlegrass (*Setaria* spp.), bahiagrass (*Paspalum notatum*), Johnsongrass (*Sorghum halepense*), bluegrass (*Poa* spp.), Bermuda grass (*Cynodon dactylon*), cheatgrass (*Bromus tectorum*), cattail sedge (*Carex typhina*), little barley (*Hordeum pusillum*), little bentgrass (*Agrostis* spp.), bittercress (*Cardamine* spp.), butterweed (*Packera glabella*), bedstraw (*Galium* spp.), buttercup (*Ranunculus* spp.), chervil (*Chaerophyllum* spp.), chickweed (*Stellaria*, *Holosteum*, and *Cerastium* spp.), clover (*Trifolium* spp.), cornsalad (*Valerianella* spp.), corn speedwell (*Veronica arvensis*), crowpoison (*Nothoscordum bivalve*), dwarfdandelion (*Krigia* spp.), fleabane (*Erigeron* spp.), forget-me-not (*Myosotis verna*), garlic (*Allium* spp.), lyre-leaf sage (*Salvia lyrata*), plantain (*Arnoglossum* spp.), medic (*Medicago lupulina*), and toadflax (*Linaria* and *Nuttallanthus* spp.). Over 820 acres of fields have been managed on the refuge. Nonnative plants have become established in many existing fields.

Prairie Demonstration Area (Morgan Hill)

The Blackbelt Prairie Region historically existed as a portion of land extending from the Tennessee border in an inverted arc through Mississippi into eastern Alabama, supporting native prairie. This crescent-shaped region covered approximately 8,700 square miles and extends from McNairy County, Tennessee, south across East-Central Mississippi and east to Russell County, Alabama. Today, the Black Belt Prairie has been listed as one of the critically endangered ecosystems in the United States, with less than 1 percent still remaining. This makes it the most degraded habitat type in Mississippi. Very small isolate remnant patches (less than 100 acres) remain in the northeastern part of the state (Jones et. al. 2007; Mississippi Museum of Natural Science 2005), in cemeteries, 16th section lands, and on Tombigbee and Bienville National Forests (Wildlife Mississippi).

Currently, the refuge has 85 acres non-black belt prairie soils being managed as a demonstration area for this off-refuge habitat type. The demonstration area is the only location where a calcareous clay prairie-like soil exists on the refuge. This area is managed using prescribed fire for planted native prairie species, including little bluestem, Cherokee sedge (*Carex cherokeensis*), yellow Indian grass (*Sorghastrum nutans*), prairie coneflower (*Ratibida pinnata*), false foxglove (*Agalinis* and *Aureolaria* spp.), and a variety of asters. Eastern red cedar (*Juniperus virginiana*) and a variety of prairie grasses form small glades in this area. Cedar glades are often found on hilly upland with eroded, calcareous soils. The cedar glades are regarded as a degraded form of the prairie community. These glades are vulnerable to decline because of conversion to pasturelands (Mississippi Museum of Natural Science 2005)

Douglas Bluff

There exist several clearly identifiable microhabitats within the Douglas Bluff area of the refuge that contain specialized and often uncommon or rare plant communities. The area's north facing slope runs along the edge of Oktoc Creek, which promotes a stable moisture regime. In 1976, Dr. Ray Watson, Mississippi State University, Department of Biological Sciences, recommended it be considered by the Service as a Research Natural Area, because of its unique and rare botanical diversity. He identified 85 plant species with fairly narrow habitat distribution or collectively uncommon locally on the bluff. Some of these species included Pachysandra (*Pachysandra procumbens*), early Saxifrage (*Saxifraga virginiensis*), and bloodroot (*Sanguinaria candensis*). Trillium and other herbaceous plants are isolated along the ridge line. Several woody plants, including American chestnut (*Castanea dentata*), bladdernut (*Staphylea trifolia*), Allegheny chinkapin (*Castanea pumila*), and fringetree (*Chionanthus virginicus*), can also be found as associates along the bluff. Although the designation was not pursued, Douglas Bluff has been established as an educational use only area.

Other Aquatic Habitats

The aquatic type habitats include a reservoir, two lakes, multiple moist-soil impoundments, numerous artificial ponds, natural beaver ponds, creeks, and the Noxubee River and its tributaries. The mostly un-channelized Noxubee River is a complex floodplain river system. The two man-made lakes and the one reservoir at Ross Branch support a wide variety of native fish and other aquatic life. The dynamic nature of the flooding regime and associated wetland habitats provide a renewable fishery resource on the refuge. The creeks, sloughs, and lakes support a diverse warm water fishery, including largemouth bass (*Micropterus salmoides*), spotted bass (*M. punctulatus*), black crappie (*Pomoxis nigromaculatus*), white crappie (*P. annularis*), bream (*Lepomis* spp.), channel catfish (*Ictalurus punctatus*), flathead catfish (*Pylodictus olivaris*), and blue catfish (*I. furcatus*). Nongame fish such as common carp (*Cyprinus carpio*), freshwater drum (*Aplodinotus grunniens*), and bigmouth buffalo (*Ictiobus cyprinellus*) are also found in refuge waters. When flooding occurs in the spring, these areas provide excellent nurseries for juvenile fish. These waters also provide essential habitat for a host of reptile and amphibian species. The moist-soil impoundments total approximately 314 acres and are dispersed throughout the refuge. Four GTRs exist on the refuge, comprising of approximately 1,359 acres that are flooded for use by wintering waterfowl. Resident and migratory wildlife use these areas for resting, foraging, breeding, and nesting. Due to erosion, the refuge's man-made lakes are increasingly losing water depth. Both the marshy shore and open waters provide excellent wildlife habitat for a variety of species. Bluff Lake and Loakfoma Lake are both up to 12 feet in depth in limited locations. Loakfoma Lake was recently rehabilitated because of invasive species. The Ross Branch Reservoir provides water to flood nearby moist-soil impoundments through gravity flow. Water control structures associated with these features allow unique water management options.

Streams

A wide variety of wildlife is dependent upon streams for its survival, including mussels, fishes, amphibians, and reptiles. The refuge's approximately 1,700 acres of riparian zone habitats created by streams sustain the most dynamic collection of wildlife. Healthy riparian zones provide organic input and woody structure into stream channels, as well as stabilize the stream banks.

The refuge is located in the Tombigbee Basin Drainage. Streams existing upon the refuge are tributaries of the Tombigbee River. This river has been highly modified by the construction of the Tennessee-Tombigbee Waterway. This waterway created a series of impoundments and canals with locks and dams to improve navigation. The series of locks and dams isolated many tributaries. Tributaries of the Tombigbee River that flow through the refuge include Noxubee River, Chinchahoma, Talking Warrior, Cypress, Jones, Oktoc, Loakfoma, Lynn, Little Yellow, and Dry Creeks. Approximately 80 miles of streams crisscross the refuge.

Moist-soil Impoundments

Moist-soil impoundments are man-made wetlands designed to produce annual plants and invertebrates for use by waterfowl, shorebirds, and wading birds. When not planted in agricultural crops, these units normally are naturally vegetated by Cyperus spp., barnyardgrass (*Echinochloa crus-galli*), millet spp., smartweed spp., and several other species that benefit wildlife. The refuge's impoundments are primarily flooded during the late fall and winter months for wintering waterfowl. The nutritious seeds and invertebrates provide critical food for the migrating waterfowl. The Jones Creek moist-soil area is subdivided into 16 small impoundments. These impoundments give the refuge the ability to manipulate multiple water levels during certain times of the year to promote desirable moist-soil plants and wildlife uses. During spring, the impoundments can be dewatered to provide mud flats for migrating shore and wading birds. The moist-soil management consists of a method of using the timing and rate of dewatering, soil disturbance, stage of plant succession, and the timing and rate of re-flooding to provide the best environment for the target wildlife. Intensive soil manipulation is necessary over the long term to prevent units from converting into willow thickets. Agricultural crops may be used as part of a field's soil disturbance rotation. The refuge's moist-soil units total 314 acres consisting of 17 individual units varying in size. Ross Branch Reservoir provides the irrigation water to flood the 11 impoundments within the Jones Creek unit; the five remaining units depend on rainfall for water.

Greentree Reservoirs (GTRs)

GTRs are typically created by impounding a stand of bottomland hardwoods using a levee and water control structure system. These impoundments are designed to hold water on bottomland hardwoods during the trees' dormant season, fall and winter, to prevent tree death, thus the name "greentree". The flooded impoundments are designed to provide nuts, acorns, vegetation, and invertebrates for wintering waterfowl when kept at a water depth less than 18 inches. GTRs can also provide important resting and loafing habitat for wintering waterfowl. Four GTRs exist on the refuge and total about 1,359 acres.

WILDLIFE

Threatened and Endangered Species

A key objective of the refuge is to provide habitat and protection for threatened and endangered species. At this time, there are two federally listed threatened or endangered animal species, which may be associated with the refuge. They include the RCW (endangered) and the wood stork (proposed listing of threatened in Mississippi).

Red-cockaded Woodpecker (RCW)

The RCW was listed in the *Federal Register* as endangered in 1970 (35 FR 16047), and received federal protection under the Endangered Species Act of 1973, as amended. At one time, the RCW was a common bird distributed across the southeastern United States, but by the time of listing, the RCW had declined to fewer than 10,000 individuals. The RCW selects mature, older-aged, open canopy pine stands with low ground cover of grasses and forbs. Its' decline has been traced to the overall loss of older-aged, open-pine forests in the south, a fire-dependent ecosystem to which the RCW has adapted.

During 2013, the refuge was home to 30 active clusters (groups) of RCWs; the term cluster refers to a signal group's nesting trees. The population of birds at the refuge is listed as a support population. The refuge population is designated as a significant support population in the Service's 2003 RCW Recovery Plan. Areas designated as primary core, secondary core, or essential support populations in the 2003 RCW Recovery Plan are required for specific population size objectives for the purposes of downlisting the species to threatened, and a future delisting. Significant support populations like that found on the refuge, while not specifically required for downlisting or delisting, provide recovery support to enhance RCW dispersal among populations, reduce the loss of genetic variation, and serve as a potential source for translocation to augment critically small populations. The RCW has the highest position in the refuge's management priorities.

The refuge's population goal of 88 groups listed in the 2003 RCW Recovery Plan was a function of the potential carrying capacity based on current forest habitat classification, anticipated acres of pine and pine hardwood types, a density of one group per 250 acres of pine type, and 100-year rotation age of loblolly pine managed through even-aged management.

The refuge RCW population consisted of at least 26 active groups in 1971, followed by a decline to 16 active groups in 1990, at which time artificial cavity inserts were provided and more intensive and extensive RCW habitat management ensued (Richardson 1991). Management activities following this period of decline included treatments to remove hardwood midstory encroachment at 24 clusters, providing artificial cavity inserts for at least 4 suitable cavities for each cluster, establishing recruitment clusters to increase the population, and reducing cavity competition by southern flying squirrels and predation by gray rat snakes (Richardson and Stockie 1995). From 1986 to 1992, the population increased from 16 to 32 active groups at an average annual geometric rate of 0.12 (12 percent). By 2000, the population peaked at 44 active groups. The peak population in 2000 coincided with a period of RCW translocations to recruitment clusters to establish new RCW groups. Since 2000, the population has experienced a net decline to 30 active groups in July 2013. A summary of the refuge's 2013 population follows:

66 adult (34 birds banded, 32 birds unbanded) RCWs were observed within population; average group size for population was 2.4 adult birds

58 total clusters monitored
- 30 active clusters with birds
  - 27 clusters contained potential breeding groups
    - 26 groups nested
    - 51 fledged young recorded
  - 2 clusters captured by adjacent groups
  - 1 cluster contained solitary male bird
- 16 inactive clusters with no birds present during year
- 12 abandoned clusters with no birds present for multiple years

Within the refuge's habitats, forest management practices such as selective cutting to control basal area and hardwoods, regeneration of forest stands using even-aged methods, and intensive prescribed burning are the primary management tools used to improve and sustain mature pine habitat as a home for this federally endangered bird. In addition, artificial nest cavity inserts are often required in mature pine trees to supplement natural cavity trees and to encourage establishment of new RCW clusters. It is the goal of management to provide RCWs with sustainable Good Quality Foraging Habitat (Table 1).

Table 1: Good quality foraging habitat criteria (Red-cockaded Woodpecker Recovery Plan, USFWS 2003)

Good Quality Foraging Habitat (GQFH) Criteria
• 18 or more stems per acre of pine that are at least 60 years of age and 14" dbh
• minimal pine BA of 20 square feet per acre
• BA of pines 10-14" DBH is 0 to 40 square feet per acre
• BA of pines less than 10" is 10 square feet per acre and less than 20 stems per acre
• BA of all pines more than 10" DBH is at least 40 square feet per acre
• groundcover of native bunchgrass or other native, fire-tolerant, fire-dependent forbs total 40% or more of ground cover and midstory plants and are dense enough to carry growing season fire at least once every 5 years
• no hardwood midstory exist or it is sparse and less than 7 feet in height
• canopy hardwoods are absent or less than 30% of canopy
• the entire foraging habitat is within 0.5-mile of center of cluster, and 50% is within 0.25-mile of center of cluster
• foraging habitat is not separated by more than 200 feet of non-foraging areas; non-foraging areas include: (1) any predominately hardwood forest; (2) pines stands less than 30 years in age; (3) cleared land; (4) paved roads; (5) utility right-of-way; and (6) water
• total stand BA for loblolly forest should be kept below 80 square feet per acre
• minimum canopy spacing of 25 feet

Currently, none of the RCW partitions on the refuge meet the recovery objective of providing sustainable GQFH; the term partition refers to habitat located within a 0.5-mile radius of the group's nest trees. In addition, none of the groups have partitions with all 502 acres being pine habitat that would provide the opportunity for perpetual management for GQFH. The current amount of pine forest within the partitions varies amongst RCW clusters on the refuge:

- 21% of partitions have more than 100 acres but less than 200 acres of pine habitat
- 50% of partitions have more than 200 acres but less than 300 acres of pine habitat
- 25% of partitions have more than 300 acres but less than 400 acres of pine habitat
- 4% of partitions have more than 400 acres of pine habitat

In summary, the use of artificial cavities has allowed clusters to be expanded throughout the refuge, but the number of RCW groups sustainable within the refuge's habitats depends on the amount of pine habitat existing within large enough continuous blocks to perpetuate partitions meeting GQFH. Partitions with more continuous pine habitat are more sustainable than those with smaller acres. It is estimated that RCW groups require a minimum of 75 acres to meet their yearly biological needs and it takes significantly more acres to ensure these minimal 75 acres are available perpetually through time.

Wood Storks

Wood storks are a tropical and subtropical species that generally breed in South America, Central America, and the Caribbean. It is the only breeding stork in the United States. A small breeding population exists in Florida, Georgia, North Carolina, and South Carolina. The wood stork was listed as an endangered species in the eastern United States in 1984 due to declines in wetland breeding, foraging, and nesting habitats. In 2006, 10,000 nesting pairs of wood storks were recorded within the continental United States. In 2007, the Service recommended changing the status of wood storks from endangered to threatened species.

The refuge is currently located in the migration route of both eastern and western populations of wood storks. Upwards of 10 percent of the eastern post-breeding and non-breeding stork population migrates into Mississippi. Currently, there are no breeding pairs of wood storks found on the refuge.
However, each summer wood storks forage in wetland and shallow water habitats on the refuge, particularly those associated with the Jones Creek Unit, and Bluff and Loakfoma lakes. Stork numbers gradually increase starting in June and peak in July as birds undergo a reverse summer migration following receding water conditions. In early September storks return to their breeding grounds. Recently, the wood stork has been proposed listed as threatened in Mississippi with no final ruling being made.

Northern Long-Eared Bat

The northern long-eared bat (*Myotis septentrionalis*) is currently a "proposed endangered" species under the Endangered Species Act. Historically, it was considered a summer resident or transient in Mississippi. There are no known occurrences of this species on the refuge.

RESIDENT AND OTHER SPECIES

Bald Eagles and Golden Eagles

During the early establishment of the refuge, the bald eagle was an uncommonly seen bird coinciding with the significant decline of the species within the lower 48 states. Anecdotal comments from the annual narratives indicated the species was most often observed as a late fall-winter resident and absent during the spring-summer. This former temporal period provides the most abundant food resources with large numbers of migratory waterfowl present. Currently, up to two golden and seven bald eagles have been documented using the refuge.

Collectively in Mississippi, bald eagles have rebounded dramatically within the past 20 years with annual increases in the number of occupied nests. On the refuge, confirmed nest building did not happen until the mid-1980s. In the late 1990s, the first-ever documented, successful eagle nest occurred on the refuge. The nest was located in a pine stand just south of the Smith Fields. The pair utilized the site annually until the nest was toppled by a wind storm. Subsequently in 2007, the pair began using a nest one-half mile away, which had been constructed a year prior, within a red-cockaded woodpecker cluster adjacent to the Doyle Arm of Bluff Lake. Ironically, the nest tree had died the

previous fall from a beetle infestation, yet the birds continued to use the tree through spring 2011. In 2012, that pair constructed another nest within the same woodpecker cluster in sight of the old nest tree. A second nesting pair of eagles was discovered in 2011 within a lone loblolly pine along the northern edge of the Jones Creek Unit's Prisock field moist-soil complex. Wintering and migrating eagles continue to utilize the refuge beginning in November and staying through March.
Golden eagles were recently documented utilizing the refuge. During the winter of 2012-2013, Mississippi State University (MSU) and the refuge partnered to place a trail camera with baited deer carcasses during the months of January and February for a nationwide golden eagle monitoring effort. The first documented sighting of a mature golden eagle was captured with this technology in January 2013 on Douglas Bluff Road. MSU personnel and the refuge plan to continue this monitoring effort for many years to gain a better understanding of golden eagle use east of the Mississippi River and to estimate population numbers of golden eagles within each area. Many of the eagles have unique identifying characteristics that allow researchers to identify individuals to get an accurate count number of eagles using an area. In December 2013, two golden eagles were photographed at a refuge monitoring station.

Forest Breeding Birds

Like waterfowl, many species of forest breeding birds are experiencing long-term declines as a result of habitat losses across the full range of their breeding and migrating habitats in North America, as well as losses in their wintering habitats in Central and South America. However, the immediate causes of the decline are not clear, and evaluation of the problem is complicated by their intercontinental range and by the fact that this group of migratory species is composed of over 250 species occupying a number of different habitat guilds (USFWS 1995).

In contrast to wintering waterfowl, forest breeding birds and grassland songbirds which use the Noxubee River ecosystem are less able to shift habitat use from one type to another habitat type. Forest breeding birds can also be appreciably concentrated while breeding. Therefore, area-sensitive species, those associated with and seemingly requiring relatively large (20,000 acres or greater) blocks of habitat, have been most adversely impacted by habitat loss in the system. Examples include the swallow-tailed kite (*Elanoides forficatus*), cerulean warbler (*Setophaga cerulean*), Swainson's warbler (*Limnothlypis swainsonii*), Acadian flycatcher (*Empidonax virescens*), great-crested flycatcher (*Myiarchus crinitus*), wood thrush (Hylocichla mustelina), red-eyed vireo (*Vireo olivaceus*), and northern parula (*Setophaga Americana*).

Henslow's sparrows (*Ammodramus henslowii*) are small secretive birds which overwinter in the southeastern United States. These birds have general preferences for grassy pine flats and other moist grassland areas. Specifically, sites where they occur in Mississippi consist of open pine overstory with an understory dominated by grasses and sedges, similar to habitat requirements for our species of concern, the RCW (Chandler and Woodrey 1995). They will avoid habitat burned within 3 months, but also avoid habitat that has not been burned in over 5 years. On the refuge, these birds might be found in the managed RCW habitats that have successfully transitioned into mature pine savannahs, as well as at the Morgan Hill prairie demonstration area.

Waterfowl

The number of waterfowl seen in the refuge's wetlands is abundant but has decreased since the 1960s and 1970s. Currently, 18 waterfowl species utilize the refuge and receive significant management attention. Mallards (*Anas platyrhynchos*), wood ducks (*Aix sponsa*), gadwall (*Anas strepera*), green-winged teal (*Anas carolinensis*), and ring-necked ducks (*Aythya collaris*) make up the bulk of the waterfowl found on the refuge, with population surveys peaking near 6,000 birds in winter months; these surveys cover approximately 50 percent of the available habitat.

Wood ducks are the most numerous waterfowl species found on the refuge on a year-round basis; their numbers peak during winter migration. Mallards, wood ducks, and ring-necked ducks still comprise the majority of all wintering waterfowl species on the refuge. Spring and fall flights of blue-winged and green-winged teal appear to have remained rather constant from old reports and casual observations made today.

Waterfowl numbers have declined over the past several decades on the refuge. The reasons may be multifaceted and complex, but many experts believe that habitat improvements throughout the surrounding landscape have contributed to decreased numbers on refuge. Although waterfowl numbers may have changed, species composition appears to be similar. Migratory waterfowl have many specific habitat requirements and energy needs. On reaching the wintering grounds, not only do waterfowl need reliable water but also food resources on which they can restore fat reserves prior to returning to the wintering grounds.

Bottomland hardwood forests are essential to wintering waterfowl. Waterfowl are influenced by four components within bottomland hardwood wetlands: herbaceous vegetation, woody vegetation, forest litter, and macroinvertebrates (Fredrickson and Batema 1992). These natural wetlands are critical foraging and resting habitats. Both hardwood bottomlands and moist-soil habitats are rich in high-energy natural seeds (e.g., acorns in oak bottomlands; grass-sedge seeds, roots, and tubers in moist-soil areas) and aquatic invertebrates (Kaminski et al. 2003, Heitmeyer 1988-2006). Aside from food resources, forested wetlands are vital to waterfowl for pair bonding, loafing, sanctuary, thermal cover, and feeding (Reinecke et al. 1989). Trees also provide roosting and nesting sites for breeding wood ducks. Trees and scrub-shrub vegetation provide cover for brood rearing. Several species of waterfowl heavily utilize flooded forested habitat in winter for resting and foraging for acorns, other fruits, various seeds, and invertebrates. Wood ducks seek these bottomland habitats almost exclusive of other habitats. Mallards, gadwall, and wigeon all utilize flooded forested habitat as one of the complex of preferred habitats (Fredrickson and Heitmeyer 1988). Breeding wood ducks preferred habitats include forested wetlands, wooded and shrub swamps, tree-lined rivers, streams, sloughs, and beaver ponds. Wood ducks are cavity nesters, seeking cavities in trees within a mile of water. Brood survival is higher in situations where nests are close to water. Adequate brood habitat can seriously affect duckling survival and reproductive success. McGilvrey (1968) described preferred brood habitat as 30 to 50 percent shrubs, 40 to 70 percent herbaceous emergent, and 25 percent open water. Overhead cover within 1 to 2 feet of the water surface is vital for wood duck broods. Optimum habitat should have 75 percent cover and 25 percent open water, with a minimum of 1/3 cover to 2/3's open water. Ducks like openings in the woods to allow them easy access.

Flooded agricultural fields coupled with moist-soil management can provide important wildlife habitat (Tirpak et al. 2009), and use of agricultural crops lessen the number of acres of moist soil and flooded GTR habitat required yearly. Agricultural crops can provide high-energy food resources for waterfowl. Annual agricultural practices can also increase the productivity of moist-soil units by stimulating the growth of desirable plants. Crops preferred by waterfowl include corn, rice, milo, millet, wheat, soybeans, and buckwheat.

The primary value of scrub-shrub habitats to waterfowl is by providing thermal roosting cover and protection from avian predators (U.S. Fish and Wildlife Service 2007a). Scrub-shrub wetlands are created by beaver, storm damage, and hydrological changes within lakes. These areas are typified by willows, buttonbush, other woody species, and perennial herbaceous vegetation. The decaying leaves provide substrate for invertebrates, which, in turn, provides food for waterfowl.

An additional essential component of waterfowl wintering habitat complexity is sanctuary from human disturbance. Winter is a biological preparatory period during which many ducks and geese pair and perform other life functions (e.g., females of some species [mallard] undergo a prebasic molt to acquire their breeding-season plumage) in readiness for reproduction. Disturbance-free habitat enables some species of waterfowl to prepare biologically for spring migration and reproduction (Reinecke et al.1989, Strickland et al. 2009). Disturbance can interrupt resting and feeding bouts resulting in a loss of energy and lowering of body weight (Henry 1980; Heitmeyer and Raveling 1988; Kahl 1991). Paulus (1984) found in Louisiana that increased foraging time by gadwalls was insufficient to counterbalance disturbance factors.

Shorebirds

Although shorebirds are not plentiful on the refuge, several species have been documented to occur here, including black-neck stilt (*Himantopus mexicanusking*), Wilson's snipe (*Gallinago delicate*), and yellowlegs (*Tringa spp.*). Shorebirds utilize a variety of habitat types such as mudflats, shorelines, an array of freshwater wetlands (with water depths less than eight inches), and dry grasslands for foraging. Roosting sites are primarily limited to shallowly flooded areas free of vegetation (Helmers 1993). Shorebirds feed predominately on invertebrates, aquatic or semi-aquatic. To maximize biomass of these prey species, standing water or completely saturated soil must be present for a sufficient period for their populations to develop. Generally, optimal prey biomass can be attained by flooding one month prior to the arrival of shorebirds.

Different species of shorebirds utilize different habitats primarily dependent upon water depth and vegetation height and density. Water depths range from 0 inches (dry mud) to 8 inches. Vegetation density ranges from no cover to 75 percent cover. However, the majority of use occurs at sites with less than 25 percent cover. Shorebirds generally utilize sites where vegetation is less than half the height of the bird, but some species will forage in taller vegetation.

Spring migration for shorebirds in this area is from March to early June and peaks from mid-April to mid-May, and fall migration is from late June to October and peaks in September. During migration, the most important consideration for shorebirds is finding sites to obtain energy for fuel during the next leg of the flight. Efforts have been made within existing moist-soil areas to provide suitable shorebird habitats on the refuge during the spring migration.

Wading Birds

Large numbers of wading birds are present on the refuge, including wood storks, great and little blue herons (*Ardea Herodias* and *Egretta caerulea*), little green herons (*Butorides virescens*), great and snowy egrets (*Ardea alba* and *Egretta thula*), and a large nesting colony of cattle egrets. Two rookeries have established on the refuge–one contains more than 10,000 breeding pairs of cattle egrets and 3,000 pairs of snowy egrets, little blue herons, and white ibis. The other rookery contains several hundred pairs of great blue herons and great egrets.

Wading birds utilize the wetland areas found throughout the refuge. The birds can be seen within the bottomland forest, in the moist-soil units and on any of the bodies of water found on the refuge. Many of the birds use the refuge for roosting sites and fly upwards of 40 miles to forage during the day.

Bats

The Rafinesque's big-eared bat is the least-studied bat in the eastern United States and is federally designated as a species of special management concern. Though widespread in the eastern United States (southern Virginia south and west to eastern Texas and northward along the Mississippi River valley into southern Indiana), this bat is not abundant. Its range most closely approximates the historical range of great cypress swamps, indicating that it may have formed a traditional reliance on these areas as roosting and foraging sites. However, population levels appear to have declined in the past century due to loss of summer roosting or foraging habitats and disturbance at winter hibernacula (Bat Conservation International).

Rafinesque's big-eared bats are slow, agile flyers and appear to forage on a wide variety of small, nocturnal insects, especially moths. They hibernate near their summer foraging grounds in old mines, caves, hollow trees, and cisterns. They are known to form nursery colonies in large hollow trees that provide stable internal environments, protection from predators, and often contain well-insulated areas that form the hot-air traps essential for rearing young. However, loss of traditional habitats has resulted in use of old buildings, abandoned houses, and attics as maternity roosts.

The southeastern myotis is a species of bat associated with riparian areas or bottomland hardwoods and is listed as a federal species of special management concern due to declining populations. Southeastern myotis bats roost in caves in the northern part of their range, but utilize cavity trees (along with Rafinesque's big-eared bats) in areas where caves are not available. They typically roost in clusters of several to a few hundred or more individuals. They are thought to forage primarily over lakes, ponds, and slow-moving streams, flying close to the water's surface. This species is unique in that it normally bears twins instead of a single young. Young take two to three weeks longer to develop than most other bats.

In Mississippi this species can be found throughout the year, hibernating and roosting in cavity trees, often in association with Rafinesque's big-eared bats. Both, the southeastern myotis bat and Rafinesque's big-eared bat have been documented on the refuge. Southeastern myotis bats can be captured in mist nets and are acoustically detected more than their cavity partners, the Rafinesque's big-eared bats. Rafinesque big-eared bats are difficult to capture using mist nets, though some individuals have been documented within opportunistic mist net events. They are equally difficult to detect using acoustical survey methods due to the extremely soft echolocation call that this particular species emits. Cavity trees for use by these species do not appear to be limited on the refuge (Stevenson 2008).

Raptors

Common raptors include red-shouldered hawk (*Buteo lineatus*), Cooper's hawk (*Accipiter cooperii*), red-tailed hawk (*Buteo jamaicensis*), and sharp-shinned hawks (*Accipiter striatus*); barred owls (*Strix varia*); both black and turkey vultures (*Coragyps atratus* and *Cathartes aura*); bald eagles; and occasionally Mississippi kites (*Ictinia mississippiensis*). Golden eagles as well as peregrine falcons (*Falco peregrinus*) are occasionally spotted on the refuge and have been documented. These species use a variety of habitats available on the refuge to provide food, cover, and nesting sites.

OTHER WILDLIFE SPECIES

Although the refuge was established for the purpose of providing habitat for the benefit of particular migratory bird species (i.e., waterfowl), in more recent years, the refuge has expanded its focus to

embrace all species of migratory birds while also attempting to provide ancillary benefits for resident bird species.

Other Birds

Northern bobwhite populations are determined by habitat conditions. The amount, quality, and availability of food and nesting areas affect population levels. Bobwhites utilize habitats comprised of native grasses, forbs, and shrubs. They are frequently found in forest openings and open woods which are also favored by RCW. Northern bobwhites (*Colinus virginianus*) are widely distributed eastern game birds favoring fire-maintained early successional habitats (Brennan 1999). Examples of habitat providing high-quality forage for these birds include fields, grasslands, and open, park-like pine habitats. Northern bobwhites primarily consume seeds and leaves of herbaceous plants; therefore, acreage being converted from mixed pine/hardwood stands to more open, park-like stands with herbaceous seed-bearing plants as the dominant understory should elicit positive responses from the Northern bobwhite. In fact, research conducted at the refuge has shown that management for RCW through the reduction of forest basal areal and the increased burning regimen increased the northern bobwhite's preference for these habitats (Fuller 1994).

Mammals

The refuge is home to 47 mammal species including the most common: white-tailed deer, beavers, gray, ground, fox, and southern flying squirrels (*Sciurus carolinensis*, *S. niger*, and *Glaucomys volans*), swamp and eastern cottontail rabbits (*Sylvilagus aquaticus* and *S. floridanus*), grey and red foxes (*Urocyon cinereoargenteus* and *Vulpes vulpes*), coyotes (*Canis latrans*), skunks (*Mephitidae* spp.), opossum (*Didelphimorphia* spp.), raccoon (*Procyon lotor*), and several species of small rodents, such as mice, rats, and voles. One of the most diverse groups of mammals is bats, with seven species likely to occur on the refuge. Hunting and wildlife watching of game species of mammals, especially white-tailed deer, continue to be a popular draw for visitor use on the refuge.

Reptiles

Numerous reptile species are known to occur on the refuge and the largest and most notable is the American alligator. The most common snakes are black racers (*Coluber constrictor*), gray ratsnake (*Pantherophis spiloides*), western cottonmouths (*Agkistrodon piscivorus*), and several species of water snakes. Common lizards include four species of skinks, Carolina anoles (*Anolis carolinensis*), and eastern fence lizards (*Sceloporus undulates*). Turtle species include red-eared sliders (*Trachemys scripta*), river cooters (*Pseudemys concinna*), common and alligator snapping turtles (*Chelydra serpentine* and *Macrochelys temminckii*), and three-toed box turtles (*Terrapene carolina*).

Insects

Insects make up the bulk of the biodiversity on the refuge with more species of insects being present than all vertebrates and plants combined. However, little is known about insect populations on the refuge because the basic biology, habitat requirements, population dynamics, and distribution are incompletely or poorly understood.

During the past 30 years, researchers from the Mississippi Entomological Museum at MSU have been studying insects at the refuge as part of a regional survey effort. Recently, intensive surveys have been conducted to document the diversity of ants (Hymenoptera: Formicidae) (MacGown et al. 2012) and

long-horned beetles (Coleoptera: Cerambycidae) (Schiefer, in preparation) on the refuge. Consequently, it is believed that the refuge has a great diversity of xylophagus (wood feeding) and saproxylic (associated with dead wood) insects, especially beetles. The various species of these insects segregate themselves in the forest by microhabitats that depend on tree species, tissue type, position of the tree, stage of decomposition, and other factors. The bottomland and upland hardwood forests are particularly diverse in saproxylic insects, but the pine forests have their own unique fauna as well. These insects are dependent on the quality and quantity of dead wood in the forest, and they decline in diversity in the intensively managed forests found in much of the southeastern United States.

Since 1987, a butterfly count has been conducted annually on the refuge as part of the North American Butterfly Association's count program. The species diversity recorded on the count is usually among the highest for counts conducted in the eastern United States, which is reflective of the habitat diversity within the count circle and on the refuge.

Although many common species of insects at the refuge can be shown to be secure, many other species are infrequently encountered. It is usually difficult to determine if these rarely encountered species are truly rare and declining or just rarely collected due to some aspect of their biology. There are no federally threatened or endangered insects found at the refuge.

Plants

No federally threatened or endangered plants are known to exist on the refuge. Several floristic surveys have been conducted on the refuge. Two surveys were conducted in order to locate Price's potato-bean. No Price's potato-bean plants or indicator species and habitat frequently associated with Price's potato-bean were found on the refuge (Warren per comm). Additional surveys did locate blackfoot quillwort, a state-listed critically imperiled species, on the refuge south of Dorman Lake Road and south of Dummy Line Road (MacDonald per comm). To assure that proposed management activities did not contribute to the loss of any of these plants, buffers were established to protect the plants and habitats. If a federally threatened or endangered plant is identified on the refuge, immediate steps will be taken to protect the plant and meet its management needs. This plan will be updated to reflect this discovery and list the plant as a resource of concern. When state-listed critically imperiled species are identified on the refuge, steps, such as buffer zones, will be taken to minimize the impact of wildlife habitat manipulations.

AQUATIC BIOTA

Paddlefish

Paddlefish were once common throughout much of the Mississippi River Basin and adjacent Gulf drainages. Losses of spawning and rearing habitat resulting from channelization and dam construction have contributed to the decline of paddlefish stock in certain river systems. The unique foraging characteristic of the fish (plankton filter feeder) makes paddlefish habitat restricted in many river systems. Early larval growth also depends on high concentrations of plankton. Adult fish locate selective spawning sites generally consisting of silt-free gravel, sand, or cobble bottoms that have relatively fast-flowing water during the breeding season. These sites are limited in most river systems. Movements between spawning sites and non-breeding locations can exceed 50 miles. Physical barriers in major rivers have drastically altered the natural movements of these fish and isolated small populations (Ross et al. 2001).

Within the middle Tennessee-Tombigbee River waterway, the species has a relatively isolated population inhabiting the Demopolis Pool and portions of the Noxubee River which provide the only

deeper water to support this fishery. Paddle fish appear to be attracted to the outflow water control structure of Bluff Lake and Halbert Lake located to the east of the lake. This area may provide suitable spawning areas due to site and waterflow characteristics.

Gulf Coast Walleye

Gulf Coast walleyes are native to the Deep South and range from Mississippi to northern Georgia. Once abundant in suitable habitats, this species declined in much of the Mobile Basin in the 1970s and early 1980s during construction of the Tennessee-Tombigbee Waterway. This project connected the Tennessee River with the Tombigbee watershed through a 234-mile network of navigation channels, locks, and dams. This project drastically changed walleye habitat by altering flow rates, changing siltation rates, and structurally modifying habitats. These changes are thought to have greatly reduced spawning success throughout the system. Areas of the Noxubee River may play an important role in the conservation of this species, with the refuge providing favorable spawning habitats.

Amphibians

Numerous species of amphibians are known to occur on the refuge. The largest is the three-toed amphiuma (*Amphiuma tridactylum*). Several species of salamanders, including the marbled and slimy (*Ambystoma opacum* and *Plethodon glutinosus*) salamander, are commonly seen. Frogs and toads such as Spring peepers (*Pseudacris crucifer*), American bullfrog (*Rana catesbeiana*), green tree frog (*Hyla cinerea*), bird-voiced tree frog (*Hyla avivoca*), gray tree frog (*Hyla versicolor*), and Fowler's toad (*Bufo fowleri*) are common on the refuge.

Fish

Bluff Lake, Loakfoma Lake, Ross Branch Reservoir, and the Noxubee River harbor 25 species of fish, of which five are primary game species. Popular game fish include several species of catfish, largemouth bass, black and white crappie, bream, red-ear sunfish (*Lepomis microlophus*), and bluegill (*Lepomis macrochirus*). Nongame fish include common carp, bowfin (*Amia calva*), and several species of shiners and darters. Many of these fish species are important food sources for wading birds and resident wildlife on the refuge.

CULTURAL RESOURCES

The body of federal historic preservation law has grown dramatically since the enactment of the Antiquities Act of 1906. Several themes recur in these laws, their promulgating regulations, and more recent executive orders. They include:

- each agency is to systematically inventory the historic properties on their holdings and to scientifically assess each property's eligibility for the National Register of Historic Places;
- federal agencies are to consider the impacts to cultural resources during the agencies' management activities and seek to avoid or mitigate adverse impacts;
- the protection of cultural resources from looting and vandalism are to be accomplished through a mix of informed management, law enforcement efforts, and public education; and
- the increasing role of consultation with groups, such as Native American tribes, in addressing how a project or management activity may impact specific archaeological sites and landscapes deemed important to those groups.

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

For compliance with Section 106 of the National Historic Preservation Act of 1966, the refuge staff will provide the regional historic preservation officer a description and location of all projects, activities, routine maintenance, and operations that affect ground and structures. Details on requests will be provided along with a range of alternatives considered. That office will analyze those undertakings for their potential to affect historic and prehistoric sites, and consult with the State Historic Preservation Officer and other parties as appropriate. The staff will notify the state, tribes, and local government officials to identify concerns about the impacts of those undertakings.

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, and produced artifacts dating to the early Archaic period (ca. 9000-7000 B.C.). Another well-studied site 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 Choctaw tribe.

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 late 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, whiteware, pearlware, salt- and alkaline-glazed stoneware shards, and bones of white-tailed deer and domestic pigs. 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.

SOCIOECONOMIC ENVIRONMENT

The refuge consists of 48,219 acres within the 61,715-acre 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 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 forested 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 78,161 people, or only about 3 percent of the state's population, and grows at about 2.4 percent every 5 years (Table 2). The people in these counties typically are native to the state, have a per capita income of about $16,000, with about 76 percent of persons over the age of 25 having high school diplomas (U.S. Department of Census 2011 Estimate).

Table 2. Demographic characteristics for the local counties, Mississippi and the United States 2012

Characteristic	Oktibbeha County	Noxubee County	Winston County	State of Mississippi	United States
Demographic					
Population 2012	48,192	11,218	19,029	2,977,457	311,587,816
Total Land Area (square miles)	458.20	695.14	607.25	46923.27	3531905.43
Population Change (%), 2010-2012	1.1	-2.8	-0.9	0.3	0.9
Population Density (population/square mile)	105.1	16.1	31.3	63.2	87.4
Race/Ethnicity (% of Population)					

White	59.0	27.0	51.9	60.0	78.1
Black/African American	36.8	71.8	46.0	37.3	13.1
Hispanic/Latino (of any race)	1.6	0.9	1.0	2.9	16.7
Asian	2.8	0.2	0.2	0.9	5.0
Education (% of population over 25)					
High School Degree	85.9	64.7	80.6	80.3	85.4
College Degree	41.7	12.1	15.3	19.7	28.2
Economic					
Median Household Income	29,013	21,798	33,007	38,718	52,762
Per Capita Income	19,330	12,508	18,313	20,521	27,915
Individuals Below Poverty Level (%)	34.1	36.1	22.8	21.6	14.3

REFUGE ADMINISTRATION AND MANAGEMENT

LAND PROTECTION AND CONSERVATION

Management policies of the refuge are designed to conserve, restore, and enhance in their natural ecosystems all imperiled animals and to manage for endemic habitats and species. Creating and maintaining habitat for the red-cockaded woodpecker, wood stork, waterfowl, and forest breeding birds are high-priority and high-visibility activities. The primary tools for management include managing forests and water level manipulation. Land acquisition is another tool used to conserve habitat for wildlife in perpetuity through the fee-title purchase of land from willing sellers. All of the lands acquired over the last few decades have been through timber-for-land exchanges. Timber-for-land exchanges do not require the use of appropriated funds for land acquisition.

Cooperative Farming

Cooperative farming is the term used for cropping activities done by non-federal third parties on land that is owned by the refuge in fee title or controlled by the refuge 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. Cropping was historically used on the refuge through a cooperative farming agreement issued by the refuge manager. Previously, the cooperative farming program at the refuge emphasized the production of soybeans and corn and the harvest of hay from the refuge fields. Cooperative farming is no longer practiced on the refuge.

ECONOMY, RECREATION, AND TOURISM

The refuge plays an important role in the economy of local communities and the region. With annual visitation around 160,000 visits, the refuge is an important destination for people seeking recreational and educational opportunities, attracting local residents as well as tourists. Approximately one-third of these visitors participate in consumptive use activities such as hunting and fishing, while the other two-thirds are involved in nonconsumptive recreation (e.g., bird watching, sightseeing, hiking, and picnicking) or education. Most, if not all, utilize services provided by local vendors within the surrounding communities, thus infusing money into the local economy.

The economic contribution of outdoor recreation is very important statewide and its participants are increasing. Hunting, fishing, and other wildlife-related activities entice visitors to the refuge from many parts of Mississippi, the southeast region, and countries from throughout the world. With their high rates of economic growth, rural recreation counties represent one of the main rural success stories of recent years. During the 1990s, these places—whose amenities attract permanent residents as well as seasonal residents and tourists—averaged a 20 percent population growth, about three times that of other non-metropolitan counties, and 24 percent employment growth, more than double the rate of other non-metropolitan counties.

Mississippi's executive and legislative branches have recognized that travel and tourism are driving forces in the state's economic development efforts. Travel and tourism's visibility in Mississippi is at an all-time high. Fifty-five local entities with a travel and tourism component were in place as of February 2012. They include chambers of commerce, convention and visitor bureaus, tourism councils, economic development offices, commissions, cities, counties, and city/county partnerships. U.S. travel and tourism had $759 billion in direct domestic and international expenditures with 7.4 million direct jobs, 6.8 million indirect and induced jobs, $188.4 billion in payroll income, and $117 billion in combined federal, state, and local tax revenues, and 2.7 percent of U.S. gross domestic product (gdp) (U.S. Travel Association, calendar year (CY) 2010).

By law (Refuge Revenue Sharing Act (16 U.S.C. 715s)), the refuge is exempt from paying property tax and instead makes revenue sharing payments to the three counties in which the refuge is located: Oktibbeha, Noxubee, and Winston (Table 3). The law provides a method of collecting monetary receipts from revenue generating activities (e.g., timber harvest revenue, commercial 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; (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.

Table 3. Revenue sharing payments, 2007 to 2012

	Year					
County	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
Noxubee	$73,460	$56,994	$53,556	$47,840	$51,264	$51,264
Oktibbeha	$128,302	$89,307	$81,836	$72,363	$77,542	$77,542
Winston	$163,106	$126,546	$181,911	$65,016	$69,670	$69,670

VISITOR SERVICES

Sam D. Hamilton Noxubee NWR strives to have an excellent reputation 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. 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.

The refuge has more than to 160,000 visits annually (based on 2012 RAPP database; U.S. Fish and Wildlife Service, 2011, written comm.). Visitors participate in a variety of activities including fishing, waterfowl hunting, upland game hunting, big game hunting, use of the visitor center, hiking, motorized and non-motorized boating, bird watching, wildlife photography, wildlife observation, environmental education, and research. The refuge serves as an outdoor classroom for MSU, Starkville School District, and other local educational institutions. For more information, please visit *http://www.fws.gov/noxubee/*.

Existing public amenities include:

- *Sam D. Hamilton Noxubee Visitor Center*
- *Public Restrooms*
- *Bluff Lake Boardwalk*
- *Bluff Lake Boat Ramp and Parking Area*
- *Three Non-motorized or Limited Access Boat Ramps*
- *Goose Overlook*
- *Loakfoma Lake Overlook/Tower*
- *Loakfoma Lake Handicapped Fishing Jetty*
- *Morgan Hill Overlook*
- *Morgan Hill Prairie Trail*
- *Webster Memorial*
- *Four Informational Kiosks*
- *Multiple Parking Areas*
- *Four Informational Kiosks*
- *Multiple Parking Areas*
- *Loakfoma Boat Ramp*
- *Seven Hunter Check Stations*
- *Woodpecker Trail*
- *Ray Watson Memorial Trail*
- *Beaver Dam Trail*
- *Scattertown Trail*
- *Craig Pond Trail*

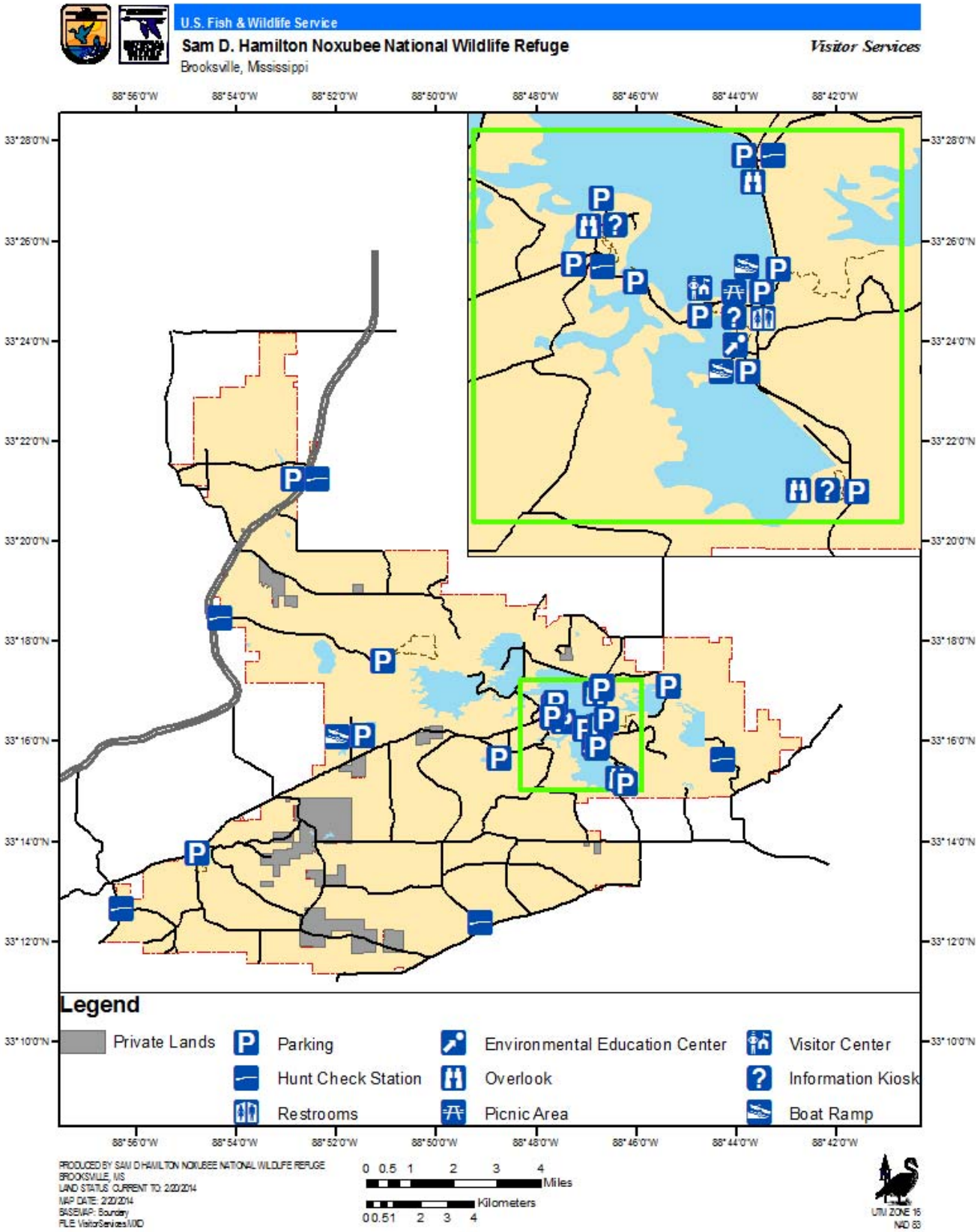

Figure 11: Visitor services' map for Sam D. Hamilton Noxubee NWR

Public Access

The refuge provides ample access suitable for the majority of public users (Figure 10). There are five boat ramps (two improved concrete and three graveled) on Bluff, Loakfoma, and Ross Branch lakes that are maintained by refuge staff. Historically, peak use of the refuge occurred during the refuge's spring fishing and fall hunting seasons, but nonconsumptive use is increasing throughout the year. At this time, the refuge maintains 61 miles of graveled and 17 miles of asphalted roads, as identified in the Federal Highways Refuge Roads Inventory. Numerous roads are open to the public and provide ample access opportunities to hunt, fish, and observe and photograph wildlife, allowing access to boardwalks, trailheads, and overlooks. With recent upgrades in key refuge access roads, commercial and pass-through traffic is on the increase along with a general increase in traffic speeds and volume. Additional increases are anticipated as the State of Mississippi recently established Mississippi's Noxubee Hills Scenic Byway, which includes the improved refuge roads as part of its designated route. Use of refuge graveled roads by the commercial trucks is also increasing as these vehicles take advantage of shorter routes through the refuge. The increase in traffic volume and use by high weight vehicles is increasing maintenance costs and higher traffic speeds are causing increasing observations of vehicle accidents and wildlife mortality.

Most of the refuge's public use facilities, including trails, buildings, maintenance facilities, employee housing areas, parking areas, boat ramps, and restrooms, are maintained in the area around Bluff and Loakfoma lakes. Other than graveled roads, roadway gates, one walking trail at Bevill's Hill, and kiosks, few other developed assets exist on the refuge.

Hunting

The refuge offers the public a wide range of hunting opportunities including seasons for archery, primitive weapon and modern gun, as well as special opportunities for youth and mobility impaired hunters. The refuge is visited by hunters living throughout the southeast to participate in a quality white-tailed deer hunting experience, as well as waterfowl hunting in the flooded bottomland forests. Deer and squirrel hunting remain the most popular public hunting opportunities, followed by waterfowl, turkey, and furbearers. In addition to these hunting seasons, hunters have the opportunity to harvest beaver, nutria, and feral hog (*Sus scrofa*) incidental to any hunt with weapons that are legal for that particular hunt.

Gun deer hunting on the refuge is implemented through a quota permit system offering up to 2,000 permits with a designed target harvest of up to 500 deer. There is a $15 fee for deer hunting permits. The annual refuge deer harvest averages an estimated 430 deer annually.

Currently, waterfowl hunting occurs on each Wednesday and Saturday mornings of the state season. There is a $15 quota hunt fee collected for each application and the hunt operates under a refuge-drawn permit system. For each hunt day, up to 12 permitted waterfowl hunters and their two additional guests can hunt waterfowl within a designated hunting location. All waterfowl hunting closes each day at 12 p.m. and all hunters must exit the area by 1 p.m. Hunters not successful in the draw have the opportunity to hunt as standby hunters on any of the days open to waterfowl hunting at no additional cost.

Furbearer hunting for raccoon (*Procyon lotor*) and Virginia opossums (*Didelphis virginiana*) with dogs is only allowed from sunset to sunrise. Prohibiting the use of catch dogs during daylight hours helps minimize conflicts between furbearer hunters and other hunters. Fields trials for both raccoon and

squirrel dogs are allowed under a special use permit and associated fee of $50. The use of dogs is authorized for waterfowl, squirrel, and rabbit hunting during daylight hours only.

The refuge currently uses a web-based permitting and quota hunt draw system. Hunters may now apply for the quota waterfowl hunts or purchase deer permits by going to the refuge website at http://www.fws.gov/noxubee/. Hunters can also visit the refuge visitor center or pick up an application that can be sent in with a check or money order. Permit fees are non-refundable and non-transferable. Permits must be signed and in possession of the sportsman at all times while hunting. Fishing and hunting of squirrel, turkey, rabbit, quail, woodcock, raccoon, and opossum remain free of fee, but still need a state license. The refuge does require all sportsmen to have the signed Hunting, Fishing, and Public Use brochure that is available for free at the Refuge Visitor Center, kiosks, or downloadable from the refuge's website. The refuge's regulations are structured to provide sportsmen with quality hunting opportunities while also providing safe public use opportunities for other user groups.

White-tailed Deer

As noted earlier, white-tailed deer hunting is a very popular activity on the refuge. The refuge hosted its first deer hunts in 1949. The number of deer harvested from 2002-2011 is shown in Table 4. With recent reductions in staffing levels, the refuge relies on self-clearing check stations for harvest information.

Table 4. Number of buck and doe deer harvested on Sam D. Hamilton Noxubee NWR, 2002-2011

	2011	2010	2009	2008	2007	2006	2005	2004	2003	2002	AVG
Total Deer	283	356	447	580	546	431	550	311	553	349	441
Bucks	116	152	236	334	330	250	290	155	380	180	242
Does	167	204	211	246	216	181	260	156	173	169	198

Furbearers

Furbearers include the opossum, raccoon, striped skunk (*Mephitis mephitis*), river otter (*Lontra canadensis*), beaver, mink (Neovison vison), muskrat (*Ondatra zibethicus*), nutria, red fox, gray fox, coyote, and bobcat (*Lynx rufus*). Hunting effort for furbearers has remained relatively steady over the years. At this time, no data are available on the actual numbers harvested. There is no public trapping season on the refuge.

Squirrels

Squirrel hunting has been the most popular small game hunted on the refuge since first offered in 1949. Hunting seasons for these species run concurrent with statewide season. At this time, no data are available on the actual numbers harvested.

Rabbits

The refuge has both swamp and cottontail rabbits but their population numbers are low. Hunting seasons for these species run concurrent with squirrel hunting. At this time, no data are available on the actual numbers harvested.

Turkey Hunt

Each year, numerous hunters pursue turkeys during the spring (gobbler) hunt. The refuge is open for turkey hunting concurrent with the statewide season. At this time, no data are available on the actual numbers harvested.

Fishing

Fishing on Bluff Lake is open March 1 – November 30 in conjunction with Mississippi fishing regulations (including size restrictions and limits). The Noxubee River and the borrow pits along Highway 25 are open year-round for fishing.

The refuge currently has two lakes (Bluff and Loakfoma), one reservoir (Ross Branch), several smaller ponds, and one river (Noxubee) that offer reliable fishing opportunities. Anglers have opportunities to catch largemouth bass, crappie, catfish, and sunfish. The popular species pursued by sport anglers have not changed over time: crappie, black bass (largemouth and spotted), bluegill, redear sunfish, and catfish. The refuge sponsors an annual youth fishing derby for the general public that continues to be popular with local residents and a second special event youth fishing derby for the Palmer Home for Children.

Fishing had become a popular sport on the refuge but angler numbers have been on the decline lately similar to many outdoor recreational activities in the past decade. Recreational fishing opportunities on the refuge are negatively impacted seasonally with the management of lakes for waterfowl and wood storks. Water levels are reduced during summer to allow for the growth of moist-soil plants used as food by ducks and to create shallow isolated water pools that trap fish as a food source for the summering wood storks.

Wildlife Observation and Wildlife Photography

A large variety of wildlife can be observed on the refuge. There are many clusters of the endangered RCW. The American alligator is one of the most sought-after species among wildlife observers and photographers. Spotting an alligator is generally a matter of being in the right place at the right time. Birds within the refuge's breeding rookeries are also a draw for wildlife observers and photographers.

Environmental Education and Outreach

The Larry Box Environmental Education Center is a partnership between the Starkville Mississippi School District and the refuge. The education center is located on the refuge and staffed by the Starkville School District. As part of the center's efforts, the refuge has partnered with educators at the Starkville School District to offer several curriculum-based environmental education programs, ranging from animal adaptations to habitat management, for approximately 5,000 students each year.

The Education Center offers visiting school groups a variety of equipment to use during their visit: binoculars, dip nets, bug boxes, microscopes, forestry supplies, waterfowl banding equipment, etc. School groups enjoy the use of the classroom in the refuge's Environmental Education Center, displays within the refuge's visitor center and the exhibit area, and the outdoor area located near Douglas Bluff.

Interpretation

Bottomland hardwood ecology, forest disturbance, animal adaptations, species interdependence, the Refuge System, red-cockaded woodpecker habitat, and refuge management are the primary themes and messages currently interpreted on the refuge. These themes and messages help visitors understand the key resource issues related to the Service, the Refuge System, and the refuge.

Volunteers and Partners

The refuge has an increasing number of volunteers providing important assistance to the refuge that ranges from helping at special events to resident volunteers staying at the refuge. Total volunteer hours average more than 12,000 hours per year and equates to about 12 full-time employees. Volunteer recruitment is an ongoing effort and all new volunteers receive appropriate orientation and training prior to work assignments. The refuge's remote rural location could be a limiting factor with regard to the number of available volunteers who possess the time, interest, and skills to assist on the refuge, but the close proximity of MSU and the importance of the refuge to the community play an important role as well.

Community partners include MSU, Friends of Noxubee, resident volunteers, Mississippi State Fish, Wildlife, and Parks, USDA Forest Service, Wild Turkey Federation, Ducks Unlimited, Bass Pro Shops, Audubon Society, and the Jena Band of the Choctaw Tribe.

Friends Group

The Friends of Noxubee Refuge group was established in May 2003. There are approximately 55 charter members who have assisted the refuge in the past with projects including: annual children's fishing derby, canoe day excursion on Bluff Lake, manning the Office/Visitor's Center, bluebird workshop, monitoring of the RCW clusters, other bird surveys, and the hosting of the Association of Retired Faculty of MSU. The Friends group has a quarterly newsletter to help keep members up to date on current and future projects and programs associated with the refuge. The group also manages a nature store inside the visitor's center and all proceeds go to support the refuge. Anyone in the public can join the group, with more information being available at the group's website (http://www.friends-of-noxubee-refuge.org/).

PERSONNEL, OPERATIONS, AND MAINTENANCE

Personnel

The refuge is currently funded for eleven employees on its organizational chart. Four of these eleven positions are now vacant. The refuge staff receives substantial assistance from volunteers, Americore, college student interns, and youth conservation corps enrollees. The refuge has an important management partnership with the Starkville School District, providing environmental education and interpretation for local youth at the Larry Box Environmental Education Center. The refuge and MSU also have an active partnership. University students and faculty contribute many hours towards conducting investigations and research projects on the refuge.

Operations and Maintenance

Each man-made feature on the refuge that requires operating and maintenance is considered an asset within the Service Asset and Maintenance Management System (SAMMS). At the current time the

refuge has 308 assets listed within this system with a total replacement cost of approximately $140 million. Annual maintenance costs are estimated at approximately $485,000. In Fiscal Year 2013, the refuge received $166,670 in maintenance funding. At the time of the writing of the 2004 Comprehensive Conservation Plan, the refuge staff consisted of 17 individuals and proposed at that time to increase the staff by an additional 14 members. Today, in fiscal year 2014, the refuge received funding for eleven positions, showing a net loss of six positions since the completion of the 2004 plan. At the current time, there are no immediate expectations of budget increases and instead the refuge may see a budget decrease with a need for further reduction of staff. Within the life span of this document, however, some level of increase is possible, and therefore some optimism is designed into the strategies. Regardless, priorities will need to be scaled to match the staffing levels, financial conditions, and level of support obtained through use of volunteers and partnerships. Administrative actions tied to the refuge's purposes will be kept in the position of highest priority followed by wildlife-dependent public use activities. Activities that cannot be considered wildlife-dependent will be terminated.

The refuge allows the public to use designated roads only. Most of the refuge's public use facilities, including trails, buildings, maintenance facilities, employee housing areas, parking areas, boat ramps, and restrooms, are maintained in the area around Bluff and Loakfoma lakes. Other than graveled roads, roadway gates, one walking trail at Bevill's Hill, and kiosks, few other developed assets exist on the refuge.

III. Plan Development

PUBLIC INVOLVEMENT AND THE PLANNING PROCESS

In accordance with Service guidelines and the requirements of the National Environmental Policy Act of 1969 (NEPA), public involvement was a crucial factor throughout the development of this draft comprehensive conservation plan (Draft CCP). This Draft CCP has been written with input and assistance from interested citizens; tribal liaisons; conservation organizations; employees of local, state, and federal agencies; and other Service agencies. The participation of these stakeholders and their ideas has been of great value in setting the refuge's management direction. The Service as a whole, and the refuge staff, in particular, are grateful to each individual who has contributed time, expertise, and ideas to the planning process. The staff remains impressed by the passion and commitment of so many individuals for the lands and waters administered by the refuge.

The intergovernmental scoping was initiated December 1, 2012, with letters sent to other federal agencies, tribal agencies and governments, Mississippi congressional contacts, Governor of Mississippi, state legislators, and state agencies, inviting them to participate in the refuge's comprehensive planning process.

The Key Contacts List (found in the administrative record at the refuge) documents individuals who were contacted from governmental organizations, including Mississippi congressional, federal, tribal, state, and local state offices. Of these groups, the Mississippi Department of Wildlife, Fisheries, and Parks appointed Dave Godwin as a liaison to the Service for this effort. MSU appointed James Martin, assistant professor in the Department of Wildlife, Fisheries, and Aquaculture, and a member of the Agricultural and Carnivore Ecology Laboratories to assist and be a liaison to the Service. The tribes designated Ms. LaDonna Brown, Historic Preservation Officer from Chickasaw Nation, and Kenneth Carleton, Tribal Archaeologist and Tribal Historic Preservation Officer from Mississippi Band of Choctaws, as tribal liaisons. The Starkville School District designated Beverly Smith, Entomologist, and Larry Box, Education Center Director, as liaisons.

In preparation for the Draft CCP, public scoping was conducted. A notice of intent, announcing the Service's intent to prepare a CCP for the refuge, was published in the *Federal Register* on January 15, 2013. An advertised public comment period for public scoping was held from January 15 – February 15, 2013. Notices informing the public of the CCP scoping process and inviting the public to attend a scheduled public scoping meeting were published in local newspapers. The news release was e-mailed to 325 newspaper, radio, TV, and on-line reporters and editors in Mississippi at 1 p.m. on January 14, 2013. Flyers announcing the same were also displayed at several locations at and around the refuge, including all kiosks, the visitor center, and check stations, and sent via e-mail to all public contacts on January 14, 2013.

The public scoping meetings were conducted on January 18, 2013, at the Noxubee Civic Center in Macon, Mississippi; on January 22, 2013, at Lake Tiak-O'Khata Resort in Louisville, Mississippi; and on January 24, 2013, at the Shriner's Club in Starkville, Mississippi. The meetings introduced the comprehensive planning process to the public and allowed attendees to voice their comments and perspectives on the issues, concerns, and opportunities they felt should be addressed in the Draft CCP. The following organizations and cities were represented: City of Macon; City of Brooksville; Noxubee County; Mississippi Chapter of the National Wildlife Turkey Federation; MSU; Philip Good Realty; Extension Service; Bank First Financial Services; Friends of Noxubee Refuge, Inc.; Winston County Economic Development Partnership; The Audubon Society; WCBI-TV (a CBS affiliate); Task Force for the Scenic Byway; Kemp Associates,

LLC.; Mississippi Department of Wildlife Fisheries, and Parks; and the Department of Forestry, MSU, and the Service. The refuge received approximately 211 written comments. These comments are summarized in Appendix D. A mailing list of names and addresses was generated from the public scoping meetings, responses to the comment sheets, and letters received through the U.S. mail. These individuals will be included in all future mailings related to the development of the Final CCP.

To obtain expert opinions, the Service used results from several review teams that assessed the refuge's programs. One team conducted a review of the refuge's wildlife and habitat management programs in 2010. A second team reviewed the refuge's visitor services' program in 2011, and the third team conducted a wilderness review in 2013. In addition, an Intergovernmental Scoping Team met on January 17, 2013, to identify the issues and concerns to be addressed in the Draft CCP. A list of experts from the Service and partnering agencies that participated in these multiple reviews and meetings is provided in Section B, Chapter V, Consultation and Coordination. The information garnered from these reviews helped the Service's planning team identify the key issues and concerns that needed to be addressed in this planning effort.

In 2011, a CCP planning team of Service staff, MDWFP, Starkville School District, and MSU representatives started meeting regularly to develop the CCP for the refuge. The team considered all public and interagency comments. The team prioritized the issues that needed to be addressed by the refuge over the 15-year life of the CCP based on the comments and recommendations of the advisory teams and the comments obtained through public scoping.

SUMMARY OF ISSUES, CONCERNS, AND OPPORTUNITIES

Based on internal, public, and intergovernmental scoping, the Service identified a total of 16 priority resource issues related to fish and wildlife population management, habitat management, resource protection, visitor services, and refuge administration. All public and advisory team comments were considered; however, some issues that may be important to the public are beyond the scope of the Service's authority and cannot be addressed in this planning process. The Service did consider all issues that were raised throughout the planning process and has developed a plan that attempts to balance competing opinions regarding important issues. The Service identified those issues that, in its best professional judgment, are priorities for future refuge management. The priority issues are summarized below by major topic.

Fish and Wildlife Population Management

- Decline in and threats to waterfowl
- Decline in and threats to forest breeding birds
- Threats to the red-cockaded woodpecker
- Lack of baseline data and monitoring for many wildlife and plant species
- Negative impacts from and presence and spread of invasive species

Habitat Management

- Need for increased management of aquatic environments
- Decline in habitat quality of bottomland hardwood forests
- Need for old fields to be reverted into pine and pine hardwood habitats
- Need for active forest management
- Decline in habitat quality of upland forests

Resource Protection

- Threats to cultural resources

- Threats to refuge habitats if land within the approved acquisition boundary is never acquired
- Lack of funding and increased priorities on resources of concern to continue maintaining Research Natural Areas and Wilderness Study Area
- Need for increased law enforcement and patrol activities

Visitor Services

- Need for increased support of fishing and hunting activities
- Demand for more or upgraded public use activities
- Lack of improved signage and access to information
- Need for effective environmental education programs to help minimize negative impacts to wildlife and habitat

Refuge Administration

- Lack of sufficient administrative resources to address increasing demands and increasing impacts
- Need for an additional fee within the Fee Program covering general access to the refuge

NOTE: Below we will briefly articulate the background and reasoning behind each of the concerns.

FISH AND WILDLIFE POPULATION MANAGEMENT

- Decline in and threats to waterfowl
- Decline in and threats to forest breeding birds
- Threats to the red-cockaded woodpecker
- Lack of baseline data and monitoring for many wildlife and plant species
- Negative impacts from and presence/spread of invasive and exotic species

Migratory waterfowl was selected as a resource of concern because of the refuge's establishing purposes and conservation concern for their population densities. Although current conservation efforts have made great progress, historically, waterfowl suffered long-term declines due to loss of habitat, overharvest, and lead contamination of feeding areas. The refuge serves as an important migratory and wintering ground for thousands of migratory waterfowl, but waterfowl observations have declined over the past several years on the refuge. The reasons may be multifaceted and complex, but many experts believe that improved habitat conditions on private lands (e.g., providing more opportunity for better habitat elsewhere) and changes in migration patterns have contributed to decreased waterfowl observations on refuges.

Nearly 350 species of forest breeding birds breed in the United States and Canada and winter in Latin America. Over the last century, there has been a decline in forest nesting populations over much of the eastern United States. Explanations for this decline range from loss and fragmentation of habitat, destruction of tropical forests where many migratory birds overwinter, cowbird parasitism, and increased nest predation. The major issues pertain to how the refuge can help support forest breeding birds to try and curve that downward population slope.

RCWs have very specific requirements to support reproduction and foraging. It is the only endangered species that is a permanent resident of the refuge. Combinations of several methods may be employed to ensure the RCW's survival, including active forest management, artificial nest cavities, removal of flying squirrels from potentially active or active nests, herbicides, prescribed fire, and mechanical treatments of woody vegetation to maintain their open pine habitat requirements.

Managing loblolly pine at the refuge's target rotation period of 100 years requires the 0.5-mile radius or 502-acre partition should optimally possess 308 acres of the pine habitat type in order to be managed toward recovery standards [i.e., Good Quality Foraging Habitat (GQFH)]. As defined by the recovery plan, the entire amount of foraging habitat needs to be with the 502-acre partition with at least half of that habitat being within a 0.25-mile of the cluster's center. Table 13 of RCW recovery plan (http://www.fws.gov/rcwrecovery/files/RecoveryPlan/finalrecoveryplan.pdf) provides details on what is required as GQFH. When managing under a strategy of 100-year rotations (preferred), a minimum of 120 acres within a partition should consist of mature pine species to manage for GQFH, with 100 acres meeting GQFH standards. The remaining acres are used to provide sustainable GQFH through rotational growth of new forest to replace that loss due to old age and disease.

Wildlife populations need to be adequately inventoried and monitored to establish baseline data, determine population trends, identify management needs, set priorities, and evaluate the impacts of management actions. Past emphasis toward management actions without monitoring has resulted in the lack of baseline data for many species that now require attention. The Inventorying and Monitoring policy (701fw2) and future development of a refuge Inventorying and Monitoring Plan will also increase efficiency and scientific rigor of survey activities.

Exotic and pest plant and animal species cause habitat loss by disrupting natural communities on the refuge. They displace native species and alter ecosystem functions. Water hyacinth (*Eichhoria crassipes*), cogongrass, bicolor lespedeza (*Lespedeza bicolor*), and Chinese privet (*Ligustrum sinense*) are all vegetative species that are found here on the refuge. Cogon grass is an exotic pest plant that affects refuge uplands. Where Cogon grass occurs, it often forms thick monotypic stands that crowd out other desirable plants. Bicolor lespedeza and Chinese privet are two additional exotic pest plant species that are so widespread over the refuge that control efforts are difficult. American lotus is a native invasive species found in refuge lakes and sloughs. Lotus plants form dense mats which shade out other more desirable plant species if left unchecked. In addition, lotus can impede water flow and recreational use. Beavers are native to the refuge but are a nuisance. Their dam building activity can cause extensive flooding and kill large acreages of bottomland hardwood forests. In addition, their habit of burrowing can damage refuge levees and roads. Feral hogs are also nuisance and exotic species now documented on the refuge. They are a major threat to plant and animal communities and can cause serious damage to road sides and levees through rooting.

HABITAT MANAGEMENT

- Need for increased management of aquatic environments
- Decline in habitat quality of bottomland hardwood forests
- Need for old fields to be reverted into pine and pine hardwood habitats
- Need for active forest management
- Decline in habitat quality of upland forests

Manipulating water levels to control nuisance and exotic species, maintaining a balanced fisheries resource, providing food and nesting resources for both waterfowl and wading birds, and maintaining the diversity of the lakes are all issues that pose concerns. Most of these concerns are associated with the management of the water levels within the lakes. The manipulations of water levels allow management to better provide waterbird food resources and production of those resources while striving for minimal oxygen depletion which causes fish mortality. Also, from a public use standpoint, boat access becomes increasingly difficult with decreasing water depth within the lakes.

The issue with the majority of the bottomland hardwood forests found on the refuge is lack of midstory and understory diversity and the regeneration of shade-intolerant tree species. Mast-producing species, such as shade-intolerant oaks, are being removed from the system as they are being out-competed by shade-tolerant iron wood and elm. In areas managed as GTRs, tree loss due to extended and repeated flooding, is also occurring. To regenerate shade-intolerant mast-producing species while a seed source and a consistent habitat for forest breeding birds still exists, the forest canopy must be carefully managed to allow for sunlight to reach the forest floor. Timber harvest in the bottomland hardwood stands can create ideal conditions for regeneration of shade-intolerant species, as well as cover, browse, and structure for wildlife. Without disturbance and removal of trees from the canopy, the shade-intolerant species will gradually be phased out of this system and only occasionally occur naturally at storm damaged blow-down sites. The current forest is converting to shade-tolerant tree species such as ironwoods, sugarberries, and elms. A forest made up of these shade-tolerant species will not provide the needed food source used by many wildlife species to survive migration or winter. Disturbance is the key to sustaining mast-producing shade-tolerant species within the bottomland hardwood systems. Disturbance also creates the characteristics exhibited in mature bottomland hardwood forests, such as dens, cavities, canopy gaps, species diversity, vegetative diversity, and natural senescence.

GTRs were developed by impounding existing stands of bottomland hardwoods with levee systems containing water control structures. These impoundments are designed to hold water on bottomland hardwoods only during the trees' dormant season, fall and winter, thus the name "greentree." Each of these impoundments is frequently naturally flooded during winter, but GTR management allows extended and predictable water levels in both fall and winter, with the intention to provide nuts, acorns, vegetation, and invertebrates for wintering waterfowl. Flooding these reservoirs to a depth of less than 18 inches provides essential feeding and resting habitat for wintering waterfowl. However, continued and extended flooding of GTRs contributes to tree root damage and tree mortality and promotes the survival of water-tolerant species. Reductions in forest health impact both waterfowl and forest breeding birds. This reduction in forest health and the lack of disturbance within bottomland hardwood forests are seen as primary problems preventing the regeneration of shade-intolerant species within GTRs.

Due to the previous agricultural history, old fields are interspersed throughout the refuge. While providing diversity, old fields can also be a cause of fragmentation and loss of needed pine acres by RCWs. Forest fragmentation can result in increased brood parasitism and nest predation for forest nesting birds. As a result, many forest nesting bird species have lower reproductive success in habitat forests fragmented by fields. Due to losses in management capability with reductions in refuge staff, many old fields on the refuge are starting to regenerate into light seeded forest species often dominated by sweet gum.

To create the sustainable desired conditions for the endangered RCW and many migratory birds, active forest management will be required upon the refuge. The recovery plan for the RCW estimates for each RCW group at least 308 acres of contiguous pine habitat are required within each partition to sustain certain parameters (U.S. Fish and Wildlife Service 2003). In general, pine stands with a basal area less than 80 square feet per acre are used for foraging. Foraging RCWs do not appear to completely avoid stands with dense woody understory, but high basal area of midstory hardwoods and pine limits their use. To create the habitat required by the recovery plan, active forest management is a must. Additionally, the majority of pine forests located on the refuge is composed of 70-year-old loblolly pine. After approximately 100 years of age, old loblolly forests begin losing increasing numbers of trees to natural mortality and continue to show signs of stand breakup as the age of the stand increases. Several factors contribute to this breakup such as: insects, lightning, wind-throw, diseases, and other causes of natural mortality. Active forest management provides small-scale opportunities to

regenerate trees within a stand which may have naturally occurred at the landscape scale only after wide spread loss of a forest due to fire and insect damage. On the refuge, very little acreage of younger aged pine (1 to 30 years old) is regenerating into the appropriate tree sizes needed for future RCW habitat. Prescribed fire used to maintain the open habitat needed by the RCW frequently kills loblolly pine seedlings along with the unwanted hardwoods that are growing within the forest. Regeneration of pine requires prescribed fire to be excluded from the area for up to 10 or more years.

The upland hardwood ecosystem historically was composed of upland red oak and white oak species, shortleaf pine, and loblolly pine on the ridges and slopes. The drains were composed of more hardwood species such as American sycamore, willow oak, and water oak. One concern is that the shortleaf and longleaf pine has dwindled in the past due to the prevalence of loblolly pine, which is easily regenerated and faster growing than the shortleaf pine in areas not frequently impacted by fire. The shortleaf pine is still represented in the mixed pine hardwood forest but is decreasing in the mixed species pine forests in this area. The topography in these areas limit management activities due to potential erosion issues, natural springs, and limited access. There are upland hardwood areas in which active forest management could promote conditions favorable to the RCWs, but these areas would create isolated partitions and provide little benefit to the main body of the population. It is also likely the hardwood drains would disrupt the continuity of these created clusters, limiting partition size to less than 308 acres of continuous pine.

RESOURCE PROTECTION

- Threats to cultural resources
- Threats to refuge habitats if land within the approved acquisition boundary is never acquired
- Lack of funding and increased priorities on resources of concern while also trying to maintain Research Natural Areas and Wilderness Study Area
- Need for increased law enforcement and patrol activities

While the refuge provides protection for a number of archaeological and historical resources, vandalism and removal of these cultural resources continues to be a threat. The Service has an obligation to past, present, and future generations to safeguard these sites from these threats and cannot do so without adequate funding for archaeological surveys and law enforcement staffing. Large tracts of public lands may provide unique opportunities for public use, and so the continual involvement of law enforcement personnel is necessary to protect the resources, as well as the public. However, staff limitations preclude intensive protection of these resources on refuge lands, and as with other refuge issues, priorities must be established, which compete for available funding and staffing.

While 48,219 acres are currently under Service ownership and management at the refuge for wildlife and habitat protection, the refuge's approved acquisition boundary is 61,715 acres. Thus, 13,496 acres of properties previously identified as important to meeting the purposes of the refuge remain as privately owned within the approved acquisition boundary. These privately owned acres will likely continue to exist until there are willing sellers and the Service has adequate funding for fee-title land acquisition. Although currently most of these privately owned acres are agricultural or undeveloped, these acres are possible locations for increased residential, commercial, and industrial development from surrounding communities. Development of these properties would not only remove them from habitat available for wildlife but could pose threats to existing refuge habitats (e.g., encroachment, water quality and quantity concerns, and spread of invasive species).

There are two research natural areas that, in accordance with SAF standards, have been identified but left under the same management as the surrounding forest. Since their establishment, there has been no attempt to develop management plans or formally map or delineate these areas from the surrounding forests. Additionally, because of the size of these areas (less than 40 acres), management within the surrounding forest overly impacts the conditions of the sites and the areas do not meet the criteria as Research Natural Areas (RNAs). The Service no longer recognizes RNAs and the policy, 611 FW 1; the RNA concept is now obsolete.

VISITOR SERVICES

- Need for increased support of fishing and hunting activities
- Demand for more and upgraded public use activities
- Lack of improved signage and access to information
- Need for effective environmental education programs to help minimize negative impacts to wildlife and habitat

The refuge provides opportunities for public uses that are compatible with the purposes for which the refuge was established and can be supported based on funding and staffing levels. Hunting and fishing are two of the six priority public uses on national wildlife refuges. At this time, the refuge offers a wide variety of hunting and fishing opportunities, but limitations have been placed to ensure compatibility. Overall, the most common question from the public is the desire for more improved access to the refuge. However, these requests often conflict with the purposes of the refuge. Some requested uses that are generally determined to be inappropriate include riding all-terrain vehicles, camping, and entering closed areas (Appendix F). Providing safety and compatible public uses requires a balanced approach and a focus on refuge priorities.

The refuge and the Starkville School District are partnering to staff the refuge's environmental education center, which hosts school groups from throughout Mississippi. As one of six priority public uses, the Service strives to make environmental education an important program for the surrounding community and the general public.

Good quality available sources of refuge information are critical to the public's appreciation and use of refuge resources. Information dissemination provides a vehicle for the Service to communicate to the public the many recreational opportunities available on the refuge, as well as the value of the natural resources. Limited staffing and funding often inhibits providing needed information to the public and the refuge needs to continue to seek improved methods for providing information while reaching resource management goals and the refuge's establishing purposes.

REFUGE ADMINISTRATION

- Lack of sufficient administrative resources to address increasing demands and increasing impacts
- Need for an additional fees to be included in the Fee Program

The refuge continues to face increasing costs of operation, higher demands for public use activities, and more impacts to refuge resources with decreasing staffing and funding. The refuge's volunteer program is becoming an increasingly important workforce for meeting refuge priorities. However, volunteers continue to require staff support and funding to remain productive.

Due to lack of funding and staffing, it was proposed that the Service should impose a Public Use Fee for all users of the refuge, as well as to maintain fees associated with waterfowl and deer hunting. The public use fee within the fee program would allow support to be provided by the estimated 112,000 nonconsumptive visits to the refuge each year. Funding from this source would be available for providing increased levels of information sharing and maintenance of public use facilities.

WILDERNESS REVIEW

Refuge planning policy requires a wilderness review as part of the comprehensive conservation planning process. A wilderness review was conducted in July 2013, by the Wilderness Review Team. In summary, the Service proposes that no other lands should be considered for wilderness. The results of the wilderness review are included in Appendix H.

IV. Management Direction

INTRODUCTION

The Service manages fish and wildlife habitats considering the needs of all natural and cultural resources in decision-making. Refuge management is conducted in accordance with all applicable laws and follows established Service policy. A requirement of the National Wildlife Refuge System Improvement Act of 1997 (Improvement Act) is for the Service to maintain the ecological health, diversity, and integrity of refuges. Public uses are allowed if they are appropriate and compatible with wildlife and habitat conservation. The Improvement Act identifies six priority wildlife-dependent public uses. These uses are: hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation.

Described below is the proposed revised comprehensive conservation plan for managing the refuge over the next 15 years. This proposed management direction contains the goals, objectives, and strategies that will be used to achieve the refuge vision.

Considered Alternatives

Three alternatives for managing the refuge were considered:

Alternative A: No Action (Current Management)

This alternative is referred to as our "No Action" or "Current Management" alternative, as required by the National Environmental Policy Act (NEPA). Under this alternative, no major changes to our biological, public use, and administrative management practices would occur from their current levels.

Alternative B: Focus on Waterfowl and Federally Listed Species

This management scheme places priority on the federally listed species and waterfowl which are integral to the refuge's purpose. This alternative emphasizes active habitat management actions that would benefit the endangered red-cockaded woodpecker and waterfowl. Visitor service programs and facilities in support of the six priority public uses (e.g., hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation) would be much reduced below those levels for Alternatives A and C. Non-wildlife-dependent public uses would be phased out.

Alternative C: (Proposed Alternative): Focus on Wildlife, Habitat Diversity, and Experiencing Nature

This alternative will manage refuge resources to optimize native wildlife populations and habitats under a balanced and integrated approach not only for federally listed species (RCW) and migratory birds, but also for other native species such as white-tailed deer, wild turkey, Northern bobwhite, paddlefish, and forest breeding birds. This alternative also provides opportunities for the six priority public uses (e.g., hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation) and other wildlife-dependent activities found appropriate and compatible with the purposes for which the refuge was established.

Implementing the proposed alternative will result in habitat management based on historic habitat conditions as guided by law (Improvement Act) and policy (601 FW 3) for the Refuge System. Management will be implemented for the conservation of a diverse bottomland hardwood habitat to

benefit migratory birds and resident wildlife. Upland habitats will be maintained within their historic habitat conditions including mimicking the natural fire regime and disturbances needed to benefit migratory birds, red-cockaded woodpeckers, and resident wildlife. A focused effort will be made to prevent, reduce, and eradicate invasive species threatening the biological integrity of the refuge. Monitoring and reconnaissance of a variety of wildlife species, ranging from reptiles and amphibians to butterflies to species of concern, will be used to assess and practice adaptive management. Cooperative projects will be prioritized based on ability to meet management objectives outlined in the CCP, or to meet refuge purpose and conducted with universities and other agencies and individuals to provide biological information to be used in management decision-making. When compatible, the wildlife-dependent recreational opportunities for hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation will be provided, and in some instances enhanced, while achieving the refuge purposes.

VISION

Sam D. Hamilton Noxubee NWR is a key puzzle piece within an interconnecting landscape consisting of pine forests, bottomland and upland hardwood forests, cypress swamps, and wetlands surrounding the historic Noxubee River whose channel and floodwaters support migratory bird species and a host of native flora and fauna. The refuge promises to conserve and manage this diversity by restoring and protecting habitats and wildlife while working with partners, listening to the American public, and promoting awareness. In the future, habitat management and public use program objectives will no longer be viewed through a lens of simply the next 15 years, but as one step in a process covering the next 100 years. Management of the refuge's habitats will be designed to support mandated and priority species without jeopardizing ecological processes. Refuge management will recognize the position of the refuge within the surrounding landscape and target those unique ecological roles it can fulfill within that landscape. New programs will be developed to provide users with a better understanding and appreciation of natural and cultural resources.

GOALS, OBJECTIVES, AND STRATEGIES

The goals, objectives, and strategies presented are the Service's response to the issues, concerns, and needs expressed by the planning team, the refuge staff and partners, and the public. Chapter V identifies the projects associated with the various strategies.

Goals describe the desired future conditions of a refuge in succinct statements. Each one translates to one or more objectives that define these conditions in measurable terms. Objectives are incremental steps planned to be taken to achieve a goal. Objectives are derived from the goals and provide a foundation for determining strategies, monitoring refuge accomplishments, and evaluating success. The following chapter is written to contain five major goals for which there are varying numbers of individual objectives. To smoothly communicate the management intent of this CCP to the public and professional audience, the objectives when read along with their strategies were written to be: (1) Specific, (2) Measurable, (3) Achievable, (4) Results-oriented, and (5) Time-fixed. These properties constitute the acronym "SMART." The attached Habitat Management Plan fully describes how the objectives with strategies are to be implemented within each of the refuge's management units.

These goals and SMART objectives with strategies reflect the Service's commitment to achieve the mandates of the Improvement Act, the mission of the Refuge System, and the purposes and vision of refuge. This Draft CCP represents the Service's planned actions within the next 15 years.

FISH AND WILDLIFE POPULATION MANAGEMENT

Goal A: Fish and Wildlife Populations

Manage and protect migratory and native wildlife populations on Sam D. Hamilton Noxubee NWR to contribute to the purposes for which the refuge was established as well as to fulfill the mission of the National Wildlife Refuge System (701 FW 1, USFWS 1992).

Discussion: The refuge supports a diversity of fish and wildlife species including the red-cockaded woodpecker and wood stork, both federally listed threatened and endangered species. The refuge supports at least 254 species of birds, 47 species of mammals, 34 species of reptiles, 23 species of amphibians, 25 species of fish, and ever-expanding numbers of species of invertebrates (Appendix I). In combination with active management, the inherent potential within refuge habitats (combination and juxtaposition of the pine, upland hardwood, bottomland hardwood, and aquatic habitats) ensures a variety of food and cover options for biodiversity.

Sub-Goal A.1 - Waterfowl

Manage and protect waterfowl populations in concert with the goals and objectives of North American Waterfowl Management Plan (NAWMP).

Discussion: The refuge's importance as a wintering habitat and an inviolate sanctuary has been recognized since its establishment in 1940 under the Migratory Bird Conservation Act, with additional recognition for its role with breeding wood ducks. During the period from 1950 to 1961, yearly waterfowl numbers ranged from 11,000 to more than 100,000 waterfowl each winter with the refuge attempting to provide food resources for up to 15 million duck energy days (DED), which equates to providing food resources for 136,000 waterfowl per day over a 110-day winter season. These high numbers of waterfowl were associated with increased management emphasis on providing agricultural crops within the Jones Creek Unit, shallow water in four GTRs within the bottomland hardwoods, and moist-soil plants within the refuge's two main lakes during a time in history when little waterfowl habitat existed within the surrounded landscape. Today, the refuge continues to manage similar numbers of acres yearly for waterfowl by providing 338 acres of moist-soil plants within the Jones Creek Unit, approximately 1,340 acres of shallow water within four GTRs, and moist-soil plants within shallow water areas of the lakes. Current waterfowl numbers on the refuge are consistently less than 10,000 birds; likely due to changes in waterfowl migration patterns and new habitat being made available throughout the landscape on both public and private lands. Reconnaissance as reported within annual narratives indicates waterfowl numbers are now consistently lower than the 100,000 historically recorded, but species diversity remains high. Approximately 18 species of waterfowl utilize the refuge and receive benefits from the refuge's moist-soil plants, as well as resting areas within the refuge's lakes and bottomland hardwoods. Resident wood ducks occur throughout the aquatic habitats of the refuge. Management that increases the number of suitable cavity trees, increased mast production, and improvement in brood habitat will improve conditions for wood ducks and other waterfowl (Waterfowl Management Handbook for the Lower Mississippi River Valley).

- Objective A.1.1: Provide at minimum, 1.1-million DEDs over a 110-day period yearly through the possible combination of managed moist-soil plants, planted agricultural crops, lakes, and seasonally flooded GTRs.

- Strategy A.1.1.1: Provide sanctuary through closure of Priscock fields and northern areas of Bluff Lake.
- Strategy A.1.1.2: Conduct mid-winter waterfowl survey(s) for occupancy and use of habitat

- Objective A.1.2: Yearly, enhance breeding waterfowl nesting opportunities by providing a minimum of 50 nest boxes and protect and promote natural cavities throughout the 15,507 acres of bottomland hardwood habitat.
  - Strategy A.1.2.1: Complete seasonal nest box checks for productivity and use.
  - Strategy A.1.2.2: Continue to mark and identify known cavity trees.
- Objective A.1.3: Enhance approximately 200 acres of aquatic shrub habitat for brooding wood ducks over the life of the CCP.
  - Strategy A.1.3.1: Initiate a GIS program to map aquatic shrub habitat.
  - Strategy A.1.3.2: Initiate wood duck brood survey.
- Objective A.1.4: Participate in wood duck banding program on approximately 400 acres to meet the yearly assigned refuge quota by National Migratory Bird Program to identify brood survival of breeding waterfowl populations.
  - Strategy A.1.4.1: Baiting, capture, and banding of wood ducks through rocket nets or swim-in traps.

Sub-Goal A.2 - Waterbirds
Manage and protect waterbird populations in concert with the goals and objectives of the North American Waterbird Conservation Plan (USFWS 2007).

Discussion: Several species of colonial waterbirds utilize the habitats on the refuge. At the current time, there is a large egret and ibis rookery, ranging from 32,000 birds in the past to around 12,000 birds currently, within Bluff Lake and several heron rookeries located along the Oktoc Creek and Noxubee rivers. The rookery within Bluff Lake is a prominent feature at the refuge and receives frequent disturbance by anglers and wildlife observers directly under the nests. Disturbance has shown to have potential negative effects on breeding bird nesting success and the minimum recommended buffer is 50 meters (Carney and Sydeman 1999). The refuge's mudflats and shallow water habitats within water impoundments, lakes, wetlands, and backwater areas of the bottomland hardwood forests provide important foraging habitat for waterbirds throughout all seasons. Important food resources are provided by managing for healthy fisheries, as well as artificially created seasonal shallow pools. Management of cypress habitat (nest sites and thermal cover) can benefit waterbird populations.

- Objective A.2.1: Enhance breeding waterbird nesting opportunities across the refuge by providing nesting habitat.

- Strategy A.2.1.1: Provide areas of limited or no human access in order to reduce disturbance to waterbirds during critical life cycle stages by using a closure area around active rookery sites.

- Objective A.2.2: Enhance thermal cover and reduce predation of waterbirds across the refuge by providing roosting habitat.
  - Strategy A.2.2.1: Protect rookeries around Bluff Lake through closures of these areas.

- Objective A.2.3: Increase brood survival of breeding waterbird populations by enhancing refuge habitats.
  - Strategy A.2.3.1: Provide seasonal drawdowns of approximately 600 acres of Bluff Lake to ensure mudflats and shallow water habitats and increase foraging opportunities.

Sub-Goal A.3 - Forest Breeding Birds

Manage and protect forest breeding bird populations in concert with the goals and objectives of the Partners in Flight North American Landbird Conservation Plan (Rich et al., 2004).

Discussion: The refuge consists of approximately 15,507 acres of bottomland hardwood habitat that is used by a diverse assemblage of both resident and migratory birds. The bottomland hardwood habitat is particularly essential to forest-dependent birds throughout their life cycle and provides habitat for breeding, post-breeding survivorship of adults and young, stopover habitat for migratory landbirds, and wintering habitat for many species. In particular, a suite of forest breeding and interior songbirds has been identified as a high priority and should be considered within the context of forest management activities occurring on the refuge (Note: for more details on songbirds reference Partners-in-Flight).

The issues affecting forest breeding birds on the refuge are forest fragmentation, habitat loss, and degradation of habitat. Long-term forest fragmentation within the refuge is primarily caused by refuge roads and levees, but old field management and development of public use facilities also play roles. Tree species diversity and forest structure are the other issues on the refuge because of the high percentage of forested habitats. For example, without perturbation, such as occurs through active silvicultural management (e.g., even- and uneven-aged management) or natural disturbances (e.g., tornadoes), maturing forests tend to develop closed over-story canopies that impede light penetration into lower layers of the forest. Limited light penetration results in sparse ground cover, understory, and midstory vegetation. Many forest birds are dependent on dense understory and ground vegetation for nesting, foraging, and escape cover. Thus, silvicultural harvests that increase light penetration, while maintaining a partial over-story canopy, are beneficial to many forest bird species. Even-aged and uneven-aged forest management techniques may be used to achieve a specific habitat need. Some forest breeding birds such as cerulean warblers (Hamel 2000) are dependent upon canopy gaps that provide complex vertical and horizontal structure for nesting and feeding. Studies in bottomland hardwood forests have shown that many species increase their use of forested habitat during the breeding period, but that many species may selectively choose canopy gaps and gap edges during the non-breeding period. These small gaps created within mature forests may increase species richness (Bowen et al. 2007). Young birds often rely on small openings in the forest

that provide patches of dense understory for use during post-fledging (Anders et al. 1998, Vega Rivera et al. 1998), and this understory provides foraging opportunities for transient migrants in spring and fall (Blake and Hoppes 1986).

Another species being threatened by habitat deforestation and conversion within the southeast is the prothonotary warbler (*Protonotaria citrea*). They are common migratory birds associated within bottomland hardwood and floodplain forests of the refuge. As a secondary cavity nester, prothonotary warblers will occupy abandoned woodpecker cavities or other natural cavities contained within dead snags or branches of living trees. Nests are customarily located over or within 5 meters of large bodies of stagnant or slow-moving water, creeks, and streams such as the Noxubee River and its tributaries or seasonally flooded bottomland hardwood forest and bald cypress swamps. GTRs within the refuge also provide excellent habitat for prothonotary warblers. After drawdown, small pools of water will provide excellent foraging habitat. The backwaters of Bluff Lake provide many forested acres that provide adequate habitat as well. Common nest-cavity trees are bald cypress, willows, and sweet gum. Canopy height may significantly vary between 12 and 40 meters and canopy cover approximates 50-75 percent. Ground vegetation is sparse and of low stature. The relatively open microhabitat also provides suitable foraging habitat for the acadian flycatcher (*Empidonax virescens*). Prone to nest parasitism by brown-headed cowbirds (*Molothrus ater*) and exhibiting area sensitivity to habitat fragmentation, prothonotary warblers flourish at the refuge where forests greatly exceed 100 hectares.

With limited expanses of bottomland hardwood forest found in this portion of the state, the refuge plays an important role within the landscape for the yellow-throated warbler (*Dendroica dominica*). Nesting near water and at the end of horizontal canopy limbs of mature bottomland hardwoods and cypress swamps, such as that contained within Bluff Lake, the nests are constructed of leaves, herbaceous vegetation, and pine needles. Selective of foraging substrate, the yellow-throated warbler is strongly preferential to bald cypress and tupelo while avoiding other tree species, especially red maple. The yellow-throated warbler is also known to occupy dry, upland oak-pine forest and will forage on pine cones of loblolly pine, an abundant coniferous species on the refuge.

Abundant within late-successional forest rather than mid- or early-successional forests, the Louisiana waterthrush (*Parkesia motacilla*) occupies a variety of habitats ranging from mature deciduous forest to bottomland hardwoods. Because anthropogenic land uses and acidification processes degrade streambeds, the Louisiana waterthrush is highly dependent on medium to high grade, first- to third-order streams such as the Noxubee River and Oktoc Creek and their associated tributaries to forage for benthic macroinvertebrate communities. Preferential to selecting stream orders of high water quality, the Louisiana waterthrush requires well-developed pools and riffles with rocky or sandy substrate. The refuge forest provides nesting cover, such as small cavities and hollows, within upturned and fallen trees. Exhibiting habitat sensitivity not only to stream order and water quality, but the Louisiana waterthrush requires forest area greater than 350 hectares with the following habitat specifications: > 80% of canopy cover, <25% shrub cover, a 30-69% ratio of deciduous to coniferous cover, and <25% herbaceous cover.

Within floodplains and forests such as those provided by the refuge, the wood thrush *(Hylocichla mustelina)*is preferential to mid- to late-successional timber classes within transitional shrublands, deciduous and mixed forests, and woody wetlands; wood thrushes avoid commercial evergreen plantations. These birds require forests comprised of moderate densities of mid-canopy trees and shrubs for nesting, and open understories with ample leaf

litter for foraging. Although these birds display some sensitivity to patch size, wood thrushes will nest in small forest fragments (<1 acre) and narrow riparian strips (<500 feet in width) but are often unsuccessful due to nest parasitism by brown-headed cowbirds and predation. Nest efficiency and productivity significantly increase for this species when habitat is greater than 200 acres and buffers are wider than 1,700 feet. Nest success also correlates with forest suitability, which in turn is influenced by size and landscape context. Selective silvicultural harvests may generate nesting and foraging sites if 70-80 percent of the forest remains intact (Evans et al. 2011).

Although extensive historical land conversion has eliminated vast expanses of forested wetlands and bottomland hardwood forests within the southeast, the refuge can provide extensive habitat for overwintering rusty blackbirds. Within forests, rusty blackbirds favor bottomland hardwood forests and bald cypress sloughs, but also occur in croplands and lawns. Rusty blackbirds primarily forage on ground stratum, to a lesser extent on floating mats or emergent vegetation and arboreal foraging. This species feeds on arthropods, insects, and berries in the leaf litter or puddles (Hamel 1992). Greenberg (2008) reported that on the wintering grounds, rusty blackbirds are ecological specialists. In bottomland hardwood forests and bald cypress sloughs, they seem to favor shallow, fluctuating surface water beneath or surrounded by forest canopy. The fluctuating water exposes mud flats where the rusty blackbirds forage for invertebrates. Aside from invertebrates, they also feed upon tiny acorn mast such as willow oak acorns and tree mast. This mast may provide sustenance when conditions are not right for foraging on insects and small fish in vernal pools (Greenberg 2008). Other studies have found that the rusty blackbirds are commonly found in a variety of forested wetlands and adjacent agricultural fields. They appear to depend on forest wetlands with open water, but may use nearby disturbed sites, possibly to supplement with principal winter diet of invertebrates, acorns, and pine seeds with waste grains and weed seeds (Greenberg et al. 2010). However, few studies of nonbreeding habitat are available for the rusty blackbird and these only reflect local conditions. No existing study satisfactorily explains how these birds use habitat at a landscape scale, or what the size of such a landscape might be. Until there is more detailed information on typical habitat elements within nonbreeding ranges, specification of what constitutes habitat is necessarily general (Hamel et al. 2009).

The Lower Mississippi Valley Joint Venture's Forest Resource Conservation Working Group developed a publication outlining "Desired Forest Conditions." This report, "Forest Restoration, Management, and Monitoring of Forest Resources in the Mississippi Alluvial Valley: Recommendations for Enhancing Wildlife Habitat" (LMVJV Forest Resources Conservation Working Group 2007), reviews the habitat needs of priority wildlife species and proposes "Desired Forest Conditions" at multiple spatial scales (landscape and stand-level) to enhance wildlife habitat. Additionally, the report presents several recommendations for improving reforestation and forest management activities. Implementation will provide habitat to benefit a wide array of priority wildlife species. Forest management activities occurring within Desired Forest Condition parameters would benefit priority Partners in Flight (PIF) forest birds and Species of Greatest Conservation Need (SGCN), as well as a suite of priority non-avian wildlife species dependent upon forests.
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- Objective A.3.1: Enhance forest breeding bird populations through nesting, brooding, and foraging opportunities.
    - Strategy A.3.1.1: Provide birds with structurally diverse forested habitat.

- Strategy A.3.1.2: Work to eradicate feral hogs.

- Objective A.3.2: Enhance over-wintering forest breeding bird populations through foraging and thermal cover opportunities.

  - Strategy A.3.2.1: Provide birds with structurally diverse forested habitat.

Sub-Goal A.4 - Threatened and Endangered Species
Manage and protect threatened and endangered species in concert with the Endangered Species Act (730 FW 2).

Discussion: Two federally listed threatened and endangered species are known to use the refuge: the RCW and the wood stork. The wood stork migrates to the refuge during summer and uses the bottomland hardwood and associated shallow water sites for feeding and roosting, but does not currently breed on the refuge. The RCW is a year-round resident within the refuge's open pine habitats.

Wood storks visit the refuge during their non-breeding season to feed and rest within the refuges bottomland hardwood habitats. The refuge's wood stork population has increased in size through time. More than 100 birds use the refuge seasonally, visiting shallow water areas for feeding and cypress forest for roosting. The storks benefit from the refuge's existing water management practice of drawing down water within Bluff Lake which provides isolated pools of fish on which the birds feed. These birds get additional benefits from the refuge's moist-soil management practices that create mudflats and shallow pools within which the birds feed. Existing closed areas provide sancturary for these birds along with secluded areas throughout the wet bottomlands. Management that continues to support these needs will benefit these summer migratory birds.

The RCW recovery plan lists the refuge's RCW population as a "support population" (USFWS 2003). This term means that the population on the refuge is not necessary for down-listing or delisting of the species. Rather, the refuge's RCW population supports recovery by providing RCW immigrants and genetic resources to other recovery populations during a time when many designated recovery populations have not reached their population size objectives. Up until this present time, no birds from the refuge's population have been translocated to other populations. As of 2013, the refuge had 58 monitored RCW clusters; 30 clusters are actively occupied by RCW groups (active) and 28 are inactive (unoccupied). Of the 28 inactive clusters, 24 of these have been inactive for more than 5 years (abandoned) and may be no longer considered an RCW cluster. Habitat within these abandoned cluster partitions may be better used toward meeting habitat of adjacent active partitions, rehabilitated to form recruitment clusters, or simply managed similarly to that of the surrounding management unit.

It is important to establish an RCW population goal for the refuge based a special analysis, considering the amount and placement of pine habitat that will be available on the refuge, the potential of the habitat to provide GQFH, and the existing quantity and quality of habitat within currently active and inactive partitions. The previous CCP set the RCW population goal at 88 groups based on dividing the proposed target number of pine acres by 250 acres; at the time 205 acres was the number of acres estimated needed to sustain a group of birds. The refuge went on to create 58 clusters in an attempt to reach that goal. Many of the artificially created clusters were placed in habitats that were in close proximity to other clusters or limited in acres of pine habitat. From the mid-1980s and early 1990s, the refuge population nearly doubled to 32 groups. By 2000, with additional efforts to create and translocate birds into new clusters,

the population totaled 44 groups. However, the artificial increase in the number of groups was short-lived and over the next decade the population declined steadily to its 2013 level of 30 groups, of which 27 are potential breeding groups.

None of the habitat within the clusters currently found on the refuge provide conditions meeting GQFH (Table 5). Prescribed burning has been an important tool to achieve control of under- and mid-story hardwoods and promote herbaceous growth within the RCW's foraging habitat. Forest management and thinning helps maintain proper forest basal areas and canopy spacing. However, existing forest and amounts of pine habitat available within partitions and the ability to sustain the forest into the future is mainly based on the placement of the artificially created cluster. Partitions with large acres (308 acres or more) of pine habitat are more effectively manageable for both current and future GQFH than those with small acres (less than 200 acres). When a cluster is located in non-pine dominated habitat or within pine habitat but in close proximaty to hardwood habitats, large proportions of the partition are unavailable to meet GQFH. Created clusters that are isolated from other RCW groups are less likely to be naturally recolonized by dispersing RCWs because of their geographic isolation; increasing the likelihood the created cluster will become inactive and abandoned. The likelihood of inbreeding also increases with isolation.

Table 5: Good quality foraging habitat criteria and managed stability standard (Red-cockaded Woodpecker Recovery Plan, USFWS 2003) and current forest conditions

	Good Quality Foraging Habitat (GQFH) Criteria	Current Forest Conditions
Pine Age	18 or more stems per acre of pine that are at least 60 years of age and 14" dbh minimal pine BA of 20 square feet per acre	>80 sq ft/ac are at least 60 years in most RCW partitions
Pine Basal Area (DBH 10-14 in)	BA of Pines 10-14" DBH is 0 to 40 square feet per acre	>80 sq ft/ac
Pine Basal Area (DBH <10 in)	BA of Pines less than 10" is 10 square feet per acre and less than 20 stems per acre.	<5 sq ft/ac
Total Stand Basal Area	BA of all Pines more than 10" DBH is at least 40 square feet per acre. Total stand BA for loblolly forest should be kept below 80 square feet per acre minimum canopy spacing of 25 feet	>100 sq ft/ac

Groundcover	Groundcover of native bunchgrass or other native, fire-tolerant, fire-dependent forbs total 40% or more of ground cover and midstory plants and are dense enough to carry growing season fire at least once every 5 years	Limited ground cover due to high BA not allowing sunlight to the forest floor
Hardwood Midstory	No hardwood midstory exist or it is sparse and less than 7 feet in height	Moderate to dense hardwood midstory within partitions
Hardwood Overstory	Canopy hardwoods are absent or less than 30% of canopy	Dense hardwood overstory within partitions
Foraging Habitat Distance from Cluster	The entire habitat is within 0.5-mile of center of cluster, and 50% is within 0.25-mile of center of cluster	The entire habitat is within 0.5-mile of center of cluster, and 50% is within 0.25-mile of center of cluster
Foraging Stand Distance from Cluster or another Foraging Stand	Foraging habitat is not separated by more than 200 feet of non-foraging areas; non-foraging areas include (1) any predominately hardwood forest, (2) pines stands less than 30 years in age, (3) cleared land, (4) paved roads, (5) utility ROW, and (6) water	Within 200 feet
Prescribed Burning Cycle	Growing season fire at least once every 5 years	Dormant and growing season fire every 2-3 years

It is the goal of future habitat management to shift cluster centers to improve habitat conditions within partitions toward meeting GQFH (Figure 12). For those partitions with sufficient amounts (308 acres or more) of pine habitat to allow for sustained GQFH, it will be important to incorporate forest stand regeneration in to the partitions management. For those partitions severely lacking in pine habitat, it will be important to manage cluster center locations toward larger blocks of pine habitat. It is also going to be important to plan the establishment of recruitment sites within locations suitable for the long-term management of RCW groups.

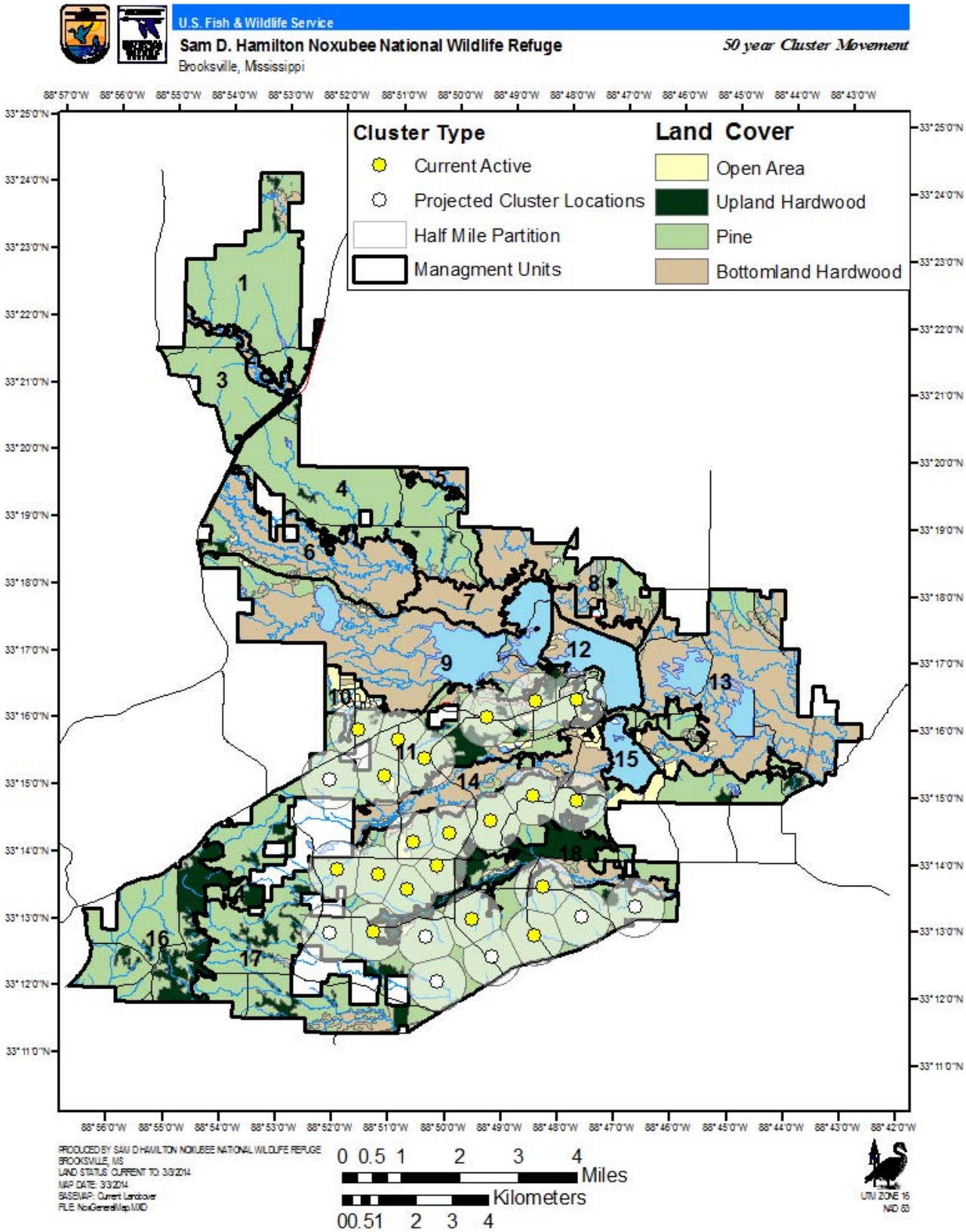

Figure 12: Target locations for RCW cluster centers after 50-year period.

- Objective A.4.1: Manage and protect RCWs as defined by the most current version of the Red-cockaded Woodpecker Recovery Plan (USFWS 2003).
    - Strategy A.4.1.1: Monitor RCW cavities.
    - Strategy A.4.1.3: Maintain at least four viable RCW cavities within each cluster.
    - Strategy A.4.1.3: Work toward banding all adult and young RCWs.
    - Strategy A.4.1.4: Translocate isolated birds within the north units into suitable recruitment clusters within the occupied south units.
- Objective A.4.2: Manipulate individual partitions by migrating cluster centers to optimize acres available to reach GQFH acreage requirements (Figure 12).
    - Strategy A.4.2.1: Complete analysis of forage habitat for all clusters
    - Strategy A.4.2.2: Complete analysis for forage habitat for pine habitats outside clusters that may be suitable for use by RCWs.
    - Strategy A.4.2.3: When needed, install new cavities in direction of pine habitat of greater suitability.
- Objective A.4.3: Manage and protect wood storks as defined by the Wood Stork Recovery Plan (USFWS 1997).
    - Strategy A.4.3.1: Protect wood storks from disturbance when roosting.
    - Strategy A.4.3.2: Limit speed of vehicls on roads and waterways in areas used by wood stork.
    - Strategy A.4.3.3: Maintain year-round closure of Priscock Fields.
    - Strategy A.4.3.4: Provide low water habitats as feeding areas.

Sub-Goal A.5 - Eagles
Manage and protect eagles in accordance with the Bald and Golden Eagle Protection Act (16 U.S.C. 668-668d).

Discussion: Up to seven bald and two golden eagles have been documented using the refuge. Bald eagles are present throughout the year and two nests are located within the refuge boundary, whereas golden eagles are currently present only during a few winter months. Golden eagles have only recently been documented and more information is needed. Protection of bald eagle nest sites from human disturbance currently exists based on the Bald and Golden Eagle Protection Act.

- Objective A.5.1: Continue to promote successful reproduction through site protection of existing eagle nests, survey for new eagle nests, and record reproductive success.
    - Strategy A.5.1.1: Establish and maintain closure areas around nest sites.

- Strategy A.5.1.2: Promote monitoring using citizen scientists.

- Objective A.5.2: Coordinate all available information gathered by partners and cooperating agencies to assist in efforts to increase information base on eagles.
  - Strategy A.5.2.1: Maintain working relations with MDWFP staff.
  - Strategy A.5.2.1: Maintain working relations with MSU staff.

Objective A.6: Resident and Other Species
Manage and protect other species populations that have a direct tie to the purpose of the refuge and mission of the Service and to support the goals of Mississippi's Comprehensive Wildlife Conservation Strategy (MDWFP 2005).

Discussion: The refuge provides habitat for a variety of resident game and non-game species including white-tailed deer, Eastern wild turkey, Northern bobwhite quail, non-migratory Canada geese, American alligators, mammals (beaver, otter, muskrat, gray squirrel, fox squirrel, Eastern cottontail rabbit, bats), and a large variety of snakes, reptiles and amphibians. Historically, the refuge served a vital role in reestablishing many resident species that had been lost due to habitat loss in the late 1800s and early 1900s. Many of these resident species provide an important connection between the American public and wildlife, whether through hunting and fishing or wildlife observation. Species like white-tailed deer and beaver continue to require active population management, because their plentiful numbers make it possible for both species to negatively impact habitats. New insects and plants are discovered each year on the refuge, and it is important to ensure they are not unnecessarily disturbed as they may be rare within the refuge or the state.

- Objective A.6.1: Work with the State of Mississippi and other partners to incorporate, where possible, upland bird species management recommendations from national and state plans.
  - Strategy A.6.1.1: Seek input and active support from biologist with MDWFP.
  - Strategy A.6.1.2: Develop partnerships with non-governmental organizations that may support upland bird species management.

- Objective A.6.2: Target a harvest level to maintain a healthy deer population, with an appropriate sex and age structure at a level consistent with long-term habitat capability, to prevent degradation of habitats important to priority species, and to provide quality recreational opportunities.
  - Strategy A.6.2.1: Maintain a deer hunter quota system set based on target deer harvest numbers.
  - Strategy A.6.2.2: Require reporting of all game animals harvested.

- Objective A.6.3: Work with the State of Mississippi and other partners to incorporate, where possible, management recommendations on bats to support healthy, diverse, and viable populations.
  - Strategy A.6.3.1: Seek input and active support from biologist with MDWFP.

- Strategy A.6.3.2: Develop partnerships with non-governmental organizations that may support bat species management.

- Objective A.6.4: Work with the State of Mississippi and other partners to incorporate, where possible, management recommendations on reptile and amphibian species to support a healthy, diverse, and viable population.
  - Strategy A.6.4.1: Seek input and active support from biologist with MDWFP.
  - Strategy A.6.4.2: Develop partnerships with non-governmental organizations that may support amphibian species management.
- Objective A.6.5: Work with the State of Mississippi and other partners to incorporate, where possible, management recommendations on invertebrates to support healthy, diverse, and viable populations.
  - Strategy A.6.5.1: Seek input and active support from biologist with MDWFP.
  - Strategy A.6.5.2: Develop partnerships with non-governmental organizations that may support invertebrate species management.
- Objective A.6.6: Work with the Ecological Services, State of Mississippi, and other partners to locate, protect, and conserve, where possible, rare native plants.
  - Strategy A.6.6.1: Seek input and active support from biologist with MDWFP.
  - Strategy A.6.6.2: Develop partnerships with non-governmental organizations that may support rare native species management.

Sub-Goal A.7 - Aquatic Biota

Manage and protect a diverse assemblage of native fish species, particularly those priority conservation actions identified for the Tombigbee Drainage within Mississippi's Comprehensive Wildlife Conservation Strategy (710 FW 1, USFWS 2006).

Discussion: Like migratory birds, the refuge's aquatic systems have a strong connection to the purposes for which the refuge was established. The National Wildlife Refuge System Administration Act states the refuge is for the "conservation, management, and restoration of the fish, wildlife, and plant resources and their habitats for the benefit of present and future generations of Americans." Following a history of reforestation, sediment loads, due to erosion of the highly erodible soils, have been slowed. Development of Mississippi's Best Management Practices has also promoted the protection of streamside management zones and water quality within lesser order streams. But, there appears to have been permanent changes within the refuge's hydrology. Old photographs reveal that since the establishment of the refuge, water quality entering and flowing within the Noxubee River and Oktoc Creek has changed from a clear stream with gravel shoals to a river of high silt loads and mud bottom. Bluff and Loakfoma lakes and Ross Branch Reservoir are artificial structures made within natural creek channels. These new bodies of water are now places where wildlife observation and angling can be enjoyed by the public. In addition, the refuge's four GTRs are additional artificial water bodies within the bottomland hardwood forest. Understanding the impacts of these changes is

challenging. For example, the water control structures and levee associated with these water bodies can impede fish passage during spawning. Other impacts can be seen through forest diebacks when timber is flooded into the growing season. Restoration and adjustments in management should continue to improve habitat for fish and other aquatic life when practiced under a balanced approach with other refuge resources.

- Objective A.7.1: Establish and maintain streamside management zones that meet or exceed criteria recommended by the State of Mississippi Best Management Practices to reduce non-point source pollution to improve water quality and stabilize water temperatures for native fish and mussel populations and to help mitigate changes in water temperature resulting from climate change.
    - Strategy A.7.1.1: Implement standards that protect at least 80 percent of diversity located in wetland areas.
    - Strategy A.7.1.2: Incorporate streamside management zone measures into the special conditons of relavent special use permits.
- Objective A.7.2: When not in conflict with waterfowl and threatened and endangered species management, maintain a balanced native fisheries population in lakes by managing size distribution, ratio of predator to prey, mortality rates, and other key parameters.
    - Strategy A.7.2.1: Monitor water levels using permanently fixed water level gauges.
    - Strategy A.7.2.2: Use geographic information systems to record and assess water level measures.
    - Strategy A.7.2.3: Periodically conduct fisheries monitoring.
    - Strategy A.7.2.4: Create deep-water habitats within Bluff Lake and use soil from excavations to create forested islands to serve as possible future rookeries for birds.
    - Strategy A.7.2.5: Use public use regulations as a tool in managing fish populations (i.e., slot or creel limits).
- Objective A.7.3: Support existing populations of paddlefish by manipulating water flow from the lakes during the key spring spawning migration periods of February 15 to May 1.
    - Strategy A.7.3.1: Weekly release at least an estimated 400 cubic feet per second of water for at least one, 8-hour period using the Bluff Lake radial arm water control structure to increase water flow in areas down stream of structure.
    - Strategy A.7.3.2: Maintain protection from the taking of paddlefish by anglers.
- Objective A.7.4: Maintain course woody debris to provide freshwater mussel and invertebrate populations with improved water quality in riverine habitats.

- Strategy A.7.4.1: Prohibit the removal of natural debris from main channels Noxubee and Oktoc creeks.

- Strategy A.7.4.2: Conduct mussle and invertebrate surveys.

- Objective A.7.5: Restore fish connectivity between the Bluff Lake and Noxubee River by installing fish passage structures for paddlefish and potential Gulf Coast walleye populations.

  - Strategy A.7.5.1: Work with partners to better understand fish passage needs.

  - Strategy A.7.5.2: If the existing structure is replaced, consider designing fish passage features.

Sub-Goal A.8 - Exotic and Pest Species

Minimize negative impacts of exotic and pest plant and animal species to levels that do not negatively affect other native species on the refuge (750 FW 1).

Discussion: Exotic species capable of spreading and invading into new areas are typically best labeled as generalists. These species normally adapt to new environments quickly and are highly prolific and superior competitors and predators. Some are very specialized and more efficient and effective than their native competitors at filling a particular niche. They compete for resources, alter community structure, displace native species, and may cause extirpations or extinctions. Invasive species often benefit from altered and declining natural ecosystems by filling niches of more specialized and displaced species with limited adaptability to changing environments. A basic tenant of the Improvement Act is management for biological diversity and integrity. The refuge has several documented exotic and pest animal species and free-roaming domestic and feral animals. These species impact the refuge's ability to carry out desired management objectives to varying degrees. For example, studies have shown that an adult feral hog will consume 160 pounds of hard mast, such as acorns, during a single winter (Yarrow and Kroll 1989) and also impact ground nesting birds, reptiles, amphibians, and other native wildlife located within the same habitat. Where the major habitat type is bottomland, feral hogs will be efficient competitors with native wildlife, including deer, Eastern wild turkey, Northern bobwhite, squirrels, and waterfowl for available hard mast resources. In addition to being a host of various diseases, such as swine brucellosis (*Brucella suis*), feral hogs cause enormous structural damage to levees and roadways by rooting large holes while feeding on grasses, roots, and stems. Exotic and feral animals, such as the feral hog, should be curtailed early and by any means possible, when such control is both practical and attainable. Whether plant or animal, exotic species will be spot treated as early as possible following detection, using integrated pest management. If beyond eradication, then efforts should be next directed to prevent further spread of the species within the refuge. Control of plant species, such as cogongrass, Japanese climbing fern (*Lygodium japonicum*), and bicolor lespedeza, are important as these plants quickly out- compete native plants.

- Objective A.8.1: Eradicate or control spread of exotic plant and animal species to promote native plant communities in terrestrial and aquatic systems.

  - Strategy A.8.1.1: Use geographic information systems to map know locations

- Strategy A.8.1.2: Actively trap and remove exotic animals.
- Strategy A.8.1.3: Actively remove or spray exotic plants with herbicides.

- Objective A.8.2: Implement procedures to minimize spread of exotic species.
  - Strategy A.8.2.1: Restrict pass-through communter traffic to paved roads.
  - Strategy A.8.2.2: Improve equipment wash stations to reduce spread of exotic plant seeds.
  - Strategy A.8.2.3: When maintaining roads, reduce disturbance of soils and ground cover outside road system structure.

- Objective A.8.3: Manage pest species under a balanced approach.
  - Strategy A.8.3.1: Only remove individual pest species when needed to control damage to habitat or protect refuge assets.

HABITAT MANAGEMENT

Goal B: Habitats
Manage and protect habitats for migratory and native wildlife on the refuge to contribute to the purposes for which the refuge was established, as well as to fulfill the mission of the National Wildlife Refuge System (620 FW 1, USFWS 2002).

Discussion: Wildlife habitat is the physical environment that provides the necessities of survival for a species. Wildlife is an integral part of any healthy environment. Within its habitat, a species can find food, water, shelter, and space that it needs to survive. In return, many of these species aid in seed dispersal, forest pest control, and many other ecological tasks that perpetuate healthy environments. Habitat management may involve manipulating the types, amount, or arrangement of food, water, and cover within a habitat for the purpose of making the habitat more suitable for a specific species or group.

Sub-Goal B.1: Pine and Mixed Pine/Hardwood
Achieve desired forest conditions within pine forests to protect, manage, enhance, and restore the values and functions of these habitats to sustain the biological needs of native wildlife and migratory birds.

Discussion: Natural and anthropogenic fires have always had a great influence on the refuge's pine communities by limiting the development of hardwoods. Prescribed fire is now fulfilling this role. Most of the historic pine forest within the refuge's boundary would have been shortleaf pine possibly mixed with longleaf and limited loblolly. However, today the refuge's pine forests are dominated by loblolly pine due to plantings accomplished 60 to 70 years ago during the early years after the refuge's establishment as an immediate effort to protect and restore the refuge's heavily eroded soils. Restoration of the refuge toward its historic forest conditions will likely need to continue for another 70 years. Management of historically pine habitats to meet the perpetual needs of the RCW will be a priority. Pine habitat currently occupied by active clusters will be managed toward providing GQFH. Silvicultural treatments designed to improve

forest conditions and foraging habitat for RCWs within the pine stands will likely benefit other wildlife species as well. Managing for RCW into the future will not be easy. Managing RCW within the forest is fundamentally a spatial and temporal puzzle and as with puzzles, a good working surface is required and not all pieces fit the same.

Providing and sustaining GQFH for the RCW requires older trees, reaching the end of their life span, to be replaced with regenerating younger pine trees. GQFH is not sustained for many clusters due to limited acres for meeting both today's foraging needs and those needed 40 years from now (Table 6). Providing GQFH for active clusters is the management goal but without regeneration of the forest, habitat provided during the life span of the plan may be lost altogether in 40 years.

Table 6. Distribution in pine age within existing partitions, Sam D. Hamilton Noxubee NWR 2012

Age-Class	Current Age Distribution
0 - 30	11.4%
31 - 60	11.1%
61 - 90	73.0%
91+	4.5%
Total Acres:	**100%**

In conjunction with an analysis of RCW foraging habitat, the forest community classification and historic forest conditions will be used to identify the types and locations suitable for RCW management. The location of future recruitment clusters will be designated in a spatially explicit manner, with each new partition assessed for the acreage and quality of existing and future potential RCW foraging habitat. The 2003 RCW recovery plan lists affirmative measures that also have been included in this Draft CCP and HMP. These activities include:

- providing of artificial cavities where suitable cavities are naturally limited;
- controlling midstory and overstory hardwood encroachment in cluster and foraging habitat by active forest management, mechanical methods, herbicide, and prescribed fire;
- thinning timber in overstocked stands to avoid establishing dense and unsuitable RCW habitat;
- prescribing frequent fire, particularly in the growing season, to control hardwood encroachment and stimulate development of a herbaceous plant ground layer;
- reducing RCW cavity competition by other species and depredation by natural predators at cavities when essential;
- restoring habitat and establishing recruitment clusters to increase population size;
- monitoring cavities, clusters, reproduction, and population status to identify limiting factors

The following prohibitive measures listed within the 2003 RCW recovery plan are also to be adopted within the Final CCP and HMP:

- no use of roads through clusters for silvicultural operations;

- no removal of cavity trees, as supported by their designation, monumentation, and protection during timber or mechanical operations in clusters;
- no mechanical or cultural operations to improve habitat within clusters during the breeding season; and
- no clear-cutting of RCW habitat and, instead, regenerate pine stands by using a modification of even-aged silviculture to establish a two-age stand with retention of seed trees.

  - Objective B.1.1: Within Management Units 11 and 17, provide approximately 3,500 acres of beneficial Good Quality Foraging Habitat (Table 1) within all active and recruitment RCW clusters yearly, and optimally supplying predictable amounts of habitat to meet both current and long-term foraging and nesting requirements of the RCW.
    - Strategy B.1.1.1: Conduct RCW habitat monitoring according to the 2003 RCW recovery plan.
    - Strategy B.1.1.2: Conduct yearly forest monitoring, including measures of ground cover, or fire fuels monitoring with measures of ground cover and litter.
    - Strategy B.1.1.3: Conduct nest checks and banded bird observations according to the 2003 RCW recovery plan.
  - Objective B.1.2: Manage up to 8,500 acres of open pine forests in MU 11 and 17 to provide sustainable GQFH outside identified RCW partitions to benefit RCW and other native wildlife species.
  - Objective B.1.3: All active RCW partitions would be managed to meet GQFH as long as RCW remain active within the area. For abandoned clusters, habitat will be managed for historical forest cover conditions to benefit priority species within that habitat.

Sub-Goal B.2 - Bottomland Hardwood Forests

Achieve desired forest conditions within bottomland hardwood forest to protect, manage, enhance, and restore the values and functions of these habitats to sustain the biological needs of native wildlife by implementing recommendations within the LMVJV Restoration, Management, and Monitoring of Forest Resources in the Mississippi Alluvial Valley: Recommendations for Enhancing Wildlife Habitat 2007 (aka Desired Forest Conditions).

Discussion: Although the refuge is not specifically identified, the refuge contributes to the overall waterfowl goals of the North American Waterfowl Management Plan (USFWS 1986). Since its establishment, the refuge has provided both wintering habitat for migratory waterfowl and nesting habitat for wood ducks. In addition, the refuge's extensive bottomland hardwood forests provide habitat for a variety of neotropical migratory birds.

  - Objective B.2.1: Manage approximately 18,000 acres of bottomland hardwood forests within Management Units 2, 5, 6, 8, 9, 13, 14, and 18, to maintain one-third to one-half in Desired Forest Conditions as recommended by Desired Forest Conditions Report of

the LMVJV (2007) and encourage the growth of large cavity trees within and adjacent to water bodies.

- Strategy B.2.1.1: Monitor the effects of forest management activities to maintain integrity of desired species composition, habitat structure, and forest health.
- Strategy B.2.1.2: Complete forest inventories, including primary and secondary desired forest condition metrics (LMVJV 2007).
- Strategy B.2.1.3: Monitor forest breeding bird species through landbird surveys (point counts).

- Objective B.2.2: Protect forest health (e.g., tree species diversity, tree vigor) within GTRs (~1,726 acres) from prolonged artificial flooding and maintain forest structural diversity to match that of the surrounding management unit of similar habitat type.

Sub-Goal B.3 - Aquatic Environments

Actively manage approximately 252 acres of shallow water moist-soil impoundments, 1,200 acres of lakes, and 1,645 acres of GTRs for native species, including a diversity of reptiles, fish, and amphibians, and waterfowl species through water level manipulation and to fulfill the mission and purposes for which the refuge was established while maintaining functional integrity of the surrounding habitat.

Discussion: By managing these environments, needed food resources, such as moist-soil plant seeds, crops high in carbohydrates, and invertebrates, are provided to waterfowl to help replenish weight lost during migration. These foods are essential for providing the energy wintering ducks need to arrive on the breeding ground in good condition (Ringelman 1990). Additionally, these habitats can be managed to support wading birds including the wood stork, a proposed threatened species. The paddlefish is an inter-jurisdictional fish which occurs in the Noxubee River. Research is on-going to determine if paddlefish are spawning in Noxubee River and Oktoc Creek and what can be done to help paddlefish prosper. Inland ponds, lakes, streams, wetlands with emergent vegetation, riparian and wooded wetlands, and beaver ponds also benefit fish, invertebrates, amphibians, reptiles, and crustaceans.

- Objective B.3.1: Provide at minimum 1.1-million DEDs over a 110-day period yearly through the possible combination of managed moist-soil plants, planted agricultural crops, lakes, and seasonally flooded GTRs.

- Objective B.3.2: Provide approximately 1,060 acres of shallow water lake habitat for seasonal use by wood stork and other wading birds, nesting and wintering waterfowl, and recreational anglers.

- Objective B.3.3: Operate Ross Branch Reservoir as a water supply to Management Unit 10, ensuring that the reservoir water volume reaches no less than 25 percent during winter months, with optimal depth being full pool during summer months.

- Objective B.3.4: Create deep water habitat within Bluff Lake to support native fish during periods of low water.

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Sub-Goal B.4 - Proposed Wilderness
Manage the 1,200-acre proposed Wilderness to retain its primeval character and influence.

Discussion: A Wilderness Review was completed in 1974, resulting in a 1,200-acre proposed wilderness area within the National Wilderness Preservation System. The proposed wilderness area is managed using the guidance in the refuge manual (6 RM 8), Wilderness Area Management. Additional research natural areas were identified for protection and preservation but no action taken to clearly document their location nor plans developed for their management.

- Objective B.4.1: Provide approximately 1,200 acres of bottomland hardwood habitat benefiting forest breeding birds, within the context of protection of wilderness character attributes in accordance with the Wilderness Act (1964).
    - Strategy B.4.1.1: Monitor the effects of passive forest management activities to maintain integrity of desired species composition, habitat structure, and forest health.

RESOURCE PROTECTION

Goal C: Resource Protection
Protect the natural and cultural resources of the refuge.

Discussion: The resource protection goal acknowledges that the refuge's natural (land, forests, water, wildlife, etc.) and cultural (old home sites, Native American artifacts, grave yards, etc.) resources face a variety of risks and threats over time. Refuge management must be vigilant to protect these resources from damage, theft, or degradation. The integrity of cultural resources may be impacted by vandalism, theft, or simple neglect. Land acquisition and recording of known sites is one method by which the Service attempts to protect natural and cultural resources. Education, interpretation, and enforcement of laws and regulations each play an additional role.

Sub-Goal C.1: Resource Management and Education
Maintain, preserve, and protect archaeological, cultural, historical, and natural resources, representing the natural and cultural history of the local area.
Discussion: While on the refuge the public may encounter cultural resources with little to no associated interpretation. Cultural resources include historic properties as defined in the National Historic Preservation Act of 1966 (NHPA), cultural items as defined in the Native American Graves Protection and Repatriation Act (NAGPRA), archaeological resources as defined by Archaeological Resources Protection Act of 1979 (ARPA), sacred sites as defined in Executive Order 13007, *Protection and Accommodation of Access To "Indian Sacred Sites"* to which access is provided under the American Indian Religious Freedom Act (AIRFA), and collections. As defined by the NHPA, a historic property or historic resource is any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places (NRHP), including any artifacts, records, and remains that are related to and located in such properties. The term also includes properties of traditional religious and cultural importance (traditional cultural properties), which are eligible for inclusion in the NRHP as a result of their association with the cultural practices or beliefs of an American Indian tribe. Archaeological resources include any material of human life or activities that is at least 100 years old, and that is of archaeological interest. Archaeological and historical investigations on and near the refuge have been sporadic over the past century, though in

recent years this trend has been changing. The refuge has several archaeological and historical sites that are documented and receive full protection. Many of these sites date back as far as to the Late Archaic period and are associated with Native American occupation. Current outreach regarding cultural resources includes information within refuge visitor center displays and information shared during special events.

It is important to the refuge to take steps so that staff, visitors and local community members do not lose connection with the land. Approximately 441 tracts have been acquired by the refuge. Today, each tract represents habitat for wildlife, but prior to acquisition it represents communities, families, and cultures. It will be a goal of the refuge to increase the amount of interpretation of the refuge's cultural resources while continuing to protect sites from unwanted disturbance. Displays may be added to the refuge's visitor center and information provided on refuge web sites and at kiosks throughout the refuge. The refuge may also consider development of displays within the individual tracts, informing visitors of previous landowners and land-use practices. The refuge will also encourage greater involvement of the arts in refuge activities, through such programs as an Artist-in-Residence Program. Maintaining an active connection with the past will be important to appreciating and understanding the path forward.

- Objective C.1.1: Over the life of the plan, implement outreach program that will provide information and preservation ethics on the refuge's cultural resources and history through interpretation and environmental education programs.
    - Strategy C.1.1.1: Incorporate information into visitor center displays, kiosk displays, and educational presentations.
    - Strategy C.1.1.2: With community involvement, establish historical plaques throughout the refuge to both inform and educate the public on cultural resources and history of the property.
- Objective C.1.2: Conduct archaeological and historic investigations to inventory and evaluate historic properties pursuant to Section 110 of the NHPA and Section 14 of the ARPA.
    - Strategy C.1.2.1: Utilizing the refuge's realty files and other relevant archival materials, locate and document farms and other features, such as cemeteries, orchards, etc., present when the refuge was established and develop a "secure" historic property GIS data layer.
    - Strategy C.1.2.2: Work to develop shared archeological staff position with other local federal agencies.
    - Strategy C.1.2.3: Seek funding to conduct surveys.
- Objective C.1.4: Consult with other federal agencies, State and Tribal Historic Preservation Offices, tribes, the professional historic preservation community, African-American communities, and the general public when managing cultural resources.
    - Strategy C.1.4.1: Encourage active partnership with tribes and partners.

- Strategy C.1.4.2: Encourage participation by partners in educational and outreach events.
- Strategy C.1.4.3: The refuge, in consultation with the Choctaw Nation, the Jena Band of Choctaws, and the Mississippi Band of Choctaws, will attempt incorporate Native American perspectives into all facets of education, investigation, and refuge management.

- Objective C.1.5: Facilitate partnerships with states, tribes, nonprofit organizations, academia, private landowners, and businesses for the development and implementation of a Cultural Resource Management Plan.
  - Strategy C.1.5.1: Develop Cultural Resources Management Plan
  - Strategy C.1.5.2: Integrate cultural resource preservation into refuge management plans and programs and evaluate the efficacy of these strategies.
  - Strategy C.1.5.3: Prior to any ground-disturbing activity continue to complete the "Request for Cultural Resource Compliance" form (Form RCRCR4) and forward it to the Regional Archaeologist for review.
  - Strategy C.1.5.4: Pertinent refuge staff will attempt to complete the Overview for Cultural Resources Management Requirements, FLETC's Archaeological Resources Training Program, Advanced Forensics Techniques and Crime Scene Investigation, and Archaeological Resources Protection Act training courses.

Sub-Goal C.2 - Protection
Implement law enforcement procedures to protect the refuge's cultural resources and diminish site destruction due to looting and vandalism.

Discussion: The majority of refuge users visit the refuge to reconnect with nature and experience the outdoors. With the refuge having approximately 160,000 visits yearly, there is a need to impose rules and regulations to protect both the resources of the refuge and the visitors from harm.

- Objective C.2.1: The refuge will evaluate the efficacy of existing signage and other law enforcement tactics to prevent, enforce, and investigate illegal activity associated with cultural resources.
  - Strategy C.2.1.1: Maintain at least one full-time Federal Wildlife Officer as part of the refuge's permanent staff
  - Strategy C.2.1.2: Work to hire a second full-time Federal Wildlife Officer as part of the refuge's permanent staff
  - Strategy C.2.1.3: Maintain interior and exterior boundaries with appropriate signs indicating property ownership

- Strategy C.2.1.4: Maintain and update regulatory signs on routine basis.

Sub-Goal C.3 - Land Acquisition
Identify willing sellers and acquire private lands within the existing approved acquisition boundary that would enhance the conservation values of the refuge.

Discussion: Land acquisition and recording of known sites is one method by which the Service attempts to protect natural and cultural resources. The refuge currently has an approved acquisition boundary of 61,715 acres of which it currently manages 48,219 acres. The remaining 13,496 acres are under private or school board ownership.

- Objective C.3.1: Rank and attempt to acquire existing land within the approved acquisition boundary from willing sellers.
  - Strategy C.3.1.1: Contact potential willing sellers.
  - Strategy C.3.1.2: Use geographic information systems to manage and maintain realty property records.

Sub-Goal C.4 - Conservation Easements
Continue to provide oversight on nine (9) Farm Service Agency Conservation Easements.

- Objective C.4.1: Contact current landowners of Farm Service Agency conservation easement to annually review both agreement and property for compliance.
  - Strategy C.4.1.1: Conduct yearly checks on Farm Service Agency properties.
  - Strategy C.4.1.2: Make yearly contact with property owners
- Objective C.4.2: Mark boundary of easements.
  - Strategy C.4.2.1: Work with property owners to mark Farm Service Agency easement boundaries.

Sub-Goal C.5 - Wild-land Fire Urban Interface
Provide resource protection to control wild fire.

- Objective C.5.1: Identify areas adjacent to and on the refuge that have an existing Wildfire Protection Plan (WFPP).
  - Strategy C.5.1.1: Use geographic information systems to identify and manage fire related information.
  - Strategy C.5.1.2: Meet with neighboring landowners to discuss fire related issues.
- Objective C.5.2: Develop and maintain mutual aid agreements with rural fire departments, State of Mississippi Forestry Commission, and USDA Forest Service to assist with wild fire suppression.

- Strategy C.5.2.1: Meet annually with partners.

VISITOR SERVICES

Goal D. Visitor Services
Provide opportunities for compatible wildlife-dependent public uses that promote an understanding and appreciation of fish, wildlife, habitat conservation, and the mission of the National Wildlife Refuge System (605 FW 2, USFWS 2006).

Discussion: The Improvement Act recognizes six priority public uses (e.g., hunting, fishing, wildlife observation, wildlife photography, and environmental education, and interpretation) of the Refuge System. These uses, "where compatible with the refuge system mission and purposes of the individual refuges," are considered "legitimate and appropriate public uses … through which the American public can develop an appreciation for fish and wildlife" and shall receive "priority consideration in refuge planning and management." The Improvement Act further states that "in administering the Refuge System, the Secretary shall ....provide increased opportunities for families to experience compatible wildlife-dependent recreation, particularly opportunities for parents and their children to safely engage in traditional outdoor activities, such as hunting and fishing...."

Sub-Goal D.1: Hunting
Provide hunting opportunities while ensuring safe, compatible, and quality experiences.

Discussion: A long tradition of hunting exists at the refuge. Opportunities exist for hunters to experience waterfowl, white-tailed deer, turkey, and small game hunting. Currently, both non-consumptive and consumptive users are overlapping in their use of the over 42,000 acres of accessible refuge lands. For example, birdwatchers can walk into areas where handicapped hunters are hunting. The hunt plan has not been updated since the 1980s, and administrative adjustments need to be incorporated. Most changes will constitute updating language; however, consideration will be given to opening newly acquired properties to match refuge hunting regulation in adjacent units. Establishment of "Connecting People with Nature" and "Experiencing Nature" areas could help reduce these conflicts. Within the "Experiencing Nature" area, hunting will be promoted and additional hunting opportunities facilitated when possible. For instance, areas other than GTR #1 could be opened to waterfowl hunting. Disabled hunter areas could be developed within another area of the refuge. Parking areas could be established for hunters. Other forms of hunter transportation (i.e., Off-road Vehicles) will not be considered because of their destruction of native plants.

- Objective D.1.1: Review and, if needed, update the Hunt Plan annually in conjunction with state agency and public input.
  - Strategy D.1.1.1: Participate in state coordination meetings.
  - Strategy D.1.1.2: Periodically host open house to increase public participation.
- Objective D.1.2: Promote hunting in areas other than the area defined as the "Connecting People with Nature" area.
  - Strategy D.1.2.1: Maintain, and if needed increase, information kiosks and check stations available to hunters.

    - Strategy D.1.2.2: Develop a disabled (as defined by: Mississippi Disabled Parking Application Section 27-19-56, MS Code of 1972) hunter program which provides for a natural hunting experience and increased access.

- Objective D.1.3: Ensure that water management associated with waterfowl hunting is compatible with the forest structure and forest species composition while providing public hunting opportunities.
    - Strategy D.1.3.1: Move waterfowl hunting areas so no one GTR is flooded more frequently than twice within a five-year period.
    - Strategy D.1.3.2: Allow upto two years of consecutive hunting within any one GTR.
- Objective D.1.4: Continue to ban use of all-terrain vehicles (ATVs), utility terrain vehicles (UTVs) and other off-road vehicles.
    - Strategy D.1.4.1: Use the refuge's special use permit system to address individual users needing special consideration.
    - Strategy D.1.4.2: Restrict use of ATVs and UTVs to administrative uses only.
    - Strategy D.1.4.3: Improve administrative UTV trails to prevent erosion and protect water quality.
- Objective D.1.5: Continue to ban use of horses and other forms of equestrian uses.
    - Strategy D.1.5.1: Maintain road system to allow ample access by way of vehicle.
    - Strategy D.1.5.2: When not inside the proposed wilderness area, allow hunters and anglers to use bicycles and push-pull carts.
- Objective D.1.6: Continue to protect the American alligator from harvest within the refuge boundary.
    - Strategy D.1.6.1: Continue to ban the hunting of alligators on the refuge.
    - Strategy D.1.6.2: Work with state biologists to manage individual alligators that become a threat to humans.
- Objective D.1.7: Establish parking areas along Bluff Lake Road to allow better hunting access.
    - Strategy D.1.7.1: Attempt to provide at least one parking area for every half-mile of road distance.
    - Strategy D.1.7.2: Identify and map areas currently favored by refuge users and consider development of nearby parking areas.

- Objective D.1.8: Partner with State of Mississippi and non-governmental organizations to host hunting opportunities for youth and disabled hunters.
    - Strategy D.1.8.1: Provide turkey hunt season open to qualifying disabled hunters.
    - Strategy D.1.8.2: Provide deer hunt season open to qualifying disabled hunters.
    - Strategy D.1.8.2: Continue to host youth squirrel hunting class in partnership with state and non-governmental organizations.

Sub-Goal D.2 - Fishing
Provide fishing opportunities while ensuring safe, compatible, and quality experiences (605 FW 3, USFWS 2006).

Discussion: A long tradition of fishing exists at the refuge. Opportunities exist for anglers to fish in refuge lakes during a limited timeframe. Fishing will be promoted and additional opportunities and accommodations will be facilitated when possible.

- Objective D.2.1: Open year-round bank fishing on Bluff Lake where and when compatible with other priority uses.
    - Strategy D.2.1.1: Open to year-round bank fishing within Bluff Lake along eastern levee and southern shore.
    - Strategy D.2.1.2: Open plung pool below Bluff Lake radial arm structure to year-round fishing.
- Objective D.2.2: Continue to support and expand handicapped fishing opportunities according to American Disablities Act (ADA) guidlines.
    - Strategy D.2.2.1: Replace fishing pier at Ross Branch Reservoir with handicapped-accessible floating pier.
    - Strategy D.2.2.2: Replace fishing dock at Loakfoma Lake with handicapped-accessible floating pier.
    - Strategy D.2.2.3: Continue to develop handicapped fishing jetty within Loakfoma Lake for use by wheelchair-bound anglers.
    - Strategy D.2.2.4: Ensure piers and jetty meet ADA guidelines.
- Objective D.2.3: Designate a non-motorized Bluff Lake boat launch near Cypress Cove.
    - Strategy D.2.3.1: Limit motorized boats within Bluff Lake to be launched from the improved concrete boat ramp on the southeast shore of the lake.
    - Strategy D.2.3.2: Consider development of concession for non-motorized boat rentals near Cypress Cove.

- Objective D.2.4: Establish improved parking areas for spillways at Loakfoma and Bluff lakes, and Ross Branch Reservoir.
    - Strategy D.2.4.1: Provide paved drive and parking at Loakfoma Lake.
    - Strategy D.2.4.2: Provide paved parking at Bluff Lake motorized ramp and spillway lots.
    - Strategy D.2.4.3: Improve graveled parking at Ross Branch Reservior.

Sub-Goal D.3 - Wildlife Observation and Photography
Provide wildlife observation and photography opportunities while ensuring safe, compatible, and quality experiences.

Discussion: An estimated 160,000 visits occur on the refuge annually. Visitors can enjoy more than 42,000 acres of accessible refuge lands. Currently, both non-consumptive and consumptive user groups can utilize all open areas of the refuge. For example, hikers can walk into areas where hunters are hunting. As the non-consumptive user group grows, the refuge recognizes many of these visitors are not prepared for the wildness of some areas of the refuge. In order to orientate these visitors, the refuge will establish an area with additional services aimed at a more relaxed and enjoyable experience, while still encouraging and supporting "wildlife first" ideals.

- Objective D.3.1: Establish a defined area around Bluff and Loakfoma lakes to serve as a "Connecting People with Nature" area for public users requiring greater support and developed amenities.
    - Strategy D.3.1.1: Replace existing public restrooms with self-contained, prefabricated restroom facility eliminating water and power use.
    - Strategy D.3.1.2: Transition existing picnic area to serve as "Connecting People with Nature" or wildlife viewing areas for families and users less able to experience the entire refuge.
    - Strategy D.3.1.3: Manage refuge trails to include only those within the "Connecting People to Nature" area and the Scattertown Trail.
    - Strategy D.3.1.4: If found compatible, limit non-wildlife-dependent activities to only the "Connecting People with Nature" areas.
    - Strategy D.3.1.5: Establish seasonal closure of trail segments within the RCW Clusters during periods of RCW nesting when in conflict with trail system.
    - Strategy D.3.1.6: Establish a developed (i.e., paved) wildlife observation trail for both bicycles and pedestrians extending from the motorized boat launch at Bluff Lake, and past the office and visitor center along the shore of Bluff Lake ending at the Goose Overlook. A loop extension would then proceed to the Smith Fields, down Goose Pen Road to Ennis Road, then around the southern end of

Loakfoma Lake. The trail would then loop back to its origin along the paved Loakfoma Road.

- Strategy D.3.1.7: Consider use of concessions to provide non-motorized canoe and kayak rentals for use within the "Connecting People with Nature" area.
- Strategy D.3.1.8: Consider use of commercial activities including commercial filming, weddings, photography, and wildlife observation tours.
- Strategy D.3.1.9: Prohibit hunting within the "Connecting People with Nature Area" unless connected to a specific education program.

- Objective D.3.2: Establish a defined area outside Bluff and Loakfoma lakes to serve as the "Experiencing Nature" area for public users requiring little to no support and no developed amenities.
  - Strategy D.3.2.1: Limit recreational bicycling to roads open to motorized vehicles and trails specifically designated for bicycle use.
  - Strategy D.3.2.2: Discontinue maintenance of the Wilderness Trail and Craig Pond Trail.
  - Strategy D.3.2.3: Encourage exploration through cultural and historical plaque system.

Sub-Goal D.4 - Interpretation
Ensure the refuge is welcoming and visitors are provided with clear information that promotes and raises public awareness of the refuge and the Service.

Discussion: Many current visitors using the refuge's picnic area, boardwalks, trails, and observation towers are unaware of the fact they are visiting a national wildlife refuge. This is a crisis of identity for the refuge. As visitation grows, the refuge must find a way to connect the mission of the Service to the areas used by visitors.

- Objective D.4.1: Maintain refuge signs at or above current standards as stated in refuge sign manual.
  - Strategy D.4.1.1: Encourage greater volunteer involvement in maintainace of refuge assets.
- Objective D.4.2: Establish interpretive signage throughout the "Connecting People with Nature" area.
  - Strategy D.4.2.1: Identify key use and gathering locations for the visiting public.
  - Strategy D.4.2.2: Develop information kiosks best suited for informing and educating based on the use occurring within the location.

Sub-Goal D.5 - Environmental Education
Promote and utilize the Larry Box Environmental Education Center (EE Center) and other refuge resources to expand and enhance environmental education opportunities.

Discussion: The EE Center is a partnership between the refuge and the Starkville School District. It serves as a great way to connect children and young adults to nature. Only phase one of three phases of the project has been completed. When fully completed, the EE Center will be a self-sustaining facility to provide food, lodging, and support staff. Currently, only Starkville School District classes are able to use the EE Center at no cost. Other school districts must pay $5 per student for use of the facility. Although the EE Center is owned by the Federal Government, it is maintained by the Starkville School District. The minimal fee is used to help purchase supplies furnished by the Starkville School District when students come to visit. If a school has never been to the EE Center, then the $5 fee/student is waived, hopefully increasing interest.

- Objective D.5.1: Through a continued partnership and coordination with Starkville School District, MSU, and other educational groups, the refuge will continue to facilitate environmental education programs at the EE Center along with coordinated use of the refuge's visitor center and other refuge facilities.
    - Strategy D.5.1.1: Support wildlife-based educational activities and curriculum through the EE Center while following state and national core curriculums for elementary, middle, high school, and college students.
    - Strategy D.5.1.2: Develop better signage to keep the general public from interfering with classes.
    - Strategy D.5.1.3: Seek alternative funding and support opportunities for the EE Center to support higher levels of participation by both schools inside and outside the Starkville School District.
- Objective D.5.2: Review and update the agreement with Starkville School District.
    - Strategy D.5.2.1: Promote the usage of the EE Center for environmental education and educationally based meetings.
    - Strategy D.5.2.2: Ensure there is no unauthorized access to the EE Center and Douglas Bluff environmental education zones.
    - Strategy D.5.2.3: Encourage greater active involvement of other area school systems.

Sub-Goal D.6 - Public Access
Manage public access to provide a safe human experience in an environmentally appropriate manner to support wildlife-dependent priority public uses while ensuring uses are compatible with the refuge purposes.

Discussion: It is the refuge's goal to provide quality public services. Budget funding allocations and staffing are insufficient to increase amenities or in some cases maintain current amenities. Alternative funding and changes to management must be considered to maintain current levels of visitor safety, opportunities, access, services, and facilities. For example, while maintaining access for visitors throughout the refuge, entry into the refuge may be restricted to Bluff Lake Road and Dummy Line Road. Visitors will be able to access areas of the southern portion of the refuge through interior roads from Dummy Line Road.

- Objective D.6.1: Maintain at least seven kiosks in all areas where public users gather.
    - Strategy D.6.1.1: Maintain sufficient kiosks at major refuge access points for public use.
    - Strategy D.6.1.2: Develop online virtual kiosks for visitors.
- Objective D.6.2: Allow public to only use those roads needed to support public use programs while ensuring public safety.
    - Strategy D.6.2.1: Establish limited number of key entry roads into the refuge at the following locations: refuge boundary at Bluff Lake Road near Logan Road, refuge boundary at Bluff Lake Road near Ross Branch Reservoir, the intersection of Singleton and Dummy Line Roads, and Loakfoma Road at the Morgan Hill Refuge Boundary.
    - Strategy D.6.2.2: Establish speed control measures to ensure public safety in "Connecting People with Nature" area.
- Objective D.6.3: Maintain visible refuge boundary markers and signs.
    - Strategy D.6.3.1: Routinely check and replace boundary paint and signs.
    - Strategy D.6.3.2: Use geographic information systems and GPS to map and manage realty features.
- Objective D.6.4: Continue to update and enforce refuge regulations according to the Code of Federal Regulations (CFR).
    - Strategy D.6.4.1: Update refuge public use information, reflecting yearly changes.
    - Strategy D.6.4.2: Review and update the CFR to properly inform refuge users and protect refuge resources.
- Objective D.6.5: Establish a public use fee providing exemptions to private inholding landowners and partners (cooperating organizations). (Footnote: The Service will not collect fees from any person under 16 years of age; any person engaged in a non-recreational activity authorized under a valid permit issued by the refuge, such as landowners using private inholdings, commercial agriculture, etc., Service-authorized

research activities; or federal, state, and tribal business or outings conducted for non-commercial educational purposes by schools or academic institutions).

- Strategy D.6.5.1: Establish a public use fee for all users.
- Strategy D.6.5.2: Maintain quota hunt fees for deer and waterfowl.
- Strategy D.6.5.3: Maintain a special event permit fee.

Sub-Goal D.7 - Outreach
Provide outreach opportunities that promote an understanding and appreciation of fish, wildlife, habitat conservation, and the mission of the Refuge System.

Discussion: The use of social media has gained popularity in recent years. It is our goal to offer more quality information to this new age of technology-savvy visitors. Using this new technology to promote our "Wildlife First" mission will increase awareness to many new user groups.

- Objective D.7.1: By 2015, redesign refuge web page for ease of access and use.
  - Strategy D.7.1.1: Follow Department of the Interior and Service standards in development of web page.
  - Strategy D.7.1.2: Incorporate video and other features to encourage use by the general public.
- Objective D.7.2: Participate in community development activities such as the Chamber of Commerce and Rotary Club.
  - Strategy D.7.2.1: Reestablish chamber of commerce memberships in all three counties within refuge boundary.
  - Strategy D.7.2.2: Provide public talks and presentations.
- Objective D.7.3: By 2016, update and distribute information including general, trail, hunting, fishing, and public use information.
  - Strategy D.7.3.1: Conduct yearly review of information.
  - Strategy D.7.3.2: Move toward providing greater amounts of information electronically instead of the traditional paper products.
  - Strategy D.7.3.3: Use social media to reach out to and inform the public of refuge happenings.

Sub-Goal D.8 - Open Lands
Manage abandoned agricultural open field areas to the community type most suitable for meeting the refuge goals and objectives.

Discussion: Management for the endangered red-cockaded woodpecker takes priority over all other species within areas where historic forest conditions correspond to pine-dominated stands. Old fields on the refuge will be prioritized and converted to forest for future RCW habitat, if the field falls within current RCW foraging areas or proposed RCW recruitment areas. Fields located within areas designated for RCW management may be reforested to shortleaf, longleaf, and/or loblolly pine through replanting or natural regeneration. The preparation could consist of mechanical or chemical treatments and prescribed fire, to prepare the seedbed for optimal planting conditions. This will provide future habitat for RCWs, reduce fragmentation, and create diversity. Once these fields are converted to pine forests, they will be managed according to RCW recovery plan standards (GQFH) when applicable.
Areas outside of those designated will be maintained in grasslands to benefit pollinators and other native wildlife. Prairies, old fields, and roadsides provide essential habitat for pollinators, which help pollinate over 75 percent of our flowering plants, and nearly 75 percent of our crops. Many pollinators, like honey bees, have shown declines in recent years. Declines in pollinators may cause plants to go extinct, reduce food sources for both wildlife and humans, and decrease biodiversity. The main threats facing pollinators are habitat loss, degradation, and fragmentation (Mississippi Museum of Natural Science 2005).

- Objective D.8.1: Manage existing open fields for forested habitat when that is the best use of the land.
    - Strategy D.8.1.1: Replant or allow natural succession of trees into fields needed for the management of forest breeding birds or RCW.
- Objective D.8.2: Manage existing open fields as fields when not needed for management of forest breeding birds or RCW.
    - Strategy D.8.2:1: Manage existing open fields within the Keaton Tower area for grassland songbirds and other native wildlife.
    - Strategy D.8.2.2: Manage up to 30 acres at Goose Overlook Field of non-native grasses for winter wildlife foraging as part of Public Use Program.
    - Strategy D.8.2.3: Maintain 31 acres of the Prairie Demonstration Area (Morgan Hill) as a Blackbelt Prairie Demonstration Area and regenerate the remaining acres into a mixed pine habitat to supplement RCW habitat in that area.

REFUGE ADMINISTRATION

Goal E. Refuge Administration
Provide sufficient leadership, staffing, information, and infrastructure to manage and protect migratory and native wildlife populations and their habitats, cultural resources, and compatible public uses that contribute to the purposes for which the refuge was established, as well as the mission of the National Wildlife Refuge System.

Discussion: Implementation of this CCP will depend on sufficient resources to follow through on objectives and strategies to accomplish the five goals. Resources include staff, equipment, facilities, and funds. Staff may come in the form of a paid professional staff or volunteers. Partnerships may be used to meet needs for staffing and funding. The refuge has an existing partnership with the Friends of Noxubee Refuge (Friends Group), a 501c3 non-profit organization that is designed to help the refuge

through advocacy, fundraising, and volunteer work. Friend members support refuge activities and events, increase awareness of the refuge, educate the public about the Service's mission and increase fundraising. The Friends Group promotes and enhances the integrity of the refuge through activities that advance public understanding, awareness, appreciation, and enjoyment of the natural environment. The refuge currently possesses a wide range of equipment necessary to support refuge activities, including passenger vehicles, agricultural equipment, and heavy equipment. Building facilities include a maintenance shop, equipment repair shop, four housing units, three resident volunteer recreational vehicle pads, three vehicle storage sheds, a fire cache, a volunteer coordination center, a satellite office building, a Visitor Center and a public restroom facility.

Sub-Goal E.1 - Operations and Maintenance

Maintain quality programs, facilities, and infrastructure along with a highly skilled and trained professional staff.

Discussion: Each man-made feature on the refuge that requires operation and maintenance is considered an asset within the Service Asset and Maintenance Management System (SAMMS). At the current time the refuge has 308 assets listed within this system, with a total replacement cost of approximately $140 million. Annual maintenance costs are estimated at approximately $485,000. In Fiscal Year 2013, the refuge received $166,670 (34%) in maintenance funding. At the time of the 2004 CCP, the refuge staff consisted of 17 individuals and proposed at that time to increase the staff by an additional 14 members. In Fiscal Year 2013, the refuge received funding for 11 positions (65%), showing a net loss of 6 positions since the completion of the 2004 CCP. At the current time, there are no immediate expectations of budget increases and instead the refuge may see a budget decrease, with a need for further reduction of staff. Within the life span of this document, however, some level of increase is possible and therefore some optimism is designed into the objectives and strategies. Regardless, priorities will need to be scaled to match the staffing levels, financial conditions, and level of support obtained through use of volunteers and partnerships. Administrative actions tied to the refuge's purposes will be kept in the position of highest priority followed by wildlife-dependent public use activities. Activities that do not support the Improvement Act of 1997 will be terminated.

- Objective E.1.1: Seek alternative funding and cost saving to address underfunded needs of refuge management.
    - Strategy E.1.1.1: Seek partnerships with state and non-governmental organizations.
    - Strategy E.1.1.2: When appropriate, apply for grants.
    - Strategy E.1.1.3: Reduce costs by eliminating public access to water hose connections and limit where needed to administrative uses only.
    - Strategy E.1.1.4: Reduce number of public access roads requiring routine maintenance by limiting pass-through traffic and permanent or seasonal closures of roads not required for use by refuge visitors.
    - Strategy E.1.1.5: Restrict commercial travel through the refuge to local deliveries only.

- Strategy E.1.1.6: Scale and adjust the number of assets (i.e., buildings, roads, levees, trails, and water control structures) requiring maintenance to match funding and staffing levels.
- Strategy E.1.1.7: Scale and adjust hours of operation during which the office and visitor center is open to match funding and staffing levels.
- Strategy E.1.1.8: Construct sufficient equipment storage facilities to provide covered parking for all refuge vehicles and equipment, maximizing lifespan of this equipment.
- Strategy E.1.1.9: Require rehabilitation and maintenance of involved refuge roads as a condition of the logging bid process and associated special use permits.
- Stratagy E.1.1.10: Administrative actions tied to the refuge's purposes will be kept in the position of highest priority followed by wildlife-dependent public use activities. Activities that cannot be considered wildlife-dependent will be terminated.

Objective E.1.2: Maintain sufficient levels of assets and professionally trained staff to conduct duties related to refuge management, and add an additional six full-time positions to the current refuge staff to achieve the refuge goals.

Discussion: Currently, the refuge has 14 positions on the organizational chart consisting of a refuge manager, deputy refuge manager, administrative officer, fire management officer, forester, two forestry technicians, wildlife biologist, biological science technician, park ranger, wildlife officer, and three maintenance workers. The refuge is seeking to restructure existing positions and add four positions for a total of 18 positions.

- Strategy E.1.2.1: Reorganize staff structure to support field activities, continue to seek approval to fill vacancies and add a law enforcement officer (GS-9), three forestry technician/foresters (GS-5/7/9), a wildlife technician (GS-5/7), a maintenance equipment operator (WG-10), a maintenance tractor operator (WG-5), and a maintenance mechanic (WG-10).
- Strategy E.1.2.2: Maintain staff in the following positions: refuge manager, engineering equipment operators, maintenance workers, park rangers, wildlife law enforcement officers, wildlife biologists, foresters, administrative officer, fire management officer, fire forestry technicians, and biological technician.
- Strategy E.1.2.3: Provide opportunities for temporary hires, volunteers, and interns.
- Strategy E.1.2.4: Improve and maintain transportation infrastructure necessary to perform habitat management, resource protection, and compatible public use opportunities.

- Strategy E.1.2.5: Maintain safe and efficient equipment to perform needed refuge operations and maintenance.
- Strategy E.1.2.6: Conduct a Federal Transportation Study on the refuge.

- Objective E.1.3: Support and expand involvement of additional partnerships including The Friends of Noxubee NWR, Inc.
  - Strategy E.1.3.1: Have direct staff involvement with partnership groups.
  - Strategy E.1.3.2: Develop opportunities for involvement in daily refuge management activities.
  - Strategy E.1.3.3: Participate in state and community level disaster preparedness planning.
- Objective E.1.4: Use volunteers (including commuting and resident RV volunteers), and interns to supplement the work of paid professional staff in staffing the visitor center and completing both routine duties and refuge projects.
  - Strategy E.1.4.1: Develop resident volunteer camper pads
  - Strategy E.1.4.2: Develop paid or unpaid volunteer coordinator position.
  - Strategy E.1.5.3: Continue to provide and maintain onsite housing for employees, volunteers, and interns, as well as RV pads for resident RV volunteers.

Sub-Goal E.2 - Science and Research
Continue to support and explore greater opportunities to expand on existing baseline information through monitoring and reconnaissance and practice adaptive management to support the purposes for which the refuge was established.

Discussion: Since the land was originally obtained from private landowners starting in 1935 and continuing with the establishment of the Noxubee NWR in 1940, the land both within and outside of the refuge has undergone change. Areas outside the refuge's boundaries have impact on habitat conditions within the refuge. Reasons for changes in waterfowl numbers on the refuge is but one example of both local and landscape impacts. It is the goal that all management directed toward meeting the purposes for which the refuge was established be based on the best available science. Although the refuge has highly educated and trained professionals on its staff, much of their time is spent on the implementation of management actions and the monitoring of outcomes from these actions. The refuge is highly dependent on partners, independent researchers, and university staff for conducting research to improve on those methods and to better understand the refuge's impacts within the greater landscape. When scientific activities are conducted on the refuge by non-Service professionals, regulations require a refuge special use permit be issued by the refuge manager. The priority for issuing of these permits will be to those projects that have a direct tie to the refuge's purposes and management activities and help improve the understanding of the refuge's impact within the greater landscape.

- Objective E.2.1: Partner with MSU and other educational institutions to develop a science program that provides high-quality, scientific-based knowledge for use in making management decisions and developing and training upcoming professionals.
    - Strategy E.2.1.1: Encourage use of the refuge for research and educational activities.
    - Strategy E.2.1.2: Participate in university and school activities.
- Objective E.2.2: Work within the Gulf Coastal Plain and Ozark Landscape Conservation Cooperative to support conservation at both the refuge and landscape scales.
    - Strategy E.2.2.1: Provide staff to serve on planning and development teams.
    - Strategy E.2.2.2: Maintain active participation in cooperative activities.
- Objective E.2.3: Work within the East Gulf Coastal Plain Joint Venture to support conservation at both the refuge and landscape scale.
    - Strategy E.2.3.1: Provide staff to serve on planning and development teams.
    - Strategy E.2.3.2: Maintain active participation in cooperative activities.
- Objective E.2.4: Work with citizen scientists, schools, and non-governmental organizations (e.g., Audubon Society) in development of baseline information.
    - Strategy E.2.4.1: Attend local group meetings.
    - Strategy E.2.4.2: Solicit involvement in refuge management activities.
- Objective E.2.5: Where appropriate, adopt standardized biological monitoring protocols to contribute data to population assessments beyond the refuge scale, and develop standardized site-specific protocols where none exist.
    - Strategy E.2.5.1: Work with the Refuge System Inventorying and Monitoring Program staff to develop protocols.
    - Strategy E.2.5.2: Develop Inventorying and Monitoring Plan (Policy 701 FW 2).
- Objective E.2.6: Focus and prioritize biological research and monitoring on those activities that have relevance to ongoing management activities.
    - Strategy E.2.6.1: Develop Inventorying and Monitoring Plan (Policy 701 FW 2).
- Objective E.2.7: Develop/sustain a close collaborative conservation relationship with the USDA Forest Service and adjacent Tombigbee National Forest to facilitate a greater conservation footprint in the landscape.
    - Strategy E.2.7.1: Meet with USDA Forest Service officials to seek areas of collaboration.

- Objective E.2.8: Plan and research changes in phenology, shifting distributions of invasive species, potential altered hydrology, water temperature, and other factors that could affect the resources of the refuge due to climate change.
    - Strategy E.2.8.1: Encourage climate change research and monitoring projects.
    - Strategy E.2.8.2: Encourage baseline monitoring.

Sub-Goal E.3 - Law Enforcement
Provide law enforcement for visitor safety, protection of resources, and to ensure public compliance with refuge regulations.

Discussion: During Fiscal Year 2013, the refuge received approximately 160,000 visitors including hunters, anglers, and wildlife observers. Among these visitors were residents of almost every state and seven international countries. The majority of the refuge users is local citizens who either live or work within a reasonable driving distance of the refuge. The refuge uses various methods, including signs, pamphlets, and staff, to ensure visitor safety and protect the refuge's natural and cultural resources. The 48,219-acre refuge has one law enforcement officer, but receives assistance by officers with the Mississippi Department of Wildlife, Fisheries and Parks. Unfortunately, vandalism, theft, and resource damage do occur on a routine basis, with recorded impacts often totaling more than $50,000 yearly in repair and replacement costs and diversion of staff time from duties related to the refuge's purposes.

- Objective E.3.1: Maintain at least one full-time and seek additional wildlife law enforcement officer as members of the permanent refuge staff.
    - Strategy E.3.1.1: Maintain one federal wildlife officer, GL-1801-07/09.
    - Strategy E.3.1.2: Maintain one federal wildlife officer, GL-1801-07.
- Objective E.3.2: Maintain closure of refuge lands to public use (not including activities covered by special use permits) at night except for those activities related to night-time raccoon hunting.
    - Strategy E.3.2.1: Close refuge to general use from one hour after sunset to one hour before sunrise.
    - Strategy E.3.2.2: Develop gate closure system to enforce night-time closure.
- Objective E.3.3: In addition to any required state or federal permits or licenses, all users must possess the refuge Hunting, Fishing, and Public Use brochure and receipt for public use when on the refuge.
    - Strategy E.3.3.1: Develop electronic hunter permit system for quota hunts.
    - Strategy E.3.3.2: Provide access to updated brochures through electronic formats.
- Objective E.3.4: Maintain programmable radio communications for regular operations and emergency communications with local, county, and state agencies.

- Strategy E.3.4.1: Ensure each staff has access to radio communication when working in the field.
- Strategy E.3.4.2: Ensure each law enforcement staff has equipment needed to effectively communicate during times of emergency.

- Objective E.3.5: Continue to partner with local and state law enforcement agencies.
  - Strategy E.3.5.1: Participate in state planning meetings
  - Strategy E.3.5.2: Maintain relations and, if needed, develop agreements to allow effective use of state law enforcement officers on the refuge.

Sub-Goal E.4 - Levees, Roads, and Rights-of-way
Manage all levees, roads, and rights-of-way without jeopardizing the infrastructure's condition, designed function, and minimally impacting wildlife resources.

Discussion: Refuge levees, roads, and rights-of-way were established to assist the staff in meeting the purposes for which the refuge was established. The levees were created to impound or redirect water. Roads and rights-of-way were created to allow access to refuge lands for habitat management and biological monitoring. In many cases these assets also serve the secondary purpose of providing public access. Each asset type must be maintained to ensure its longevity and function. Maintenance often provides the additional benefit of protecting the environment from undesirable impacts such as siltation into nearby streams. These assets can additionally become desirable areas to wildlife because of their early successional habitat (i.e., grasses and herbaceous flowers). Wildlife, including insects, deer, and turkey, are drawn to these areas when roadsides are allowed to grow up with wild appearance. Alternatively, undesirable wildlife, such as cowbirds, a bird that practices nest parasitism, may be drawn to these habitats when vegetation is kept well-groomed. Controlling the amount of use by vehicles and other types of transportation is also important as roads, levees, and rights-of-way are often introduction points for invasive and exotic species.

- Objective E.4.1: Manage and, if needed, reduce road infrastructure to the level supported by both maintenance funding and staffing levels that maintains individual roads in good condition.
  - Strategy E.4.1.1: Adopt U.S. Department of Transportation, Federal Highway Administration, Graveled Roads - Maintenance and Design Manual - November 2000 as guide for maintenance of refuge graveled roads.
  - Strategy E.4.1.2: Adaptively manage vehicular traffic to ensure refuge roads continue to serve refuge administrative and public use needs by restricting commercial and non-visitor traffic and other forms of transportation that can lead to the introduction of exotics and increased maintenance costs.
  - Strategy E.4.1.3: Maintain levees through mechanical, chemical, and prescribed fire to ensure integrity and function of the structure.

- Strategy E.4.1.4: Where possible, manage rights-of-way for the benefit of wildlife.

- Objective E.4.2: Work with local governments to support the development of improved access to the refuge when appropriate and compatible.

  - Strategy E.4.2.1: Support development of Noxubee Hills Scenic Byway.

  - Strategy E.4.2.2: Develop legal agreement to allow sharing of resources when appropriate.

Sub-Goal E.5 - Research Natural Areas
Eliminate the designation of Research Natural Areas and incorporate "Old Robinson Road Research Natural Area," (consisting of an estimated 46 acres) and the "Morgan Hill Research Natural Area" (consisting of an estimated 67 acres) into surrounding management units.

Discussion: Research natural areas were identified to be protected and preserved for research and education. Due to management required to maintain the areas, they did not meet the criteria as research natural areas.

- Objective E.5.1: By 2015, discontinue the recognition of research natural areas.

Sub-Goal E.6 - Habitat Conditions
Manage refuge habitats to reflect historic conditions in accordance with Service policy.

Discussion: The refuge would strive to manage habitats for historic conditions and if necessary under changing climatic conditions would provide the most stable habitat for those native species that would most likely flourish.

- Objective E.6.1: Promote habitat types more reflective of historic forest conditions.

  - Strategy E.6.1.1: Conduct analysis of historic habitat conditions on the refuge.

  - Strategy E.6.1.2: Encourage research to determine and refine characteristics of historic habitat.

- Objective E.6.2: When necessary, use active forest management to reestablish conditions reflective of historic forest conditions.

  - Strategy E.6.2.1: Develop Habitat Management Plan.

V. Plan Implementation

INTRODUCTION

Refuge lands are managed as defined under the National Wildlife Refuge System Improvement Act of 1997. Congress has distinguished a clear legislative mission of wildlife conservation for all national wildlife refuges. National wildlife refuges, unlike other public lands, are dedicated to the conservation of the Nation's fish and wildlife resources and wildlife-dependent recreational uses. Priority projects emphasize the protection and enhancement of fish and wildlife species first and foremost, but considerable emphasis is placed on balancing the needs and demands for wildlife-dependent recreation and environmental education.

To accomplish the purpose, vision, goals, and objectives contained in this Draft CCP for the refuge, this section identifies projects, funding and personnel needs, volunteers, partnership opportunities, step-down management plans, a monitoring and adaptive management plan, and plan reviews and revisions.

PROPOSED PROJECTS

Listed below are the proposed project summaries and their associated costs for fish and wildlife population management, habitat management, resource protection, visitor services, and refuge administration over the next 15 years. This proposed project list reflects the priority needs identified by the public, planning team, and refuge staff based upon available information. These projects were generated for the purpose of achieving the refuge's objectives and strategies. The primary linkages of these projects to those planning elements are identified in each summary (Table 7).

FISH AND WILDLIFE POPULATION AND HABITAT MANAGEMENT

Project 1. Participate in objective based monitoring programs, data collection and reconnaissance in concert with national protocol and procedures.

> The refuge will coordinate with the Inventorying and Monitoring Network and incorporate efforts by partners and volunteers to expand on baseline data to help reach the goals for which the refuge was established. The refuge has highly educated and trained professionals on its staff; much of their time is spent on the implementation of management actions and monitoring and conducting reconnaissance of outcomes from these actions. Independent and university researchers conduct significant research on the refuge, and the refuge's special use permit process helps ensure these efforts improve understanding of the refuge's impacts within the greater landscape. Specific projects that will receive priority efforts include, but not limited to, monitoring paddlefish, investigating red-cockaded woodpecker population dynamics, monitoring to improve sustainability of fisheries within the lakes, waterfowl monitoring, and resident and migratory wildlife population monitoring, including bat species. Also included are floristic inventorying, forest habitat inventorying and monitoring, forest health monitoring, and water quality monitoring.

Linkage Objectives: A.1.1-A.8.3, D.5.1-2, E.2.1-E.2.7

Project 2. Suppress, control, monitor, and implement procedures to minimize spread of nuisance, exotic, and invasive plant and animal species.

A basic tenant of the Improvement Act is management for biological diversity and integrity. The refuge has several documented native and nonnative invasive, exotic, and nuisance animal species and a high likelihood of free-ranging feral animals. These species impact the refuge's ability to carry out desired management objectives to varying degrees. Some of the specific projects include bark beetle monitoring, beaver dam removal, beaver trapping, control of American Lotus within refuge wetlands, control of hardwoods within areas managed for RCWs, and removal of exotic plants, including, but not limited to, cogon grass, Japanese climbing fern, and bicolor lespedeza.

Objectives: A.6.6, A.8.1-3, E.1.2, E.2.1-8

Project 3. Fire Management Program – Fire Lines

Prescribed fire is a critical management tool for habitat management and the control of early successional woody vegetation within pine stands used by RCWs. Fire lines are the primary method for protecting adjacent habitats from fire and give the ability to better control prescribed fire units. Two of the specific projects include establishing new fire lines around the pine regeneration areas essential for successful stand replacement and establishing fire lines around riparian and cultural sites that could be harmed by fire.

Objectives: B.1.1-3, B.2, C.2.1, C.5.1, E.1.2

Project 4. Hydrologic Monitoring and Restoration – Restoration of Fish Passage

The hydrology of the refuge has been manipulated and changed since the refuge was established. Large hydrologic changes were created during the establishment of the refuge's lakes and GTRs. Due to changes both in and outside the refuge, water quality has suffered. Restoration and adjustments in management should continue to improve habitat for fish and other aquatic life when practiced under a balanced approach with other refuge resources. Some of the specific projects include improving the hydrologic connection for fish passage between rivers and man-made water-bodies, including Bluff and Loakfoma lakes and the GTRs.

Objectives: A.7.1-A.7.5, B.2, B.3.1-3, E.1.2

Project 4a. Hydrologic Monitoring and Restoration – Restoration of Woodland Water Flow

The hydrology of the refuge has been manipulated and changed since the refuge was established. Smaller changes have occurred when springs and wetlands were manipulated to provide drinking water or for the development of roads and trails. Some of the specific projects include repair of low water crossings on Robinson and Goose Pen Roads and establishing low water crossings on Dummy Line, Section Line, and Williams Roads to improve hydrological functions in these areas.

Objectives: A.8.1, B.2.1-2, B.3.1-3, E.1.1-2

Project 4b. Hydrologic Monitoring and Restoration – Removal of Obsolete Structures

The hydrology of the refuge has been manipulated and changed since the refuge was established, often under the goal of providing habitat for waterfowl. Many moist-soil areas established under this goal have since been abandoned with local declines in wintering waterfowl numbers. Targeted sites for restoration are in areas needed by RCWs. Returning these sites to their natural hydrology would encourage establishment of better foraging habitat for these birds. Specific projects include but not limited to the removal of levees and water control structures for all fields immediately west of Loakfoma Lake, areas within the Smith Fields, and northern levee of GTR-3 south of the Noxubee Wilderness Area.

Objectives: A.8.1-3, B.2.1-2, B.3.1-3, E.1.1-2

Project 5. Creation of Artificial Bat Roost

In association with restoration of the man-made borrow pit located near Bevill's Hill, the refuge will investigate the concept of creating one or more artificial bat roosts constructed from precast concrete culvert pipes. The refuge will work with biologists and other scientists familiar with the needs of and threats to resident bats.

Objectives: *A.6.3, B.2.1, E.1.1-2, E.2.1-8*

RESOURCE PROTECTION

Project 6. Land Acquisition

The refuge will rank and attempt to acquire all existing private lands within the acquisition boundary from willing sellers. Land swap should be considered to exchange existing low priority fee-title lands for high-priority inholdings.

Objectives: C.3.1, E.1.2

Project 7. Cultural Resource Surveys

Systematic inventories should be conducted at the necessary level of intensity to adequately document the nature, extent, and condition of significant cultural resources. Refuge staff will work with the Service Archaeologist, SHPO, and tribes to assign priorities for systematic surveys. At the earliest possible time during the planning of a particular activity, it is necessary to determine what steps and levels of funding are necessary to comply with the inventory, evaluation, and mitigation procedures addressed in 36 CFR 800. Funding will be sought for a refuge-wide archaeological survey and site specific surveys will continue to address priority projects.

Objectives: C.1.1-5, E.1.2

VISITOR SERVICES

Project 8. Managing Public Uses – "Connecting People with Nature" area

The refuge would establish two zones of public use areas by creating the "Connecting People with Nature" area located in the areas around Bluff and Loakfoma lakes and an "Experiencing

Nature" area located over the remaining area of the refuge. The creation of these areas would encourage recreational opportunities that remain compatible with the purposes for which the refuge was established and the mission of the Service. Within the "Connecting People with Nature" area, specific projects would include the creation of a 6-mile loop trail system. The initial segment would include a paved walkway from the improved Bluff Lake boat ramp to the Smith Fields. The trail would run along the shoreline of Bluff Lake, intersect the Cypress Cove Boardwalk, and follow the existing fire line past the Woodpecker Trail (~3 miles), intersecting with the Goose Overlook. The trail would leave the Goose Overlook and run along the north side of Bluff Lake Road until crossing onto the Smith Field Road. An equal or lesser developed trail would then follow the Smith Field Road south, joining with an existing fire line toward Loakfoma Creek. A new trail would be created along the north side of Loakfoma Creek until reaching Ewing Road. Following Ewing Road south until reaching the refuge boundary at Loakfoma Lake, a new trail would be created along the southern end of the lake and then turn northward returning visitors to the improved Bluff Lake boat ramp. This new trail would include a spur trail leading back along the west side of Loakfoma Lake. This new trail system would allow wildlife observation by way of both walking and bicycling. The undeveloped boat ramp into Bluff Lake north of Doyle's Arm would be eliminated.

There would also be improvements to existing facilities including an extension made to the deck at the back of Visitor's Center to provide a floating dock. The existing Beaver Dam Trail would be improved to include a loop along the River Road. This new trail loop would measure approximately 4.5 miles. The handicapped access on Loakfoma fishing jetty and ramp would be improved along with the Morgan Hill parking area and trail. Possible expansion would be made to the parking areas along Bluff Lake Road at Doyle's Arm and other locations along the road. Improvement to the special event youth fishing ponds would continue, with installation of benches and pavilions. Access to the west of Bluff Lake for improved wildlife observation would include establishment of a new bypass trail between Loakfoma Road and Ewing Road, thus avoiding wildlife disturbance at the Goose Overlook fields. Up to three, no water, composting vault public restrooms would be made available along the improved trails.

Objectives: D.1.1-8, D.2.1-4, D.3.1-2, D.4.1-2, D.5.1-2, D.6.1-5, E.1.1-2

Project 9. Improved fishing access at Ross Branch Reservoir

Ross Branch Reservoir offers an isolated lake fishing experience that may be well-suited toward handicapped anglers requiring a greater level of infrastructure. The current parking area, dock, and ramp would be improved to provide wheeled chair access through construction of modern floating dock and concrete access ramp.

Objectives: *D.2.4, E.1.2*

Project 10. Improved Public Information Stations

Additional refuge kiosks and hunter check stations will be created throughout the refuge. These stations will be placed at key refuge entry points and distributed at convenient locations within the refuge for users.

Objectives: D.1.2, D.1.7, D.4.1-2, D.7.1-3, E.1.1-2

Project 11. Improve Vehicle Traffic Flow for Wildlife

The refuge will create controlled access points allowing for public access but limiting use of refuge roads by pass-through commuter traffic. Refuge entry points will be located at the following areas: both ends of Bluff Lake Road, Brookville Road near the refuge boundary at Morgan Hill, Dummy Line Road and Singleton Road, Clearman Road, Ross Branch Road, Roberts Road, Bevill's Hill Road, White Road, Keaton Tower Road, and Cedar Grove Road. All other roads will be continued to be maintained as administrative access only. Gates will be used to control access at all other refuge-maintained road entry points. Speeds on refuge roads will also be limited to 25 miles per hour unless otherwise posted. Speed control measures may be used to address site-specific vehicle speeding issues.

Objectives: D.1.7, E.1.2

REFUGE ADMINISTRATION

Project 12. Refuge Management Projects – Real Property Assets

Each man-made feature on the refuge that requires operation and maintenance is considered a Real Property Asset within the Service Asset and Maintenance Management System (SAMMS). At the current time, the refuge has 308 assets listed within this system with a total replacement cost of approximately $140 million. Annual maintenance costs are estimated at approximately $485,000. In Fiscal Year 2013, the refuge received $166,670 in maintenance funding. This limited funding will be utilized for priority maintenance and improvements. Refuge assets will be prioritized and maintained, favoring those tied to the purposes for which the refuge was established and then those that support public uses.

Objectives: E.1.1-2

Project 13. Refuge Management Projects – New Projects

In addition to recognized maintenance needs, additional refuge management projects will be addressed including reclamation of an existing borrow pit located near Bluff Lake Road and Bevils Hill Road, creation of a second large equipment shed to provide adequate covered storage for vehicles, farm tractors and heavy equipment, and installing security fencing and gates to protect all facilities (Note: This new project would be covered under additional NEPA documentation and process if needed).

Objectives: E.1.1-2

Project 14. Refuge Management Projects – Control of Feral Hogs

Feral hogs have recently begun to populate portions of the refuge. These hogs have a potential to multiply and spread at an alarming rate if not controlled. Feral hogs tend to out-compete native wildlife for critical food resources and are known to cause the predation of ground-nesting birds. Additionally, feral hogs carry diseases that can be spread to both humans and domestic livestock. This project would employ temporary seasonal technicians to conduct feral hog control activities. The refuge would also work with the USDA to control hogs on the refuge. This effort would need to occur as soon as possible before feral hog populations reach uncontrollable levels and distribution.

Objectives: A.8.1, A.8.3, E.1.1

Project 15. Refuge Management Projects – Removal of two current employee housing buildings and replace with a new bunkhouse of similar square footage.

Providing housing for interns, long-term volunteers, and visiting staff and researchers helps ensure personnel safety and facilitates the gathering of quality data and completion of high-priority projects. Current housing was constructed in the 1960s. New housing would offer higher efficiency, compliance with ADA requirements, and lower maintenance costs. One house would remain as potential housing for new permanent employees.

Objectives: E.1.1-2

Table 7. Summary of Projects

#	PROJECT TITLE	FIRST YEAR COST	RECURRING ANNUAL COST	ADDITIONAL STAFF FTE'S
1	Science-based Inventorying and monitoring of wildlife Populations a. Improve Halbert Lake for paddlefish b. RCW monitoring c. Fisheries monitoring d. Water quality monitoring e. Hunt program population monitoring f. Floristic inventorying g. Forest habitat monitoring h. Waterfowl monitoring	470,000	320,000	(4) GS- 5/7
2	Suppress and control, develop maps to depict infestations, and implement procedures to minimize spread of nuisance, exotic, and invasive plant and animal species. a. Bark beetle surveys b. Removing beaver dams c. Trapping beavers d. Trapping feral hogs e. Removal of up to 60% of American Lotus	35,000	35,000	

3	Fire Management Program – Operations (new fire lines around regeneration areas)	30,000	30,000	
4	Hydrologic Monitoring and Restoration a. Repair low water crossings on Robinson Road levee b. Improve hydrologic connection between water control pool and spillway c. Restore natural hydrology on Corn Field moist-soil area and Smith Fields	100,000	1.3 M	
5	Creation of Artificial Bat Roost	100,000	1,000	
6	Land Acquisition	30,000,000		
7	Cultural Resource Surveys	200,000	45,000	
8	"Connecting People With Nature Area" a. Paved walkway from boat ramp to Smith fields past woodpecker trail (~3 miles) b. Eliminating boat gravel boat ramp at Doyle's Arm to provide additional parking area c. Loakfoma spillway additional parking d. Extend deck in the back of Visitors Center and provide a floating boat ramp e. Redesign spillway and bridge f. Create biking trail River Road to Beaver Dam Trail (~4.5 miles)	2,950,500	180,000	(1) WG-8

	g. Improve access on Loakfoma fishing jetty and ramp h. Redesign Morgan Hill parking area i. Improve fishing ponds area j. Create improved walkway/bikeway between k. Loakfoma Road and Ewing Road l. Create bypass trail around Goose Overlook m. Improve Beaver Dam Trail entrance n. Provide three vault public restrooms in place of old facilities and new areas			
9	Improved fishing access at Ross Branch Reservoir	30,000	500	
10	Improved Public Information Stations a. Create additional check stations b. Create additional kiosks	130,000		
11	Improved Traffic Flow	50,000	10,000	
	Refuge Management Projects a. Reclamation of gravel pit b. Create new pole barn c. Install fencing and gates to protect facilities and resources d. Create low water crossings in lieu of ineffective culverts e. Demolition of current housing and construction of new bunk house	2.1 M	10,000	

12	Refuge Management Projects – Real Property Assets	485,000	485,000	(1) WG-4
13	Refuge Management Projects – New Projects	300,000		
14	Refuge Management Projects – Control of Feral Hogs	100,000	100,000	(1) GS-5
15	Refuge Management Projects – Removal of two current employee housing buildings and replace with a new bunkhouse of similar square footage	1,500,000	1,000	
16	Create deep water habitat and new cypress islands within Bluff Lake	200,000		

In the preceding chapters, this Draft CCP for the refuge has set forth a vision for the refuge and outlined the management goals, objectives, and strategies needed to realize that vision. Full implementation of the vision will require additions to the organizational structure of the refuge above the 11 current employees. Existing staff will intensify their efforts and new staff members will enable the refuge to expand its wildlife and habitat conservation, resource protection, enforcement, and public education and outreach endeavors. The following table and organizational chart identifies the additional positions and future structure of the refuge (Table 8).

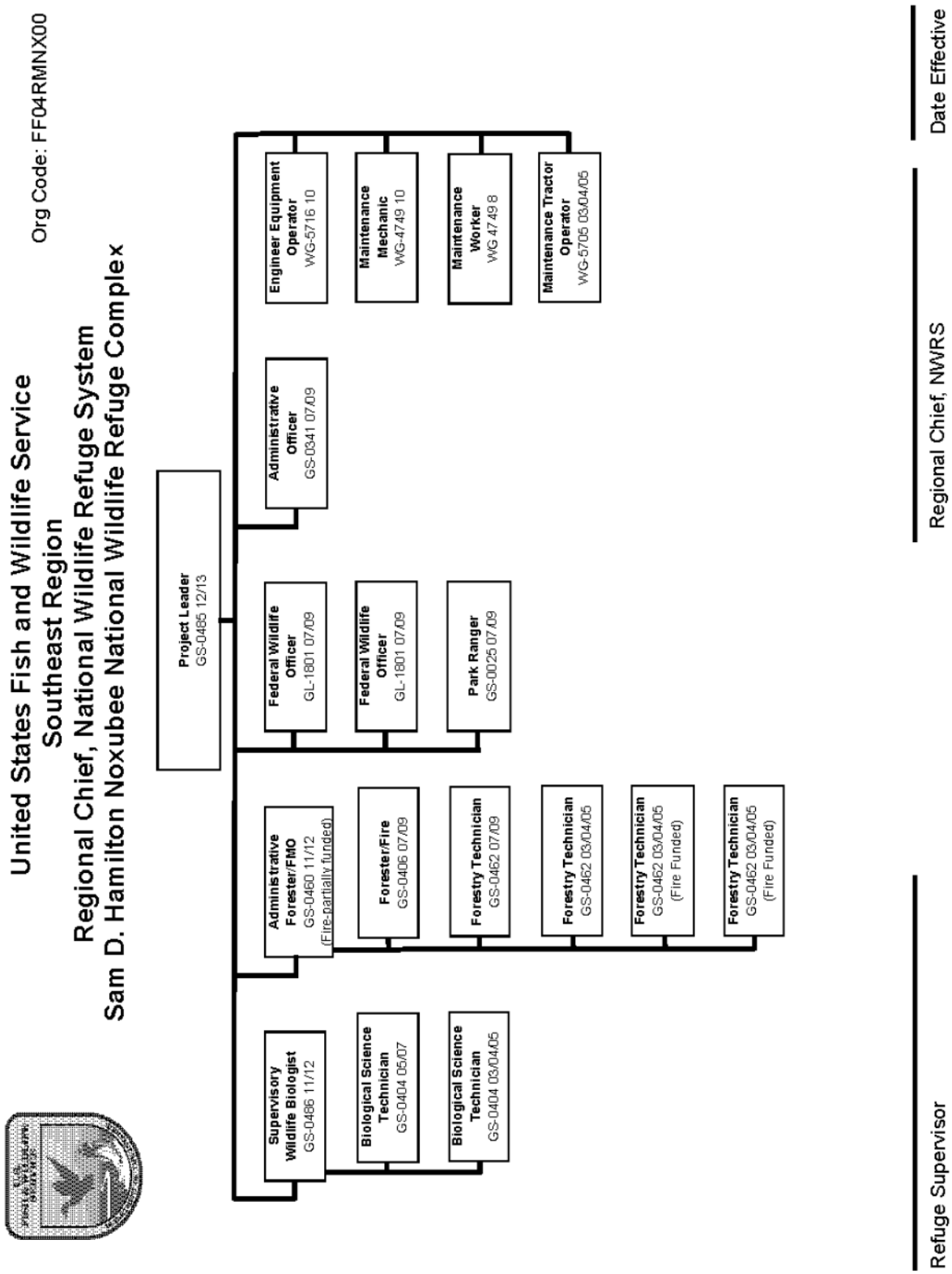

Figure 13. Sam D. Hamilton Noxubee NWR Complex Organizational Chart 2013

Table 8. Additional new personnel identified to implement the CCP for Sam D. Hamilton Noxubee NWR

Position Title	Grade	Funding Required
Law Enforcement Officer	GS- 9	$62,297
Forestry Technician/Forester	(3) GS- 5/7/9	$186,891
Wildlife Technician	GS- 5/7	$41,122
Engineering Equipment Operator	WG-10	$45,288
Maintenance Tractor Operator	WG-5	$34,498
Maintenance Mechanic	WG- 10	$45,288

PARTNERSHIP/VOLUNTEER OPPORTUNITIES

A key element of this Draft CCP is to establish and strengthen partnerships with local volunteers, landowners, private organizations, non-governmental organizations, county government, state and federal natural resource agencies, and Native American tribes. In the immediate vicinity of the refuge, opportunities exist to establish and grow partnerships with Wild Turkey Federation, Friends of Noxubee Refuge, Inc., Quail Unlimited, Quail Forever, Ducks Unlimited, The Nature Conservancy, C.A. Barge Timberlands, L.P., Bass Pro Shops, Audubon Society, Mississippi State University, USDA Forest Service, National Park Service, and Mississippi Department of Wildlife, Fisheries and Parks.

STEP-DOWN MANAGEMENT PLANS

A comprehensive conservation plan is a strategic plan that guides the direction of the refuge. A step-down management plan provides specific guidance on activities, such as habitat, fire, and visitor services. These plans (Table 9) are also developed in accordance with the National Environmental Policy Act, which requires the identification and evaluation of alternatives and public review and involvement prior to their implementation.

Table 9. Step-down management plans related to the goals and objectives of the Draft CCP

Step-down Plan	Completion Date
Habitat Management Plan	Attached
Visitor Services Plan	Attached
Hunt Plan	Attached
Integrated Pest Management Plan	Attached
Fire Management Plan	2015
Inventorying and Monitoring Plan	TBD
Cultural Resources Management Plan	2017

MONITORING AND ADAPTIVE MANAGEMENT

Adaptive management is a flexible approach to long-term management of biotic resources that is directed over time by the results of ongoing monitoring activities and other information. More specifically, adaptive management is a process by which projects are implemented within a framework of scientifically driven experiments to test the predictions and assumptions outlined within a plan.

To apply adaptive management, specific surveying, inventorying, and monitoring protocols will be adopted for the refuge. The habitat management strategies will be systematically evaluated to determine management effects on wildlife populations. This information will be used to refine approaches and determine how effectively the objectives are being accomplished. Evaluations will include ecosystem team and other appropriate partner participation. If monitoring and evaluating indicate undesirable effects for target and non-target species and/or communities, alterations to the management projects will be made. Subsequently, the CCP will be revised. Specific monitoring and evaluating activities will be described in the step-down management plans.

PLAN REVIEW AND REVISION

The Final CCP will be reviewed annually as the refuge's annual work plans and budgets are developed. It will also be reviewed to determine the need for revision. A revision will occur if and when conditions change or significant information becomes available, such as a change in ecological conditions or a major refuge expansion. The Final CCP will be augmented by detailed step-down management plans to address the completion of specific strategies in support of the refuge's goals and objectives. Revisions to the Final CCP and the step-down management plans will be subject to public review and NEPA compliance.

Section B. Environmental Assessment

I. Background

INTRODUCTION

The Fish and Wildlife Service prepared this Environmental Assessment (EA) for Sam D. Hamilton Noxubee NWR (Sam D. Hamilton Noxubee NWR or refuge) in compliance with the National Environmental Policy Act (NEPA) and the National Wildlife Refuge System Improvement Act of 1997 (Improvement Act). Following a public review and comment period on the Draft CCP, a final decision will be made by the Fish and Wildlife Service that will guide refuge management actions and decisions over the next 15 years, provide the public with an understanding of the refuge and its management activities, and incorporate information and suggestions from the public and refuge partners. The Draft CCP and associated step-down plans propose a management direction, which is described in detail through a set of goals, objectives, and strategies. The Draft CCP and associated step-down plans address current management issues, provide long-term management direction and guidance for the refuge, and satisfy the legislative mandates of the Improvement Act. While the CCP provides general management direction, step-down plans provide more detailed management direction and actions.

The EA presents a range of reasonable management alternatives. The intent is to support informed decision-making regarding future management of the refuge. Each alternative presented in this EA was generated with the potential to be fully developed into a Final CCP. The predicted biological, physical, social, and economic impacts of implementing each alternative are analyzed in this EA. This analysis assists the Service in determining if the alternatives represent no significant impacts, thus requiring the preparation of a Finding of No Significant Impact, or if the alternatives represent significant impacts, thus requiring more detailed analysis through an Environmental Impact Statement and a Record of Decision. Following public review and comment, the Service will select an alternative to be fully developed for this refuge.

PURPOSE AND NEED FOR ACTION

The purpose of the EA is to ensure that Sam D. Hamilton Noxubee NWR serves as a refuge and breeding ground for migratory birds, an inviolate sanctuary for waterfowl, and as habitat for the endangered red-cockaded woodpecker (RCW). The refuge plays a key role in conserving and managing ecological diversity by restoring and protecting habitats and wildlife with the help of partners. The refuge plays an important role in promoting awareness for wildlife with the American public and provides opportunities for compatible wildlife-dependent public uses that promote an understanding and appreciation of fish, wildlife, and habitat conservation, conserve the Wilderness character, and the mission of the National Wildlife Refuge System. The refuge plays an additional role in addressing the control and elimination of exotic, invasive, and nuisance species and providing areas appropriate and compatible for scientific researching and monitoring. The refuge has an important role in protecting the areas outstanding natural, cultural, scenic, and ecological values.

This EA addresses the need to adopt a 15-year management plan for the refuge. The Draft CCP provides guidance for future refuge management and meets the requirements of the Improvement Act. It also evaluates the compatibility of public uses and impacts to the refuge's biological integrity, diversity, and environmental health.

DECISION FRAMEWORK

Based on the assessment described in this document, the Service will select an alternative to implement the Final CCP and associated step-down plans for the refuge. Unless more detailed analysis through an Environmental Impact Statement and a Record of Decision is needed, the Final CCP will include a Finding of No Significant Impact, which is a statement explaining why the selected alternative will not have a significant effect on the quality of the human environment. This determination is based on an evaluation of the Service and Refuge System mission, the purpose(s) for which the refuge was established, and other legal mandates. Assuming no significant impact is found, implementation of the CCP will begin and will be monitored annually and revised when necessary.

PLANNING STUDY AREA

Sam D. Hamilton Noxubee NWR is located within three counties (Noxubee, Oktibbeha, and Winston) in east-central Mississippi, approximately 17 miles south-southwest of Starkville and approximately 120 miles north-northeast of Jackson, the capital city of Mississippi. Primary access routes to the refuge are by Oktoc Road from Starkville, by Highway 25 via Loakfoma Road and Brooksville-Louisville Road from Louisville, and by Lynn Creek Road from Brookville. The refuge land currently encompasses 48,219 acres within the 61,715-acre approved acquisition boundary, leaving 13,496 acres in other ownerships. The current un-acquired inholdings include 3,437 acres of state land (640 acres - Section 16 properties; 2,797 acres - Mississippi State University), which will likely never be acquired. The remaining 7,262 acres consists of scattered, small privately owned tracts.

This EA will identify management on refuge lands, as well as those lands proposed for acquisition by the Service.

AUTHORITY, LEGAL COMPLIANCE, AND COMPATIBILITY

The Service developed this Draft CCP/EA in compliance with the National Wildlife Refuge System Improvement Act of 1997 and Part 602 of the Fish and Wildlife Service Manual (National Wildlife Refuge System Planning). The actions described within also meet the requirements of the National Environmental Policy Act of 1969 (Public Law 91-190, 42 U.S.C. 4321 and 4331-43335) (NEPA). The refuge staff achieved compliance with NEPA through the involvement of the public and the incorporation of an EA in this document, with a description of the alternatives considered and an analysis of the environmental consequences of the alternatives (Chapters III and IV in this section). When fully implemented, the CCP will strive to achieve the vision and purposes of the refuge.

The CCP's overriding consideration is to carry out the purposes for which the refuge was established. The laws that established the refuge and provided the funds for acquisition state the purposes. Fish and wildlife management is the first priority in refuge management, and the Service allows and encourages public use (wildlife-dependent recreation) as long as it is compatible with, or does not detract from, the refuge's mission and purposes.

COMPATIBILITY

The National Wildlife Refuge System Administration Act of 1966, as amended by the National Wildlife Refuge System Improvement Act of 1997, states that before permitting the use of any area within the Refuge System for any purpose, including but not limited to hunting, fishing, public recreation and accommodations, and access that such uses should be determined 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." In addition, "wildlife-dependent recreational uses may be authorized on a refuge when they are compatible and not inconsistent with public safety."

PUBLIC INVOLVEMENT AND THE PLANNING PROCESS

In accordance with Service guidelines and NEPA recommendations, public involvement has been a crucial factor throughout the development of the Draft CCP and associated step-down plans for Sam D. Hamilton Noxubee NWR. This Draft CCP has been written with input and assistance from interested citizens, conservation organizations, and employees of local and state agencies. The participation of these stakeholders and their ideas has been of great value in setting the management direction for the refuge. The Service, as a whole, and the refuge staff, in particular, are very grateful to each individual and group who has contributed time, expertise, and ideas to the planning process. The staff remains impressed by the passion and commitment of so many individuals for the lands and waters administered by the refuge.

A complete summary of the issues and concerns is provided in Section C, Appendix D, Public Involvement - Summary of Public Scoping Comments.

II. Affected Environment

For a description of the affected environment, see Section A, Chapter II, Refuge Overview.

III. Description of Alternatives

FORMULATION OF ALTERNATIVES

The planning team identified three alternative management actions designed to achieve the purposes for which the refuge was established; the mission of the Refuge System; and the mission of the Service. These three alternatives are described below. They represent different approaches for managing and operating the refuge over a 15-year timeframe, with the primary distinctions being the emphasis given to the biological and visitor services programs. Each alternative provides for protection, restoration, and management of the refuge's natural and cultural resources. The alternatives address appropriate and compatible wildlife-dependent uses as described by the Improvement Act and Fish and Wildlife Service policy. Each alternative was evaluated based on how it would address the priority resource issues that were identified by the Service, its partnering agency advisors, and the public during multiple public scoping meetings, as detailed in Chapter III of the Draft CCP (Section A). Table 11 compares how each alternative addresses these priority resource issues. The table is grouped by each of the five goals outlined in Chapter IV of the Draft CCP.

FEATURES COMMON TO ALL ALTERNATIVES

Several elements of refuge management are common to all three alternatives: (1) protect, restore, and enhance the refuge's federally protected species as well as the habitats that support these species; (2) protect the refuge's archaeological, cultural, and historic resources, and seek to provide improvement in staffing for law enforcement to prevent looting and vandalism, and ensure public safety. All management activities that could impact natural and cultural resources will comply with all applicable laws, regulations, and policies, and individual projects may require additional consultation with the Service's Regional Archaeologist and the State of Mississippi's Historic Preservation Office; (3) as the plan is implemented and projects are developed, all activities will be subject to applicable future state and federal permit requirements; (4) consultation under the Endangered Species Act with the Service's Ecological Services Office may be required; (5) management actions benefiting native resident wildlife would occur primarily as collateral benefits from actions taken to manage priority species; (6) each of the alternatives will seek sufficient funding for adequate staffing and administrative support to the level necessary to meet the refuge's goals and objectives in managing and protecting its wildlife resources; and (7) each of the alternatives are budget-dependent.

Under each alternative the following wildlife-dependent recreational opportunities have been found to be compatible with the refuge's mission and purpose: bicycling, boating, hunting, fishing, wildlife observation, wildlife photography, and wildlife interpretation and education.

In 1974, the Service requested that Congress designate 1,200 acres of the refuge as a wilderness area. Although the proposed wilderness area has not yet been approved by Congress, the Service protects the area as designated wilderness based on Service policy (610 FW 1). This same level of protection is offered under all three alternatives.

Each alternative includes provisions for establishment or increasing use of partnerships as a method of increasing efficiency in refuge management. Current partnerships that assist the refuge in reaching its conservation objectives will continue. Increased coordination will occur with the Service's private lands biologist located in the Mississippi Field Office in Jackson, to implement the Partners for Fish and Wildlife Program and other conservation programs. Communication with local landowners and

community groups will be increased to promote wildlife conservation. Refuge staff will maintain and develop new partnership opportunities with state agencies, tribes, nonprofit organizations, academia, private land managers, and businesses to broaden support for the refuge and wildlife within the surrounding landscape. Emphasis will continue to be placed on further developing the refuge's Friends Group as a support group for refuge programs along with increasing the number of volunteers to assist with environmental education, maintenance, and habitat management programs.

Under each of the alternatives, if and when financial and staffing resources become limited, management objectives will be prioritized for implementation in the following order. The first priority would be to address the purposes for which the refuge was established, the Service mission, applicable legal mandates (i.e., Endangered Species Act, Wilderness Act, Improvement Act), and the protection and maintenance of the refuge's biological integrity (601 FW 3), diversity, and environmental health. The second priority would be protection and maintenance of refuge equipment and infrastructure used to enhance refuge habitat and support staff. The third priority would be to provide resources and support for the six priority public uses identified within the Improvement Act.

DESCRIPTION OF ALTERNATIVES

Alternative A describes the refuge's current management (i.e., managing within the framework of the 2004 CCP) and is the baseline for the other two alternatives. Alternative B provides for management of refuge habitats reflective of historic habitat conditions for both federally listed species and migratory birds, but with fewer public use facilities and opportunities. It allows for an increased focus on federally listed species and the refuge's biological integrity. Alternative B assumes stable funding capable of supporting the current refuge staff of 11 employees. Alternative C encourages management of refuge habitats reflective of historic conditions focused around the species of concern, while providing for a wide range of compatible public uses and recreation opportunities. This alternative assumes any declines in funding and staffing are either short-term or can be offset through increases in use of partnerships and volunteers. Research and biological work would be encouraged beyond federally listed species and refuge's biological integrity. Alternative C does propose an additional five permanent staff to provide optimal resource protection and management capability. Table 11 provides a summarized comparison of the alternatives and provides a ready reference while reviewing the following sections. The descriptions for each of the three alternatives follow a set format to allow ease of comparison.

ALTERNATIVE A: CURRENT MANAGEMENT (NO ACTION)

This alternative is referred to as our "No Action" or "Current Management" alternative, as required by NEPA. Under this alternative, no major changes to our biological, public use, and administrative management practices would occur from their current levels.

Wildlife and Habitat Management

- Actively manage waterfowl habitat by providing 1.5-million Duck Energy Days (DEDs) over the 110-day wintering waterfowl season, supporting two times the anticipated number of ducks, using 1,997 acres of moist-soil habitats. Food resources would include 252 acres of moist-soil plants and/or agricultural crops farmed (i.e., disking, planting, fertilizing) within the Jones Creek Unit , 1,645 acres of flooded timber within four GTRs, and 100 acres of shallow water lake habitat within Bluff and Loakfoma lakes.

- Forested bottomland habitats would receive little to no active management other than water level manipulation occurring within GTRs for the benefit of waterfowl and recreation associated with waterfowl hunting with auxiliary benefits for other migratory and native species.
- Habitat for RCWs and other wildlife dependent on late-successional-pine habitat would continue as the refuge's highest priority. Refuge population goal set by the 2008 RCW plan was a function of the potential carrying capacity based on current forest habitat classification, acres of pine and pine hardwood types, a density of 1 group/250 acres of pine type, and rotation age of loblolly pine managed through even-aged management would be maintained. The assumption for the current goal of 88 RCW clusters was based on the refuge creating 22,000 acres of continuous pine habitat; this was never realized. Management actions would include a variety of techniques used to maintain appropriate woodpecker feeding habitat and cavity tree conditions including the following: commercial and non-commercial silviculture; integrated exotic, nuisance, and pest management; creation of new artificial cavities; maintenance of existing suitable cavities through the use of restrictor plates and snake exclusion devices; and kleptoparasite control which together will increase the woodpeckers productivity on the refuge. In addition to those areas where historic conditions support pine habitats, additional habitats would be maintained or converted to pine even when not supported by historic habitat conditions resulting in potentially more habitat for RCWs. In order to sustain forest resources for future RCW habitat, harvesting of existing mature forests as part of regeneration efforts within present and future partitions would occur. Refuge staff and possibly contractors would continue to scientifically monitor RCWs through nest and fledge checks.

- Reconnaissance would be used to monitor the status of other wildlife including waterfowl.

- Integrated pest management actions would be prioritized and threats (i.e., exotic plants, exotic and feral animals) to habitats treated using approved chemical, mechanical, and lethal take techniques.

- Approximately 252 acres of shallow water moist-soil impoundments, 1,200 acres of lakes, and 1,645 acres of GTRs would be managed for native species including a diversity of reptiles, fish, and amphibians, and waterfowl species through water level manipulation.

- Active habitat management would continue to benefit grassland species by maintaining 1,140 of existing fields and grasslands and establishing approximately 80 acres of grassland prairie habitat (grasses and light and heavy seeded broadleaf and tuberous perennials) at Morgan Hill through mowing, prescribed fire, and mechanical and chemical controls.

- Habitats would not be managed for historic conditions but maintained to favor a pine-dominated forest type using various forestry methods, prescribed fire, and mechanical and chemical understory control.

- Bottomland hardwood forests would receive little to no active management other than water level manipulation occurring within GTRs for the benefit of waterfowl and recreation associated with waterfowl hunting.

Resource Protection

- Funding would be sought to conduct a refuge-wide archaeological survey. A refuge-led cultural resources interpretive program for refuge users and area residents would be initiated to promote an understanding and appreciation of the human influence on the region's ecosystems for refuge users and area residents.

- Acquisition of additional lands in the Approved Acquisition Boundary (AAB) would be sought through fee-simple title and timber for land exchange. Specifically, the Service would seek to acquire from willing sellers the remaining 4,263 acres of private land in-holdings within the refuge's existing AAB.

- The two existing Research Natural Areas (RNA) would continue to be recognized as if under the Society of American Foresters (SAF) designation, but research objectives and management strategies would remain undeveloped.

- Law enforcement efforts would continue at a level to protect both natural and cultural resources and public safety through a combined effort of an on-site refuge officer and partnership with other federal and state officers.

Visitor Services

- Small game, turkey, deer, and waterfowl hunting opportunities would be maintained. Native fish populations within Bluff and Loakfoma lakes and Ross Branch Reservoir would be maintained through natural reproduction, regulated harvest, and stocking to support the current level of use.

- Wildlife-dependent recreational opportunities that have been identified as priority under the Improvement Act would be offered under this alternative including hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation. The refuge would maintain opportunities for wildlife observation and photography by restoring and improving access on overlooks, boardwalks, and trails.

- The refuge would continue to acquire funding to replace lost, stolen, or dilapidated signs.

- Current environmental education programs would continue with Starkville School District, MSU, and civic groups to teach required curriculum and share expertise both on and off the refuge. The refuge would continue hosting meetings and interpretive programs at the Environmental Education Center, providing an onsite outdoor classroom, and also offering staff support for environmental education and interpretive programs at off-site locations for 5,000 students annually.

- Refuge staff would continue to support the Friends of Noxubee Refuge, Inc., which promotes refuge goals and programs and provides volunteer assistance and fund-raising.

Refuge Administration

- The authorized staff as of 2004 CCP was 16 employees but has since been reduced to 11 employees. Facilities and equipment would be maintained and expanded as funding allows, including vehicles and heavy equipment, computer and communication systems, and refuge roads, buildings, structures, trails, and signs.
- Under this alternative, the refuge would continue with the existing fee program for deer and waterfowl hunters.

ALTERNATIVE B: FOCUS ON WATERFOWL AND FEDERALLY LISTED SPECIES

This management scheme places priority on the federally listed species and waterfowl which are integral to the refuge's purpose. This alternative emphasizes active habitat management actions that would benefit RCWs and waterfowl. Visitor service programs and facilities in support of the six priority public uses (i.e., hunting, fishing, wildlife observation, wildlife photography, and interpretation and environmental education) would be much reduced below those levels for Alternatives A and C. Non-wildlife-dependent public uses would be phased out.

Wildlife and Habitat Management

- The Improvement Act clearly establishes that wildlife conservation is the singular national wildlife refuge mission. Biological integrity, diversity, and environmental health are critical components of wildlife conservation. Under this alternative, the refuge would favor management that restores historic forest conditions while achieving refuge purposes. The refuge would maintain, and where appropriate, restore the biological integrity, diversity, and environmental health of the refuge (601 FW 3). This alternative would provide approximately 1 million DEDs over a 110-day period yearly through the possible combination of managed moist-soil units, planted agricultural crops that can be flooded, aquatic vegetation, and invertebrates within refuge lakes and seasonally flooded GTRs which provide mast crops and invertebrates. Wood duck breeding opportunities would be enhanced using wood duck nest boxes, but greater emphasis would be placed on protecting trees with natural cavities throughout the bottomland forests. Trees found with existing cavities and those having unique wildlife values would be protected from timber harvest. Active manipulation of habitats and populations would occur as necessary to maintain biological integrity, diversity, and environmental health. Silvicultural treatments within bottomland hardwood habitats would receive low priority, but may be used to promote recruitment of red oak species within the overstory of those flooded forested habitats used by waterfowl. The refuge would attempt to increase brood survival of waterfowl by managing shallow water aquatic habitats to produce and sustain protective scrub/shrub cover with fringe area of the refuge's lakes. Manipulation of water level would be the primary tool used to produce the desired scrub/shrub cover. The refuge would participate in wood duck banding programs and try to obtain refuge quotas as assigned by National Migratory Bird program and limit human access to key areas used by waterfowl to reduce disturbance during critical life cycle stages.

- Bottomland forests would benefit forest breeding birds as collateral benefits from management conducted for the benefit of waterfowl and those federally listed species found on the refuge. Active manipulation of habitats for the benefit of forest breeding birds would occur as a lower priority to that required for RCWs and waterfowl.

- The number of RCW clusters would be based on continuous pine habitat as defined by historic conditions and the optimal partition size of 308 acres based on the 100-year rotation. Mathematically, this suggests that the maximum number of clusters feasible on the refuge is 38. However, due to natural variation in the habitat within management units, loss of habitat between the circular partitions, loss of habitat due to private inholdings, and edge effects due to bordering lands or hardwood habitats, the optimal number and new refuge target goal would be 27 RCW clusters. All RCW partitions would be managed according to the RCW recovery plan. Habitat manipulations used to benefit RCWs could include silvicultural practices (e.g., active forest management including but not limited to manual or mechanized pre-commercial thinning, commercial biomass thinning, mulching, firewood cutting, timber stand improvements,

be 27 RCW clusters. All RCW partitions would be managed according to the RCW recovery plan. Habitat manipulations used to benefit RCWs could include silvicultural practices (e.g., active forest management including but not limited to manual or mechanized pre-commercial thinning, commercial biomass thinning, mulching, firewood cutting, timber stand improvements, herbicide, irregular shelterwood, shelterwood, seedtree, patch cuts, afforestation, reforestation, and free thinning), prescribed fire, raking, mowing, creation of new artificial cavities, maintenance of suitable cavities, midstory reduction (chemical and/or mechanical control), integrated pest management, use of restrictor plates on cavities, snake exclusion devices, and kleptoparasite control. Forested habitats would be actively manipulated to produce a forest reflective of historic conditions. In order to sustain forest resources for future RCW habitat, harvesting of existing mature forests as part of regeneration efforts within present and future partitions would occur. Only within the historically pine habitats managed for RCW, active habitat manipulations would be implemented to progress toward sustainable Good Quality Foraging Habitat in each partition to support a RCW potential breeding group (U.S. Fish and Wildlife Service 2003). No additional, non-historic pine habitats would be maintained or converted for support of the RCW to pine. Refuge staff and possibly contractors would continue to scientifically monitor RCWs through nest and fledge checks.

- Quantitative monitoring would be limited to RCWs and other wildlife would be monitored through simple reconnaissance.

- Efforts would be made to prevent the establishment of exotic invasive and pest species through integrated pest management, including chemical and mechanical control, control of pass-through vehicle traffic and maintaining restrictions on ATVs, off-road vehicle use, and equine and other livestock.

- Water levels in all GTRs would be managed through water manipulation so no more than two GTRs would be purposefully flooded for wintering waterfowl habitat yearly. Efforts would be made to restore the biological integrity, diversity, and environmental health in the GTRs to match those habitats of the surrounding forests of similar type. The refuge would increase management in the bottomland hardwood forests to restore historic conditions while providing the needed habitat for waterfowl and, if present, federally listed species.

- All old fields and the Morgan Hill Prairie Demonstration Area would no longer be maintained and allowed to either naturally re-seed or would be manually planted into a forest type most similar to the historic conditions.

- Other than in areas where forests are being restored to their historic condition, the refuge would actively manage forested habitats to maintain the desired wildlife habitat for federally listed species and waterfowl. Active even-aged and uneven-aged silviculture would occur using a variety of techniques including timber harvest, prescribed fire, and chemical and/or mechanical midstory reduction.

- Upland forests would be managed for historic conditions and when applicable management would emphasize needed habitat for federally listed species. Active even-aged and uneven-aged forest management would occur using a variety of techniques including timber harvest, prescribed fire, and chemical and/or mechanical midstory reduction.

Resource Protection

- Comprehensive, refuge-wide surveys would be opportunistically sought but individual cultural resource surveys only for specific projects or sites (614 FW 2) would be the standard. Partnerships would be developed with other agencies, institutions, and ethnic groups (e.g., Choctaw Nation, African American groups), to accomplish tasks and seek ideas and means to improve management of cultural resources.

- Efforts would be made to acquire additional lands in the approved acquisition boundary through fee-simple title and timber for land exchange. Specifically, the Service would seek to acquire from willing sellers the remaining 4,263 acres of private land in-holdings within the refuge's existing approved acquisition boundary.

- The two existing Research Natural Areas would continue to be recognized as if under the Society of American Foresters designation, but research objectives and management strategies would remain undeveloped.

- Improvements to the existing law enforcement program would be based on recommendations provided by the Office of the Chief of Refuge Law Enforcement, Southeast Region, following a programmatic review.

Visitor Services

- The existing hunting programs would be reduced through reductions in staff and facility support. The currently permitted hunting seasons that require significant administrative costs due to regulatory oversight (i.e., waterfowl hunting and primitive weapon and modern gun deer) would be exchanged for less costly seasons such as an archery deer season requiring less administrative support. The visitor center would be closed on weekends and operating hours would be reduced to the work week (Mon-Friday) to match staff availability. The picnic area and nearby public restrooms would be closed. Fish habitat would not be enhanced for increased recreational uses.

- Wildlife observation and photography opportunities would be reduced through the reduced availability and maintenance of viewing facilities, such as boardwalks and nature trails. Special use events requiring substantial planning and resources to host would be discontinued. Some of the secondary graveled roads would be closed to vehicles and instead would exist as low-maintained, non-motorized trails.

- Due to reductions in visitor services programs, signage and information available to the public would be reduced. Only refuge regulatory signs would receive priority and only the minimal levels of directional signs would be maintained. Public use staff would be eliminated and replaced with biological or forestry technicians.

- No offsite interpretive programs would be offered. Refuge staff would not participate in environmental education; it would be solely dependent on the currently structured partnership with Starkville School District and volunteers.

Refuge Administration

- The staff would be held at 13 or fewer employees with organizational changes made to increase field staff including law enforcement officers and biological and forestry technicians. Facilities and equipment, including vehicles and heavy equipment, computer and communication systems, and refuge roads, buildings, structures, trails, and signs, would all be placed on a priority list and maintained when funding allowed. Closing or removal of poorly maintained assets would occur.

- The collection of fees for permitted quota deer and waterfowl hunts would be continued.

ALTERNATIVE C: FOCUS ON WILDLIFE, HABITAT DIVERSITY, AND EXPERIENCING NATURE (PROPOSED ACTION)

This alternative would manage refuge resources to optimize native wildlife populations and habitats under a balanced and integrated approach not only for federally listed species (RCW) and migratory birds, but also for other native species such as white-tailed deer, wild turkey, Northern bobwhite, paddlefish, and forest breeding birds. This alternative also provides opportunities for the six priority public uses (e.g., hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation) and other wildlife-dependent activities found appropriate and compatible with the purposes for which the refuge was established.

Wildlife and Habitat Management

- The Improvement Act clearly establishes that wildlife conservation is the singular national wildlife refuge mission. Biological integrity, diversity, and environmental health are critical components of wildlife conservation. Under this alternative, the refuge would favor management that restores historic forest conditions while achieving refuge purposes. The refuge would maintain, and where appropriate, restore the biological integrity, diversity, and environmental health of the refuge (601 FW 3). This alternative would provide approximately 1 million DEDs over a 110-day period yearly through the possible combination of managed moist-soil units, planted agricultural crops that can be flooded, aquatic vegetation and invertebrates within refuge lakes, and seasonally flooded GTRs which provide mast crops and invertebrates. Wood duck breeding opportunities would be enhanced using wood duck nest boxes, but greater emphasis would be placed on protecting trees with natural cavities throughout the bottomland forests. Trees found with existing cavities and those having unique wildlife values would be protected from timber harvest. Active manipulation of habitats and populations would occur as necessary to maintain biological integrity, diversity, and environmental health. Silvicultural treatments within bottomland hardwood habitats would receive low priority but may be used to promote recruitment of red oak species within the overstory of those flooded forested habitats used by waterfowl. The refuge would attempt to increase brood survival of waterfowl by managing shallow water aquatic habitats to produce and sustain protective scrub/shrub cover with fringe area of the refuge's lakes. Manipulation of water level would be the primary tool used to produce the desired scrub/shrub cover. The refuge would participate in wood duck banding programs and try to obtain refuge quotas as assigned by National Migratory Bird program and limit human access to key areas used by waterfowl to reduce disturbance during critical life cycle stages.

- Forest breeding bird populations would be enhanced through improved nesting, brooding, and foraging opportunities by application of active habitat manipulation techniques within bottomland hardwood forested habitats and streamside management zones. Even-aged and uneven-aged ssilviculture, including selective thinning, patch cuts, groups tree selection clearcuts, timber stand improvements, chemical treatments and other methods, could be used to ensure hardwood species' diversity, red oak recruitment into the overstory, and forest structure for the benefit of a diversity of wildlife.

- The number of RCW clusters would be based on continuous pine habitat as defined by historic conditions and the optimal partition size of 308 acres based on the 100-year rotation. Mathematically, this suggests that the maximum number of clusters feasible on the refuge is 38. However, due to natural variation in the habitat within the management units, loss of habitat between the circular partitions, loss of habitat due to private inholdings, and edge effects due to bordering lands or hardwood habitats, the optimal number and new refuge target goal would be 27 RCW clusters. All RCW partitions would be managed according to the RCW recovery plan. Habitat manipulations used to benefit RCWs could include silvicultural practices (e.g., active forest management, including, but not limited to, manual or mechanized pre-commercial thinning, commercial biomass thinning, mulching, firewood cutting, timber stand improvements, herbicide, irregular shelterwood, shelterwood, seedtree, patch cuts, afforestation, reforestation, and free thinning), prescribed fire, raking, mowing, creation of new artificial cavities, maintenance of suitable cavities, midstory reduction (chemical and/or mechanical control), integrated pest management, use of restrictor plates on cavities, snake exclusion devices, and kleptoparasite control. Forested habitats would be actively manipulated to produce a forest reflective of historic conditions. In order to sustain forest resources for future RCW habitat, harvesting of existing mature forests as part of regeneration efforts within present and future partitions would occur. Only within the historically pine habitats managed for RCW, active habitat manipulations would be implemented to progress toward sustainable Good Quality Foraging Habitat in each partition to support a RCW potential breeding group (U.S. Fish and Wildlife Service 2003). No additional, non-historic pine habitats would be maintained or converted for support of the RCW to pine. Refuge staff and possibly contractors would continue to scientifically monitor RCWs through nest and fledge checks.

- In addition to robust monitoring of RCWs, additional quantitative monitoring of a broad suite of wildlife and their habitats would be sought through non-governmental organizations, universities, and volunteers; and participation in the Refuge System's Inventorying and Monitoring program would occur for development of standardized survey methods, cataloging and analyzing refuge information.

- Efforts would be made to prevent the establishment of exotic invasives and pest species through integrated pest management, including chemical and mechanical control, control of pass-through vehicle traffic and maintaining restrictions on ATVs, off-road vehicle use, and equine and other livestock.

- Deep-water habitats within Bluff Lake would be created through dirt excavation to ensure consistency in recreational fisheries resources (i.e., crappie, bass, and sunfish). Excavated soil from the creation of the deep water habitat would be used to create islands within the lake to serve as bird rookery sites. Other existing water control structures on Bluff Lake and in areas upstream of the lake would also be modified or removed to allow fish passage. Paddlefish and Gulf coast walleye would benefit from the restoration. Additional ephemeral pools for amphibians would be artificially created throughout the refuge through excavation in areas where excess water impedes road maintenance or threatens sedimentation of streams.

- The Morgan Hill Prairie Demonstration Area would remain but be reduced by more than 50 percent in size and the remaining area would be restored into habitats similar to that indicated by historic conditions. Existing old fields that would not be a direct benefit to federally protected species or waterfowl would continue to be managed as old field sites for the benefit of native grassland species. Old fields that would be a direct benefit to federally protected species or waterfowl would be restored to historical species compositions through natural regeneration or the manual planting of trees. No new field sites would be created.

- Active forest management including silvicultural treatments, prescribed fire, and chemical and/or mechanical midstory reduction would occur throughout the refuge's habitats to achieve desired historic forest conditions, greater habitat diversity and forest structure to benefit RCWs, forest interior birds, and a wider range of native wildlife.

- Upland forests would be managed for historic conditions and, when applicable, management would emphasize providing the needed habitat for federally listed species. If needed to support federally listed species, active forest management would occur using a variety of techniques including timber harvest, prescribed fire, and chemical and/or mechanical midstory reduction.

Resource Protection

- To protect cultural resources, completing a comprehensive, refuge-wide survey of archaeological sites would be the goal as well as individual cultural resource surveys as needed for specific projects or sites. Partnerships would be developed with other agencies, institutions, and cultural groups (e.g., Choctaw Nation, African American groups), to seek ideas and possibly share staff positions. The refuge would improve management and interpretation of the refuge's cultural resources.

- Conservation partnerships would be developed with neighboring landowners and worked through partnerships to have the greatest impact on maintaining or restoring the biological integrity of the local community. Fee-title acquisition from willing sellers would focus on lands within the existing approved acquisition boundary that would most efficiently assist the refuge in meeting the purposes for which it was established and the mission of the Service.

- Under this alternative the two RNAs would no longer remain under this designation and would be managed as part of the larger surrounding units of similar type and managed for their historic conditions.

- A second wildlife law enforcement officer position would be established in combination with possible collateral duty officer positions to assist in protecting natural and cultural resources along with public safety. A second officer would provide greater opportunities to assist visitors within the Connecting People with Nature Area. Additional improvements to the existing law enforcement program would be based on recommendations provided by the Office of the Chief of Refuge Law Enforcement , Southeast Region, following a programmatic review.

Visitor Services

- The current level of visitor service programs would be expanded for the general public and attempts made to provide more access for youth and users with disabilities. The Service would develop a week-long, large game (turkey and deer) hunt program to provide increased opportunities for disabled hunters in exchange for a week reduction in the general gun deer and turkey seasons. Deer hunting opportunities overall would be increased by expanding archery season to the full state season. The Service would work with the MDWFP to develop youth hunting and fishing opportunities. Fishing opportunities would be expanded to include year-round designated bank fishing areas on Bluff and Loakfoma lakes. Other wildlife-dependent uses and their supporting facilities would be maintained and enhanced through upgrades or additional facilities. Alternative funding mechanisms, such as a general user fee under the Fee Program, and partnerships would be used to spread costs of programs across all users possibly eliminating the need for separate hunting related fees. These funds would be used to maintain refuge roads, trails, kiosks, and hunting check stations and support administrative costs and subsequently increase availability of congressionally appropriated funds for management of wildlife.

- The existing visitor services programs would be increased. This alternative would establish a "Connecting People with Nature" area to consolidate activities and users requiring greater support to enjoy wildlife observation activities. Existing activities that are not considered wildlife-dependent uses, such as a picnicking area and off-road mountain biking, would not be allowed, but more opportunities for bicycling, walking, and connecting with nature would be offered through designed trails with increased accessibility for disabled Americans. All existing wildlife-dependent uses and the supporting facilities would be maintained and, if resources are available, enhanced through possible increase and better maintenance in overlooks, boardwalks, and trails. An effort would be made to increase visitor safety and enjoyment through establishment of parking areas, improved management of vehicle flow, creation of paved walking and biking trails, and roadside bike lanes along Bluff Lake and Loakfoma Roads.

- Refuge regulatory and informational signs would receive priority. This alternative would increase the availability of directional signs and informational kiosks at all major access and gathering locations to aid and direct visitors and alert them to key regulatory and interpretive messages.

- Partnerships to conduct environmental education and off-site activities and increase volunteer involvement in all its programs would be established. Current environmental education programs would continue with Starkville School District, MSU, and civic groups to teach required curriculum and share expertise both on and off the refuge. The refuge would continue hosting meetings and interpretive programs at the Environmental Education Center, providing an onsite outdoor classroom, and also offering staff support for environmental education and interpretive programs at off-site locations for 5,000 students annually.

- The Friends of Noxubee Refuge, Inc., which promotes refuge goals and programs, provides volunteer assistance and fund-raising would continue to be supported. More effort would be placed toward developing cooperative programs sponsored through the Friends.

Refuge Administration

- An increase in support resources above current levels of funding, staffing, partnering, equipment and facilities, and Friends and volunteer support needed to protect refuge resources and to meet increasing public needs would need to occur. The current staff of 11 employees would be reorganized under this goal of reaching an optimal staff level of 18 as recommended within the 2008 Final Report for the Staffing Model for Field Stations.

- This alternative would continue participation in the existing Fee Program. Changes within the program would include establishment of a general access pass for all users to assist in the maintenance and development of public use programs and facilities (e.g., Daily Pass, Weekly Pass, or Annual Pass). Current federal duck stamps and other congressionally authorized entrance fee passes would be accepted as a refuge access pass.

Table 10: Comparison of alternatives by management issues for Sam D. Hamilton Noxubee NWR

Goal A: Fish and Wildlife Population Management Move to above table **Manage and protect migratory and native wildlife populations on Sam D. Hamilton Noxubee NWR to contribute to the purposes for which the refuge was established as well as to fulfill the mission of the National Wildlife Refuge System.**			
Issues	**Alternative A** **Continue Current Management, No Action Alternative**	**Alternative B** **Focus on Waterfowl and Federally Listed Species**	**Alternative C** **Focus on Migratory Birds, Federally Listed Species, Native Wildlife, Habitat Diversity, and Experiencing Nature**
Decline in and threats to waterfowl	Actively manage waterfowl habitat by providing 1.5-million Duck Energy Days (DEDs) over the 110-day wintering waterfowl season, two times the anticipated number of ducks, using 1,997 acres of moist-soil habitats. Food resources would include 252 acres of moist-soil plants and/or agricultural crops farmed (i.e., disking, planting, fertilizing) within the Jones Creek Unit, 1,645 acres of flooded timber within four GTRs, and 100 acres of shallow water lake habitat within Bluff and Loakfoma lakes.	Alternative B expands on and is slightly different from Alternative A. This alternative would provide approximately one and a half times the anticipated number of ducks expected to arrive daily on the refuge through the possible combination of managed moist-soil plants, planted agricultural crops, lakes, and seasonally flooded GTRs. Enhanced breeding waterfowl nesting opportunities for wood ducks would be provided using some wood duck nest boxes, but mainly by promoting existing natural cavities throughout the bottomland forests. Trees found with existing cavities and those having unique wildlife values would be protected from harvest. Active manipulation of habitats and populations would occur as necessary to maintain biological integrity, diversity and environmental health. Timber management, prescribed fire, and	Same as Alternative B.

		mechanical and chemical control of midstory would be used to promote recruitment of red oak species within the overstory of those flooded forested habitats used by waterfowl. The refuge would attempt to increase brood survival of waterfowl by managing shallow water aquatic habitats to produce and sustain protective scrub/shrub cover. Manipulation of water level would be the primary tool used to produce the desired scrub/shrub cover. The refuge would participate in wood duck banding programs to meet the refuge quota as assigned by National Migratory Bird program and limit human access to areas used by waterfowl in order to reduce disturbance during critical life cycle stages.	
Decline in and threats to forest breeding birds	Under this alterative, bottomland hardwood forests and forest breeding birds would receive little to no active management other than water level manipulation occurring within GTRs for the benefit of waterfowl and recreation associated with waterfowl hunting.	Opposed to Alternative A, forest breeding birds would only receive collateral benefits from management conducted for the benefit of waterfowl and those federally listed species found on the refuge. Active manipulation of habitats for the benefit of forest breeding birds would occur as a lower priority to that required for RCW and waterfowl.	Expanding on Alternative A, the refuge would not just manage, but would enhance forest breeding bird populations through improved nesting, brooding, and foraging opportunities by application of active habitat manipulation techniques within bottomland hardwood forested habitats and streamside management zones. Silvicultural practices, including selective thinning, patch cuts, timber stand improvements, chemical treatments, and other methods, would be used to ensure hardwood species' diversity, red oak recruitment into the overstory, and forest structure for the benefit of a diversity of wildlife.

Threats to RCW populations	Habitat for the RCW and other wildlife dependent on late-successional pine habitat would continue as the refuge's highest priority. Refuge population goal as set by the 2008 RCW plan was a function of the potential carrying capacity based on current forest habitat classification, acres of pine and pine hardwood types, a density of 1 group/250 acres of pine type, and rotation age of loblolly pine managed through even-aged management would be maintained. The assumption for the current goal of 88 RCW clusters was based on the refuge creating 22,000 acres of continuous pine habitat; this was never realized. Management actions would include a variety of techniques used to maintain appropriate woodpecker feeding habitat and cavity tree conditions, including the following: commercial and	Expanding on and slightly different from Alternative A, the number of RCW clusters would be based on continuous pine habitat, as defined by historic conditions and the optimal partition size of 308 acres based on the 100-year rotation. Mathematically, this suggests that the maximum number of clusters feasible on the refuge is 38. However, due to natural variation within the habitat of the management units, loss of habitat between the circular partitions, loss of habitat due to inholding, and edge effects due to bordering lands or hardwood habitats, the optimal number and new refuge target goal would be 27 RCW clusters. All RCW partitions would be managed according to the RCW recovery plan. Habitat manipulations used to benefit RCWs could include silvicultural practices (e.g., active forest management including but not limited to manual or mechanized pre-commercial thinning, commercial biomass thinning, mulching, firewood cutting, timber stand improvements, herbicide, irregular shelterwood,	Same as Alternative B

	non-commercial silviculture; integrated exotic, nuisance, and pest management; creation of new artificial cavities; maintenance of existing suitable cavities through the use of restrictor plates and snake exclusion devices; and kleptoparasite control which together would increase the RCW's productivity on the refuge. In addition to those areas where historic conditions support pine habitats, additional habitats would be maintained or converted to pine even when not supported by historic habitat conditions resulting in potentially more habitat for RCWs. In order to sustain forest resources for future RCW habitat, harvesting of existing mature forests as part of regeneration efforts within present and future partitions would occur. Refuge staff and possibly contractors would continue to scientifically monitor RCWs through nest and fledge checks.	shelterwood, seedtree, patch cuts, afforestation, reforestation, and free thinning), prescribed fire, raking, mowing, creation of new artificial cavities, maintenance of suitable cavities, midstory reduction (chemical and/or mechanical control), integrated pest management, use of restrictor plates on cavities, snake exclusion devices, and kleptoparasite control. Forested habitats would be actively manipulated to produce a forest reflective of historic conditions. In order to sustain forest resources for future RCW habitat, harvesting of existing mature forests as part of regeneration efforts within present and future partitions would occur. Only within the historically pine habitats managed for RCW, active habitat manipulations would be implemented to progress toward sustainable Good Quality Foraging Habitat in each partition to support a RCW potential breeding group (U.S. Fish and Wildlife Service 2003). No additional, non-historic pine habitats would be maintained or converted for support of the RCW to pine. Refuge staff and possibly contractors would continue to scientifically monitor RCWs through nest and fledge checks.	

Lack of baseline data and monitoring for many wildlife and plant species	Refuge staff would continue to monitor only RCWs through nest and fledge checks and reconnaissance only for all other wildlife including waterfowl.	Differing from Alternative A, quantitative monitoring would be limited to RCWs and other wildlife would be monitored through simple reconnaissance.	Expanding on Alternative B, the refuge would encourage additional monitoring of a broad level of wildlife and their habitats through non-governmental organizations, universities, and volunteers and participate in the Refuge System's Inventorying and Monitoring program for development of standardized survey methods, cataloging and analyzing refuge information.
Negative impacts from and presence/spread of invasive, exotic, and nuisance species	Integrated pest management actions would be prioritized and threats (i.e., exotic plants, and exotic and feral animals) to habitats treated, using approved chemical, mechanical, and lethal take techniques.	Expanding on Alternative A, the refuge would also work to prevent the establishment of exotic and invasive species through control of pass-through vehicle traffic and maintaining restrictions on ATVs, off-road vehicle use, and equine and other livestock.	Same as Alternative B.

Goal B. Habitat **Manage and protect habitats for migratory and native wildlife on Sam D. Hamilton Noxubee NWR to contribute to the purposes for which the refuge was established as well as to fulfill the mission of the National Wildlife Refuge System.**			
Issues	**Alternative A** **Continue Current Management, No Action Alternative**	**Alternative B** **Focus on Waterfowl and Federally Listed Species**	**Alternative C** **Focus on Migratory Birds, Federally Listed Species, Native Wildlife, Habitat Diversity, and Experiencing Nature**
Need for increased management of aquatic environments	The Service would actively manage approximately 252 acres of shallow water moist-soil impoundments, 1,200 acres of lakes, and 1,645 acres within four GTRs with auxiliary benefits for native species including a diversity of reptiles, fish, and amphibians, and waterfowl species.	Differing from Alternative A, water levels in all GTRs would be managed through water manipulation so no more than two GTRs would be purposefully flooded for wintering waterfowl habitat yearly. Efforts would be made to restore the biological integrity, diversity, and environmental health in the GTRs, to match those habitats of the surrounding forests of similar type. The refuge would increase management in the bottomland hardwood forests to restore historic conditions, while providing the needed habitat for waterfowl and, if present, federally listed species.	Expanding Alternative B, deep-water habitats within Bluff Lake would be created through dirt excavation to ensure consistency in recreational fisheries resources (i.e., crappie, bass, and sunfish). Excavated soil from the creation of the deep water habitat would be used to create islands within the lake to serve as bird rookery sites. Other existing water control structures on Bluff Lake and in areas upstream of the lake would also be modified or removed to allow fish passage. Paddlefish and Gulf coast walleye would benefit from the restoration. Additional ephemeral pools for amphibians would be artificially created throughout the refuge through excavation in areas where excess water impedes road maintenance or threatens sedimentation of streams.
Need for old fields to be reverted into pine and pine hardwood habitats	Active habitat management would continue to benefit grassland species by maintaining 1,140 acres of existing fields and grasslands and establishing approximately 80 acres of	As opposed to Alternative A, all old fields and the Morgan Hill Prairie Demonstration Area would no longer be maintained, but would be allowed to either naturally reseed or manually planted to a forest type most similar to historic conditions.	Opposed to Alternatives A and B, the Morgan Hill Prairie Demonstration Area would remain, but be reduced by more than 50% in size and the remaining area would be restored to habitats similar to that indicated by historic conditions. A limited number of old fields would be managed for the benefit of native grassland species. No new field sites would be created.

	grassland prairie habitat (grasses and light and heavy seeded broadleaf and tuberous perennials) at Morgan Hill through mowing, prescribed fire, and mechanical and chemical controls.		
Need for active forest habitat management	Under this alterative, those areas considered critical for RCWs would not be managed for historic conditions, but maintained as a pine dominated forest type using a variety of forest management techniques.	As opposed to Alternative A, other than in areas where forests are being restored to their historic condition, the refuge would actively manage forested habitats to maintain the desired wildlife habitat for federally listed species and waterfowl. Active even-aged and uneven-aged silviculture practices would occur using a variety of techniques, including timber harvest, prescribed fire, and chemical and/or mechanical midstory reduction.	Expanding on Alternative B, increased active forest management, including silvicultural treatments, prescribed fire, and chemical and/or mechanical midstory reduction, would occur throughout the refuge's habitats in order to achieve greater habitat diversity and forest structure to benefit a wider range of native wildlife.
Decline in habitat quality of bottomland hardwood forests	Under this alterative, bottomland hardwood forests would receive little to no active management other than water level manipulation occurring within GTRs for the benefit of waterfowl and recreation associated with waterfowl hunting.	As opposed to Alternative A, the refuge would actively manage the bottomland hardwood forests through a variety of silvicultural techniques and water level manipulation to ensure historic conditions are maintained with emphasis on providing the needed habitat for waterfowl and federally listed species.	Expanding on Alternative B, the refuge would also actively manage the bottomland hardwood forests for the benefit of forest breeding birds.

Goal C: Resource Protection Protect the natural and cultural resources of the refuge			
Issues	**Alternative A Continue Current Management, No Action Alternative**	**Alternative B Focus on Waterfowl and Federally Listed Species**	**Alternative C Focus on Migratory Birds, Federally Listed Species, Native Wildlife, Habitat Diversity, and Experiencing Nature**
Threats to cultural resources	Under this alternative, the Service would seek funding to conduct a refuge-wide archaeological survey, and a refuge led cultural resources interpretive program for refuge users and area residents would be initiated, to promote an understanding and appreciation of the human influence on the region's ecosystems for refuge users and area residents.	As opposed to Alternative A, the comprehensive, refuge-wide survey would be exchanged in favor of conducting individual cultural resource surveys only for specific projects or sites (614 FW 2). Partnerships would be developed with other agencies, institutions, and ethnic groups (e.g., Choctaw Nation, African-American groups), to accomplish tasks and seek ideas and means to improve management of cultural resources.	Alternative C combines and expands both Alternatives A and B. To protect cultural resources, completing a comprehensive, refuge-wide survey of archaeological sites would be the goal, as well as individual cultural resource surveys as needed for specific projects or sites. Partnerships would be developed with other agencies, institutions, and cultural groups (e.g., Choctaw Nation, African-American groups), to seek ideas and the means to improve management and interpretation of the refuge's cultural resources.
Threats to refuge habitats if the Approved Acquisition Boundary (AAB) is never acquired	This alternative would seek to acquire additional lands in the AAB through fee-title and timber for land exchange. Specifically, the Service would seek to acquire from willing sellers the remaining 4,263 acres of private land in-holdings within the refuge's existing AAB.	Same as Alternative A.	Expanding Alternative A, the refuge would develop conservation partnerships with neighboring landowners and work through partnerships to have the greatest impact on maintaining or restoring the biological integrity of the local community. Fee-title acquisition would focus on lands within the existing AAB that would most efficiently assist the refuge in meeting the purposes for which it was established and the mission of the Service.

Lack of funding and increased priorities on resources of concern to continue maintaining Research Natural Areas (RNAs)	The two existing RNAs would continue to be recognized as if under the Society of American Foresters (SAF) designation, but research objectives and management strategies would remain undeveloped.	Same as Alternative A.	Under this alternative, the two RNAs would no longer remain under this designation and would be managed as part of the larger surrounding units of similar type and managed for their historic conditions.
Need for increased law enforcement and patrol activities	Law enforcement efforts would continue at a level to protect both natural and cultural resources and public safety through a combined effort of an on-site refuge officer and partnership with other federal and state officers.	Expanding Alternative A, improvements to the existing law enforcement program would be based on recommendations provided by the Office of the Chief of Refuge Law Enforcement, Southeast Region, following a program review.	Expanding on both Alternatives A and B, the refuge would establish a second wildlife law enforcement officer postion in combination with possible collateral duty officer position, to assist in protecting natural and cultural resources along with public safety. A second officer would provide greater opportunities to assist visitors within the Connecting People with Nature Area. Additional improvements to the existing law enforcement program would be based on recommendations provided by the Office of the Chief of Refuge Law Enforcement, Southeast Region, following a program review.

Goal D. Visitor Services Provide opportunities for compatible wildlife-dependent public uses that promote an understanding and appreciation of fish, wildlife, habitat conservation, and the mission of the National Wildlife Refuge System.			
Issues	**Alternative A Continue Current Management, No Action Alternative**	**Alternative B Focus on Waterfowl and Federally Listed Species**	**Alternative C Focus on Migratory Birds, Federally Listed Species, Native Wildlife, Habitat Diversity, and Experiencing Nature**

Need for increased support of fishing and hunting activities	The Service would maintain small game, turkey, deer, and waterfowl hunting opportunities. Native fish populations within Bluff and Loakfoma lakes and Ross Branch Reservoir would be maintained through natural reproduction, regulated harvest, and stocking to support the current level of use.	Opposed to Alternative A, the existing hunting programs would be reduced through reductions in staff and facility support. The currently permitted hunting seasons that require significant administrative costs due to regulatory oversight (i.e., waterfowl hunting and primitive weapon and modern gun deer) would be exchanged for less costly seasons, such as an archery deer season requiring less administrative support. The visitor center would be closed on weekends and operating hours would be reduced to the work week (Monday-Friday), to match staff availability. The picnic area and nearby public restrooms would be closed. Fish habitat would not be enhanced for increased recreational uses.	The current level of visitor services programs would be expanded for the general public and attempts made to provide more access for users with disabilities and youth. The Service would develop a week-long, large game (turkey and deer) hunt program to provide increased opportunities for disabled hunters in exchange for a week reduction in the general gun deer and turkey seasons. Deer hunting opportunities overall would be increased by expanding the archery season to the full state season. The Service would work with MDWFP to develop youth hunting and fishing opportunities. Fishing opportunities would be expanded to include year-round designated bank fishing areas on Bluff and Loakfoma lakes. Other wildlife-dependent uses and their supporting facilities would be maintained and enhanced through upgrades or additional facilities. Alternative funding mechanisms, such as a public use fee under the Fee Program, and partnerships would be used to spread costs of programs across all users, possibly eliminating the need for separate hunting related fees. These funds would be used to maintain refuge roads, trails, kiosks, and hunting check stations, as well as support administrative costs and subsequently increase availability of congressionally appropriated funds for management of wildlife.

Demand for more or upgraded public use activities	Wildlife-dependent recreational opportunities that have been identified as priority under the Improvement Act would be offered under this alternative, including hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation. The refuge would maintain opportunities for wildlife observation and photography by restoring and improving access on overlooks, boardwalks, and trails.	As opposed to Alternative A, wildlife observation and photography opportunities would be reduced through the reduced availability and maintenance of viewing facilities, such as boardwalks and nature trails. Special use events requiring substantial planning and resources to host would be discontinued. Some of the secondary graveled roads would be closed to vehicles and instead would exist as non-motorized trails.	Similar to Alternative A, the existing visitor services programs would be increased. This alternative would establish a "Connecting People with Nature" area to consolidate activities and users requiring greater support to enjoy wildlife observation activities. Existing activities that are not considered wildlife-dependent uses, such as picnicking and off-road mountain biking, would not be allowed but more opportunities for bicycling, walking, and connecting with nature would be offered through designed trails with increased accessibility for disabled Americans. All existing wildlife-dependent uses and the supporting facilities would be maintained and, if resources are available, enhanced through possible increase and better maintenance in overlooks, boardwalks, and trails. An effort would be made to increase visitor safety and enjoyment through establishment of parking areas, improved management of vehicle flow, creation of paved walking and biking trails, and roadside bike lanes along Bluff Lake and Loakfoma Roads.
Lack of improved signage and access to information	Continue to acquire funding to replace lost, stolen, or dilapidated signs.	Opposed to Alternative A and because of reductions in visitor services programs, signage and information available to the public would be reduced. Only refuge regulatory signs would receive priority and only the minimal levels of directional signs would be maintained.	Opposed to Alternative B and similar to Alternative A, refuge regulatory and informational signs would receive priority. This alternative would increase the availability of directional signs and informational kiosks at all major access and gathering locations, to aid and direct visitors and alert them to key regulatory and interpretive messages.

Need for effective environmental education (EE) programs to help minimize negative impacts to wildlife and habitat	Current EE programs would continue with Starkville School District, Mississippi State University, and civic group personnel available to teach required curriculum and share expertise both on and off the refuge. The refuge would continue hosting meetings and interpretive programs at the EE Center, providing an onsite, outdoor classroom, and also offering staff support for EE and interpretive programs at offsite locations for 5,000 students annually. Refuge staff would continue to support the Friends group, which promotes refuge goals and programs and provides volunteer assistance and fund-raising.	Opposed to Alternative A, no offsite interpretive programs would be offered. Refuge staff would not participate in EE; it would be solely dependent on the currently structured partnership with Starkville School District and volunteers.	Expanding Alternative A, the refuge would partner with others to conduct EE and offsite activities and increase volunteer involvement.

Goal E. Refuge Administration **Provide sufficient leadership, staffing, information, and infrastructure to manage and protect migratory and native wildlife populations and their habitats, cultural resources, and compatible public uses that contribute to the purposes for which the refuge was established as well as the mission of the National Wildlife Refuge System.**			
Issues	**Alternative A Continue Current Management, No Action Alternative**	**Alternative B Focus on Waterfowl and Federally Listed Species**	**Alternative C Focus on Migratory Birds, Federally Listed Species, Native Wildlife, Habitat Diversity, and Experiencing Nature**
Lack of sufficient administrative resources to address increasing demands and increasing impacts	The authorized staff as of 2004 CCP was 16 employees, but has since been reduced to 13 employees. Facilities and equipment would be maintained as funding allows including: vehicles and heavy equipment; computer and communication systems; and refuge roads, buildings, structures, trails, and signs.	Opposed to Alternative A, the staff would be held at 13 or fewer employees with organizational changes made to increase field staff including law enforcement officers and biological and forestry technicians. Facilities and equipment including vehicles and heavy equipment, computer and communication systems, and refuge roads, buildings, structures, trails, and signs would all be placed on a priority list and maintained when funding allowed. Closing or removing of poorly maintained assets would occur.	Opposed to Alternatives A and B, this alternative would assume an increase in support resources above current levels of funding, staffing, partnering, equipment, and facilities, as well as Friends group and volunteer support needed to protect refuge resources and meet increasing public needs. The current staff of 11 employees would be reorganized under this goal of reaching an optimal staff level of 18, as recommended within the 2008 Final Report for the Staffing Model for Field Stations.

Need for an additional access fee for inclusion in the Fee Program	Under this alternative, the refuge would continue with the existing Fee Program for only deer and waterfowl hunters.	Same as Alternative A.	Expanding on Alternative A, this alternative would continue participation in the existing Fee Program. Changes within the program would include establishment of an access pass (e.g., Daily Pass, Weekly Pass, or Annual Pass) for all users to assist in funding the maintenance and development of public use programs and facilities. Current federal duck stamps and other congressionally authorized entrance fee passes would be accepted as a refuge access pass.

IV. Environmental Consequences

OVERVIEW

This section analyzes and discusses the potential environmental effects or consequences that can be reasonably expected by the implementation of each of the three alternatives described in Chapter III of this EA. Conclusions are based on best available scientific information, internal consultation, peer review, and professional judgment of the CCP planning team members. Appendix B provides an extensive list of references that were reviewed in preparation of this Draft CCP/EA.

The CCP is a programmatic document intended to analyze proposed actions over a 15 year-time frame on a conceptual level to guide management direction and priorities. It should be noted that these are anticipated effects. Prior to authorizing any future project proposal, the refuge will comply with NEPA as directed by the Council of Environmental Quality regulations at 40 CFR 1500-1508, including by providing for any public participation and site-specific analysis that may be required under NEPA.

Potential effects or impacts, either positive (beneficial) and negative (adverse), to resources resulting from the implementation of the three alternatives were identified and placed into one of the listed categories, where possible.

- None – No effects expected.
- Minimal – Impacts are not expected to be measurable, or are too small to cause any discernible degradation to the environment.
- Minor – Impacts would be measureable, but not substantial, because the impacted system is capable of absorbing the change
- Moderate – Effects would be measureable, but could be reduced through appropriate mitigation.
- Major – Impacts would be measurable and individually or cumulatively significant; an Environmental Impact Statement would be required to analyze these impacts.

ALTERNATIVE A: CURRENT MANAGEMENT - NO ACTION

This alternative would maintain the status quo, which would have net positive beneficial impacts on the human environment, wildlife populations, and wildlife habitat. Implementation of Alternative A is anticipated to result in net positive environmental benefits, but is not considered to be the most effective management strategy for achieving the goals and objectives of the refuge.

The refuge would continue to collect wildlife population information that contributes to good adaptive management mainly for the benefit of RCW. The RCW population would continue to be monitored and maintained on the refuge. Habitat for the RCW and other wildlife dependent on late-successional pine habitat would continue to be managed by silvicultural practices, raking, creation of new artificial cavities, maintenance of suitable cavities, use of restrictor plates, snake exclusion devices, predator and kleptoparasite control, and bark-shaving, which together would increase the RCWs productivity on the refuge. In addition to those areas where historic conditions support pine habitats, additional habitats would be maintained as even-aged pine even when not supported by historic habitat conditions and result in less diverse habitats on the refuge but increase habitat for RCWs. Harvesting of existing mature forests as part of regeneration efforts within present and future partitions would occur. All interspersed old fields would remain as fields regardless of location, which would likely benefit grassland species but could potentially have negative impacts on RCW management in areas having high densities of clusters.

Exotic and pest species would be actively removed or controlled using approved integrated exotic, invasive, nuisance, and pest management techniques and would positively affect the native plant communities. Knowledge would continue to be gained and shared with the public concerning climate change and the continued threats of exotic plants and animals.

Moist-soil plants and agricultural crops would be provided as a waterfowl food resource through disking, planting, fertilizing, and water level management. Protection, active management, and reconnaissance would take place for waterfowl. Little to no selective thinning of bottomland hardwood forests would occur for the benefit of over-wintering waterfowl populations or forest breeding birds and may lead to a less diverse, lower structured hardwood forests within the bottomlands and provide less foraging and nesting habitat for migratory birds. Under this alterative, bottomland hardwood forests would receive little to no active management other than water level manipulation occurring within all GTRs yearly for the benefit of waterfowl and recreation associated with waterfowl hunting. Other species including forest breeding birds and resident species, such as deer and turkey, may be negatively impacted as forest diversity and structure subsequently decline in favor of water and shade tolerant tree and shrub species. The refuge would provide minimal management for forest breeding bird populations through nesting, brooding, and foraging opportunities that may or may not decrease their population size.

Several habitats on the refuge would be actively managed including: shallow water moist-soil impoundments and GTRs through water level manipulation; old fields through mowing, prescribed fire, mechanical and chemical controls; and upland forests emphasizing maintenance and creation of pine habitat needed for the federally listed RCW.

Forested bottomland habitats would receive little to no active management other than water level manipulation occurring within GTRs for the benefit of waterfowl and recreation associated with waterfowl hunting with auxiliary benefits for other migratory and native species. The RNAs would continue to be recognized as if under the Society of American Foresters (SAF) designation, but research objectives and management strategies would remain undeveloped. Law enforcement for visitor safety, resource protection, and compliance with refuge regulation would remain the same. Archaeological and historical sites would continue to be protected, but surveying to document unknown sites would be minimal. The Service would seek to acquire from willing sellers the remaining 4,263 acres of private land in-holdings within the refuge's existing AAB.

The Service would maintain small game, turkey, deer, and waterfowl hunting opportunities. Also, sufficient fish populations within Bluff and Loakfoma lakes would be maintained through natural reproduction and regulated harvest. Opportunities for wildlife observation and photography would be maintained. The public would continue to be informed of refuge issues, opportunities, and proposed actions. The refuge would enhance opportunities for wildlife observation and photography by maintaining access on overlooks, boardwalks, and trails. The refuge would continue to promote local and seasonal volunteers and support the Friends of Noxubee Refuge, Inc. The refuge would continue maintaining a relationship with the public through the visitor center, signage, brochures, websites, and kiosks. The refuge would provide limited environmental education and interpretation programs but maintain the partnership with the Starkville School District to host classes at the education center. Primary access to the refuge would remain the same and road maintenance would be dependent on budget and staffing.

The refuge would continue day-to-day operations as able based on availability of funding, staffing, and equipment. This alternative would not increase, improve, or add facilities unless dedicated funding was obtained. Good communication with partners would continue. The refuge would develop updated step-

down plans from this CCP (i.e., wildlife inventorying and monitoring plan, habitat management plan, animal control plan, and visitor services plan) as resources allow.

Effects on the Physical Environment

This section discusses potential effects to physical resources (e.g., topography, soils, water resources) under the No Action alternative.

TOPOGRAPHY AND GEOLOGY

Beneficial

Under this alternative, positive impacts with regard to the topography and geology are anticipated only through the ongoing protection of natural resources.

Adverse

Under this alternative, no restoration of already impacted areas would occur and unstable areas may be adversely impacted through continued erosion of topography and geology that has already been disturbed.

SOILS

Beneficial

The refuge would continue to maintain native vegetation cover on the refuge that stabilizes and minimizes soil losses through erosion. All the land the Service now owns would remain under Service management, thereby eliminating the potential for soil impacts from development or other non-compatible uses. The refuge would continue to prohibit recreational activities such as ATVs that would damage soils on the refuge. Public use of trails, fishing sites, wildlife observation areas, parking lots, and other areas subject to high levels of public use would be designed and maintained to minimize impacts on refuge soils. Monitoring and mitigation of any erosion problems during routine refuge management would continue. Managing forests and wetlands would benefit soil quality and help maintain soil structure and the biological productivity of soil. By maintaining the native vegetation, natural soil formation processes would be encouraged. Overall, the protection and maintenance of habitats on the refuge are expected to benefit soils. The refuge would continue to use best management practices in all management activities that might affect refuge soils to ensure that we maintain or improve soil productivity and minimize erosion.

Adverse

Use of mechanized equipment could result in some soil erosion and compaction. The use of heavy equipment compacts soil, decreasing infiltration and percolation rates and increasing runoff (Lewis 1998). Soil productivity could be adversely impacted through compaction, erosion, and nutrient leaching and displacement during any activity involving machinery. Although activity by equipment is carefully monitored, minimizing soil compaction and rutting, a temporary increase in localized soil movement can be expected due to vegetation removal and use of machinery. Recovery of severely compacted soils could range from 5 to 40 years (Croke et. al 2001). Up to 90 percent of sediment produced from forested lands comes from roads (Grace et. al 1998). The erosion and sediment associated with roads can be mitigated but not totally eliminated. Planting of native species can be

used to provide a quick method for the stabilization of disturbed soils. Soil nutrient losses would be negligible in terms of long-term productivity.

Nutrients needed by the soil and stored within the trees would be lost due to timber removal, but over time nutrients would be added back into the soil through natural processes. Timber harvesting, without mitigation measures to protect soil and nutrient loss, can increase total watershed yields, storm peak flows, erosion, and sedimentation. The refuge would follow best management practices (BMPs), which include streamside management zones (SMZs).

Disturbance of soils through agricultural practices, fire management, maintenance and habitat management can lead to displacement, change in soil structure, and direct loss of soil within focused areas. Soil disturbance, without mitigation measures to protect soil and nutrient loss, could increase erosion, sedimentation, and introduction of exotics or changes in soil composition. All alternatives would follow Mississippi's BMPs (http://www.deq.state.ms.us/Mdeq.nsf/page/NPS_Agriculture and http://www2.dnr.cornell.edu/ext/bmp/contents/during/dur_roads.htm).

The use of off road vehicles for management activities is crucial for the efficient and effective management of habitats and maintenance on the refuge. However, use of these vehicles could have negative impacts on soils due to compaction, displacement of soil, and changes to hydrology. Use of vehicles with low ground pressure tires would be favored during monitoring activities and maintenance projects.

Under this alternative, chemicals would be used to augment soils or control vegetation. Overuse or misuse of the chemicals could cause adverse impacts through mortality to desired native vegetation, resulting in increased soil erosion. All possible best management practices would be implemented over the duration of these techniques to ensure the least possible adverse impacts. Under all alternatives, pesticides and fertilizers would be used to meet management objectives. Soil PH and composition may be altered due to use of chemicals. Before pesticides can be used on refuge lands and waters, pesticide use proposals are required in accordance with policy 596 FW 1. All pesticide usage would comply with the applicable federal (FIFRA) and state regulations pertaining to pesticide use, safety, storage, disposal, and reporting. Best management practices would minimize or eliminate possible effects associated with pesticide drift or surface runoff that may impact soils. Fertilizers would be used in accordance with agricultural BMPs (http://www.deq.state.ms.us/Mdeq.nsf/page/NPS_Agriculture).

Prescribed fires are used to enhance and maintain habitats; however, under unique circumstances, including burn piles and hot spots, soils could have the potential to become sterilized and have higher rates of erosion.

CLIMATE CHANGE

Climate change has been identified by the Service as a serious issue, as further detailed in Section A, Chapter II. Overall, impacts to climate change within the next 15-year period are expected to be minimal as climate in the area is already highly variable. No immediate action is anticipated as being needed, but changes in habitat and forest composition should be expected due to increased threat by exotic plants and animals and shifts in species composition. The refuge would strive to manage habitats for historic conditions and if necessary under changing climatic conditions provide the most stable habitat for those native species that would most likely flourish.

Beneficial

The refuge is expected to have positive, albeit small, net effects with respect to greenhouse gas emissions and associated climate change. The refuge would continue to acquire and protect lands,

thereby increasing the acreage of land covered with natural vegetative communities. Plants absorb carbon dioxide and as a result, vegetated areas can act as important carbon sinks (Heath and Smith 2004). This process, whereby plants take up atmospheric carbon dioxide and store it as biomass, is commonly referred to as carbon sequestration. Generally, the highest rate of carbon sequestration occurs during succession to forest, and the rate of sequestration declines as trees mature (Heath and Smith 2004). Department of the Interior Secretarial Order 3226 states that there is a consensus in the international scientific community that global climate change is occurring and that it should be addressed in governmental planning and decision-making. Secretarial Order 3226 was amended on January 16, 2009; however, Secretarial Order 3285 issued on March 11, 2009, replaced Amendment Number 1 and re-instated some of the provisions of the 2001 order. Secretarial Order 3285 established a Climate Change Response Council within the Office of the Secretary. Its purpose is to facilitate a Department-wide approach for applying scientific tools to increase the agency's understanding of climate change and to coordinate an effective response to the impacts of climate change upon tribes and on the land, water, ocean, fish and wildlife, and cultural heritage resources that the Department manages. It also made production and transmission of renewable energy on public lands a priority for the Department. The order calls for the incorporation of climate change considerations into long-term planning documents such as the CCP.

The increase of carbon within the earth's atmosphere has been linked to the gradual rise in surface temperatures commonly referred to as global warning. In relation to comprehensive planning for national wildlife refuges, carbon sequestration constitutes the primary climate-related impact to be considered in planning. The U.S. Department of Energy's Carbon Sequestration Research and Development (U.S. Department of Energy 1999) defines carbon sequestration as "...the capture and secure storage of carbon that would otherwise be emitted to or remain in the atmosphere."

The land is a tremendous force in carbon sequestration. Terrestrial biomes of all sorts—grasslands, forests, wetlands, tundra, perpetual ice, and desert—are effective both in preventing carbon emissions and in acting as a biological "scrubber" of atmospheric carbon monoxide. The conclusions of the Department of Energy's report noted that ecosystem protection is important to carbon sequestration and may reduce or prevent the loss of carbon currently stored in the terrestrial biosphere. Forests have emerged as important factors in climate change. Trees store, or sequester, significant amounts of carbon within the trees' wood, thereby helping offset the large amounts of carbon dioxide emitted by factories, motor vehicles, and other sources. When trees burn down or die, much of that carbon is returned to the atmosphere. It can take decades for forest regrowth to sequester the amount of carbon emitted in a single wildfire. Studies have shown carbon emissions were reduced for forests that had been subject to prescribed burns, depending on the vegetation mix and location of the forests.

Conserving natural habitat for wildlife is the heart of any long-range plan for national wildlife refuges. The actions proposed in this
Draft CCP would conserve or restore land and water, and would thus enhance carbon sequestration. This, in turn, would contribute positively to efforts to mitigate human-induced global climate changes.

Adverse

Under the no action alternative, no steps would be taken to investigate the potential impacts of climate change on the refuge's habitats, so no information that could be useful to future managers if habitats are impacted due to climate change would be available.

AIR QUALITY

Beneficial

Other than vehicles and equipment used by staff and public users, there are no major stationary or mobile sources of air pollution present on the refuge, nor would any be created under any of the alternatives. The Service expects refuge land management to help reduce any future direct and cumulative impacts by maintaining and promoting natural vegetative cover throughout the refuge. Through time, all upgrades to existing facilities would become more and more energy efficient. Collectively, these management actions would help reduce the potential for additional synthetic sources of emissions in the surrounding landscape.

Timber harvest to improve forest conditions would improve air quality. Healthy and productive trees store carbon and release oxygen. Air quality in the region is generally good and we do not expect our management to result in measurably changed air quality, but actions under this alternative may positively contribute to local ambient conditions.

Adverse

The two management actions that affect air quality the most are prescribed fires and timber harvests. The major pollutants from prescribed burning are particulates (small particles of ash, partly consumed fuel, and liquid droplets) and gases (carbon monoxide, carbon dioxide, hydrocarbons, and small quantities of nitrogen oxides). Those would continue to be released if the no action alternative is selected. Air quality could be temporarily degraded during fire management operations, however, wildfires tend to consume considerably more biomass per acre and occur under weather conditions outside the planning window of fire managers. No major differences in air quality relative to prescribed fire are anticipated. Prescribed burning, while temporarily degrading air quality is done under more predictable circumstances and generally under conditions where fuel consumption, the primary factor in determining particulate emissions, is less than wildfires. Low intensity prescribed burning would release inconsequential amounts of gases. Particulates can reduce visibility or cause negative effects on the health of people with respiratory illnesses. Appropriate smoke management can minimize or nearly eliminate both negative effects.

Vehicular use from heavy equipment, staff, and visitors with the associated emissions is likely to have the greatest impacts on air quality due to a growing local and regional population and increased refuge visitation. However, this might be mitigated by reduced vehicle or residential emissions in the local area and by managing traffic that uses refuge roads as commuting lanes without the intended purpose of visiting the refuge. Lower traffic speeds would also encourage greater fuel conservation and fewer emissions as well. In general, any management activity that requires the use of equipment which consumes fuels or causes particulate matter to be raised into the air will impact air quality. However, general management activities would not significantly adversely affect regional air quality and would likely be compensated for by the general health of the local habitat and function of a healthy ecosystem; none of the alternatives would violate EPA standards, and all three would comply with the Clean Air Act.

HYDROLOGY AND WATER QUALITY

Beneficial

Conservation lands, such as the refuge, tend to improve water quality downstream as vegetated areas reduce runoff and sedimentation, while also absorbing some nitrogen, phosphorus and other pollutants.

Leaving streams unaltered provides beneficial impacts to wildlife and water quality by maintaining natural structure and flow and encouraging establishment of native species. Release of held water with water control structures increases the oxidation of water downstream possibly benefiting paddlefish and other aquatic species. The holding of water within lakes and GTRs increases opportunities for sedimentation removal and other forms of filtering of water. Following forestry, agricultural and storm water BMPs and the use of low-impact development methods on refuge lands are expected to improve water quality within portions of the refuge. The positive impacts to water quality are expected to be moderate under this alternative.

Adverse

Under the no action alternative, the cumulative effects of public recreation, prescribed fire, use of mechanical equipment, maintenance of roads, and long-term herbicide use for vegetation control could result in a slight decrease in water quality in localized areas, specifically in wetland transition areas prone to exotic, nuisance, or pest plant infestation. Confining water within lakes and GTRs reduces opportunities for natural flooding and deposition of nutrients throughout refuge habitats. Spawning and fish passage are negatively impacted by using water control structures. Under all alternatives, BMPs when conducting management and maintenance activities would be implemented. With proper application of herbicides, no activity should have long-term damaging impacts on water bodies. The main effects of prescribed burning on water resources are the potential for increased runoff due to rain events. Prescribed burning itself usually does not affect water quality unless it is so intense that it consumes the duff and litter layer and exposes soils near streams (Marshall 2008). When surface runoff increases after burning, it may carry suspended soil particles, dissolved inorganic nutrients, and other materials into adjacent streams and other waterbodies, thus reducing water quality. These effects seldom occur after prescribed burns in Coastal Plains. Generally, a properly planned prescribed burn will not adversely affect water quality or quantity of ground or surface water in the South (USDA Forest Service, R8-TP 11, 1989). Moderate prescribed burns that retain ground cover but top-kill most plants should produce small increases in streamflow and channel sediment and negligible increases in surface runoff and erosion (Douglass 1983). Keeping roads well-maintained; treating exotic, nuisance, or pest plant infestation areas quickly after being discovered; and conducting reconnaissance of public use would keep impacts to water quality small, lessening the impact that may affect local water quality. Under all alternatives, we would conduct reconnaissance on the condition of the lakes and rivers in the refuge. If necessary, areas would be posted with use restrictions, possibly closed and protected, or barriers would be used to direct activities towards areas with less steep slopes. Public outreach and education on littering and proper waste disposal would lessen potential negative water quality impacts.

NOISE

Under all alternatives, moderate increases in noise above ambient levels from equipment and automobile traffic are expected. Under all alternatives, temporary noise and minor traffic increases would be by-products of habitat and wildlife management and public visitation. Noise pollution under all alternatives would be temporary.

Effects on the Biological Environment

This section discusses the potential effects of the No Action alternative on the refuge's biological resources (e.g., habitats, wildlife, and federal- and state-listed species).

HABITATS AND VEGETATION

Beneficial

Prescribed fire and chemical application promotes desirable understory, early successional herbaceous species, and helps to control exotics and undesirable woody vegetation. Additional resources, if provided, would allow for more control of invasive species, further improving forested habitat conditions. Quick and early treatment of invasive plants with chemicals and water management are often the methods of control. Prevention of invasive vegetation may involve washing of equipment prior to movement throughout the refuge and the careful planning of public vehicle flow to discourage pass-through traffic, while still promoting vehicle access throughout the refuge by visitors.

Adverse

Prescribed fires have the potential to kill desirable plants located throughout the vertical structure of the forest. Plant characteristics such as bark thickness and stem diameter influence the susceptibility to fire. Most hardwood bark has poor insulating qualities and is thinner than the bark of pine species. As a result, hardwood trees are generally much more susceptible to fire injury than pines. Placing prescribed fire in areas such as bottomland hardwoods has the potential to influence species composition away from that of historical habitat conditions. Even within fire-dependent species, cambial damage can occur from the extended smoldering of duff around the plant's root collar, especially in areas with heavy fuel loads. Damage can also occur whenever excessive heat penetrates and consumes the forest litter layer, killing feeder roots and beneficial soil organisms. Many of these negative impacts can be mitigated through frequent burning, which, in turn, reduces fuel loading and proper placement of fire breaks.

Chemical and water management may adversely impact vegetation and habitats through the release of other non-target species. These species out-compete native vegetation, impacting desirable habitat. Removal of vegetation causes direct mortality of targeted species. Non-targeted species could also be negatively impacted. Individual plants and their communities are impacted at varying levels. For example, damage to crowns or tree stems during the process of removing neighboring trees could result in exposing cambium that subsequently allows for infestation by bark beetles, thus killing the non-target tree. Other management activities, including the practice of raking and clearing around the base of the tree, can have negative impacts on certain species. Impacts from raking are expected to be negligible, because raking only occurs on RCW cavity trees and the beneficial impact to raking is protection of the tree from mortality caused by high-intensity fire. The adverse effects of raking are exposed soil, roots, and damage to roots, but would be mitigated through light raking only when protection from fire is crucial. Creation of new cavities for RCWs, although playing a role in the birds recovery, may have some effects on the stem of the tree by weakening the tree and allowing avenues for pests and non-target species infestations as well as tree mortality due to stem breakage from wind damage.

The use of ORV's for management activities is crucial for the efficient and effective management of habitats and maintenance of assets on the refuge. Use of these vehicles could have negative impacts on vegetation and the degree of loss is dependent on the intensity of vehicle use (Hall 1980). Use of ORVs would only be sporadic during monitoring activities and maintenance projects. Maintenance activities to maintain or improve infrastructure, such as roads or trails, may involve the occasional use of chemicals or mechanical tools to remove unwanted vegetation. Where invasive vegetation already exists, the use of mechanical tools can often promote the further spread of the unwanted plant's seeds or growing parts. Soil disturbance from maintenance activities and public use can often open up areas to the colonization by invasive vegetation. Without careful planning and attention to BMPs, overspray

of chemicals can kill desirable plants and impact sensitive wildlife species. Identification and inventory of sensitive habitats, such as those used by butterflies and sensitive amphibians, play a key role in protection of these areas. Public use and vehicle traffic can also be a seed source for the introduction of nonnative or disease infected vegetation. Quick and early treatment of invasive plants with chemicals is often the best method of control. Prevention of invasive vegetation may involve washing of equipment prior to movement throughout the refuge and the careful planning of public vehicle flow to discourage pass-through traffic, while still promoting vehicle access throughout the refuge by refuge visitors.

Deer overabundance can affect native vegetation and natural ecosystems (Tilghman 1989, Nudds 1980, Hunter 1990; Behrend et al. 1970). White-tailed deer have substantial impacts on certain herbaceous and woody species and on overall plant community structure (Waller and Alverson 1997). Over-browsing by deer can decrease tree reproduction, understory vegetation cover, plant density, and plant diversity (Warren 1991). High densities of deer have been recognized as vectors for spreading invasive species like Japanese stiltgrass. Public white-tailed deer hunts to manage deer populations can benefit vegetative communities.

Feral hogs can have large negative impacts on native habitats and wildlife. Hogs are known to destroy native plants, consume native wildlife through their feeding behavior, and damage infrastructure, such as trails and earthen levees. Negative impacts to habitat would continue and increase if feral hog populations are not eliminated. Due to their high reproductive potential, a few hogs can multiply into many hogs within a few years. Under all alternatives, impacts would be negligible through the attempted removal of all feral hogs. Hogs would be removed through targeted trapping and harvest.

Although beaver play an important ecological role in wetland creation, unmanaged beaver populations can lead to persistent damming of free-flowing waters, resulting in vegetation mortality, including mature trees. Adaptive management would play an important role in managing damage through removal of undesirable beavers and their dams, lessening the impacts on forested habitats and infrastructure. Impacts would be negligible under all alternatives.

<u>Pine and Pine/Hardwoods</u>

Beneficial

Under Alternative A, the refuge would disregard historic forest conditions and manage to promote approximately 27,000 acres of pine and pine/hardwood mixed forests. The greater number of pine acres could possibly equate to higher numbers of RCWs and other wildlife species that favor mature pine habitats having conditions favorable for RCW. More pine acres available for RCW would likely not allow many clusters to be managed for Good Quality Foraging Habitat unless cluster numbers are decreased form the goal of 88 clusters under this alternative.

Adverse

Ignoring historical forest conditions would allow pine species to become established throughout the refuge. More pine acres equates to fewer acres of other habitat types, specifically upland and bottomland hardwood forests and associate species. The expansion of pine species into less suitable habitats increases management costs and efforts due to greater effort needed to reduce hardwood competition. Encouraging RCWs to form clusters within non-historical pine locations often subjects partitions to be managed well below the recovery standard due to habitat fragmentation issues and subject individual birds to lower chance of reproductive success and survival.

Bottomland Hardwoods

Beneficial

Under alternative A, little to no active forest management, other than seasonal flooding of GTRs, would occur in these habitats. Lack of active forest management would limit disturbance to soils and the forests' community structure. Disturbances that do occur would be limited to natural factors such as tornados and wind storms. Those species that favor a dense overstory with little to no midstory and understory would be more prevalent. Shade tolerant tree species would become common.

Adverse

Under Alternative A, the refuge would manage for fewer acres of upland and bottomland hardwoods than represented by historic forest conditions. This alternative would likely cause a decrease in species composition and reduction in forest structure. Shade intolerant tree species (i.e., oaks) and the hard mast they produce would be reduced, negatively impacting native species, including waterfowl, migratory birds, and many resident wildlife species.

Aquatic Habitats

Beneficial

Under Alternative A, water quality would be protected by using the BMPs and the Service's Pesticide Use Proposal process. The natural flood regime would promote natural hydrological functions. Protection of streams from physical disturbance protects water quality and stream integrity and structure. Drawdowns of lakes encourage shrub and herbaceous growth, promoting healthy fisheries and food for waterfowl. Under this alternative, the dieback of forest within GTR areas would continue to create more aquatic habitats.

Adverse

Artificial flooding of bottomland hardwoods outside of the natural flood regime with the aid of water control structures can lead to degradation of habitat, direct mortality of trees, increases in soil erosion, and decreases in water quality. Reduction in the number of bottomland habitats for pine would impact seasonal wetlands and change hydrology. These areas would be managed for increased sunlight, low tree basal areas, herbaceous understories, and moist-soil species.

WILDLIFE

Beneficial

Management of habitats and control of exotic and invasive species using integrated pest management can have both indirect and direct impacts on wildlife. Under this alternative, the maximum number of RCW clusters would be sought, fields would be maintained for grassland species, and waterfowl and other moist-soil loving species would benefit. Resident species would benefit, but receive little direct management attention. Migratory birds favoring a closed canopy, simple structured hardwood forest would benefit. Although the physical act of management can cause the destruction of habitat and the mortality or displacement of wildlife, adaptive management and planning of activities to consider the needs of wildlife throughout their lifecycle can mitigate these impacts. For example, mowing fields and levees would be scheduled to occur outside of the birds' nesting season. Capture, tagging, marking, and banding of wildlife is used to monitor populations of RCW and waterfowl. Beneficial effects include the collection of scientific data to appropriately monitor and better manage these populations.

Adverse

Management actions and recreational uses can cause wildlife disturbance. Immediate responses by wildlife to disturbing activity can range from behavioral changes, physiological changes, or mortality (Knight and Temple 1995). The long-term effects are more difficult to assess. Wildlife responses to human disturbance include avoidance, habituation, and attraction (Knight and Cole 1991). A key factor in predicting how wildlife would respond to disturbance is the predictability of the activity within the habitat. The use of trails or boardwalks for wildlife viewing during predictable times would mitigate the impacts (Oberbillig 2001). Wildlife species have a greater reaction to humans moving unpredictably (Gabrielsen and Smith 1995). When nesting waterbirds are approached by humans, they often flush from nests in an attempt to either intimidate a potential predator or to flee from danger (Carney and Sydeman 1999). Wildlife may also be attracted to human presence if provided a reward. Habituation of wildlife to visitors may increase mortality of wildlife due to nuisance behavior, vehicle collisions, or illegal harvest. Visitors would be encouraged to use developed trails, roads, boardwalks, and overlooks to limit disturbances and concentrate visitor activities to less sensitive areas; areas heavily used by migratory birds would be limited for public use; traffic patterns and speeds on refuge roads would be kept low to decrease disturbance and wildlife mortality. Allowing public use on the refuge increases litter, pollution, and disturbance to wildlife.

Under this alternative, RCW cluster management would continue to be challenging due to limited number of acres available within each partition. Wildlife favoring non-pine habitats would be impacted by having fewer acres of hardwoods available. Species favoring a diverse, multi-structured mature forest would receive little benefit. Hard mast productivity would remain low, impacting a wide variety of migratory and native wildlife.

Capturing, tagging, marking, and banding of wildlife are used to monitor populations. Adverse effects could include the stress, mortality, and injury of wildlife. Mitigation of these practices would include using the least intrusive and safe capture techniques according to published guidelines for each species.

The use of ORVs for management activities is crucial for the best management of habitats and maintenance on the refuge. Use of these vehicles could have negative impacts on wildlife through disturbance. Use of these vehicles would only be sporadic during monitoring activities and maintenance projects.

Waterfowl

Beneficial

Under Alternative A, the refuge targets producing at least three times the amount of food expected to be used by waterfowl through the flooding of all GTRs, production of moist-soil plants within the refuge's agricultural fields, and management of lake water levels annually. The refuge provides up to 150 wood duck boxes for increased nesting opportunities. Closure of lakes and moist-soil areas to refuge visitors during wintering periods protects waterfowl from unnecessary disturbance.

Adverse

Under this alternative, decreased forest health and structure and the direct mortality of trees due to repeating flooding of the forest in GTRs would have some adverse impacts to waterfowl in these areas due to less hard mast production. However, the forest would eventually provide increased open areas favorable to moist-soil annual plant growth and waterfowl use. Allowing public use on the refuge increases litter, pollution, and disturbance to waterfowl.

Forest Breeding Birds

Beneficial

The greatest benefit would be provided to forest breeding bird species favoring pine forests with similar needs to that of the RCW. Wading birds would also benefit from dead timber areas created within GTRs. Closed canopy hardwood forests with little to no midstory and understory would benefit some resident and migratory species [e.g., northern bobwhite quail (*Colinus virginianus*), yellow-breasted chat (*Icteria virens*), and wood thrush (*Hylocichla mustelina*)] that are already common within the landscape. Rusty blackbirds may benefit under this alternative.

Adverse

The less common forest breeding birds that favor mature and structurally diverse hardwood forests would be provided limited habitat. With little alternative habitat existing in the surrounding landscape, these species would likely be greatly reduced within the local area. Loss of soft and hard mast would leave a variety of forest breeding birds susceptible to lowered food resources and higher levels of mortality. Allowing public use on the refuge increases litter, pollution, and disturbance to forest breeding birds.

Aquatic Biota

Beneficial

Active management of refuge waters, from its original un-manipulated state where natural processes remained in place to a highly controlled system using water control structures and levees, provides habitats for a diversity of aquatic species including sport fish. Highly oxygenated waters exiting from water control structures provides potential spawning habitat for various species of fish, including paddlefish. These artificial systems provide a reliable water source for aquatic biota that would otherwise be subjected to periods of little to no water. The created lakes and wetlands trap sediment and pollutants and help protect habitat for mussels and other sensitive aquatic species. Although many water bodies are artificial and manipulated, there are large areas where rivers, streams, and wetlands

are left in their natural state. Fish and other species have benefited from the protection of the natural rivers, as well as the manipulation of other water bodies.

Adverse

Levees and other water control structures change the natural flood regime, in turn, modifying habitat for aquatic species. Often the impacts of these modifications are unknown for these species. Water control structures often present barriers for safe fish passage upstream. Water control structures also have the potential to dampen the variability of floodwaters therefore reducing spawning habitat for fish and other aquatic biota. Use of chemicals for control of exotic and invasive species can impact aquatic biota causing mortality and changes in water chemistry. Use of boats within waters does increase pollution and the possibility of petro-chemical spills which can, in turn, cause adverse impacts to aquatic biota. Allowing public use on the refuge increases litter, pollution, and disturbance to aquatic biota.

Resident Wildlife

Beneficial

Promotion of early successional habitats within the pine forests benefits a variety of species (e.g., bats, butterflies, deer, turkey, quail, rabbit, and sparrows). Protection of snags, cavities, and downed woody material would also benefit a variety of species (e.g., bats, wood duck, spiders, beetles, raccoon, and opossums) by ensuring available habitat used for food, cover, and breeding areas. Although adverse impacts occur for individual game species, public hunting protects these populations from disease, starvation, and other factors from over-use of the habitats.

Adverse

The lack of tree diversity and forest structure within the bottomland hardwood forests would decrease soft and hard mast and cover for a variety of species (e.g., butterflies, deer, turkey, quail, rabbit, and sparrows). Decreasing of hardwoods and hard mast species in pine forests, which in turn decreases food resources and cover, adversely affects a variety of species (e.g., squirrels, quail, turkey and deer). Removal and harvest of wildlife through public hunts and nuisance and invasive species management have adverse effects on individual wildlife. Allowing public use increases the chances for direct mortality of some species due to vehicle collisions and disturbances that could interfere with the natural behavior of wildlife. Allowing public use on the refuge increases litter, pollution, and disturbance to resident wildlife.

FEDERALLY LISTED SPECIES

Beneficial

Management of the endangered RCW and wood stork is unique because of their biological needs. RCWs require intensely managed pine habitat maintained by fire, herbicide, siliviculture, installation of artificial cavities, and frequent disturbance associated with monitoring. In addition, limiting the amount of midstory to promote herbaceous ground cover is beneficial for RCWs.
Under Alternative A, RCWs would receive maximum pine acres in which to form the targeted 88 clusters. If this number of active bird clusters could be formed and maintained, it would equate to greater numbers of RCW and better protect species genetic diversity, which would help the refuge serve its purpose of being a support population for RCW recovery. Specifically, the refuge would strive to artificially maintain or convert 22,000 acres to a pine-dominated habitat, to meet the population goal

of 88 clusters. This would be beneficial due to less vulnerability of demographic isolation of northern subpopulation and of environmental effects such as storm damage. All RCW management and monitoring methods represent those in the recovery plan to provide a net conservation benefit.

Under Alternative A, the refuge provides summer feeding opportunities for migrating wood stork. As forest health decreases in GTRs due to yearly flooding for waterfowl, these increasing open habitats may become more favorable for wood stork that feed and roost in these open wetland-like habitats. Water drawdowns in lakes would continue to provide isolated pools of fish and feeding habitat for these birds. Wood stork numbers are expected to increase under this alternative. Wood storks benefit from seasonal drawdowns of water that create isolated pools with fish and invertebrates on which they can feed. These same drawdowns promote the growth of moist-soil plants that benefit waterfowl and secretive marsh birds, such as rails.

Adverse

Management of the endangered RCW is unique because of its biological needs. Management actions can negatively impact other wildlife within similar habitats. Limiting the amount of midstory to promote herbaceous ground cover can result in habitat less desirable to some native wildlife species requiring higher levels of cover. Management and protection of the birds' cavities often require the control of flying squirrels and other species considered kleptoparasites. Drawdowns of lakes and other water bodies for wood stork impact public use access and fish favoring deepwater habitats. If low oxygen conditions develop when water levels are low due to high temperatures, fish die-offs could occur. Natural restocking would occur with natural flooding of the area in winter and spring, but fish stock may be depleted for periods of time.

Under Alternative A, the refuge would require 22,000 acres (the refuge currently has 48,219 acres of land total) of pine forests to meet the target population of 88 clusters and manage the habitat for Recovery Standards; meaning conversion of approximately 10,000 more acres of hardwood habitat. Due to likely unsurmountable habitat fragmentation and issues of competition with hardwood species, many of the RCW partitions would not have sufficient acres or pine forest structure to manage for Recovery Standards. Staff and refuge resources would be insufficient to meet the management actions needed to maintain this level of effort and RCW clusters would remain unstable and likely continue to decrease. Harvesting of existing mature forests as part of regeneration efforts within present and future partitions would impact individual birds by temporarily removing potential habitat for up to a 30-year period. Other silvicultural operations (i.e., thinning, mulching, right-of-way maintenance, emergency actions, and timber stand improvements) could adversely impact individual birds through accidental take of cavity trees. Operation of forestry equipment within partitions and clusters could have an adverse impact on disturbance of individual RCWs while in nesting season. Closing abandoned clusters in favor of adding acreage to remaining clusters would adversely impact those RCWs that may disperse into these areas. Monitoring and research, including the capture of birds, could result in accidental mortality and disturbance. Use of prescribed fire could result in the accidental loss of cavity trees and RCWs. The use of chemicals to control undesired woody understory or exotic/invasive species would have temporary adverse impacts to RCWs, possible mortality of cavity trees, and killing insects that they feed on. Creation of new cavities for RCWs by using a chainsaw and other equipment to cut a hole in pre-determined cavity trees, bark shaving, use of restrictor plates, and use of other excluders could subject trees to damage, insect infestation, and increased wind throw, which could lead to cavity tree mortality. Public use within partitions (i.e., hunting, hikers, wildlife viewers, and vehicle use) could adversely affect RCWs by disturbance or take of individual birds. Maintenance of roads, trails, and related infrastructure could adversely impact RCWs through disturbance. Maintenance of facilities could adversely impact RCWs through disturbance. Protection of archaeological sites would have adverse impacts on RCWs by potentially removing these areas from

productive habitat. Creating and maintaining firebreaks could adversely impact RCWs through disturbance. Refuge boundary maintenance could adversely impact RCWs through disturbance. Administrative use of vehicles within partitions and clusters could have an adverse impact on disturbance of individual RCWs while in nesting season. Specifically other potential adverse effects are:

- the long-term projected absence of future suitable habitat and stands to replace those that are expected to decline within the next 50 years
- smaller available habitat due to overlapping partitions
- limit the amount of GQFH available due to limitation in staffing
- continuing to manage for 88 RCW groups in smaller partitions where the establishment of sustained habitat over time will be limited in certain situations (RCW cluster at the RCW trail)
- ability to regenerate without falling below the MSS would be constrained, and in such cases one consequence is to do nothing and when the stands naturally decline to an unsuitable state, RCW group loss can occur

Under Alternative A, there would not be any adverse impacts to wood storks.

EFFECTS ON SOCIOECONOMIC ENVIRONMENT

This section discusses potential effects to socioeconomic resources (e.g., refuge revenue sharing, wildlife-dependent economics, ecosystem services, and land use patterns) under the No Action alternative.

Refuge Revenue Sharing

The "Revenue Sharing Account" places funds collected through wildlife habitat management and agriculture revenue generating activities into one joint account for all refuges that is then redistributed throughout the Refuge System. These funds are used in lieu of property taxes to reimburse counties at a rate determined by congress. A revenue sharing check from the Service is paid to counties having refuge administered lands. Annual refuge revenue-sharing payments to Oktibbeha, Noxubee, and Winston counties would continue at rates authorized by Congress under each alternative. Also a small portion, currently $60,000 or less per year is returned to the refuge in an "Expense for Sales Account." These funds are used in the administration of forestry related activities.

ALTERNATIVE B: FOCUS ON WATERFOWL AND FEDERALLY LISTED SPECIES

Alternative B would emphasize and primarily focus on federally listed species and waterfowl on the refuge. Implementation of this alternative is anticipated to result in net positive environmental benefits.

All habitats would be managed to reflect their historic habitat condition. There would be a potential for less active management and use of prescribed burning in habitats that do not support RCWs, along with a shift in management goals in areas that do not reflect historical habitat conditions to those that will support historic condition into the future.

Active habitat manipulations used to benefit RCWs would include silvicultural practices; raking; mowing; integrated exotic, nuisance, and pest management; creation of new artificial cavities; maintenance of suitable cavities; use of restrictor plates; snake exclusion devices; and kleptoparasite control, which together will increase the RCW productivity on the refuge. Forested habitats not tied to ongoing RCW management would only be actively manipulated to produce a forest reflective of historic conditions.

The refuge would provide feeding and resting opportunities for 10,000 waterfowl each winter through focused management of moist-soil plants, planted agricultural crops, shallow water habitats in lakes, and seasonally flooded GTRs. Enhanced wood duck nesting opportunities would be provided, placing increased emphasis on retaining trees with natural cavities and using a reduced number of wood duck nest boxes. Waterfowl brood survival would be increased by managing for brooding habitats within shallow water areas of lakes and wetlands. Refuge staff would continue to participate and coordinate in wood duck banding programs to meet the refuge quota as assigned by National Migratory Bird Program. Disturbance to migratory waterfowl and wading birds during their critical life cycle stages would be provided by a stable level of acres with limited or no human access. Buffers excluding human access would be created around wading bird rookeries.

Exotic and pest species would be actively removed or controlled in all areas of the refuge, using approved integrated pest management techniques and would positively affect the native plant communities. Knowledge would continue to be gained and shared with the public concerning refuge species, habitat management, and potential impacts of climate change. This, in turn, would lead to more diverse habitats on the refuge by providing the best possible habitat for the federally listed species, as well as a mosaic of habitat types based on specific site characteristics that benefit native wildlife including migratory birds. The refuge would not actively manage habitat within streamside management zones or upland hardwood forests. Bottomland hardwood forests would have limited silvicultural practices needed to maintain species diversity and production of hard mast for waterfowl foraging opportunities. The Service would maintain aquatic environments through seasonal drawdowns to produce native moist-soil plants and isolate fish for wood stork, seasonal flooding to make moist-soil plants available to waterfowl, herbicides used to control exotic and pest plants, and seasonal disking used to control woody growth and ensure quality habitat for waterfowl species and other migratory birds, colonial nesting birds, and native aquatic fauna.

The only species that would be inventoried and monitored would be those species of refuge management concern, including RCWs and waterfowl. No additional quantitative monitoring would occur for resident wildlife species, such as white-tailed deer, wild turkey, northern bobwhite quail, amphibians, reptiles, fish, or invertebrates.

With the increased management focus on federally protected species and migratory waterfowl that need pine and bottomland hardwood forests, all old fields and the Morgan Hill Prairie Demonstration Area would no longer be maintained as fields, but allowed to either naturally re-seed or be planted into a forest type most representative of historic conditions. The loss of old fields would likely be detrimental to grassland species; however, increased management of pine habitats may more than offset these losses. Active forest management through a variety of silvicultural techniques including selective thinning, prescribed fire, and chemical or mechanical midstory reduction would be used. Research objectives and management strategies would remain undeveloped for RNAs.

Law enforcement for visitor safety, resource protection, and compliance with refuge regulations would remain the same. Without increased support through additional staff, partnerships, and funding, this level of law enforcement could have adverse effects on resource protection and visitor safety. Archaeological and historical sites would continue to be protected, but surveying for unknown sites would be minimal and only completed when a new project is approved.

The Service would maintain but simplify the administrative oversight (depending on funding and volunteer involvement) for the refuge's public use programs, including small game, deer, and waterfowl hunting, and fishing opportunities. User satisfaction may be decreased as active support of these programs is reduced.

The refuge would continue to maintain a relationship with the public through a visitor center, signage, brochures, websites, and kiosks, but these opportunities may be reduced due to funding restraints or higher priorities of the resources of concern. The refuge would provide limited environmental education and interpretation programs in addition to those provided through the environmental education center and the partnership with Starkville School District and volunteers. Opportunities for wildlife observation and photography would be maintained only at levels at which dedicated funding allowed. Opportunities for activities outside the six priority public uses of the Refuge System would be eliminated. The public would continue to be informed of refuge issues, opportunities, and proposed actions. The refuge would continue to promote local and seasonal volunteers and support the Friends of Noxubee Refuge, Inc. Access to the refuge would remain, but closure of some public access trails and roads would occur, leaving only primary access routes onto the refuge and no more than one road into each refuge unit open.

The refuge would continue day-to-day operations with minimal funding and equipment. This alternative would not increase, improve, or add facilities. Facilities, staffing, and equipment would be maintained as funding allowed. This alternative assumes no increase in staffing and stable funding to manage the refuge. Good communication with partners would continue and efforts would be made to improve this communication. The refuge would continue with the existing fee program for white-tailed deer and waterfowl hunters.

Effects on the Physical Environment

This section discusses potential effects to physical resources (e.g., topography, soils, and water resources).

TOPOGRAPHY AND GEOLOGY

Beneficial

Under Alternative B, positive impacts with regard to the topography and geology are anticipated with effort going to restoration of disturbed sites.

Adverse

Under this alternative, no adverse impacts to the topography and geology are anticipated.

SOILS

Beneficial

The refuge would continue to maintain native vegetation cover on the refuge that stabilizes and minimizes soil losses through erosion. All the land the Service now owns would remain under Service management, thereby eliminating the potential for soil impacts of development or other uses. The refuge would continue to prohibit recreational activities such as ATVs and horses that would damage soils on the refuge. Public use of trails, fishing sites, wildlife observation areas, parking lots, and other high-use areas would be designed and maintained to minimize impacts on refuge soils. Monitoring and mitigating for any erosion problems during routine refuge management would continue. Managing and restoring forests and wetlands would benefit soil quality and help restore soil structure and improve the biological productivity of soil. By restoring the native vegetation, natural soil formation processes would be encouraged. Overall, the protection, maintenance, and restoration of habitats on the refuge are

expected to benefit soils. Restoration projects would consider natural landform and transitional zones with project designs to replicate transitional soil characteristics, soil stability, and hydrology when feasible. The refuge would consider beneficial uses of any extra soils excavated onsite. Regardless of which alternative is selected, we would continue to use BMPs in all management activities that might affect refuge soils, to ensure that we maintain or improve soil productivity and minimize erosion.

Adverse

Soil productivity could be adversely impacted through compaction, erosion, and nutrient leaching and displacement during any activity involving machinery. Heavy equipment can compact soils, decreasing infiltration and percolation rates and increasing runoff (Lewis 1998). Activity by equipment is carefully monitored, minimizing soil compaction and rutting. A temporary increase in localized soil movement can be expected due to vegetation removal and use of machinery. Recovery of severely compacted soils could range from 5 to 40 years (Croke et. al 2001). Up to 90 percent of sediment produced from forested lands comes from roads (Grace et. al 1998). The erosion and sediment associated with roads can be mitigated but not totally eliminated. Overuse or misuse of the chemicals could cause adverse impacts through mortality to desired native vegetation, resulting in increased soil erosion. Planting of native species can be used to provide a quicker method for the stabilization of soil and vegetation. Soil nutrient losses would be negligible in terms of long-term productivity.

Nutrients including carbon needed by the soil and stored within the tree would be lost due to timber removal, but over time nutrients would be added back into the soil through natural processes. Timber harvesting, without mitigation measures to protect soil and nutrient loss, can increase total watershed yields, storm peak flows, erosion, and sedimentation. All alternatives would follow BMPs which include streamside management zones.

Disturbance of soils through agricultural practices, fire management, maintenance, and habitat management can lead to displacement, change in soil structure, and direct loss of soil within focused areas. Soil disturbance, without mitigation measures to protect soil and nutrient loss, could increase erosion, sedimentation, introduction of exotics or changes in soil composition. All alternatives would follow the Mississippi's BMPs (http://www.deq.state.ms.us/Mdeq.nsf/page/NPS_Agriculture and http://www2.dnr.cornell.edu/ext/bmp/contents/during/dur_roads.htm).

The use of ORVs for management activities is crucial for the best management of habitats and maintenance on the refuge. Use of these vehicles could have negative impacts on soils due to compaction. Use of these vehicles would only be sporadic during monitoring activities and maintenance projects and would not be allowed unless sight conditions were optimal to prevent rutting and soil disturbance.

Under this alternative, chemicals may be used to augment soils or control vegetation. All possible BMPs would be implemented over the duration of these techniques to ensure the least possible adverse impacts. Under all alternatives, pesticides and fertilizers would be possibly used to meet management objectives. Before pesticides can be used on refuge lands and waters, pesticide use proposals are required in accordance with 596 FW 1. All pesticide usage would comply with the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) and state regulations pertaining to pesticide use, safety, storage, disposal, and reporting. BMPs would minimize or eliminate possible effects associated with pesticide drift or surface runoff that may impact soils. Fertilizers would be used in accordance with agricultural BMPs. Impacts would be negligible under all alternatives (http://www.deq.state.ms.us/Mdeq.nsf/page/NPS_Agriculture).

Prescribed fires are used to enhance and maintain habitats; however, under unique circumstances, including burn piles and hot spots, soils could have the potential to become sterilized and have higher rates of erosion.

CLIMATE CHANGE

Climate change has been identified by the Service as a serious issue, as further detailed in Section A, Chapter II. Overall, impacts to climate change on refuge habitat are unknown and due to an already existing level of high variation in weather, may be hard to detect until large impacts are revealed. Refuge lands are managed in a manner that mimics a more natural state and generally are not significant sources of greenhouse gases. The refuge would strive to manage habitats for historic conditions and if necessary, under changing climatic conditions, provide the most stable habitat for those native species that would most likely flourish.

Beneficial

The refuge is expected to have positive, albeit small, net effects with respect to greenhouse gas emissions and associated climate change. The refuge would continue to acquire and protect lands, thereby increasing the acreage of land covered with natural vegetative communities. Plants absorb carbon dioxide and as a result, vegetated areas can act as an important carbon sink (Heath and Smith 2004). This process, whereby plants take up atmospheric carbon dioxide and store it as biomass, is commonly referred to as carbon sequestration. Generally, the highest rate of carbon sequestration occurs during succession to forest, and the rate of sequestration declines as trees mature (Heath and Smith 2004). Department of the Interior Secretarial Order 3226 states that there is a consensus in the international scientific community that global climate change is occurring and that it should be addressed in governmental planning and decision-making. Secretarial Order 3226 was amended on January 16, 2009; however, Secretarial Order 3285, issued on March 11, 2009, replaced Amendment Number 1 and reinstated some of the provisions of the 2001 order. Secretarial Order 3285 established a Climate Change Response Council within the Office of the Secretary, DOI. Its purpose is to facilitate a Department-wide approach for applying scientific tools to increase the agency's understanding of climate change and to coordinate an effective response to the impacts of climate change upon tribes and on the land, water, ocean, fish and wildlife, and cultural heritage resources that the Department manages. It also made production and transmission of renewable energy on public lands a priority for the Department. The order calls for the incorporation of climate change considerations into long-term planning documents such as the CCP.

The increase of carbon within the earth's atmosphere has been linked to wide variations in weather with the gradual rise in surface temperatures commonly referred to as global warming. In relation to comprehensive planning for national wildlife refuges, carbon sequestration constitutes the primary climate-related impact to be considered in planning. The U.S. Department of Energy's Carbon Sequestration Research and Development (U.S. Department of Energy 1999) defines carbon sequestration as "...the capture and secure storage of carbon that would otherwise be emitted to or remain in the atmosphere."

The land is a tremendous force in carbon sequestration. Terrestrial biomes like those found on the refuge—grasslands, forests, and wetlands—are effective both in preventing carbon emissions and in acting as a biological "scrubber" of atmospheric carbon monoxide. The conclusions of the Department of Energy's report noted that ecosystem protection is important to carbon sequestration and may reduce or prevent the loss of carbon currently stored in the terrestrial biosphere. Forests have emerged as important factors in climate change. Trees store, or sequester, significant amounts of carbon, thereby helping offset the large amounts of carbon dioxide emitted by factories, motor vehicles, and

other sources. When trees burn down or die, much of that carbon is returned to the atmosphere. It can take decades for forest regrowth to sequester the amount of carbon emitted in a single wildfire. Studies have shown carbon emissions were reduced for forests that had been subject to prescribed burns, depending on the vegetation mix and location of the forests.

The refuge would continue to manage habitats for native species on which wildlife depends, and work to develop contingencies for how native habitats can be managed to best offset the adverse impact of climate change. Researching and monitoring that investigates which native plant species could provide the most stable and long-term benefit for wildlife would be encouraged. Efforts to encourage more long-lived pine species (i.e., shortleaf and longleaf pine) would be investigated.

Conserving natural habitat for wildlife is the heart of any long-range plan for national wildlife refuges. The actions proposed in this Draft CCP/EA would conserve or restore land and water, and would thus enhance carbon sequestration and habitat on the refuge. This, in turn, contributes positively to efforts to mitigate human-induced global climate changes.

Adverse

Under Alternative B, there would be no negligible adverse effects on climate change.

AIR QUALITY

Beneficial

Other than vehicles and equipment used by staff and public users, there are no major stationary or mobile sources of air pollution present on the refuge, nor would any be created under any of the alternatives. We expect refuge land management to help reduce any future direct and cumulative impacts by maintaining and promoting natural vegetative cover throughout the refuge. Through time, all upgrades to existing facilities would become more and more energy efficient. Collectively, these management actions would help reduce the potential for additional synthetic sources of emissions in the surrounding landscape.

Timber harvest to improve forest conditions and regrowth of forests in old fields would improve air quality. Trees store carbon and release oxygen. Because air quality in the region is generally good, we do not expect our management to result in measurably improved air quality, but it may contribute to improved local, ambient conditions.

Adverse

The two management actions that affect air quality the most are prescribed fires and timber harvests. The major pollutants from prescribed burning are particulates (small particles of ash, partly consumed fuel, and liquid droplets) and gases (carbon monoxide, carbon dioxide, hydrocarbons, and small quantities of nitrogen oxides). Air quality would be temporarily degraded during fire management operations. However, wildfires tend to consume considerably more biomass per acre and occur under weather conditions outside the planning window of fire managers. Prescribed burning, while temporarily degrading air quality is done under more predictable circumstances and generally under conditions where fuel consumption, the primary factor in determining particulate emissions, is less than wildfires. Low intensity prescribed burning would release inconsequential amounts of gases. Particulates can reduce visibility or cause negative effects on the health of people with respiratory illnesses. Appropriate smoke management can minimize or nearly eliminate both negative effects. No major differences in air quality relative to prescribed fire are anticipated.

Vehicular use from heavy equipment, staff, and visitors with the associated emissions is likely to have the greatest impacts on air quality due to a growing local and regional population and increased refuge visitation. However, this might be mitigated by reduced vehicle or residential emissions in the local area and by managing traffic that uses refuge roads as commuting lanes without the intended purpose of visiting the refuge. Lower traffic speeds would also encourage greater fuel conservation and fewer emissions as well.

In general, any management activity that requires the use of equipment which consumes fuels or causes particulate matter to be raised into the air would impact air quality. However, general management activities would not significantly adversely affect regional air quality and would like be compensated for by the general health of the local habitat and function of a healthy ecosystem; none of the alternatives would violate EPA standards, and all three would comply with the Clean Air Act.

HYDROLOGY AND WATER QUALITY

Beneficial

Conservation lands, such as the refuge, tend to improve water quality downstream as vegetated areas reduce runoff and sedimentation, while also absorbing some nitrogen, phosphorus, and other pollutants. Leaving streams unaltered provides beneficial impacts to wildlife and water quality by maintaining natural structure and flow and encouraging establishment of native species. Release of held water with water control structures increases the oxidation of water downstream possibly benefiting paddlefish and other aquatic species. The holding of water within lakes and GTRs increases opportunities for sedimentation removal and other forms of filtering of water. Following forestry, agricultural, and storm water BMPs and the use of low impact development methods on refuge lands, are expected to improve water quality within portions of the refuge. The positive impacts to water quality are expected to be moderate under this alternative.

Adverse

Under Alternative B, the cumulative effects of public recreation, prescribed fire, use of mechanical equipment, maintenance of roads, and long-term herbicide use for vegetation control could result in a slight decrease in water quality in localized areas, specifically in wetland transition areas prone to exotic, nuisance, or pest plant infestation. Confining water within lakes and GTRs reduces opportunities for natural flooding and deposition of nutrients throughout refuge habitats. Spawning and fish passage is negatively impacted from using water control structures. Under all alternatives, BMPs would be implemented. With proper application of herbicides, no activity should have long-term damaging impact on water bodies. The main effects of prescribed burning on water resources are the potential for increased runoff due to rain events. Prescribed burning itself usually does not affect water quality unless it is so intense that it consumes the duff and litter layer and exposes soils near streams (Marshall 2008). When surface runoff increases after burning, it may carry suspended soil particles, dissolved inorganic nutrients, and other materials into adjacent streams and other waterbodies, thus reducing water quality. These effects seldom occur after prescribed burns in Coastal Plains. Generally, a properly planned prescribed burn would not adversely affect water quality or quantity of ground or surface water in the South (USDA Forest Service, R8-TP 11, 1989). Moderate prescribed burns that retain ground cover but top-kill most plants should produce small increases in streamflow and channel sediment and negligible increases in surface runoff and erosion (Douglass 1983). Keeping roads well-maintained; treating exotic, nuisance, or pest plant infestation areas quickly after being discovered; and conducting reconnaissance of public use would keep impacts to water quality small, lessening the impact that may affect local water quality. Under all alternatives, we would conduct reconnaissance on the condition of the lakes and rivers in the refuge. If necessary, areas would be posted with use

restrictions, possibly closed and protected, or barriers used to direct activities towards areas with less steep slopes. Public outreach and education on littering and proper waste disposal would lessen potential negative water quality impacts.

NOISE

Beneficial

When compared to the local towns, the refuge serves as a respite for visitors from the outside noise and general busyness to which visitors are subjected in their normal lives. Most noise on the refuge is created naturally, through the sound of wind, falling water, and wildlife. Although these sounds can be loud, they are normally seen as a positive feature for the visiting public.

Adverse

Under all alternatives, moderate increases in noise from equipment and automobile traffic are expected. Under all alternatives, temporary noise and minor traffic increases would be by-products of habitat and wildlife management and public visitation. Noise pollution under all alternatives would be temporary.

EFFECTS ON THE BIOLOGICAL ENVIRONMENT

This section discusses the potential effects of Alternative B on the refuge's biological resources (e.g., habitats, wildlife, and federal- and state-listed species).

HABITATS AND VEGETATION

Beneficial

Prescribed fire promotes desirable understory, early successional herbaceous species, and helps to control undesirable woody vegetation. Additional resources, if provided, would allow for more control of invasive species, further improving forested habitat conditions. Quick and early treatment of invasive plants with chemicals is often the method of control. Prevention of invasive vegetation may involve washing of equipment prior to movement throughout the refuge and the careful planning of public vehicle flow to discourage pass-through traffic while still promoting vehicle access throughout the refuge by refuge visitors. Management of the refuge for historic forest conditions protects the refuge's biological integrity and complies with guidance provided with the Improvement Act and Service policy.

Adverse

Prescribed fires have the potential to kill desirable plants located in the midstory and understory. Plant characteristics such as bark thickness and stem diameter influence the susceptibility to fire. Most hardwood bark has poor insulating qualities and is thinner than the bark of pine species. As a result, hardwood trees are generally much more susceptible to fire injury than pines. Placing prescribed fire in areas such as bottomland hardwoods has the potential to influence species composition away from that of historical habitat conditions. Even within fire-dependent species, cambial damage can occur from the extended smoldering of duff around the plant's root collar especially in areas with heavy fuel loads. Damage can also occur whenever excessive heat penetrates into the soil, killing feeder roots and beneficial soil organisms. Many of these negative impacts can be mitigated through frequent burning, which, in turn, reduces fuel loading and proper placement of fire breaks.

Removal of vegetation causes direct mortality of targeted species. Non-targeted species could also be negatively impacted. Individual plants and their communities are impacted at varying levels. For example, damage to crowns or tree stems during the process of removing neighboring trees could result in exposing cambium that subsequently allows for infestation by bark beetles, thus killing the non-target tree. Other management activities including the practice of raking around the base of the tree can have negative impacts on certain species. The adverse effects of raking are exposed soil, roots, and damage to roots but would be mitigated through light raking only when protection from fire is crucial. Impacts from raking are expected to be negligible because raking only occurs on RCW cavity trees, and the beneficial impact to raking is protection of the tree from mortality caused by high-intensity fire. Creation of new cavities for RCWs may have some effects on the stem of the tree by weakening the area and allowing easier avenues for pests and non-target species. Bark shaving could have adverse effects by allowing accessibility to pests and vulnerability to fire damage.

Managing for historic forest conditions would likely reduce the number of pine acres available for management of the RCW. However, the acres being managed for pine versus acres that could be managed for historic conditions (which may not include pine) may not provide Good Quality Foraging Habitat. This would be due to the difficulty of control of the hardwood midstory competition because of the natural regrowth of a hardwood canopy. These pine habitats also tend to be on the periphery of the main population and subject lower probabilities of survival.

The use of ORVs for management activities is crucial for the best management of habitats and maintenance on the refuge. Use of these vehicles could have negative impacts on vegetation and the degree of loss is dependent on the intensity of vehicle use (Hall 1980). Use of these vehicles would only be sporadic during monitoring activities and maintenance projects.

Maintenance activities to maintain or improve infrastructure such as roads or trails may involve the occasional use of chemicals or mechanical tools to remove unwanted vegetation. Where invasive vegetation already exists, the use of mechanical tools can often promote the further spread of the unwanted plant's seeds or growing parts. Soil disturbance from maintenance activities and public use can often open up areas to the colonization by invasive vegetation. Public use and vehicle traffic can also be a seed source for the introduction of nonnative or disease infected vegetation. Quick and early treatment of invasive plants with chemicals is often the method of control. Prevention of invasive vegetation may involve washing of equipment prior to movement throughout the refuge and the careful planning of public vehicle flow to discourage pass-through traffic, while still promoting vehicle access throughout the refuge by refuge visitors.

Deer overabundance can affect native vegetation and natural ecosystems (Tilghman 1989, Nudds 1980, Hunter 1990; Behrend et al. 1970). White-tailed deer have substantial impacts on certain herbaceous and woody species and on overall plant community structure (Waller and Alverson 1997). Over-browsing by deer can decrease tree reproduction, understory vegetation cover, plant density, and plant diversity (Warren 1991). High densities of deer have been recognized as vectors for spreading invasive species like Japanese stiltgrass. Public white-tailed deer hunts to manage deer populations can benefit vegetative communities.

Feral hogs can have negative impacts on native habitats and wildlife. Hogs are known to destroy native plants and consume native wildlife through their feeding behavior. Negative impacts to habitat would continue and increase if feral hog and beaver populations are unchecked. Under all alternatives, impacts would be negligible through the attempted removal of all feral hogs.

Although some beaver dams are beneficial, unmanaged beaver populations can lead to persistent damming of free-flowing waters, resulting in vegetation mortality. Mitigation through removal of

undesirable beavers and their dams would lessen the impacts on forested habitats and infrastructure. Impacts would be negligible under all alternatives.

Pine and Pine/Hardwoods

Beneficial

Under Alternative B, the refuge would regenerate native southern pine species (short leaf, loblolly, and long leaf) (instead of a loblolly monoculture) and increase diversity, sustainability, and longevity of the pine forest. Promoting a forest that better represents Good Quality Foraging Habitat would decrease the wide-spread outbreak of diseases and bugs. Prescribed fire also benefits pine forests by promoting pine associated understories, decreasing wild land fire outbreaks, and decreasing hardwood competition. Development of larger RCW partitions would allow for the continued regeneration of the pine forests protecting the long-term viability of both the forest and bird population.

Pine/hardwood forests would benefit from the favoring of historic forest conditions through decreasing pressure to convert these areas into pine only forests. Restrained management in these pine/hardwood areas would allow the regeneration and establishment of a highly diverse tree species favoring a variety of wildlife.

Adverse

Under Alternative B, pine acreage would be reduced and fewer acres would be subjected to prescribed fire in favor of pine. The pine forests would become less diverse due to removal and control of hardwood. Due to greater amounts of disturbance and mechanized equipment compared to Alternative A, pine areas may become more susceptible to invasive species such as cogon grass, Japanese climbing fern, and Japanese stilt grass.

Bottomland Hardwoods

Beneficial

Under Alternative B, beneficial impacts for bottomland hardwoods would include management of water within the GTRs and the forest to prevent wide-spread tree mortality and creation of dead timber areas. Silvicultural treatments would be conducted to ensure tree species diversity and production of hard mast when needed.

Adverse

Under Alternative B, the refuge would actively manage fewer acres of bottomland hardwoods and more would become passively managed. This alternative would likely cause a reduction in forest structure.

Aquatic Habitats

Beneficial

Under Alternative B, water quality would be protected by using the BMPs and the Service's pesticide use proposal process. The natural flood regime would promote natural hydrological functions and a healthy forest system. Expanded streamside management zone (SMZ) criteria would provide greater protection of streams from physical disturbance, improving water quality, stream integrity, and structure. Drawdowns of lakes encourage herbaceous growth and structure. Management of moist-soil habitats

creates additional aquatic habitats. The retention of select beaver ponds and identification of important beaver use areas would be an essential part of maintaining healthy aquatic systems. Flooding of GTRs would be conducted under a schedule cycle, allowing for use by wildlife in winter while ensuring the long-term health and productivity of the forest.

Adverse

Artificial flooding of bottomland hardwoods outside of the natural flood regime in areas containing water control structures can lead to degradation of habitat, increases in soil erosion, and decreases in water quality. Short-term impacts to aquatic habitats through water removal could have immediate impacts on plants and animals dependent on that water.

WILDLIFE

Beneficial

Management of habitats and control of exotic and invasive species using integrated pest management can have both beneficial and adverse impacts on wildlife. Improvement of habitat conditions throughout the refuge would benefit wildlife by providing food, cover, and breeding areas. Under Alternative B, RCW clusters would be managed for the recovery standard. Partition sizes would be larger and although target populations sizes reduced, realized productivity of the birds would likely be increased. Waterfowl would benefit from management of moist-soil areas, improved bottomland hardwood conditions, and greater amounts of habitats within lakes and wetlands. Resident wildlife and migratory birds would benefit from historical forest conditions favoring more hardwood and pine/hardwood forests.

Adverse

Management actions and recreational uses can cause wildlife disturbance. The physical act of management can cause the destruction of habitat including loss of cavities, food resources and cover, and the mortality of wildlife. Equipment used to conduct management can cause the mortality or displacement of wildlife. Even though recreational uses could be viewed as reduced compared to Alternatives A and C, there could still be some disturbance to wildlife. Recreational uses on the refuge can cause wildlife disturbance ranging from behavioral changes, physiological changes, or mortality (Knight and Cole 1995). Hunting and fishing cause direct mortality of wildlife. Management focused towards the benefit of one species can be to the detriment of another species of wildlife; this alternative does not manage all wildlife equally. Capture, tagging, marking, and banding of wildlife used to monitor populations can have adverse effects, including stress, mortality, and injury. Allowing public use on the refuge increases litter, pollution, and disturbance to wildlife.

The use of ORVs for management activities is crucial for the best management of habitats and maintenance on the refuge. Use of these vehicles could have negative impacts on wildlife through disturbance. Use of these vehicles would only be sporadic during monitoring activities and maintenance projects.

<u>Waterfowl</u>

Beneficial

Under Alternative B, the refuge would focus significant management attention on providing waterfowl habitat by manipulating GTRs, moist-soil units, and lakes annually. The refuge would provide fewer

wood duck boxes and focus more on retention of natural cavities for increased nesting opportunities. Annual agriculture crops along with native moist-soil plants and hard mast would be used to provide foods for wintering waterfowl. The closure of lakes and moist-soil areas to refuge visitors during wintering periods protects waterfowl from unnecessary disturbance.

Adverse

The decrease in reliance in wood duck boxes would negatively impact wood ducks and mergansers if the natural cavities are insufficient. Allowing public use on the refuge increases litter, pollution, and disturbance to waterfowl. Reduced yearly reliance on all GTRs would reduce available habitat but would better protect forest structure and productivity of the forest.

Forest Breeding Birds

Beneficial

The greatest benefit would be provided to forest breeding bird species favoring pine forests and moderately closed canopy hardwood forests with open understories. Improved forest conditions within GTRs would increase soft and hard mast production benefiting wildlife using this energy source. Rusty blackbirds, several species of warbler, ovenbirds, and others would likely benefit from management actions occurring under this alternative.

Adverse

Under this alternative, not all forest breeding birds would benefit through directed management. Forest breeding birds would not receive priority management over the endangered species and waterfowl found on the refuge. Prescribed fire and chemical and mechanical treatments reduce cover for ground nesting birds and understory for shrub nesting species. Hunting as well as other public uses has the potential to disturb birds during critical periods of their life cycle. Allowing public use on the refuge increases litter, pollution, and disturbance to forest breeding birds. Regeneration (i.e., management tools: irregular shelterwood, seedtree, shetlterwood, herbicides, and patch and clear-cutting) of pine forests for RCW management or to restore historical conditions could have temporal adverse effects to some but not all forest breeding birds.

Aquatic Biota

Beneficial

Active management of refuge waters from its original un-manipulated state where natural processes remained in place to a highly controlled system using water control structures and levees provides habitats for a diversity of aquatic species including sport fish. Highly oxygenated waters exiting from water control structures provides potential spawning habitat for various species of fish including paddlefish. These artificial systems provide a reliable water source for aquatic biota that would otherwise be subjected to periods of little to no water. The created lakes and wetlands reduce water turbidity to provide habitat for mussels and other sensitive aquatic species. Although many water bodies are artificial and manipulated, there are large areas where rivers, streams, and wetlands are left in their natural state. Fish and other species have benefited from the protection of the natural rivers as well as the manipulation of other water bodies. Streamside management zones would have increased protection above the recommendation within the Mississippi BMP guidelines, which would benefit at least 80 percent of amphibians normally found in these areas. Creating artificial ephemeral pools that lack fish provide protection for breeding amphibians.

Adverse

Levees and other water control structures change the natural flood regime in turn modifying habitat for aquatic species. Often the impacts of these modifications are unknown for these species. Water control structures often present barriers for safe fish passage upstream. Water control structures also have the potential to dampen the variability of floodwaters therefore reducing spawning habitat for fish and other aquatic biota. Use of chemicals for control of exotic and invasive species can impact aquatic biota causing mortality and changes in water chemistry. Use of boats within waters does increase pollution and the possibility of petro-chemical spills, which can, in turn, cause adverse impacts to aquatic biota.

Resident Wildlife

Beneficial

The priority species listed in this alternative serve as a surrogate for many of the native species that would also benefit from the proposed management actions. Promotion of early successional habitats within the pine forests benefits a variety of species (e.g., bats, butterflies, deer, turkey, quail, rabbit, and sparrows). Protection of snags, cavities, and downed woody material would also benefit a variety of species (e.g., bats, wood duck, spiders, beetles, raccoon, and opossums) by ensuring available habitat used for food, cover, and breeding areas. Although adverse impacts occur for individual game species, public hunting protects these populations from disease, starvation, and other factors from over use of the habitats. Increased pine and pine/hardwood areas would benefit those species requiring a more diverse habitat.

Adverse

The lack of early successional habitats within the bottomland hardwood forests would decrease soft mast and cover for a variety of species (e.g., butterflies, deer, turkey, quail, rabbit, and sparrows). Decreasing of hard mast species in pine forests adversely affects a variety of species (e.g., squirrels, quail, turkey, and deer). Regeneration (i.e., management tools: irregular shelterwood, seedtree, shetlterwood, herbicides, and patch and clear-cutting) of pine forests for RCW management or to restore historical conditions could have temporal adverse effects to some but not all resident wildlife through displacement or less immeditate foraging habitat. Removal and harvest of wildlife through public hunts and nuisance and invasive species management have adverse effects on individual wildlife. Allowing public use increases the chances for direct mortality of some species due to vehicle collisions.

FEDERALLY LISTED SPECIES

Beneficial

Management of the endangered RCW requires specific habitat requirements to be met to provide nesting and foraging habitat needs of the birds. Within the loblolly pine habitats found on the refuge, favorable RCW habitat requires intensely managed pine habitat maintained by fire, herbicide, timber management, and installation of artificial cavities. In addition, limiting the amount of midstory woody vegetation to increase available foraging habitat is beneficial for RCWs. Under this alternative, partitions would be reorganized on the landscape to reduce total number of clusters on the landscape to a minimum of thirty. By reducing the population goal, RCW partitions would have more acreage, less overlap, and create sustainability across their habitat. The reduction in acres managed for RCWs would allow an increase in the number of acres in GQFH thereby increasing RCW potential breeding

group size, reproductive success, survival, and opportunities for dispersal. Reduction and reorganization of partitions would allow staff to artificially migrate recruitment clusters to decrease overlap with existing clusters and maximize pine habitat for individual clusters. By increasing partition sizes and reducing RCW management in the northern subpopulation north of Highway 25, it would also increase the opportunity to regenerate pine forests within partitions, ensuring the long-term sustainability of habitat for RCWs on the refuge. Reduction of the hardwood canopy cover component to standards set in the recovery plan is expected to decrease nest cavity competition with other species and prevent predation of individual RCW. The use of artificial devices (e.g., restrictor plates and snake excluding devices) also decreases nest cavity competition with other species. Artificial cavities are installed to compensate for the absence of suitable natural cavities under current conditions to stabilize and increase the number of RCW groups and population size. Open canopy and prescribed fire promotes the herbaceous ground cover which increases invertebrate food resources required for the RCW. Habitat manipulations used to benefit RCWs could include silvicultural practices (i.e., active forest management including but not limited to manual or mechanized pre-commercial thinning, commercial biomass thinning, mulching, firewood cutting, timber stand improvements, herbicide, irregular shelterwood, shelterwood, seedtree, patch cuts, afforestation, reforestation, free thinning), prescribed fire, raking, mowing, creation of new artificial cavities, maintenance of suitable cavities, midstory reduction (chemical and/or mechanical control), integrated pest management, use of restrictor plates on cavities, snake exclusion devices, and kleptoparasite control. Active forest management of the forests would reduce the likelihood of catastrophic southern pine beetle outbreaks that could cause the death of individual or all trees within the partition. All RCW management and monitoring methods represent those in the recovery plan to provide a net conservation benefit.

Wood storks would greatly benefit from the summer drawdowns of the lakes to provide concentrated food sources within isolated pools and recently de-watered moist-soil areas.

Adverse

According to the most current number of active clusters and most recent forage habitat analysis within those areas of the refuge which were historically occupied by pine in the overstory, the appropriate number of clusters capable of being supported by the habitat would be a minimum of 27 clusters in Management Units 11 and 17. This analysis reduces the number of acres maintained or created for the RCW to approximately 12,000 acres. The smaller population size could have a greater risk of vulnerability to demographic and environmental effects and to extirpation. Regeneration (i.e., management tools: irregular shelterwood, seedtree, shetlterwood, and patch and clear-cutting) of pine forests within present and future partitions to ensure the long-term sustainability of habitat for RCWs on the refuge could temporarily remove suitable and potential foraging and nesting habitat through loss of trees greater than 10 inches in diameter. Additionally, harvesting of existing mature forests as part of regeneration efforts within present and future partitions could temporarily remove habitat for up to 30 years due to seedling growth in to the midstory obscuring tree bole. However, foraging habitat would be sustained at or positively in excess of the MSS in affected active and inactive or recruitment partitions during any period to avoid adverse effects of a temporary habitat reduction. Monitoring and research including the capture of birds could result in accidental mortality and disturbance. Inspecting cavities, the capture and banding of nestlings and adults, and installing artificial cavities would be conducted according to standard protocols and authorized under a Service section 10(a)(1)(A) permit. Any incidental injury or mortality would be authorized under the Service's formal Section 7 consultation and biological opinion for all Section 10(a)(1)(A) management; monitoring and research permits would be issued to all private, state, and federal agencies and individuals involved with management, conservation, and recovery of the RCW throughout the range of the species. Administrative use of vehicles within partitions and clusters could have an adverse impact on disturbance of individual RCWs while in nesting season. Although the refuge possesses a take permit for the loss of one bird biannually

and measures are taken to prevent the loss of trees or birds, use of prescribed fire could result in the accidental loss of cavity trees. The refuge has one record of take on file following the loss of a cavity tree due to prescribed fire. The use of chemicals to control undesired woody understory or exotic/invasive species could affect RCWs through the subsequent dietary dose exposure by contaminated prey. This risk is small due to mitigation requirements compared to the reduction in habitat from hardwood encroachment on pine tree boles which reduce the foraging area. Protection of archaeological sites, such as cemeteries, could limit the management actions conducted on these areas which could reduce the desired habitat conditions thereby adversely impacting RCWs.

There would be no adverse impacts for wood storks.

EFFECTS ON SOCIOECONOMIC ENVIRONMENT

This section discusses potential effects to socioeconomic resources (e.g., refuge revenue sharing, wildlife-dependent economics, ecosystem services, and land use patterns) under Alternative B.

Refuge Revenue Sharing

The "Revenue Sharing Account" places funds collected through wildlife habitat management and agriculture revenue generating activities into one joint account for all refuges that is then redistributed throughout the Refuge System. These funds are used in lieu of property taxes to reimburse counties at a rate determined by congress. A revenue sharing check from the Service is paid to counties having refuge-administered lands. Annual refuge revenue sharing payments to Oktibbeha, Noxubee, and Winston counties would continue at rates authorized by Congress under each alternative. Also a small portion, currently $60,000 or less per year is returned to the refuge in an "Expense for Sales Account." These funds are used in the administration of forestry-related activities.

ALTERNATIVE C: FOCUS ON MIGRATORY BIRDS, FEDERALLY LISTED SPECIES, NATIVE WILDLIFE, HABITAT DIVERSITY, AND EXPERIENCING NATURE (PROPOSED ALTERNATIVE)

Alternative C would expand resource management for diversity while enhancing wildlife management and recreation opportunities. Implementation of Alternative C is anticipated to result in net positive environmental benefits.

Active habitat management, using a variety of methods including silvicultural and integrated exotic, invasive, nuisance, and pest management, would improve habitats for migratory birds, federally listed species, native wildlife, habitat diversity, and experiencing nature. In bottomland hardwoods, waterfowl and forest breeding bird populations would be enhanced through improved nesting, brooding, and foraging opportunities. Forests within the bottomland hardwoods would be managed to reflect historic habitat conditions and produce multi-layered canopies and increased midstory development to create a natural floristic diversity within the forest midstory and understory. Additional benefits would be provided to over-wintering bird populations through an increase in foraging and thermal cover opportunities. In pine forests, active habitat manipulations used to benefit RCWs would include silvicultural practices; raking; integrated exotic, nuisance, and pest management; bird banding; creation of new artificial cavities; maintenance of suitable cavities; use of restrictor plates; snake exclusion devices; predator and kleptoparasite control; and bark-shaving, which together would increase RCW productivity on the refuge. Mature pine forests characterized by well-spaced pines, an open midstory and understory, and dense ground cover of grasses and forbs would also provide desired habitat for grassland species and migratory birds, such as Bachman's sparrow, and native species, such as quail

and turkey. The silvicultural and integrated exotic, invasive, nuisance, and pest management techniques implemented for RCWs on historic pine areas would benefit other species adapted to fire ecology. Areas of the refuge currently being managed in an attempt to produce habitat for RCWs, but that do not reflect historical habitat conditions of a pine forest, would be allowed to return to the habitat type most reflective of historical habitat conditions. Areas that should be managed for the historical habitat condition of pine would be managed for that type.

The refuge would collect a wider range of scientifically based wildlife population information that contributes to good adaptive management. The refuge would continue monitoring RCWs and make an effort to monitor waterfowl food production within moist-soil areas, forest breeding birds using point counts, paddlefish reproduction in Noxubee River and at Bluff Lake spillway, fish species diversity and health within Loakfoma and Bluff lakes, effects of silviculture, and integrated exotic, invasive, nuisance, and pest management within all habitats, and wildlife habitat quality. The refuge would also provide increased management, reconnaissance, and surveying and monitoring for the benefit of resident wildlife species, such as deer, turkey, quail, amphibians, reptiles, and invertebrates as additional resources become available (e.g., funding, grants, staffing, volunteers, or partnerships).

The Service would manage waters and wetlands with existing water management structures to provide waterfowl food plants while maintaining balanced fisheries. The refuge would provide ample feeding opportunities for waterfowl through the possible combination of managed moist-soil plants within the lakes, flooded bottomland hardwoods, and seasonally flooded GTRs along with planted agricultural crops within the Prisock fields. Enhanced breeding waterfowl nesting opportunities would also be provided by protecting natural cavities, and providing strategically placed nest boxes. Waterfowl broods survival would be enhanced by managing scrub/shrub habitat along lake edges. The refuge would continue to participate in the wood duck banding program to meet the refuge quota as assigned by National Migratory Bird Program. Public access would be allowed throughout the refuge, but limited or no human access would exist in areas important to migratory birds and their critical life cycle stages. Moist-soil wetlands would be potentially disked, planted, and flooded as necessary to provide food and habitat conditions for wintering waterfowl. Levels in all GTRs would be managed so no more than two GTRs would be flooded habitat for wintering waterfowl yearly and no one GTR artificially flooded more than twice every five years. Extended dry periods within the GTRs would ensure forest species diversity and structure improved to match those of the surrounding forest of similar type.

To help ensure consistent recreational fisheries without impacting waterfowl or wood stork management, the refuge would create deepwater habitat in Bluff Lake to ensure consistency in recreational fisheries resources (i.e., crappie, bass, and sunfish). Excess soil from the creation of the deepwater habitat would be used to create islands within the lake to serve as future bird rookery sites made up of bald cypress. The refuge would find opportunities to redesign existing water control structures on Bluff Lake and the Oktoc River drainage and improve fish passage from Noxubee River to other upstream areas of the lake to positively benefit paddlefish and other aquatic species.

Almost all existing old field sites would be managed to produce habitat conditions reflective of historic forest conditions. A limited number of existing old fields in areas not designated for RCWs would be managed for the benefit of native grassland species. Morgan Hill Prairie Demonstration Area would be reduced by more than 50 percent to only the 32 acres located at the north end of the existing open area. Fields not maintained would be restored to historic species composition. No new field sites would be created as the improved forest management for RCW should provide collateral benefits for native grassland species. All existing RNA designations would be eliminated and the lands managed within the surrounding habitats to reflect historic forest conditions.

A comprehensive, refuge-wide survey of archaeological sites as well as individual cultural resource surveys for specific projects or sites would be conducted. Partnerships would be developed with other agencies and cultural groups (e.g., Choctaw Nation and African-American groups) to seek ideas and the means to improve management of cultural resources. Law enforcement for visitor safety, resource protection, and compliance with refuge regulation would increase. Archaeological and historical sites would continue to be protected.

Partnerships and community involvement would be key methods for protecting the ecology and biological function of the landscape. Development of easements and land acquisition would be a tool used to provide land protection. Efforts to acquire private lands from willing sellers remaining within the existing approved acquisition boundary (AAB) would continue to be made. Expanding the refuge's AAB would only occur after 90 percent of the obtainable lands within the current AAB have been acquired or additional lands are needed to meet the purposes for which the refuge was established.

The visitor services programs would be increased and made more readily accessible for users with disabilities as manageable by funding and staffing. Fishing from designated bank areas of the Bluff and Loakfoma lakes would be allowed year-round. Deer hunting opportunities would be increased by expanding areas and seasons. Other wildlife-dependent uses and their supporting facilities would be maintained and enhanced as resources become available. Wildlife observation and photography opportunities would increase through the addition of trails, additional signs, and increased maintenance of existing facilities. A "Connecting People with Nature" area would be designated around the visitor center and developed with new trails, kiosks, and other visitor amenities.

The refuge would improve or add facilities and equipment as funding allows including: vehicle fleet; computer and communication systems; and refuge entrance roads, buildings, structures, trails, and signs. The Service would increase staff and funding to better manage the refuge. Good communication with partners would continue and be improved. The refuge would continue with the existing fee program, adding a refuge public use fee and if sufficient reducing or eliminating administrative fees for white-tailed deer and waterfowl hunting.

EFFECTS ON THE PHYSICAL ENVIRONMENT

This section discusses potential effects to physical resources (e.g., topography, soils, and water resources) under Alternative C.

TOPOGRAPHY AND GEOLOGY

Beneficial

Under this alternative, positive impacts with regard to the topography and geology are anticipated as disturbed areas are restored. For example, one of the proposed projects is the restoration of the sand/gravel pit near Bevill's Hill. Recontouring the banks would be a possible development of artificial bat roosting opportunities. The bat roosting opportunities would be made available through installation of concrete culverts that would have a possible beneficial impact for bat productivity and other species. The recontouring of the banks would have a beneficial impact for stabilization of the soils and help prevent further erosion. Management of the water control structures also would minimize the impacts of damaging floods to the surrounding topography.

Adverse

Under this alternative, no adverse impacts to the topography and geology are anticipated.

SOILS

Beneficial

The refuge would continue to maintain native vegetation cover on the refuge that stabilizes and minimizes soil losses through erosion. All the land the Service now owns would remain under Service management, thereby eliminating the potential for soil impacts of development or other uses. The refuge would continue to prohibit recreational activities such as ATVs that would damage soils on the refuge. Public use of trails, fishing sites, wildlife observation areas, parking lots, and other high-use areas would be designed and maintained to minimize impacts on refuge soils. Construction of new trails would also help minimize soil erosion by focusing public use to designated areas. Monitoring and mitigation of any erosion problems during routine refuge management would continue. Managing and restoring forests and wetlands would benefit soil quality and help restore soil structure and improve the biological productivity of soil. By restoring the native vegetation, natural soil formation processes would be encouraged. Overall, the protection, maintenance, and restoration of habitats on the refuge are expected to benefit soils. Restoration projects would consider natural landform and transitional zones with project designs to replicate transitional soil characteristics, soil stability, and hydrology when feasible. The refuge would consider beneficial uses of any extra soils excavated onsite. Regardless of which alternative is selected, we would continue to use BMPs in all management activities that might affect refuge soils to ensure that we maintain or improve soil productivity and minimize erosion (e.g., use of silt fencing during construction or maintenance, use of low impact equipment, and reestablishment of native vegetation).

Adverse

Use of mechanized equipment could result in some soil erosion and compaction. The use of heavy equipment causes compaction of soils, decreasing infiltration and percolation rates and increasing runoff (Lewis 1998). Soil productivity could be adversely impacted through compaction, erosion, and nutrient leaching and displacement during any activity involving machinery. Activity by equipment is carefully monitored, minimizing soil compaction and rutting. A temporary increase in localized soil movement can be expected due to vegetation removal and use of machinery. Recovery of severely compacted soils could range from 5 to 40 years (Croke et al. 2001). Up to 90 percent of sediment produced from forested lands comes from roads (Grace et al. 1998). The erosion and sediment associated with roads can be mitigated but not totally eliminated. Planting of native species can be used to provide a quicker method for the stabilization of soil and vegetation. Soil nutrient losses would be negligible in terms of long-term productivity.

Nutrients needed by the soil and stored within the tree would be lost due to timber removal, but over time nutrients would be added back into the soil through natural processes. Timber harvesting, without mitigation measures to protect soil and nutrient loss, can increase total watershed yields, storm peak flows, erosion, and sedimentation. All alternatives would follow BMPs, which include streamside management zones.

Disturbance of soils through agricultural practices, fire management, restoration, maintenance, and habitat management can lead to displacement, change in soil structure, and direct loss of soil within focused areas. Soil disturbance, without mitigation measures to protect soil and nutrient loss, could increase erosion, sedimentation, introduction of exotics or changes in soil composition. All alternatives would follow the Mississippi's BMPs (http://www.deq.state.ms.us/Mdeq.nsf/page/NPS_Agriculture and http://www2.dnr.cornell.edu/ext/bmp/contents/during/dur_roads.htm).

The use of ORVs for management activities is crucial for the best management of habitats and maintenance on the refuge. Use of these vehicles could have negative impacts on soils due to compaction. Use of these vehicles would only be sporadic during monitoring activities and maintenance projects. ORV's are not allowed for public use.

Under this alternative, chemicals would be used to augment soils or control vegetation. Overuse or misuse of the chemicals could cause adverse impacts through mortality to desired native vegetation, resulting in increased soil erosion. All possible BMPs would be implemented over the duration of these techniques to ensure the least possible adverse impacts. Under all alternatives, pesticides and fertilizers would be used to meet management objectives. Before pesticides can be used on refuge lands and waters, pesticide use proposals are required in accordance with 596 FW 1. All pesticide usage would comply with the applicable federal and state regulations pertaining to pesticide use, safety, storage, disposal, and reporting. BMPs would minimize or eliminate possible effects associated with pesticide drift or surface runoff that may impact soils. Fertilizers would be used in accordance with agricultural BMPs. Impacts would be negligible under all alternatives (http://www.deq.state.ms.us/Mdeq.nsf/page/NPS_Agriculture).

Prescribed fires are used to enhance and maintain habitats; however, under unique circumstances, including burn piles and hot spots, soils could have the potential to become sterilized and have higher rates of erosion.

CLIMATE CHANGE

Climate change has been identified by the Service as a serious issue, as further detailed in Section A, Chapter II. Overall, impacts to climate change are expected to be minimal, but likely beneficial because lands that are managed in a manner that mimics a more natural state generally are not significant sources of greenhouse gases. The refuge would strive to manage habitats for historic conditions and if necessary under changing climatic conditions provide the most stable habitat for those native species that would most likely flourish.

Beneficial

The refuge is expected to have positive, albeit small, net effects with respect to greenhouse gas emissions and associated climate change. The refuge would continue to acquire and protect lands, thereby increasing the acreage of land covered with natural vegetative communities. Plants absorb carbon dioxide and as a result, vegetated areas can act as an important carbon sink (Heath and Smith 2004). This process, whereby plants take up atmospheric carbon dioxide and store it as biomass, is commonly referred to as carbon sequestration. Generally, the highest rate of carbon sequestration occurs during succession to forest, and the rate of sequestration declines as trees mature (Heath and Smith 2004). Department of the Interior Secretarial Order 3226 states that there is a consensus in the international scientific community that global climate change is occurring and that it should be addressed in governmental planning and decision making. Secretarial Order 3226 was amended on January 16, 2009; however, Secretarial Order 3285 issued on March 11, 2009, replaced Amendment Number 1 and reinstated some of the provisions of the 2001 order. Secretarial Order 3285 established a Climate Change Response Council within the Office of the Secretary, Department of the Interior. Its purpose is to facilitate a Department-wide approach for applying scientific tools to increase the agency's understanding of climate change and to coordinate an effective response to the impacts of climate change upon tribes and on the land, water, ocean, fish and wildlife, and cultural heritage resources that the Department manages. It also made production and transmission of renewable energy on public lands a priority for the Department. The order calls for the incorporation of climate change considerations into long-term planning documents such as the CCP.

The increase of carbon within the earth's atmosphere has been linked to the gradual rise in surface temperatures commonly referred to as global warning. In relation to comprehensive planning for national wildlife refuges, carbon sequestration constitutes the primary climate-related impact to be considered in planning. The U.S. Department of Energy's Carbon Sequestration Research and Development (U.S. Department of Energy 1999) defines carbon sequestration as "...the capture and secure storage of carbon that would otherwise be emitted to or remain in the atmosphere."

The land is a tremendous force in carbon sequestration. Terrestrial biomes of all sorts—grasslands, forests, wetlands, tundra, perpetual ice, and desert—are effective both in preventing carbon emissions and in acting as a biological "scrubber" of atmospheric carbon monoxide. The conclusions of the Department of Energy's report noted that ecosystem protection is important to carbon sequestration and may reduce or prevent the loss of carbon currently stored in the terrestrial biosphere. Forests have emerged as important factors in climate change. Trees store, or sequester, significant amounts of carbon, thereby helping offset the large amounts of carbon dioxide emitted by factories, motor vehicles, and other sources. When trees burn down or die, much of that carbon is returned to the atmosphere. It can take decades for forest regrowth to sequester the amount of carbon emitted in a single wildfire. Studies have shown carbon emissions were reduced for forests that had been subject to prescribed burns, depending on the vegetation mix and location of the forests. The refuge would continue to manage habitats for native species on which wildlife depends. Research and monitoring that investigates which native plant species could provide the most stable and long-term benefit for wildlife would be encouraged. Efforts to encourage more long-lived pine species (i.e., shortleaf and longleaf pine) would be investigated.

Conserving natural habitat for wildlife is the heart of any long-range plan for national wildlife refuges. The actions proposed in this Draft CCP/EA would conserve or restore land and water, and would thus enhance carbon sequestration. This, in turn, contributes positively to efforts to mitigate human-induced global climate changes.

Adverse

Under alternative C, there would be no negligible adverse effects due to climate change.

AIR QUALITY

Beneficial

Other than vehicles and equipment used by staff and public users, there are no major stationary or mobile sources of air pollution present on the refuge, nor would any be created under any of the alternatives. We expect refuge land management to help reduce any future direct and cumulative impacts by maintaining and promoting natural vegetative cover throughout the refuge. Through time, all upgrades to existing facilities would become more and more energy efficient. Collectively, these management actions would help reduce the potential for additional synthetic sources of emissions in the surrounding landscape.

Timber harvest to improve forest conditions and regrowth of forests in old fields would improve air quality. Trees store carbon and release oxygen. Because air quality in the region is generally good, we do not expect our management to result in measurably improved air quality, but it may contribute to improved local, ambient conditions.

Adverse

The two management actions that affect air quality the most are prescribed fires and timber harvest. The major pollutants from prescribed burning are particulates (small particles of ash, partly consumed fuel, and liquid droplets) and gases (carbon monoxide, carbon dioxide, hydrocarbons, and small quantities of nitrogen oxides). Air quality would be temporarily degraded during fire management operations. However, wildfires tend to consume considerably more biomass per acre and occur under weather conditions outside the planning window of fire managers. Prescribed burning, while temporarily degrading air quality is done under more predictable circumstances and generally under conditions where fuel consumption, the primary factor in determining particulate emissions, is less than wildfires. Low intensity prescribed burning would release inconsequential amounts of gases. Particulates can reduce visibility or cause negative effects on the health of people with respiratory illnesses. Appropriate smoke management can minimize or nearly eliminate both negative effects. No major differences in air quality relative to prescribed fire are anticipated.

Vehicular use from heavy equipment, staff, and visitors with the associated emissions is likely to have the greatest impacts on air quality due to a growing local and regional population and increased refuge visitation. However, this might be mitigated by reduced vehicle or residential emissions in the local area and by managing traffic that uses refuge roads as commuting lanes without the intended purpose of visiting the refuge. Lower traffic speeds would also encourage greater fuel conservation and fewer emissions as well.

In general, any management activity that requires the use of equipment which consumes fuels or causes particulate matter to be raised into the air would impact air quality. However, general management activities would not significantly adversely affect regional air quality and would like be compensated for by the general health of the local habitat and function of a healthy ecosystem; none of the alternatives would violate EPA standards, and all three would comply with the Clean Air Act.

HYDROLOGY AND WATER QUALITY

Beneficial

Conservation lands, such as the refuge, tend to improve water quality downstream as vegetated areas reduce runoff and sedimentation, while also absorbing some nitrogen, phosphorus, and other pollutants. Leaving streams unaltered provides beneficial impacts to wildlife and water quality by maintaining natural structure and flow and encouraging establishment of native species. Release of held water with water control structures increases the oxidation of water downstream possibly benefiting paddlefish and other aquatic species. The holding of water within lakes and GTRs increases opportunities for sedimentation removal and other forms of filtering of water. Following forestry, agricultural and storm water BMPs and the use of low impact development methods on refuge lands are expected to improve water quality within portions of the refuge. The positive impacts to water quality are expected to be moderate under this alternative.

Adverse

Under Alternative C, the cumulative effects of public recreation, prescribed fire, use of mechanical equipment, maintenance of roads, and long-term herbicide use for vegetation control could result in a slight decrease in water quality in localized areas, specifically in wetland transition areas prone to exotic, nuisance, or pest plant infestation. Confining water within lakes and GTRs reduces opportunities for natural flooding and deposition of nutrients throughout refuge habitats. Spawning and

fish passage are negatively impacted from using water control structures. Under all alternatives, BMPs would be implemented. With proper application of herbicides, no activity should have long-term damaging impacts on water bodies. The main effects of prescribed burning on water resources are the potential for increased runoff due to rain events. Prescribed burning itself usually does not affect water quality unless it is so intense that it consumes the duff and litter layer and exposes soils near streams (Marshall 2008). When surface runoff increases after burning, it may carry suspended soil particles, dissolved inorganic nutrients, and other materials into adjacent streams and other waterbodies, thus reducing water quality. These effects seldom occur after prescribed burns in Coastal Plains. Generally, a properly planned prescribed burn would not adversely affect water quality or quantity of ground or surface water in the South (USDA Forest Service, R8-TP 11, 1989). Moderate prescribed burns that retain groundcover but top-kill most plants should produce small increases in streamflow and channel sediment and negligible increases in surface runoff and erosion (Douglass 1983). Keeping roads well-maintained; treating exotic, nuisance, or pest plant infestation areas quickly after being discovered; and conducting reconnaissance of public use would keep impacts to water quality small, lessening the impact that may affect local water quality. Under all alternatives, we would conduct reconnaissance on the condition of the lakes and rivers in the refuge. If necessary, areas would be posted with use restrictions, possibly closed and protected, or barriers used to direct activities towards areas with less steep slopes. Public outreach and education on littering and proper waste disposal would lessen potential negative water quality impacts.

NOISE

Under all alternatives, moderate increases in noise from equipment and automobile traffic are expected. Temporary noise and minor traffic increases would be by-products of habitat and wildlife management and public visitation. Noise pollution would be temporary.

EFFECTS ON THE BIOLOGICAL ENVIRONMENT

This section discusses the potential effects of Alternative C on the refuge's biological resources (e.g., habitats, wildlife, and federal- and state-listed species).

HABITATS AND VEGETATION

Beneficial

Prescribed fire promotes desirable understory, early successional herbaceous species, and helps to control undesirable woody vegetation. Additional resources, if provided, would allow for more control of invasive species, further improving forested habitat conditions. Quick and early treatment of invasive plants with chemicals is often the method of control. Prevention of invasive vegetation may involve washing of equipment prior to movement throughout the refuge and the careful planning of public vehicle flow to discourage pass-through traffic, while still promoting vehicle access throughout the refuge by visitors. Prescribed fire when used broadly across a large portion of the landscape in close temporal proximity can produce a mosaic habitat of burned and unburned areas. This is especially true when ground versus aerial ignition is used. Allowing the forests to regenerate based on historic conditions versus forcing species into artificial habitats is beneficial, and supports the purposes for which the refuge was established.

Adverse

Prescribed fires have the potential to kill desirable plants located in the midstory and understory. Plant characteristics such as bark thickness and stem diameter influence the susceptibility to fire. Most hardwood bark has poor insulating qualities and is thinner than the bark of pine species. As a result, hardwood trees are generally much more susceptible to fire injury than pines. Placing prescribed fire in areas such as bottomland hardwoods has the potential to influence species composition away from that of historical habitat conditions. Even within fire-dependent species, cambial damage can occur from the extended smoldering of duff around the plant's root collar especially in areas with heavy fuel loads. Prescribed fire when used broadly across a large portion of the landscape in close temporal proximity can reduce habitat availability for species seeking cover and food. Damage can also occur whenever excessive heat penetrates into the soil killing feeder roots and beneficial soil organisms. Many of these negative impacts can be mitigated through frequent burning, which, in turn, reduces fuel loading.

Removal of vegetation causes direct mortality of targeted species. Non-targeted species could also be negatively impacted. Individual plants and their communities are impacted at varying levels. For example, damage to crowns or tree stems during the process of removing neighboring trees could result in exposing cambium that subsequently allows for infestation by bark beetles, thus killing the non-target tree. Other management activities including practices that call for nails in trees and raking around the base of the tree can have negative impacts on certain species. Impacts from nails are expected to be negligible and mitigation of damage is the selection of certain species and nail type. Impacts from raking are expected to be negligible because raking only occurs on RCW cavity trees and the beneficial impact to raking is protection of the tree from mortality caused by high-intensity fire. The adverse effects of raking are exposed soil, roots, and damage to roots, but would be mitigated through light raking only when protection from fire is crucial. Creation of new cavities for RCWs may have some effects on the stem of the tree by weakening the area and allowing easier avenues for pests and non-target species. Bark shaving could have adverse effects by allowing accessibility to pests and vulnerability to fire damage.

Managing for historic forest conditions would likely reduce the number of pine acres available for management of the RCW. However, the acres being managed for pine in contrary to the historic conditions are not providing Good Quality Foraging Habitat due to hard to control hardwood midstory competition, and many of the clusters are inactive or occupied by solitary male birds. These pine habitats also tend to be on the periphery of the main population and subject lower probabilities of survival.

The use of ORVs for management activities is crucial for the best management of habitats and maintenance on the refuge. Use of these vehicles could have negative impacts on vegetation and the degree of loss is dependent on the intensity of vehicle use (Hall 1980). Use of these vehicles would only be sporadic during monitoring activities and maintenance projects.

Maintenance activities to maintain or improve infrastructure such as roads or trails may involve the occasional use of chemicals or mechanical tools to remove unwanted vegetation. Where invasive vegetation already exists, the use of mechanical tools can often promote the further spread of the unwanted plant's seeds or growing parts. Soil disturbance from maintenance activities and public use can often open up areas to the colonization by invasive vegetation. Public use and vehicle traffic can also be a seed source for the introduction of nonnative or disease-infected vegetation. Quick and early treatment of invasive plants with chemicals is often the method of control. Prevention of invasive vegetation may involve washing of equipment prior to movement throughout the refuge and the careful planning of public vehicle flow to discourage pass-through traffic, while still promoting vehicle access throughout the refuge by visitors.

Deer overabundance can affect native vegetation and natural ecosystems (Tilghman 1989, Nudds 1980, Hunter 1990; Behrend et al. 1970). White-tailed deer have substantial impacts on certain herbaceous and woody species and on overall plant community structure (Waller and Alverson 1997). Over-browsing by deer can decrease tree reproduction, understory vegetation cover, plant density, and plant diversity (Warren 1991). High densities of deer have been recognized as vectors for spreading invasive species like Japanese stiltgrass. Public white-tailed deer hunts to manage deer populations can benefit vegetative communities.

Feral hogs can have negative impacts on native habitats and wildlife. Hogs are known to destroy native plants and consume native wildlife through their feeding behavior. Negative impacts to habitat would continue and increase if feral hog and beaver populations are unchecked. Under all alternatives, impacts would be negligible through the attempted removal of all feral hogs.

Although some beaver dams are beneficial, unmanaged beaver populations can lead to persistent damming of free-flowing waters, resulting in vegetation mortality. Mitigation through removal of undesirable beavers and their dams would lessen the impacts on forested habitats and infrastructure. Impacts would be negligible under all alternatives.

Pine and Pine/Hardwoods

Beneficial

Under Alternative C, the refuge would increase active forest management to achieve greater habitat diversity and forest structure to benefit a wider range of native wildlife while favoring historic forest conditions. Focusing on historic conditions versus maximizing pine habitat types would eventually promote higher quality forests. Regeneration of native southern pine species (e.g., short leaf, loblolly, and long leaf) instead of a loblolly monoculture increases diversity, sustainability, and longevity of the pine forests. Promoting a forest that better represents Good Quality Foraging Habitat would decrease the wide-spread outbreak of diseases and bugs. Prescribed fire also benefits pine forests by promoting pine-associated understories, decreasing wild land fire outbreaks, and decreasing hardwood competition. Development of larger RCW partitions would allow for the continued regeneration of the pine forest protecting the long-term viability of both the forest and bird population.

Pine/hardwood forests would benefit from the favoring of historic forest conditions through decreasing pressure to manage these areas toward pine only forests. Restrained management in these pine/hardwood areas would allow the regeneration and establishment of a highly diverse tree species favoring a variety of wildlife.

Adverse

Under Alternative C, pine acreage would be reduced and fewer acres would be subjected to prescribed fire in favor of pine. Increased forests of the refuge would become pine/pine hardwood and less suitable to RCWs. The pine forests would become less diverse due to removal and control of hardwood. Due to greater amounts of disturbance and mechanized equipment compared to Alternative A, pine areas may become more susceptible to invasive species such as cogon grass, Japanese climbing fern, and Japanese stilt grass.

Pine/hardwood areas may become more susceptible to bug outbreaks due to higher basal area and closer canopies. Decreased prescribed fire in these areas would also increase the probability of wild land fires.

Bottomland Hardwoods

Beneficial

Under Alternative C, there would be increased active forest management to both promote historic forest conditions and to achieve greater habitat diversity and forest structure to benefit a wider range of native wildlife and forest-breeding birds in bottomland hardwood forests. Production of hard mast and the regeneration of the desirable shade intolerant hardwoods would increase.

Adverse

Under Alternative C, shade tolerant and intolerant species would coexist in these areas. Due to greater amounts of disturbance and mechanized equipment compared to Alternatives A and B, hardwood bottomland areas may become more susceptible to invasive species and damage caused to residual trees by repeated treatments. Reduction of canopy would increase wind throw of dominant trees.

Aquatic Habitats

Beneficial

Under Alternative C, water quality would be protected by using the BMPs and the Service's pesticide use proposal process. The natural flood regime would promote natural hydrological functions. Protection of streams from physical disturbance protects water quality and stream integrity and structure. Drawdowns of lakes encourage herbaceous growth and structure. This alternative also creates additional seasonal aquatic habitats (e.g., ephemeral pools) within areas otherwise subjected to erosion or sedimentation. Moist-soil management practices create additional aquatic habitats. Aquatic habitats benefit from retention of organic material versus being flushed out of the system. The retention of select beaver ponds would be an essential part of maintaining healthy aquatic systems.

Adverse

Flooding of bottomland hardwoods outside of the natural flood regime in areas containing water control structures leads to degradation of habitat, increases in soil erosion, and decreases in water quality. Aquatic habitats would not be maximized under this alternative due to beaver control. Short-term impacts to aquatic habitats through water removal could have immediate impacts on plants and animals dependent on that water.

WILDLIFE

Beneficial

Improvement of habitat conditions throughout the refuge would be a benefit to wildlife by providing food, cover, and breeding areas.
Under Alternative C, RCW clusters would be managed at the recovery standard. Partition sizes would be larger and productivity of the birds would increase. Waterfowl would benefit from management of moist-soil areas, improved bottomland hardwood conditions, and greater amounts of habitats within lakes and wetlands. Forest breeding birds would benefit from a diverse habitat within the overstory, midstory, and understory. Game species would benefit from increased diversity in the pine/hardwood and bottomland habitats. Grassland species would benefit from the continuation of the demonstration prairie and herbaceous cover associated with the RCW managed habitats. Aquatic species including fish would benefit through improved habitats and increased consideration for their biological needs.

Adverse

The physical act of management can cause the destruction of habitat including loss of cavities, food resources and cover, and the mortality of wildlife. Equipment used to conduct management can cause the mortality or displacement of wildlife. Recreational uses on the refuge can cause wildlife disturbance, ranging from behavioral changes, physiological changes, or mortality (Knight and Cole 1995). Hunting and fishing cause direct mortality of wildlife. Management focused towards the benefit of one species can be to the detriment of another species of wildlife; this alternative does not manage all wildlife equally. Capture, tagging, marking, and banding of wildlife used to monitor populations can have adverse effects including stress, mortality, and injury. Allowing public use on the refuge increases litter, pollution, and disturbance to wildlife.

Waterfowl

Beneficial

Under Alternative C, the refuge would manage bottomland hardwood forests to promote forest diversity while enhancing historic conditions and providing healthy habitats for wintering waterfowl. Moist-soil habitats within agricultural fields and lakes would provide increased food resources for wintering waterfowl. Forest management promoting retention of cavity trees would benefit wood ducks and other cavity nesting species. Scrub/shrub areas within wetlands would increase wood duck brood survival by providing cover. Closure of lakes and moist-soil areas to refuge visitors during wintering periods protects waterfowl from unnecessary disturbance.

Adverse

Under this alternative, the use of native moist-soil plants with some high-energy agricultural crops and fewer GTRs yearly would produce fewer duck energy days and yet fully support realized wintering waterfowl numbers on the refuge. The decrease in reliance in wood duck boxes would negatively impact these species if the natural cavities are insufficient. Development of the “Connecting People with Nature” area and the year-round bank fishing could cause increased disturbance to waterfowl. Allowing public use on the refuge increases litter, pollution, and disturbance to waterfowl.

Forest Breeding Birds

Beneficial

Under Alternative C, the refuge would manage pine/hardwood and hardwood forests to promote forest diversity while enhancing historic conditions and providing healthy habitats for forest breeding birds. Forest management promoting retention of cavity trees would benefit birds and other cavity nesting species. Active management within Alternative C that favors growth of native cane and other early successional species would benefit those bird species requiring these habitats. Alternative C focuses on those forest breeding birds, in particular rusty blackbird, cerulean warbler, ovenbird, scarlet tanager, and yellow-throated warbler, needing the most assistance within the local landscape.

Adverse

Under this alternative, not all forest breeding birds would benefit through directed management. Forest breeding birds would not receive priority management over the endangered species found on the refuge. Prescribed fire, chemical, and mechanical treatments reduce cover for ground-nesting birds and understory for shrub-nesting species. Hunting as well as other public uses has the potential disturb

birds during critical periods of their life cycle. Allowing public use on the refuge increases litter, pollution, and disturbance to forest breeding birds. Regeneration (i.e., management tools: irregular shelterwood, seedtree, shetlterwood, and patch and clear-cutting) of pine forests for RCW management or to restore historical conditions could have temporal adverse effects to some but not all forest breeding birds.

Aquatic Biota

Beneficial

Active management of refuge waters, from its original un-manipulated state where natural processes remained in place to a highly controlled system using water control structures and levees, provides habitats for a diversity of aquatic species including sport fish. Highly oxygenated waters exiting from water control structures provides potential spawning habitat for various species of fish including paddlefish. These artificial systems provide a reliable water source for aquatic biota that would otherwise be subjected to periods of little to no water. The created lakes and wetlands trap sediment and pollutants and help protect habitat for mussels and other sensitive aquatic species. Although many water bodies are artificial and manipulated, there are large areas where rivers, streams, and wetlands are left in their natural state. Fish and other species have benefited from the protection of the natural rivers, as well as the manipulation of other water bodies. Streamside management zones would have increased protection above the recommendation within the Mississippi BMP guidelines, which would benefit at least 80 percent of amphibians normally found in these areas. Creating artificial ephemeral pools that lack fish provide protection for breeding amphibians. Under this alternative, creation of deepwater habitats in Bluff Lake would benefit aquatic species and fish by providing better reliable water in lower water periods during drawdowns and concentrated food sources. Wood storks, eagles, and waterbirds would also benefit from concentrated food sources. The proposed project that would create fish passageways would benefit fish species needing to move up stream for spawning and to find other food resources. This alternative also proposes creating several low-water crossings in lieu of ineffective culverts. These areas would decrease sedimentation and improve water flow therefore increasing desirable habitat for aquatic biota.

Adverse

Levees and other water control structures change the natural flood regime in turn modifying habitat for aquatic species. Often the impacts of these modifications are unknown for these species. Water control structures often present barriers for safe fish passage upstream. Water control structures also have the potential to dampen the variability of floodwaters therefore reducing spawning habitat for fish and other aquatic biota. Use of chemicals for control of exotic and invasive species can impact aquatic biota causing mortality. Use of boats within waters does increase pollution and the possibility of petroleum-chemical spills which can in turn cause adverse impacts to aquatic biota. Allowing public use on the refuge increases litter, pollution, and disturbance to aquatic biota. Use and maintenance of roads may increase turbidity and decrease water quality and water availability for aquatic species.

Resident Wildlife

Beneficial

The priority species listed in this alternative serve as a surrogate for many of the native species that would also benefit from the proposed management actions. Promotion of early successional habitats within the pine forests benefits a variety of species (e.g., bats, butterflies, deer, turkey, quail, rabbit, and sparrows). Protection of snags, cavities, and downed woody material would also benefit a variety of species (e.g., bats, wood duck, spiders, beetles, raccoon, and opossums) by ensuring available

habitat used for food, cover, and breeding areas. Although adverse impacts occur for individual game species, public hunting protects these populations from disease, starvation, and other factors from over-use of the habitats. Increased pine and pine/hardwood areas would benefit those species requiring a more diverse habitat.

Adverse

Under this alternative, native species do not receive any management actions for their sole benefit, but depend on priority species serving as surrogates for their needs. Some fields and moist-soil areas currently being used by grassland species, waterfowl, and aquatic biota targeted as potential RCW habitat would be afforested to provide more Good Quality Foraging Habitat for this endangered species. Regeneration (i.e., management tools: irregular shelterwood, seedtree, shelterwood, and patch and clear-cutting) of pine forests for RCW management or to restore historical conditions could have temporal adverse effects to some but not all all resident wildlife through displacement or less immeditate foraging habitat. Removal and harvest of wildlife through public hunts and nuisance and invasive species management has adverse effects to individual wildlife. Allowing public use increases the chances for direct mortality of some species due to vehicle collisions.

FEDERALLY LISTED SPECIES

Beneficial

Management of the endangered RCW requires that specific habitat requirements be met to provide nesting and foraging habitat needs of the birds. Within the loblolly pine habitats found on the refuge, favorable RCW habitat requires intensely managed pine habitat maintained by fire, herbicide, timber management, and installation of artificial cavities. In addition, limiting the amount of midstory woody vegetation to increase available foraging habitat is beneficial for RCWs. Under this alternative, partitions would be reorganized on the landscape to reduce total number of clusters on the landscape to a minimum of thirty. By reducing the population goal, RCW partitions would have more acreage, less overlap, and create sustainability across their habitat. The reduction in acres managed for RCWs would allow an increase in the number of acres in Good Quality Foraging Habitat thereby increasing RCW potential breeding group size, reproductive success, survival, and opportunities for dispersal. Reduction and reorganization of partitions would allow staff to artificially migrate recruitment clusters to decrease overlap with existing clusters and maximize pine habitat for individual clusters. By increasing partition sizes and reducing RCW management in the northern subpopulation north of Highway 25, it would also increase the opportunity to regenerate pine forests within partitions, ensuring the long-term sustainability of habitat for RCWs on the refuge. Reduction of the hardwood canopy cover component to standards set in the recovery plan is expected to decrease nest cavity competition with other species and prevent predation of individual RCWs. The use of artificial devices (e.g., restrictor plates and snake excluding devices) also decreases nest cavity competition with other species. Artificial cavities are installed to compensate for the absence of suitable natural cavities under current conditions to stabilize and increase the number of RCW groups and population size. Open canopy and prescribed fire promotes the herbaceous groundcover which increases invertebrate food resources required for the RCW. Habitat manipulations used to benefit RCWs could include silvicultural practices (i.e., active forest management including but not limited to manual or mechanized pre-commercial thinning, commercial biomass thinning, mulching, firewood cutting, timber stand improvements, herbicide, irregular shelterwood, shelterwood, seedtree, patch cuts, afforestation, reforestation, free thinning), prescribed fire, raking, mowing, creation of new artificial cavities, maintenance of suitable cavities, midstory reduction (chemical and/or mechanical control), integrated pest management, use of restrictor plates on cavities, snake exclusion devices, and kleptoparasite control. Active management of the

forests would reduce the likelihood of catastrophic southern pine beetle outbreaks that could cause the death of individual or all trees within the partition. All RCW management and monitoring methods represent those in the recovery plan to provide a net conservation benefit.

Wood storks would greatly benefit from the summer drawdowns of the lakes to provide concentrated food sources within isolated pools and recently de-watered moist-soil areas.

Adverse

According to the most current number of active clusters and most recent forage habitat analysis within those areas of the refuge which were historically occupied by pine in the overstory, the appropriate number of clusters capable of being supported by the habitat would be a minimum of 27 clusters in Management Units 11 and 17. This analysis reduces the number of acres artificially maintained or created for the RCW to approximately 12,000 acres. The smaller population size could have a greater risk of vulnerability to demographic and environmental effects and to extirpation. Regeneration (i.e., management tools: irregular shelterwood, seedtree, shelterwood, and patch and clear-cutting) of pine forests within present and future partitions to ensure the long-term sustainability of habitat for RCWs on the refuge could temporarily remove suitable and potential foraging and nesting habitat through loss of trees greater than 10 inches in diameter. Additionally, harvesting of existing mature forests as part of regeneration efforts within present and future partitions could temporarily remove habitat for up to 30 years due to seedling growth in to the midstory obscuring tree bole. However, foraging habitat would be sustained at or positively in excess of the MSS in affected active and inactive or recruitment partitions during any period to avoid adverse effects of a temporary habitat reduction. Monitoring and researching, including the capture of birds, could result in accidental mortality and disturbance. Inspecting cavities, the capture and banding of nestlings and adults, and installing artificial cavities would be conducted according to standard protocols and authorized under a Service Section 10(a)(1)(A) permit. Any incidental injury or mortality would be authorized under the Service's formal Section 7 consultation and biological opinion for all Section 10(a)(1)(A) management, monitoring, and research permits issued to all private, state, and federal agencies and individuals involved with management, conservation, and recovery of the RCW throughout the range of the species. Administrative use of vehicles within partitions and clusters could have an adverse impact on disturbance of individual RCWs while in nesting season. Although the refuge possesses a take permit for the loss of one bird biannually and measures are taken to prevent the loss of trees or birds, use of prescribed fire could result in the accidental loss of cavity trees. The refuge has one record of take on file following the loss of a cavity tree due to prescribed fire. The use of chemicals to control undesired woody understory or exotic/invasive species could affect RCWs through the subsequent dietary dose exposure by contaminated prey. This risk is small due to mitigation requirements compared to the reduction in habitat from hardwood encroachment on pine tree boles which reduce the foraging area. Protection of archaeological sites, such as cemeteries, could limit the management actions conducted on these areas which could reduce the desired habitat conditions thereby adversely impacting RCWs.

Under Alternative C, there would not be any adverse impacts to wood storks.

EFFECTS ON SOCIOECONOMIC ENVIRONMENT

This section discusses potential effects to socioeconomic resources (e.g., refuge revenue sharing, wildlife-dependent economics, ecosystem services, and land use patterns) under Alternative C.

Refuge Revenue Sharing

The “Revenue Sharing Account” places funds collected through wildlife habitat management and agriculture revenue generating activities into one joint account for all refuges that is then redistributed throughout the Refuge System. These funds are used in lieu of property taxes to reimburse counties at a rate determined by Congress. A revenue sharing check from the Fish and Wildlife Service is paid to counties having refuge administered lands. Annual refuge revenue-sharing payments to Oktibbeha, Noxubee, and Winston counties would continue at rates authorized by Congress under each alternative. Also a small portion, currently $60,000 or less per year is returned to the refuge in an “Expense for Sales Account.” These funds are used in the administration of forestry related activities.

EFFECTS COMMON TO ALL ALTERNATIVES

A few potential effects would be the same under each alternative and are summarized under ten categories: safety and health, environmental justice, land acquisition, cultural resources, aesthetics, and other effects.

Health and Safety (Fire and Smoke)

Fires may contribute to temporary changes in air quality. The refuge’s prescribed fires are more likely to be local problems and could be occasionally acute due to the large quantities of smoke that can be produced in a given area during a short period of time. Smoke consists of small particles (particulate) of ash, partly consumed fuel, and liquid droplets. Particulates are of special concern for the refuge because they reduce visibility on roadways. The amount of particulate put into the air depends on amount and type of fuel consumed, fuel moisture content, rate of fire spread, and type of firing technique used. Rate of smoke dispersal depends mainly on stability of the atmosphere and wind transport speeds. Maintaining the air quality is the responsibility of the Mississippi Department of Environmental Quality (DEQ). The refuge follows the guidelines and permitting process established by the Mississippi Forestry Commission (Mississippi Forestry Commission 2010). The permits are only issued by the commission when the appropriate atmospheric conditions are present for adequate dispersal of smoke. In addition, the refuge’s Prescribed Burn Plans address protection and preventive measures for smoke-sensitive and -critical areas.

Integrated Pest Management

Exotic and pest species have many impacts on refuge flora and fauna by degrading, changing, or displacing the native species. The Service has established procedures and responsibilities for pest management activities on and off refuge lands (596 FW 1), by adopting integrated pest management (IPM). IPM addresses the chemical, physical, cultural, and biological management tools used to manage pest and nuisance species. This process ensures pesticides are used safely and effectively and that low-risk pesticides are selected for the target species. The refuge ensures compliance with the Endangered Species Act and other applicable laws and regulations.

Chemical approaches including using pesticides, such as herbicides, insecticides, or fungicides, could have potential health risks from direct contact with chemicals when visiting treated infestation sites immediately following application. Exposure could occur from ingestion or skin contamination from treated vegetation. Skin exposure would be the most likely hazard for people accessing application sites. The inherent level of health risk to public and non-public users is minimal and readily mitigated through compliance with temporary site access restrictions, staff compliance with herbicide label stipulations, and agency standards for safe pesticide storage, transportation, use, and disposal.

Physical approaches, including barriers, trapping, explosives, euthanasia, hand-pulling, hoeing, mowing, and tilling, could have the potential health risks from direct contact with the species or

management tool being used. The inherent level of health risk to public and non-public users is minimal and readily mitigated through compliance with temporary site access restrictions.

Cultural approaches including crop rotation and alterations in planting dates have no unforeseen health or safety risks.

Biological approaches including modification or introduction of new species to manage existing species would likely be both controversial and complex. These actions would likely require a separate environmental assessment and biological approaches not covered within this document.

Environmental Justice

The U.S. EPA's Office of Environmental Justice defines it as follows: "Environmental Justice is the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental law, regulations, and policies. EPA has this goal for all communities and persons across this Nation. It will be achieved when everyone enjoys the same degree of protection from environmental and health hazards and equal access to the decision-making process to have a healthy environment in which to live, learn, and work (http://www.epa.gov/environmentaljustice; accessed February 2012)."

President Clinton signed Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, on February 11, 1994, to focus federal attention on the environmental and human health conditions of minority and low-income populations, with the goal of achieving environmental protection for all communities.

The order directs federal agencies to develop environmental justice strategies to aid in identifying and addressing disproportionately high adverse human health or environmental effects of their programs, policies, and activities on minority and low-income populations. The order is also intended to promote nondiscrimination in federal programs substantially affecting human health and the environment, and to provide minority and low-income communities' access to public information and participation in matters relating to human health or the environment.

Overall, we expect none of the alternatives to place disproportionately high, adverse environmental, economic, social, or health impacts on minority or low income persons. Before we make any major changes in habitat management or the environment, we always inform all of our publics, equally, and our programs and facilities are open to all who are willing to adhere to the established refuge rules and regulations. We do not discriminate in our responses for technical or practical information on conservation issues or when providing technical assistance in managing private lands.

Land Acquisition

Land acquisition within the approved acquisition boundary of the refuge would likely come from the Land and Water Conservation Fund, the Migratory Bird Conservation Fund, and U.S. Army Corp of Engineers mitigation programs. Lands can also be acquired through donations from conservation and private organizations. Land-for-timber exchange has been the predominant source for acquiring lands from willing sellers; this practice would remain the most viable option into the future. In addition to acquisitions, conservation easements and leases can be used to obtain the minimum interests necessary to satisfy refuge objectives for the benefit of wildlife. This, in turn, would have positive impacts on the surrounding environment and habitats. For each of these alternatives, we have concluded that the impacts would be positive.

Cultural Resources

All alternatives afford additional land protection and low levels of development, thereby producing little negative effect on the refuge's cultural and historic resources. Potentially negative effects could include silvicultural operations, construction of new trails or facilities, and development of water impoundments. In most cases, these management actions would require review by the Service's Regional Archaeologist in consultation with the State of Mississippi Historic Preservation Office, as mandated by Section 106 of the National Historic Preservation Act. Therefore, the determination of 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.

Service acquisition of land with known or potential archaeological or historical sites provides two major types of protection for these resources, protection from damage by federal activity and protection from vandalism or theft. The National Historic Preservation Act requires that any actions by a federal agency which may affect archaeological or historical resources be reviewed by the State Historic Preservation Office, and that the identified effects must be avoided or mitigated. The Service's policy is to preserve these cultural, historical, and archaeological resources in the public trust, and avoid any adverse effects wherever possible. For compliance with Section 106 of the National Historic Preservation Act, the refuge staff would, during the early planning stages of proposed new actions, provide the regional historic preservation officer with a description and location of all projects, activities, routine maintenance, and operations that affect ground and structures, details on requests for compatible uses, and the range of alternatives considered. That office would analyze those undertakings for their potential to affect historic and prehistoric sites, and consult with the State Historic Preservation Officer and other parties as appropriate. We would notify the state and local government officials to identify concerns about the impacts of those undertakings.

Refuge lands are vulnerable to looting, despite our best efforts at outreach, education, and law enforcement; however, impacts are expected to be negligible based on our observations of past visitor impacts from public uses. Upland areas adjacent to wetland areas have been identified for high potential for cultural resources. In addition, refuge visitors may inadvertently or even intentionally damage or disturb known or undiscovered cultural artifacts or historic properties. We would continue our vigilance in looking for this problem, use law enforcement where necessary, and continue our outreach and education efforts. For each of these alternatives, we have concluded that the impacts would not be significant.

Aesthetics

Active management that includes integrated pest management and habitat manipulations would have temporary negative aesthetic impacts, with easily observable dead and dying vegetation along roadsides and within the forest and lakes. However, under all alternatives, these actions would result in a net benefit to habitat integrity and aesthetics would be improved by providing greater amounts of habitat for wildlife. Over the longer term, negative impacts would be offset as more refuge habitat is brought into a condition more reflective of historic habitat conditions, resulting in greater plant diversity in the understory.

Other Effects

Partnerships with other entities, including universities, state, tribes, etc., to conduct research or cultural resource investigations could have negligible impacts on resources while strengthening scientific awareness. Each of the alternatives would have similar effects or minimal to negligible effects on transportation, human health and safety, children, hazardous materials, waste management, and utilities and public services

Table 11. Summary of environmental effects by alternative

Issues	Alternative A (Current Management – No Action Alternative)	Alternative B Focus on Waterfowl and Federally Listed Species	Alternative C (Proposed Alternative) Focus on Migratory Birds, Federally Listed Species, Native Wildlife, Habitat Diversity, and Experiencing Nature
Waterfowl	**Providing moist-soil and GTR habitats and closing critical habitat areas seasonally to decrease disturbance for population health** **Positive**	**Providing moist -soil, GTR, and lake habitats for increased population health, managing for increased brood rearing habitat, forested habitat manipulation to promote hard mast and cover, and closing critical habitat areas seasonally to decrease disturbance** **Positive**	**Same as Alternative B** **Positive**

Forest Breeding Birds	**Little to no active management in bottomland hardwood forests** **Negative**	**No active manipulation of habitats would occur specifically for the benefit of forest breeding birds** **Negative**	**Enhance populations through improved nesting, brooding, and foraging opportunities by application of active habitat manipulation techniques within bottomland hardwood forested habitats and side management zones to increase structural and species diversity** **Positive**
Red-cockaded Woodpecker Populations	**Habitat management would continue to promote pine and pine/hardwood forests both in agreement and contrary to historical conditions to provide habitat** **Neutral**	**Active habitat manipulations would establish, maintain, and promote a future forest condition more reflective of historical conditions to establish where possible the integral 120 acres of Good Quality Foraging Habitat** **Positive**	**Same as Alternative B** **Positive**

Monitoring and Baseline Data	**Continue monitoring RCWs through nest and fledge checks and visual and opportunistic surveys of other wildlife** **Neutral**	**Conduct scientific inventorying and monitoring for species of federal responsibility** **Neutral**	**Increased scientific monitoring of a broader range of wildlife through non-governmental organizations, universities, and volunteers** **Positive**
Invasive, Exotic, and Nuisance Species	**Some exotic, invasive, and nuisance species would be actively removed or controlled using integrated pest management techniques** **Positive**	**Exotic, invasive, and nuisance species would be actively removed or controlled using a more aggressive integrated pest management technique** **Positive**	**Same as Alternative B** **Positive**

Need for increased management of aquatic environments	**Actively manage moist-soil impoundments, lakes, and GTRs for waterfowl and waterbirds with auxiliary benefits for native species including a diversity of reptile, fish, amphibian, plant, and invertebrate species**	**Manage lakes and moist-soil impoundments primarily for waterfowl; Decreased water level manipulation in at least two GTRs and manage forest conditions in the GTRs to match those of the surrounding forests of similar type**	**Actively manage moist-soil impoundments, lakes, and GTRs for a diversity of wildlife; Create deepwater habitats within Bluff Lake and ensure consistency in recreational fisheries resources and use excavated soil to create islands within the lake to serve as bird rookery sites; Existing water control structures on Bluff Lake and in areas upstream of the lake would also be modified or removed to allow fish passage; Additional ephemeral pools for amphibians would be artificially created throughout the refuge through excavation in areas where excess water impedes road maintenance or threatens sedimentation of streams**

	Neutral	**Neutral**	**Positive**
Need for old fields to be reverted into pine and pine hardwood habitats	**Active habitat management in existing fields, grasslands, and restoration of prairie habitat at Morgan Hill** **Neutral**	**All old fields and the Morgan Hill Prairie Demonstration Area no longer maintained and either naturally reseeded or planted into a forest type most similar to historic conditions** **Neutral**	**A limited number of old fields managed and approximately 50% of the Morgan Hill Prairie Demonstration Area maintained** **Neutral**
Need for Active Forest Habitat Management	**Active forest management to achieve pine dominated forests for RCW habitat regardless of historic forest conditions** **Positive**	**Active forest management for historic forest conditions in those areas needed to maintain the desired wildlife habitat for federally listed species and waterfowl** **Positive**	**Increased active forest management to achieve greater habitat diversity and forest structure to benefit a wider range of native wildlife** **Positive**

Decline in habitat quality of bottomland hardwood forests	**Little to no active management in bottomland hardwood forests other than water level manipulation occurring within GTRs** **Negative**	**Actively manage the bottomland hardwood forests through a variety of techniques and water level manipulation to promote historic forest conditions** **Positive**	**Increased active forest management to both promote historic forest conditions and to achieve greater habitat diversity and forest structure to benefit a wider range of native wildlife including habitat for forest breeding birds** **Positive**
Decline in habitat quality of upland forests	**Areas not considered critical for the RCW would receive little to no active management** **Neutral**	**Actively manage upland forested habitats to reflect historic forest conditions through a variety of silvicultural methods; In areas deemed critical for RCW's, Good Quality Foraging Habitat would be promoted** **Positive**	**Same as Alternative B** **Positive**

Threats to cultural resources	**Seek funding to conduct a refuge-wide archaeological survey, and a refuge-led cultural resources interpretive program** **Positive**	**Individual cultural resource surveys only for specific projects or sites** **Neutral**	**Complete a comprehensive, refuge-wide survey of archaeological sites as well as individual cultural resource surveys as needed for specific projects or sites** **Positive**
Threats to refuge habitats if the Approved Acquisition Boundary (AAB) is never acquired	**Seek to acquire additional lands in the AAB through fee-title and timber-for-land exchange** **Positive**	**Same as Alternative A** **Positive**	**Work with partners and community to protect habitats using easements and additional acquisitions of lands through a combination of Land and Water Conservation Fund; the Migratory Bird Conservation Fund; USACE mitigation programs; donations from conservation and private organizations, or land-for-timber exchange** **Positive**

Lack of funding and increased priorities on resources of concern to continue maintaining Research Natural Areas (RNA)	**The two existing RNAs would remain managed as if under the Society of American Foresters designation, but research objectives and management strategies would remain undeveloped** **Negative to Neutral**	**Same as Alternative A** **Negative to Neutral**	**The two RNAs would no longer remain under this designation and would be managed as part of the larger surrounding units of similar type and managed for their historic conditions** **Neutral to Positive**
Need for increased law enforcement and patrol activities	**Law enforcement efforts would continue at a level to protect both natural and cultural resources and public safety through a combined effort of an on-site refuge officer and partnership with other federal and state officers** **Neutral to Positive**	**Improve law enforcement efforts** **Positive**	**Establish a second law enforcement officer** **Positive**

Need for increased support of fishing and hunting activities	**Maintain small game, deer, and waterfowl hunting opportunities through continuation of permit and quota hunts; Fish populations within Bluff and Loakfoma Lakes would be maintained through natural reproduction, regulated harvest, and stocking to support the current level of use** **Neutral**	**Decrease administrative support for all recreational opportunities** **Negative**	**Increase recreational opportunities especially for users with disabilities and maintain or enhance other facilities with a focused "Connecting People with Nature" area** **Positive**
Demand for more or upgraded public use activities	**Maintain recreational opportunities** **Positive**	**Reduce recreational opportunities** **Negative**	**Increase wildlife-dependent opportunities and eliminate all non-wildlife-dependent opportunities** **Positive**
Lack of improved signage and access to information	**Replace lost, stolen, or dilapidated signs** **Neutral**	**Signage and information available to the public would be reduced and only refuge regulatory signs would receive priority** **Negative**	**Increase signage and information** **Positive**

Need for effective environmental education programs to help minimize negative impacts to wildlife and habitat	**Continue hosting meetings and interpretive programs at the Environmental Education Center** **Positive**	**Environmental Education through the Environmental Education Center would be continued to be led by partners only** **Negative**	**Partner with others to conduct onsite environmental education and offsite activities with increased volunteer involvement** **Positive**
Lack of sufficient administrative resources to address increasing demands and increasing impacts	**Facilities and equipment would be maintained as funding and staffing allows and to meet refuge goals** **Positive**	**Reduction in staffing, maintenance of facilities, and removal of assets** **Negative**	**Increase funding, staffing, partnering, equipment, facilities, and Friends and volunteer support groups** **Positive**
Need for an additional fee for access to include in the Fee Program	**Continue with the existing Fee Program for deer and waterfowl hunters** **Neutral**	**Same as Alternative A** **Neutral**	**Continue participation in the existing Fee Program and include establishment of an access pass fee** **Positive**

UNAVOIDABLE IMPACTS AND MITIGATION MEASURES

Under Alternative A, the no-action alternative, there are numerous unavoidable impacts, including law enforcement that is not adequate for safeguarding the public especially with increasing levels of visitor use; continued degradation of the biological functions of native plant communities and wildlife habitat due to previous and ongoing conversion of mixed pine/hardwood areas to pine for RCWs, the invasion of exotic or nuisance plants and animals, and reducing biodiversity. Over time, if these issues are not addressed, they would continue to impact refuge resources.

Alternative B has some unavoidable impacts including law enforcement that is not adequate for safeguarding the public especially with increasing levels of visitor use. There would be a reduction in the degradation of the biological functions of native plant communities and wildlife habitat due to reversion to historic habitat conditions, the invasion of exotic or nuisance plants, and animals impacting biodiversity. Other than focused active management for the RCW and waterfowl, resident fish and wildlife would receive little direct management attention potentially causing unbalanced populations. Forest composition in the bottomland hardwoods would shift toward shade-tolerant species which would shift the species diversity away from hard mass species reducing foods for waterfowl and other wildlife. Visitor services would decrease and existing trails, observations towers, and boardwalks would not be maintained which could result in closure for public safety reasons.

Alternative C, the proposed alternative, also has some unavoidable impacts covered below. These impacts are expected to be minor and short-term in duration. The following sections describe the measures the refuge would employ to mitigate and minimize the potential impacts that would result from implementation of the proposed alternative.

WATER QUALITY AND SOIL DISTURBANCE

Soil disturbance and siltation due to water management activities, silviculture, prescribed fire, integrated pest management, road and levee maintenance, construction projects associated with the "Connecting People with Nature" area, other refuge projects, use of equipment associated with management activities, and dirt excavation in Bluff Lake are expected to be minor and of short duration. The refuge would use BMPs, streamside management zones, and pesticide use plans to help mitigate adverse impacts that could affect water or soil quality and disturbance. For example, construction projects would only be planned for times when erosion, rutting, and storm water runoff would be least degrading to the construction area or surrounding habitats. Prescribed fire would follow the prescription within the fire management plan and use strict guidelines for burn times and days.

Visitor use on refuge assets is expected to have a negligible impact on water quality and soil disturbance. To minimize the impacts from public use, the refuge would include informational signs that request users to obey public use regulations to avoid causing increased disturbance and impacts.

Long-term herbicide use for vegetation control could result in a possible negative impact to water quality and soil disturbance in areas prone to exotic plant infestation. Through the proper application of herbicides, impacts are expected to be minor while reducing or eliminating exotic plant infestations.

WILDLIFE DISTURBANCE

Disturbance to wildlife is an unavoidable consequence of many public use programs. While some activities such as wildlife observation may be less disturbing than others, all of the public use activities proposed would be planned to avoid unacceptable levels of impacts and compatible with purposes of the refuge and mission of the Service. Water management activities, silviculture, prescribed fire,

integrated pest management, road and levee maintenance, construction projects associated with the "Connecting People with Nature" area, other refuge projects, use of equipment associated with management activities, and dirt excavation in Bluff Lake would also disturb wildlife. To mitigate these disturbances, projects would be planned for opportunities outside of critical wildlife life cycles especially for RCW. BMPs, streamside management zones, and pesticide use proposals would be properly followed if not exceeded to help mitigate impacts.

The known and anticipated levels of disturbance from the alternatives are not considered to be significant. Nevertheless, the refuge would manage public use activities to reduce impacts. Providing access for fishing opportunities allows the use of a renewable natural resource without adversely impacting other resources. Hunting would also be managed with restrictions that ensure minimal impact on other resources. Wildlife disturbance due to habitat management would be limited to concentrated areas of the refuge with escape cover available. During nesting season, when possible, we would limit habitat disturbance. If the refuge determines that impacts from the expected additional visitor uses are above the levels that are anticipated, those uses would be discontinued, restricted, or rerouted to other less-sensitive areas.

Specifically for the endangered RCW:

Harvest of existing mature forests as part of regeneration efforts within present and future partitions would be mitigated if existing partitions meet minimum acreage requirements and those acres remaining provide GQFH. If insufficient number of acres exists, this action would not be mitigated and could be a potential direct adverse impact to the RCWs. The refuge would take no management actions that would reduce habitat below managed stability standard. Silvicultural operations (i.e., emergency actions, regeneration, and wildlife stand improvements) could have short-term and unavoidable impacts due to creating temporary (approximately 25-30 years) unsuitable foraging habitat and disturbance. Silvicultural operations (i.e., thinning, mulching, right-of-way maintenance, emergency actions, and timber stand improvements) would be mitigated through reconnaissance and marking with white bands of known cavity trees prior to treatments; ongoing monitoring of work being completed; and if a cavity tree is removed, artificial cavity would be installed. Operation of forestry equipment within 200 feet of cluster trees would be mitigated through restricting use of such equipment to dates outside of nesting seasons and no use during early morning and late evening hours. The refuge is closed to all activities after dark. Closing abandoned clusters in favor of adding acreage to remaining clusters would be mitigated by providing better habitat for remaining clusters and larger group sizes (i.e., more male helpers). Monitoring and research including the capture of birds would be mitigated through proper training and permitting of individuals conducting the monitoring actions and careful considerations of climate conditions when monitoring occurs. Inspecting cavities, the capture and banding of nestlings and adults, and installing artificial cavities would be conducted according to standard protocols and authorized under a Service Section 10(a)(1)(A) permit. Any incidental injury or mortality would be authorized under the Service's formal Section 7 consultation and biological opinion for Section 10(a)(1)(A) Management, Monitoring, and Research Permits Issued to all Private, State, and Federal Agencies and Individuals involved with Management, Conservation, and Recovery of the RCW throughout the range of the species. To mitigate prescribed fire impacts to cavity trees, the refuge personnel would rake hazardous fuels at least three feet around the trees to avoid high fuel loads, use low intensity burns on a sufficient burn cycle, spot fire around active trees while personnel are present, and monitor cluster impacts after the fire. Prescribed burning is conducted within prescribed parameters. If actual conditions or fire behavior moves outside of prescription parameters after burn operations are initiated, the burn may be terminated or completed at the discretion of the burn boss based on firefighter/public safety, observed fire behavior, and other factors. Prescribed burning would not be conducted within active RCW cavity tree cluster sites during severe drought conditions (use an appropriate Keetch-Byram Drought Index (KBDI) for local conditions. If any

incidental loss of a cavity tree with active cavities occurs, refuge staff would install a suitable number of replacement artificial cavities so there would be no net loss (USFWS 2006). The use of chemicals to control undesired woody understory or exotic/invasive species would be mitigated by ensuring employees' use all proper techniques that are outlined in the pesticide use proposal to include proper chemicals used, application rates followed, and use of trained applicators. Mitigation of creation of new artificial cavities, bark shaving, use of restrictor plates, and use of excluders for RCWs would occur as often as possible by recycling of existing cavity trees (i.e., install new cavity in same tree) and avoid scarring of the cambium during bark shaving. The risk of cavity tree mortality due to installing a cavity insert is insignificant by avoiding installations during drought, other periods of stress, and usually in the dormant season (USFWS 2006). Use of restrictor plates helps prolong the life of existing cavities, thus delaying the need for new installations. No mitigation would be possible for installation of excluding devices. Mitigation of the adverse effects from public use would be providing the public with information on RCW biology, thus preventing the unaware user from unintentional disturbance to the RCW; areas of high-density public use including hiking and high vehicle use areas would be closed, if disturbance was of concern. Any persons found taking an endangered species would be prosecuted. Maintenance of roads, trails, and related infrastructure would be mitigated by limiting maintenance activities near clusters to non-nesting seasons and avoiding early morning and late evening hours. Maintenance of facilities located near clusters would be mitigated by limiting maintenance activities to non-nesting seasons and avoiding early morning and late evening hours. All administrative areas would be managed as habitat. The impacts to RCWs by protecting archaeological sites would not be mitigated. Creating and maintaining firebreaks would be mitigated by limiting creation and maintenance of firebreaks to non-nesting seasons and avoiding work during early morning and late evening hours. Locations of firebreaks would be rerouted or abandoned if near an RCW cluster. Refuge boundary maintenance near clusters would be mitigated by limiting maintenance activities to non-nesting seasons and avoiding early morning and late evening hours. Administrative use of vehicles within areas near clusters would be mitigated through operation outside of nesting seasons and throughout the year during by limiting activity in early morning and late evening. With these mitigation measures, there would be no permanent decline in the population size for active clusters.

VEGETATION DISTURBANCE

Silvicultural practices including removal of trees through commercial forestry operations and integrated pest management would have slightly different effects on vegetation, depending primarily on the condition of the habitat and the intensity of the harvest operation. Forest management activities would promote desired habitat conditions, improve and protect the forest health, and promote recruitment of desired forest species. Additionally, these activities would promote species diversity and encourage structure within existing and future forested habitats.

Silvicultural practices come with some biological risks, including potential for physical damage to residual trees, existing vegetation, resident wildlife, and to soils through erosion or compaction. BMPs would be met or exceeded during all forestry management activities. Physical damage to residual trees as a result of harvesting activities is normally minor. Habitat conditions would be assessed prior to treatment and carefully monitored during harvest to ensure that log landing and skid trail locations minimize soil impacts and damage to residual trees. Damage to existing vegetation during the harvesting process would be temporary. Negative short-term impacts could result from the creation, extension, and maintenance of fire lines that require the clearing of vegetation along their length using heavy equipment and/or hand raking. Plants in the understory would quickly regain their vigor due to increased light availability to the forest floor. Exclusion and buffer zones would be created around areas having greater sensitivity.

Frequent and variably timed inspections of harvesting operations would ensure that only designated trees are cut, and that problems are rectified before becoming major issues. Some snags, cavity and den trees, and large coarse woody debris would be retained, as appropriate, to meet refuge objectives. Silvicultural practices would be suspended or restricted at any time continued operation might cause excessive damage to the habitat and soil. Designated haul roads would be mitigated following completion of treatments by planting in native cover crops and limiting access. Remaining open roads would be designed so that they do not negatively affect hydrology of surrounding habitats. This work would require the use of equipment such as a bulldozer and road-grader. Habitat management practices would be allowed only when site conditions are dry enough to minimize unnecessary damage.

Visitor use may increase the potential for introduction of new exotic species into areas when visitors do not comply with regulations at access points such as trails and boat ramps. The refuge would minimize this impact by enforcing the regulations for access to the refuge's water bodies and by installing informational signs that request users to stay on the trails.

In places where undeveloped trails are created by the visiting public, unfrequented trails would retain their dominant vegetation species, on medium-use trails some plant species would be replaced and heavily-used trails would often contain invasive species (Liddle and Scorgie 1980). One example of undeveloped trails easily observable on the refuge is those created by anglers accessing the water's edge. Impacts from undeveloped trails would be mitigated through reconnaissance and possible closure for restoration. Impacts to vegetation communities surrounding developed trails are expected to be negligible because of the trail's design (wide enough for several visitors at once) and continued maintenance. Additional impacts to vegetation are minimized by not permitting public users to cut, collect, or transport live vegetation to or from the refuge.

Impacts to vegetation are further minimized because public users are restricted from installing permanent structures and temporary structures cannot be attached using screws, nails, or any other damaging materials. The refuge has also taken steps to provide boardwalks and observation platforms for use in public use areas to further mitigate negative impacts on vegetation. Consolidating high-impact recreational activities to the "Connecting People with Nature" area would further reduce the impacts to vegetation. Research and monitoring activities, including the removing and trampling of vegetation, are expected to cause negligible site-specific impacts on vegetation communities.

USER GROUP CONFLICTS

As public use increases, unanticipated conflicts between different user groups could occur. If this should happen, the refuge would adjust its programs, as needed, to eliminate or minimize any public user conflicts. These methods include establishing separate use areas, different use periods, and limits on the numbers of users to provide safe, quality, appropriate, and compatible wildlife-dependent recreational opportunities.

EFFECTS ON ADJACENT LANDOWNERS

Implementation of the proposed alternative is expected to positively impact landowners including higher property values, less intrusion of invasive exotic plants, and increased opportunities for viewing and benefiting from more diverse wildlife.

However, some negative impacts that may occur include a higher frequency of trespass by public users onto adjacent private lands, and noise associated with vehicle traffic. To minimize these potential impacts, the refuge would provide informational signs that clearly mark refuge boundaries; maintain the refuge's existing parking facilities; use law enforcement; and provide increased educational efforts at the visitor center.

LAND OWNERSHIP AND SITE DEVELOPMENT

Land acquisition efforts by the Service could lead to changes in land use and recreational use patterns. However, most of the non-Service-owned lands within the refuge's approved acquisition boundary are currently undeveloped. If these lands are acquired as additions to the refuge, they would be maintained in a natural state, managed for wildlife populations, and opened to wildlife-compatible public uses, where feasible.

Potential development of the refuge's buildings, trails, roads, and other improvements could lead to minor short-term negative impacts on plants, soils, and some wildlife species. All construction activities would comply with the requirements of Section 404 of the Clean Water Act; the National Historic Preservation Act; Executive Order 11988, Floodplain Management; and other applicable regulatory requirements.

CUMULATIVE IMPACTS

A cumulative impact is defined as an impact on the natural or human environment, which results from the incremental impact of the proposed action when added to other past, present, and reasonably foreseeable future actions regardless of which agency (federal or non-federal) or person undertakes such other actions (40 CFR 1508.7).

Cumulative impacts are the overall, net effects on a resource that arise from multiple actions. Impacts can "accumulate" spatially, when different actions affect different areas of the same resource. They can also accumulate over the course of time, from actions in the past, the present, and the future. Occasionally, different actions counterbalance one another, partially canceling out each other's effect on a resource. But more typically, multiple effects add up, with each additional action contributing an incremental impact on the resource. In addition, sometimes the overall effect is greater than merely the sum of the individual effects, such as when one more reduction in a population crosses a threshold of reproductive sustainability, and threatens to extinguish the population.

A thorough analysis of impacts always considers their cumulative aspects, because actions do not take place in a vacuum: there are virtually always some other actions that have affected that resource in some way in the past, or are affecting it in the present, or would affect it in the reasonably foreseeable future. So any assessment of a specific action's effects must in fact be made with consideration of what else has happened to that resource, what else is happening, or what else would likely happen to it.

A few activities or actions in the proposed management plan are anticipated to have minor to negligible cumulative impacts. These are discussed as follows:

EFFECTS ON THE PHYSICAL ENVIRONMENT

All the alternatives provide for habitat restoration and enhancement projects, and land acquisition. For instance the "Connecting People with Nature" area project would be designed to reduce negative effects on wildlife habitat in other areas of the refuge and enhance the compatible recreation

experience. Collectively, over time, and in working with other conservation partners, these actions would improve the refuge's native habitats and recreation experiences.

Some minimum and minor impacts on physical resources are expected, under each of the alternatives, but none of these are anticipated to be cumulatively significant. Cumulative effects on individual physical resource categories are further discussed below.

Climate Change

With respect to climate change, we believe that the refuge would be a net carbon sink over the 15-year planning period. The amount of carbon that would potentially be released by the refuge as a result of associated energy use from habitat management was not estimated for this EA. However, under each alternative, the refuge would continue to lower its carbon emissions. As we work to implement many of the strategies for achieving Service-wide carbon neutrality by 2020 (USFWS 2009c: Draft Strategic Plan for Climate Change), refuge energy use is expected to decline. These actions would include conversion to hybrid vehicles, upgrading energy efficiencies in facilities, video-conferencing, and green purchasing. These actions, combined with those of other Service offices and the Federal Government in general, would likely result in a beneficial reduction in the rate of greenhouse gas emissions nationally.

Topography

Under all Alternatives, no adverse cumulative effects are predicted to this resource.

Geology

No adverse impacts on geology are expected under all Alternatives.

Soils and Water Quality

We predict no adverse cumulative impacts on water quality and soils under any of the alternatives. We would use BMPs on any roads, trails, or other infrastructure construction sites to ensure those impacts are avoided, minimized, and mitigated. Any forest management that would take place would be done so that all BMPs are followed and monitored closely. All projects are few, and dispersed on the refuge, so their local effects would not be additive.

Air Quality

All alternatives are not expected to have cumulative adverse impacts on air quality, locally or regionally, since they would help retain vegetated areas within the acquisition boundaries. Some short-term, local deterioration in air quality would be expected from air emissions of motor vehicles used by visitors and staff, as well as habitat management (e.g., prescribed burning)

Noise

Cumulative effects on noise are anticipated to be minimal.

Visual Resources

Cumulative effects on visual resources are anticipated to be minimal. Habitat manipulation through forest and aquatic management would change the appearance of the landscape. These management

actions are necessary for management of wildlife and the habitat on which they depend. The aesthetics of the cumulative effects vary based on personal perspective.

EFFECTS ON THE BIOLOGICAL ENVIRONMENT

The management activities in the proposed action are intended to maintain or improve the area's biological resources by protecting the biological integrity of the refuge. Benefits are anticipated for rare, threatened, and endangered species; migratory birds; and native wildlife and habitat diversity, including the minimization of negative impacts associated with exotic, invasive, and nuisance species.

Although the degree of habitat quality and improvement differs under the three alternatives, all are intended to improve fish and wildlife habitat and populations. For species that are threatened, endangered, candidate, rare or have declining populations, this improvement is important to their overall population and genetic diversity.

All alternatives attempt to improve or at least maintain biological resources on the refuge. The combination of refuge management actions with other organizations (e.g., MSU, MDWF) could result in significant, beneficial cumulative effects by: (1) increasing conservation and management for native and threatened and endangered species; (2) improving habitats, especially those for migratory birds (e.g., moist-soil habitats, bottomland hardwoods, wetlands, and GTRs that are regionally declining); and, (3) preventing the spread of or reducing invasive plants and animals.

Recreational hunting and fishing have been identified in the Improvement Act as priority public uses, provided they are compatible with the purposes for which the refuge was established. All hunts fall within the framework of Mississippi's open seasons and follow state regulations. Small game animal populations on the refuge are capable of sustaining harvest because of their short reproduction cycles. Hunting regulations for both endemic and migratory game species are based on specific statewide and nationwide harvest objectives. Migratory bird regulations are established at the federal level each year following a series of meetings involving both state and federal biologists. Harvest guidelines are based on population survey and habitat condition data. Refuge hunting programs are always within these regulations. As currently proposed, the known and anticipated levels of disturbance of allowing hunting are considered minimal and well within the tolerance level of known wildlife species and populations present on the refuge. All hunting and fishing activities would be conducted within the constraints of sound biological principles and refuge-specific regulations established to restrict illegal or questionable activities. The benefits that hunting and fishing bring to each refuge improves the entire Refuge System's available habitat and native wildlife populations and thus provides the public with more valuable and diverse refuge recreational opportunities.

In the proposed alternative, monitoring activities through wildlife inventories and assessments of public use levels and activities would be utilized, and public use programs would be adjusted as needed to limit disturbance. Implementation of an effective law enforcement program and development of site-specific refuge regulations that are reviewed annually should minimize most incidental take problems. Any negative cumulative effects of fishing (a consumptive resource use) are anticipated to be minimal. Fishing is not anticipated to cause any significant adverse cumulative effects. Fishing would be limited to areas that minimize any associated wildlife disturbance effects.

The negative cumulative effects of visitation are anticipated to be minimal. Although non-consumptive users can affect wildlife through disturbance, the effects of the proposed alternative are not considered significant and well within the tolerance level of known wildlife species and populations present in the visited areas. As public use levels expand across time, unanticipated conflicts between user groups may occur. Experience has proven that chronological and spatial zoning (e.g., establishment of separate use areas,

use periods, and restrictions on the number of users) is an effective tool in eliminating conflicts between user groups.

There would be no significant adverse cumulative effects to hydrology or water quality under any of the alternatives. On the refuge, best management practices including erosion and sediment control measures would be used during the construction of roads, trails, and structures, as well as during forest management and noxious weed control to ensure effects are minimized. These onsite projects would be widely dispersed over the large area of the refuge and over long periods of time so their local effects would not be additive.

Proposed integrated pest management activities are not expected to have significant adverse cumulative effects. These activities include mechanical removal, application of approved herbicides, and euthanasia. Herbicides used for exotic plant control are used and managed to target specific exotic plants or infestations, are approved for use in natural areas to control exotic plants, and generally do not have long-lasting residual effects to the environment as their chemical nature provides for relatively quick break down of the product after application. Further, use of herbicides is inherently limited based on label rates and approved application practices on refuge lands further minimizing any negative effects. All exotic plant chemical applications would be conducted in accordance with Service policy and under an approved refuge-specific Integrated Pest Management Plan.

Under the proposed alternative, it is anticipated that the prescribed fire program would have a minimal negative cumulative effect on the biological environment. It is a natural process to have fire in the various habitat types. With the use of prescribed fire, conducted under agency policies and approved fire management plan, risk of undesirable conditions that could affect lives and resources would be reduced. Managed fire reduces fuel loads, helps prevent catastrophic wildfires, and supports habitat needs for a variety of species. Throughout the life of the management plan, monitoring would be conducted to evaluate the effects of fire on the landscape.

EFFECTS ON THE SOCIO-ECONOMIC ENVIRONMENT

Several positive effects to the area's socioeconomics are expected under all three alternatives. Wildlife dependent activities would contribute to the region's economy. A segment of the visiting public would spend its money at area hotels and restaurants. Furthermore, visitors would locally buy some equipment and supplies associated with public uses such as hunting, fishing, wildlife watching, and photography. Conservation lands have also been shown to produce economic benefits to local communities by reducing costs associated with providing clean water, storm water management, and improving air quality (The Trust for Public Land 2010). Neighboring landowners of refuges have been found to benefit from improved water quality through management and restoration of waters and native habitats, increased land value, decreases in potential storm water damage, and from the assurance that those refuge properties would not be developed. Other benefits of refuge lands include maintenance of many traditional uses, recognition of cultural values, and increased opportunities for general public use activities.
White-tailed deer hunting is a traditional and popular activity on the refuge and in the State of Mississippi. License sales and associated hunting expenditures provide substantial income to the state (Measells et al. 2005). The management of deer through hunting is necessary to protect habitat. Other game species such as waterfowl, turkey, squirrel, raccoons, rabbit, quail, woodcock, and opossum also provide similar benefits.

Non-hunted resident wildlife, including birds, small mammals, reptiles, amphibians, and invertebrates, provide socioeconomic benefits through environmental education, income from tourism, and opportunities to connect with nature. With increased wildlife-dependent recreation opportunities, user

group conflicts may occur. The refuge's visitor use programs would be adjusted as needed to eliminate or minimize occurrences to provide quality wildlife-dependent recreational opportunities.

We expect none of the management actions in the three proposed alternatives to have a significant adverse cumulative impact on the economy of local towns or the counties in which the refuge lies. We would expect none of the alternatives to alter the demographic or economic characteristics of the local community. The actions we propose would neither disproportionately affect any communities nor damage or undermine businesses or community organizations. All of the alternatives would maintain the aesthetics of the refuge's natural landscape, enhance biological resources available for consumption, and provide wildlife experiences that promote a pleasurable quality of life for humans.

These varying alternatives would have cumulative impacts, because we expect the demand for nearly all recreation to grow while the amount of refuge space and natural resources stays relatively constant. In Alternative A, current uses would grow without major change to public use programs. Alternative B focuses on waterfowl and federally listed species, and only the six priority public uses. Alternative C, the proposed alternative, attempts to strike a reasonable balance. The refuge would remain a destination of choice for both wildlife and people. If successful, that integrated approach should prove more sustainable with positive long-term impacts on natural resources on the refuge and social and economic impacts on the communities beyond.

Our working relationships with area colleges and universities, private landowners, and others should improve and promote a strong connection to the local community. With the increased connection, the refuge would gain community support and in turn the community would gain a sense of stewardship of the refuge.

DIRECT AND INDIRECT EFFECTS OR IMPACTS

Direct effects are caused by an action and occur at the same time as the action. Indirect effects are caused by an action but are manifested later in time or further removed in distance, but should be still reasonably foreseeable.

The actions proposed for implementation under the proposed alternative include facility development, wildlife habitat and population management, resource protection, public use, and administrative programs. These actions would result in both direct and indirect effects. Facility development, for example, would most likely lead to increased public use, a direct effect; and it, in turn, would lead to indirect effects such as increased littering, noise, vehicular traffic, and vehicle-caused wildlife mortality.

The opportunities for wildlife-dependent priority public uses would be available to visitors and have direct impacts including user conflicts, wildlife disturbance, and damage to habitats. To mitigate these direct impacts, administration may close parts of the refuge to public uses, establishing separate use areas, use periods, or restrict the number of users. Each has been shown to be an effective tool in eliminating conflicts between user groups and wildlife. Indirect impacts are anticipated to include loss of focus for the refuge mission, declines in habitat quality, and possible declines in diversity. These indirect impacts would be detected and mitigated through the implementation and revision of the CCP and other step-down plans and continued reconnaissance and monitoring activities.

Improved facilities utilized by refuge visitors are roads, parking lots, trails, and boat launching ramps. Direct effects of these facilities could cause impacts to localized soils and waters and may cause some wildlife disturbances and damage to vegetation. Indirect impacts by the improvement and increased use of these facilities may include increased litter, spread of exotics, wildlife mortality, noise pollution, and illegal uses. Changes in traffic flow would likely mitigate many of these adverse impacts to the

refuge by designating access and limiting vehicle speeds. This would also help eliminate travelers using the refuge as a short-cut between two locations.

The refuge maintenance and management activities have direct impacts to both wildlife and visitors to the refuge. These direct impacts include disturbance and interruptions of both wildlife and visitor activities. Indirect impacts could include increased erosion, temporary displacement of wildlife, mortality of wildlife, and decreased community support. Both the direct and indirect impacts can be mitigated through periodically conducting these activities at times (seasonal or daily) that result in the least amount of disturbance and interruption of the life cycle of wildlife and visitor experience. Public notices and outreach would also be used to inform and educate the public on the timing and necessity of these activities.

Visitors on the refuge have the potential to cause both direct and indirect impacts on cultural resources. Refuge visitors may inadvertently and unintentionally damage or disturb known or undiscovered cultural artifacts. Using outreach, education, and law enforcement, these illegal activities can be minimized. Through continued efforts to survey and record cultural resources, the refuge would be better able to prioritize protection of this history.

For compliance with Section 106 of the National Historic Preservation Act, the refuge staff would provide the regional historic preservation officer a description and location of all projects, activities, and routine maintenance and operations that affect ground and structures. Details on requests would be provided along with a range of alternatives considered. That office would analyze those undertakings for their potential to affect historic and prehistoric sites, and consult with the State Historic Preservation Officer and other parties as appropriate. We would notify the state, tribes, and local government officials to identify concerns about the impacts of those undertakings.

SHORT-TERM USES VERSUS LONG-TERM PRODUCTIVITY

In this section, we examined the relationship between local, short-term uses of the human environment and maintaining the long-term productivity of the environment. By long-term, we mean that the impact would extend beyond the 15-year period of the final CCP.

The key to protecting and ensuring the refuge's long-term productivity is to find the threshold where public uses do not degrade or interfere with the refuge's natural resources. The plans proposed under the proposed alternative have been carefully conceived to achieve that threshold. Therefore, implementing the proposed alternative would lead to long-term benefits for wildlife protection and land conservation that far outweigh any short-term impacts.

The habitat protection and management actions proposed under the proposed alternative are dedicated to maintaining the long-term productivity of refuge habitats. The benefits of this plan for long-term productivity far outweigh any impacts from short-term actions, such as the creation of features within the "Connecting People with Nature" area. While these features could cause short-term negative impacts through trail creation and disturbance to wildlife, the longer term reduction of erosion and increased educational values and the associated public support gained from the improved visitor experience would produce benefits that outweigh those negative impacts.

Diverse wildlife recreational opportunities for public use should provide the best long-term positive recreational and economic impacts to local communities. Maintaining biological diversity in natural ecosystems helps ensure their long-term resiliency. The proposed public use programs would be designed to heavily rely on outreach and environmental education to explain all of our management

actions to visitors and the public that would encourage everyone to be better stewards of our natural environment.

Under all alternatives, our primary aim is to maintain or enhance the long-term productivity and sustainability of natural resources on the refuge, in the State of Mississippi, and the Gulf Coastal Plain Ecosystem. Habitat management practices that mimic ecological and sustainable processes optimize the maintenance and enhancement of the biological integrity, diversity, and environmental health of those habitats for the long term. Long-term productivity is especially enhanced when the ecological and sustainable management actions that are in the proposed alternative would best support and improve links between ecological processes and ecosystem function.

V. Consultation and Coordination

OVERVIEW

This chapter summarizes the consultation and coordination that has occurred to date in identifying the issues, alternatives, and proposed alternative, which are presented in this Draft CCP/EA. It lists the meetings that have been held with the various agencies, organizations, and individuals who were consulted in the preparation.

The following meetings, contacts, and presentations were undertaken by the Service during the preparation of the Draft CCP/EA:

CCP PLANNING TEAM
The CCP Planning Team met several times between 2012 and 2014. It included representatives from the Service, the University of Mississippi, and the State of Mississippi. The team met as a whole to determine the priority issues, identify potential solutions or approaches (alternatives), and to develop, draft, review and refine the Draft CCP/EA.

- Dr. Steven Reagan, USFWS, Project Leader, Sam D. Hamilton Noxubee and Choctaw NWRs
- Kimberly Sykes, USFWS, Deputy Manager, Sam D. Hamilton Noxubee and Choctaw NWRs
- Michelle Paduani, USFWS, Natural Resource Planner
- Andrea Dunstan, USFWS, Sam D. Hamilton Noxubee NWR, Visitor Services
- Richard Campbell, USFWS, Project Leader, Private John Allen NFH
- Kathy Lunceford, USFWS, Ecological Services, Biologist
- Beverly Smith, Starkville School District, Entomologist/Naturalist
- Randy Wilson, USFWS, Migratory Birds
- Dave Godwin, MDWFP, Biologist
- James Martin, MSU, Professor

BIOLOGICAL REVIEW "PULSE CHECK" TEAM

The Wildlife and Habitat Management Review Team consisted of Service staff with invited state and county agency researchers and natural resource managers. The refuge's pulse check for the biological review was conducted during January 20-22, 2010. The review summary was completed by Randy Wilson in 2010. The list below includes the people who were on this review team and their associated titles when the review was completed.

- Elizabeth Souheaver, Regional Office, Area II Refuge Supervisor
- Chuck Hunter, Regional Office, Refuges
- Janet Ertel, Regional Office, Refuges
- Randy Wilson, Jackson Field Office, Migratory Birds
- Bruce Leopold, Mississippi State University
- Don Jackson, Mississippi State University
- Jeanne Jones, Mississippi State University
- Wes Burger, Mississippi State University
- John Hodges, Consultant

- Sue Wilder, Refuge Fire Management Officer, Mississippi
- Gary Pogue, West Tennessee NWR Complex
- Gypsy Hanks, North Louisiana NWR Complex
- Carl Schmidt, Piedmont National Wildlife Refuge
- James Harris, Southeast Louisiana NWR Complex
- Jeff Denman, White River National Wildlife Refuge
- Henry R. Sansing, Noxubee National Wildlife Refuge
- Kimberly Sykes, Noxubee National Wildlife Refuge
- David Richardson, Noxubee National Wildlife Refuge
- Richard Smith, Noxubee National Wildlife Refuge
- Jason Hunnicutt, Noxubee National Wildlife Refuge

VISITOR SERVICES REVIEW TEAM (ALL FWS)

Garry Tucker, Visitor Services and Outreach Specialist, Regional Office, Atlanta, GA

CULTURAL RESOURCES REVIEW TEAM

Rick Kanaski, FWS, Regional Archaeologist and Historic Preservation Officer, Savannah Coastal Refuges

WILDERNESS REVIEW TEAM

The wilderness review team met at the refuge on July 8, 2013, to gather information and conduct an inventory of the refuge's lands and waters. This process required reviewing all land acquisitions since 1974, site knowledge with existing land status maps, photographs, available land use information, and road inventory data, to determine if any additional refuge lands and waters met the minimum criteria for wilderness. Aerial and non-aerial photographs were used to document the imprint of man's work, road locations, and other surface disturbances. The power point presentation with photos and maps is available in the administrative record.

- Dr. Steven Reagan, USFWS, Project Leader, Sam D. Hamilton Noxubee and Choctaw NWRs
- Kimberly Sykes, USFWS, Deputy Manager, Sam D. Hamilton Noxubee and Choctaw NWRs
- Michelle Paduani, USFWS, Natural Resource Planner
- Andrea Dunstan, USFWS, Sam D. Hamilton Noxubee NWR, Visitor Services
- Kathy Lunceford, USFWS, Ecological Services, Biologist
- Beverly Smith, Starkville School District, Entomologist/Naturalist
- Paul Reynolds, USFWS, Fire Management Officer, Sam D. Hamilton Noxubee NWR
- Steven Lewis, USFWS, Biologist, Sam D. Hamilton Noxubee NWR
- Bobbi Gentry, USFWS, Law Enforcement Officer, Sam D. Hamilton Noxubee NWR
- Lori Haygood, USFWS, Intern
- Natalie Yates, USFWS, Intern

INTERGOVERNMENTAL COORDINATION PLANNING TEAM

- Dave Godwin, Mississippi Department of Wildlife, Fisheries, and Parks
- Tyler Stubbs, Project Manager, Mississippi Department of Wildlife, Fisheries, and Parks
- Dr. James Martin, Mississippi State University, Department of Wildlife, Fisheries, and Aquaculture
- Misty Booth, Mississippi State University, Forester
- Terence Lee Schiefer, Mississippi Entomological Museum, Mississippi State University
- LaDonna Brown, Historic Préservation Officier, Chickasaw Nation
- Kenneth Carleton, Tribal Archaeologist and THPO, Mississippi Band of Choctaws
- Beverly Smith, Starkville School District, Director, Larry Box Education Center
- Randy Wilson, USFWS, Migratory Bird Office
- Kathy Lunceford, USFWS, Ecological Services Office
- Ricky Campbell, USFWS, Private John Allen National Fish Hatchery
- Daniel Schwarz, USFWS, Private John Allen National Fish Hatchery
- Will McDearman, USFWS, RCW Coordinator
- Glenn Constant, USFWS, Fisheries Resources
- Rick Kanaski, USFWS, Archaeologist
- Bobby Claybrook, USDA Forest Service, Supervisory Forester

Appendix A. Glossary

Adaptive Management: Refers to a process in which policy decisions are implemented within a framework of scientifically driven experiments to test predictions and assumptions inherent in a management plan. Analysis of results helps managers determine whether current management should continue as is or whether it should be modified to achieve desired conditions.

Alluvial: Sediment transported and deposited in a delta or riverbed by flowing water.

Alternative: 1. A reasonable way to fix the identified problem or satisfy the stated need (40 CFR 1500.2). 2. Alternatives are different sets of objectives and strategies or means of achieving refuge purposes and goals, helping fulfill the Refuge System mission, and resolving issues (Service Manual 602 FW 1.6B).

Anadromous: Migratory fishes that spend most of their lives in the sea and migrate to fresh water to breed.

Basal Area: The area of a horizontal cross section of a tree's stem, generally measured at breast height.

Biological Diversity: 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 (Service Manual 052 FW 1. 12B). The System's focus is on indigenous species, biotic communities, and ecological processes. Also referred to as biodiversity.

Carrying Capacity: The maximum population of a species able to be supported by a habitat or area.

Categorical Exclusion: A category of actions that does 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 (40 CFR 1508.4).

CFR: Code of Federal Regulations.

Compatible Use: A proposed or existing wildlife-dependent recreational use or any other use of a national wildlife refuge that, based on sound professional judgment, will not materially interfere with or detract from the fulfillment of the National Wildlife Refuge System mission or the purpose(s) of the national wildlife refuge [50 CFR 25.12 (a)]. A compatibility determination supports the selection of compatible uses and identifies stipulations or limits necessary to ensure compatibility.

Comprehensive Conservation Plan: A document that describes the desired future conditions of a refuge or planning unit and provides long-range guidance and management direction to achieve the purposes of the refuge; helps fulfill the mission of the Refuge System; maintains and, where appropriate, restores the ecological integrity of each refuge and the Refuge System; helps achieve the goals of the National Wilderness Preservation System; and meets other mandates (Service Manual 602 FW 1.6 E).

Concern: See Issue

Cover Type: The present vegetation of an area.

Cultural Resource Inventory: A professionally conducted study designed to locate and evaluate evidence of cultural resources present within a defined geographic area. Inventories may involve various levels, including background literature search, comprehensive field examination to identify all exposed physical manifestations of cultural resources, or sample inventory to project site distribution and density over a larger area. Evaluation of identified cultural resources to determine eligibility for the National Register follows the criteria found in 36 CFR 60.4 (Service Manual 614 FW 1.7).

Cultural Resource Overview: A comprehensive document prepared for a field office that discusses, among other things, its prehistory and cultural history, the nature and extent of known cultural resources, previous research, management objectives, resource management conflicts or issues, and a general statement on how program objectives should be met and conflicts resolved. An overview should reference or incorporate information from a field office's background or literature search described in Section VIII of the Cultural Resource Management Handbook (Service Manual 614 FW 1.7).

Cultural Resources: The remains of sites, structures, or objects used by people in the past.

Designated Wilderness Area: An area designated by the U.S. Congress to be managed as part of the National Wilderness Preservation System (Draft Service Manual 610 FW 1.5).

Duck Energy Day (DED)s: Duck-energy days are the number of dabbling ducks (tribe: Anatini) that potentially can be sustained energetically in a wetland for a specified duration.

Disturbance:	Significant alteration of habitat structure or composition. May be natural (e.g., fire) or human-caused events (e.g., aircraft overflight).
Ecosystem:	A dynamic and interrelating complex of plant and animal communities and their associated non-living environment.
Ecosystem Management:	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.
Endangered Species (Federal):	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.
Endangered Species (State):	A plant or animal species in danger of becoming extinct or extirpated in the state within the near future if factors contributing to its decline continue. Populations of these species are at critically low levels or their habitats have been degraded or depleted to a significant degree.
Environmental Assessment (EA):	A concise public 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 (40 CFR 1508.9).
Environmental Impact Statement (EIS):	A detailed written statement required by section 102(2)(C) of the National Environmental Policy Act, analyzing the environmental impacts of a proposed action, adverse effects of the project that cannot be avoided, alternative courses of action, short-term uses of the environment versus the maintenance and enhancement of long-term productivity, and any irreversible and irretrievable commitment of resources (40 CFR 1508.11).
Estuary:	The wide lower course of a river into which the tides flow. The area where the tide meets a river current.
Finding of No Significant Impact (FONSI):	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 (40 CFR 1508.13).
Fire Line	An area cleared of all of its burnable fuel to prevent the spread of fire from one area into another area. Soils can be exposed using heavy equipment (i.e., bulldozers, fire plows) when permanent lines are needed or through handtools when temporary lines are more desireable to meet management goals and objectives.

Goal: Descriptive, open-ended, and often broad statement of desired future conditions that conveys a purpose but does not define measurable units (Service Manual 620 FW 1.6J).

Habitat: Suite of existing environmental conditions required by an organism for survival and reproduction. The place where an organism typically lives.

Habitat Restoration: Management emphasis designed to move ecosystems to desired conditions and processes, and/or to healthy ecosystems.

Habitat Type: See Vegetation Type.

Improvement Act: The National Wildlife Refuge System Improvement Act of 1997.

Informed Consent: The grudging willingness of opponents to "go along" with a course of action that they actually oppose (Bleiker).

Issue: Any unsettled matter that requires a management decision [e.g., an initiative, opportunity, resource management problem, threat to the resources of the unit, conflict in uses, public concern, or other presence of an undesirable resource condition (Service Manual 602 FW 1.6K)].

Management Alternative: See Alternative

Management Concern: See Issue

Management Opportunity: See Issue

Migration: The seasonal movement from one area to another and back.

Mission Statement: Succinct statement of the unit's purpose and reason for being.

Monitoring: The process of collecting information to track changes of selected parameters over time.

National Environmental Policy Act of 1969 (NEPA): Requires all 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 NEPA with other planning requirements, and prepare appropriate NEPA documents to facilitate better environmental decision-making (40 CFR 1500).

National Wildlife Refuge System Improvement Act of 1997 (Public Law 105-57): Under the Refuge Improvement Act, the Fish and Wildlife Service is required to develop 15-year comprehensive conservation plans for all national wildlife refuges outside Alaska. The Act also describes the six public uses given priority status within the Refuge System (i.e., hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation).

National Wildlife Refuge System Mission: The mission 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.

National Wildlife Refuge System: 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; areas for the protection and conservation of fish and wildlife that are threatened with extinction; wildlife ranges; game ranges; wildlife management areas; or waterfowl production areas.

National Wildlife Refuge: A designated area of land, water, or an interest in land or water within the Refuge System.

Native Species: Species that normally live and thrive in a particular ecosystem.

Natural Resource: Materials and components that can be found within the environment. A natural resource may exist as a separate entity such as water or air, or as a living organism such as a salamander.

Noxious Weed: A plant species designated by federal or state law as generally possessing one or more of the following characteristics: aggressive or difficult to manage; parasitic; a carrier or host of serious insect or disease; or non-native, new, or not common to the United States. According to the Federal Noxious Weed Act (P.L. 93-639), a noxious weed is one that causes disease or had adverse effects on man or his environment and therefore is detrimental to the agriculture and commerce of the United States and to the public health.

Objective: A concise statement of what we want to achieve, how much we want to achieve, when and where we want to achieve it, and who is responsible for the work. Objectives derive from goals and provide the basis for determining strategies, monitoring refuge accomplishments, and evaluating the success of strategies. Making objectives attainable, time-specific, and measurable (Service Manual 602 FW 1.6N).

RCW Partition: Partitions are spatially created by 0.25 mile and 0.5 mile radius circles drawn around the cluster centers.

Plant Association: A classification of plant communities based on the similarity in dominants of all layers of vascular species in a climax community.

Plant Community: An assemblage of plant species unique in its composition; occurs in particular locations under particular influences; a reflection or integration of the environmental influences on the site such as soils, temperature, elevation, solar radiation, slope, aspect, and rainfall; denotes a general kind of climax plant community.

Preferred Alternative: 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.

Prescribed Fire: The application of fire to wildland fuels to achieve identified land use objectives (Service Manual 621 FW 1.7). May occur from natural ignition or intentional ignition.

Priority Species: Fish and wildlife species that require protective measures and/or management guidelines to ensure their perpetuation. Priority species include the following: (1) State-listed and candidate species; (2) species or groups of animals susceptible to significant population declines within a specific area or statewide by virtue of their inclination to aggregate (e.g., seabird colonies); and (3) species of recreation, commercial, and/or tribal importance.

Public Involvement Plan: Broad long-term guidance for involving the public in the comprehensive conservation planning process.

Public Involvement: A process that offers impacted and interested individuals and organizations an opportunity to become informed about, and to express their opinions on Service actions and policies. In the process, these views are studied thoroughly and thoughtful consideration of public views is given in shaping decisions for refuge management.

Public: Individuals, organizations, and groups; officials of federal, state, and local government agencies; Indian tribes; and foreign nations. It may include anyone outside the core planning team. It includes those who may or may not have indicated an interest in service issues and those who do or do not realize that Service decisions may affect them.

Purposes of the Refuge: "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 sub-unit." For refuges that encompass congressionally designated wilderness, the purposes of the Wilderness Act are additional purposes of the refuge (Service Manual 602 FW 106 S).

Recommended Wilderness:	Areas studied and found suitable for wilderness designation by both the Director of the Fish and Wildlife Service and the Secretary of the Department of the Interior, and recommended for designation by the President to Congress. These areas await only legislative action by Congress in order to become part of the Wilderness System. Such areas are also referred to as "pending in Congress" (Draft Service Manual 610 FW 1.5).
Record of Decision (ROD):	A concise public record of decision prepared by the federal agency, pursuant to NEPA, that contains a statement of the decision, identification of all alternatives considered, identification of the environmentally preferable alternative, a statement as to whether all practical means to avoid or minimize environmental harm from the alternative selected have been adopted (and if not, why they were not), and a summary of monitoring and enforcement where applicable for any mitigation (40 CFR 1505.2).
Refuge Goal:	See Goal
Refuge Purposes:	See Purposes of the Refuge
Songbirds: (Also Passerines)	A category of birds that is medium to small, perching landbirds. Most are territorial singers and migratory.
Step-down Management Plan:	A plan that provides specific guidance on management subjects (e.g., habitat, public use, fire, and safety) or groups of related subjects. It describes strategies and implementation schedules for meeting CCP goals and objectives (Service Manual 602 FW 1.6 U).
Strategy:	A specific action, tool, technique, or combination of actions, tools, and techniques used to meet unit objectives (Service Manual 602 FW 1.6 U).
Study Area:	The area reviewed in detail for wildlife, habitat, and public use potential. For purposes of this CCP, the study area includes the lands within the currently approved refuge boundary and potential refuge expansion areas.
Threatened Species (Federal):	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.
Threatened Species (State):	A plant or animal species likely to become endangered in the state within the near future if factors contributing to population decline or habitat degradation or loss continue.

Tiering: The coverage of general matters in broader environmental impact statements with subsequent narrower statements of environmental analysis, incorporating by reference, the general discussions and concentrating on specific issues (40 CFR 1508.28).

U.S. Fish and Wildlife Service Mission: The mission of the U.S. Fish and Wildlife Service is working with others to conserve, protect, and enhance fish and wildlife and their habitats for the continuing benefit of the American people.

Unit Objective: See Objective

Vegetation Type, Habitat Type, Forest Cover Type: A land classification system based upon the concept of distinct plant associations.

Vision Statement: A concise statement of what the planning unit should be, or what we hope to do, based primarily upon the Refuge System mission and specific refuge purposes, and other mandates. We will tie the vision statement for the refuge to the mission of the Refuge System; the purpose(s) of the refuge; the maintenance or restoration of the ecological integrity of each refuge and the Refuge System; and other mandates (Service Manual 602 FW 1.6 Z).

Wilderness Study Areas: Lands and waters identified through inventory as meeting the definition of wilderness and undergoing evaluation for recommendation for inclusion in the Wilderness System. A study area must meet the following criteria:

- Generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable;
- Has outstanding opportunities for solitude or a primitive and unconfined type of recreation; and
- Has at least 5,000 contiguous roadless acres or is sufficient in size as to make practicable its preservation and use in an unimpaired condition (Draft Service Manual 610 FW 1.5).

Wilderness: See Designated Wilderness

Wildfire: A free-burning fire requiring a suppression response; all fire other than prescribed fire that occurs on wildlands (Service Manual 621 FW 1.7).

Wildland Fire: Every wildland fire is either a wildfire or a prescribed fire (Service Manual 621 FW 1.3

ACRONYMS AND ABBREVIATIONS

BCC	Birds of Conservation Concern
BRT	Biological Review Team
CCP	Comprehensive Conservation Plan
CFR	Code of Federal Regulations
cfs	cubic feet per second
DOI	Department of the Interior
DU	Ducks Unlimited
EA	Environmental Assessment
EE	Environmental Education
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
FR	Federal Register
FTE	Full-Time Equivalent
FY	Fiscal Year
GIS	Global Information System
GQFH	Good Quality Foraging Habitat
NEPA	National Environmental Policy Act
NRHP	National Register of Historic Places
NWR	National Wildlife Refuge
NWRS	National Wildlife Refuge System
PFT	Permanent Full Time
PUNA	Public Use Natural Area
RM	Refuge Manual
RNA	Research Natural Area
ROD	Record of Decision
RONS	Refuge Operating Needs System
RRP	Refuge Roads Program
FWS	U.S. Fish and Wildlife Service (also Service)
TFT	Temporary Full Time
USC	United States Code

Appendix B. References and Literature Citations

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Appendix C. Relevant Legal Mandates and Executive Orders

STATUTE	DESCRIPTION
Administrative Procedures Act (1946)	Outlines administrative procedures to be followed by federal agencies with respect to identification of information to be made public; publication of material in the Federal Register; maintenance of records; attendance and notification requirements for specific meetings and hearings; issuance of licenses; and review of agency actions.
American Antiquities Act of 1906	Provides penalties for unauthorized collection, excavation, or destruction of historic or prehistoric ruins, monuments, or objects of antiquity on lands owned or controlled by the United States. The Act authorizes the President to designate as national monuments objects or areas of historic or scientific interest on lands owned or controlled by the Unites States.
American Indian Religious Freedom Act of 1978	Protects the inherent right of Native Americans to believe, express, and exercise their traditional religions, including access to important sites, use and possession of sacred objects, and the freedom to worship through ceremonial and traditional rites.
Americans With Disabilities Act of 1990	Intended to prevent discrimination of and make American society more accessible to people with disabilities. The Act requires reasonable accommodations to be made in employment, public services, public accommodations, and telecommunications for persons with disabilities.
Anadromous Fish Conservation Act of 1965, as amended	Authorizes the Secretaries of Interior and Commerce to enter into cooperative agreements with states and other non-federal interests for conservation, development, and enhancement of anadromous fish and contribute up to 50 percent as the federal share of the cost of carrying out such agreements. Reclamation construction programs for water resource projects needed solely for such fish are also authorized.
Archaeological Resources Protection Act of 1979, as amended.	This Act strengthens and expands the protective provisions of the Antiquities Act of 1906 regarding archaeological resources. It also revised the permitting process for archaeological research.
Architectural Barriers Act of 1968	Requires that buildings and facilities designed, constructed, or altered with federal funds, or leased by a federal agency, must comply with standards for physical accessibility.
Bald and Golden Eagle Protection Act of 1940, as amended	Prohibits the possession, sale or transport of any bald or golden eagle, alive or dead, or part, nest, or egg except as permitted by the Secretary of the Interior for scientific or exhibition purposes, or for the religious purposes of Indians.

STATUTE	DESCRIPTION
Bankhead-Jones Farm Tenant Act of 1937	Directs the Secretary of Agriculture to develop a program of land conservation and utilization in order to correct maladjustments in land use and thus assist in such things as control of soil erosion, reforestation, conservation of natural resources and protection of fish and wildlife. Some early refuges and hatcheries were established under authority of this Act.
Cave Resources Protection Act of 1988	Established requirements for the management and protection of caves and their resources on federal lands, including allowing the land managing agencies to withhold the location of caves from the public, and requiring permits for any removal or collecting activities in caves on federal lands.
Clean Air Act of 1970	Regulates air emissions from area, stationary, and mobile sources. This Act and its amendments charge federal land managers with direct responsibility to protect the "air quality and related values" of land under their control. These values include fish, wildlife, and their habitats.
Clean Water Act of 1974, as amended	This Act and its amendments have as its objective the restoration and maintenance of the chemical, physical, and biological integrity of the Nation's waters. Section 401 of the Act requires that federally permitted activities comply with the Clean Water Act standards, state water quality laws, and any other appropriate state laws. Section 404 charges the U.S. Army Corps of Engineers with regulating discharge of dredge or fill materials into waters of the United States, including wetlands.
Coastal Barrier Resources Act of 1982 (CBRA)	Identifies undeveloped coastal barriers along the Atlantic and Gulf Coasts and included them in the John H. Chafee Coastal Barrier Resources System (CBRS). The objectives of the act are to minimize loss of human life, reduce wasteful federal expenditures, and minimize the damage to natural resources by restricting most federal expenditures that encourage development within the CBRS.
Coastal Barrier Improvement Act of 1990	Reauthorized the Coastal Barrier Resources Act (CBRA), expanded the CBRS to include undeveloped coastal barriers along the Great Lakes and in the Caribbean, and established "Otherwise Protected Areas (OPAs)." The Service is responsible for maintaining official maps, consulting with federal agencies that propose spending federal funds within the CBRS and OPAs, and making recommendations to Congress about proposed boundary revisions.
Coastal Wetlands Planning, Protection, and Restoration (1990)	Authorizes the Director of the Fish and Wildlife Service to participate in the development of a Louisiana coastal wetlands restoration program, participate in the development and oversight of a coastal wetlands conservation program, and lead in the implementation and administration of a national coastal wetlands grant program.

STATUTE	DESCRIPTION
Coastal Zone Management Act of 1972, as amended	Established a voluntary national program within the Department of Commerce to encourage coastal states to develop and implement coastal zone management plans and requires that "any federal activity within or outside of the coastal zone that affects any land or water use or natural resource of the coastal zone" shall be "consistent to the maximum extent practicable with the enforceable policies" of a state's coastal zone management plan. The law includes an Enhancement Grants Program for protecting, restoring, or enhancing existing coastal wetlands or creating new coastal wetlands. It also established the National Estuarine Research Reserve System, guidelines for estuarine research, and financial assistance for land acquisition.
Emergency Wetlands Resources Act of 1986	This Act authorized the purchase of wetlands from Land and Water Conservation Fund moneys, removing a prior prohibition on such acquisitions. The Act requires the Secretary to establish a National Wetlands Priority Conservation Plan, required the states to include wetlands in their Comprehensive Outdoor Recreation Plans, and transfers to the Migratory Bird Conservation Fund amounts equal to import duties on arms and ammunition. It also established entrance fees at national wildlife refuges.
Endangered Species Act of 1973, as amended	Provides for the conservation of threatened and endangered species of fish, wildlife, and plants by federal action and by encouraging the establishment of state programs. It provides for the determination and listing of threatened and endangered species and the designation of critical habitats. Section 7 requires refuge managers to perform internal consultation before initiating projects that affect or may affect endangered species.
Environmental Education Act of 1990	This Act established the Office of Environmental Education within the U.S. Environmental Protection Agency to develop and administer a federal environmental education program in consultation with other federal natural resource management agencies, including the Fish and Wildlife Service.
Estuary Protection Act of 1968	Authorized the Secretary of the Interior, in cooperation with other federal agencies and the states, to study and inventory estuaries of the United States, including land and water of the Great Lakes, and to determine whether such areas should be acquired for protection. The Secretary is also required to encourage state and local governments to consider the importance of estuaries in their planning activities relative to federal natural resource grants. In approving any state grants for acquisition of estuaries, the Secretary was required to establish conditions to ensure the permanent protection of estuaries.

STATUTE	DESCRIPTION
Estuaries and Clean Waters Act of 2000	This law creates a federal interagency council that includes the Director of the Fish and Wildlife Service, the Secretary of the Army for Civil Works, the Secretary of Agriculture, the Administrator of the Environmental Protection Agency and the Administrator for the National Oceanic and Atmospheric Administration. The council is charged with developing a national estuary habitat restoration strategy and providing grants to entities to restore and protect estuary habitat to promote the strategy.
Food Security Act of 1985, as amended (Farm Bill)	The Act contains several provisions that contribute to wetland conservation. The Swampbuster provisions state that farmers who convert wetlands for the purpose of planting after enactment of the law are ineligible for most farmer program subsidies. It also established the Wetland Reserve Program to restore and protect wetlands through easements and restoration of the functions and values of wetlands on such easement areas.
Farmland Protection Policy Act of 1981, as amended	The purpose of this law is to minimize the extent to which federal programs contribute to the unnecessary conversion of farmland to nonagricultural uses. Federal programs include construction projects and the management of federal lands.
Federal Advisory Committee Act (1972), as amended	Governs the establishment of and procedures for committees that provide advice to the federal government. Advisory committees may be established only if they will serve a necessary, nonduplicative function. Committees must be strictly advisory unless otherwise specified and meetings must be open to the public.
Federal Coal Leasing Amendment Act of 1976	Provided that nothing in the Mining Act, the Mineral Leasing Act, or the Mineral Leasing Act for Acquired Lands authorized mining coal on refuges.
Federal-Aid Highways Act of 1968	Established requirements for approval of federal highways through national wildlife refuges and other designated areas to preserve the natural beauty of such areas. The Secretary of Transportation is directed to consult with the Secretary of the Interior and other federal agencies before approving any program or project requiring the use of land under their jurisdiction.
Federal Noxious Weed Act of 1990, as amended	The Secretary of Agriculture was given the authority to designate plants as noxious weeds and to cooperate with other federal, State and local agencies, farmers' associations, and private individuals in measures to control, eradicate, prevent, or retard the spread of such weeds. The Act requires each Federal land-managing agency, including the Fish and Wildlife Service, to designate an office or person to coordinate a program to control such plants on the agency's land and implement cooperative agreements with the states, including integrated management systems to control undesirable plants.

STATUTE	DESCRIPTION
Federal Lands Recreation Enhancement Act (REA)	Limits fees to recreation sites that have a specified minimum level of development and meet specific criteria. Provides new public participation opportunities when agencies propose to establish new, or alter existing, recreation fees. For the BLM and the US Forest Service this includes providing Recreation Resource Advisory Committees with an opportunity to review and make recommendations on agency fee proposals. Authorizes a new interagency recreation pass – the "America the Beautiful – National Parks and Federal Recreational Lands Pass".
Fish and Wildlife Act of 1956	Establishes a comprehensive national fish, shellfish, and wildlife resources policy with emphasis on the commercial fishing industry but also includes the inherent right of every citizen and resident to fish for pleasure, enjoyment, and betterment and to maintain and increase public opportunities for recreational use of fish and wildlife resources. Among other things, it authorizes the Secretary of the Interior to take such steps as may be required for the development, advancement, management, conservation, and protection of fish and wildlife resources including, but not limited to, research, development of existing facilities, and acquisition by purchase or exchange of land and water or interests therein.
Fish and Wildlife Conservation Act of 1980, as amended	Requires the Service to monitor non-gamebird species, identify species of management concern, and implement conservation measures to preclude the need for listing under the Endangered Species Act.
Fish and Wildlife Coordination Act of 1958	Promotes equal consideration and coordination of wildlife conservation with other water resource development programs by requiring consultation with the Fish and Wildlife Service and the state fish and wildlife agencies where the "waters of a stream or other body of water are proposed or authorized, permitted or licensed to be impounded, diverted…or otherwise controlled or modified" by any agency under federal permit or license.
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 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.
Fishery (Magnuson) Conservation and Management Act of 1976	Established Regional Fishery Management Councils comprised of federal and state officials, including the Fish and Wildlife Service. It provides for regulation of foreign fishing and vessel fishing permits.

STATUTE	DESCRIPTION
Freedom of Information Act, 1966	Requires all federal agencies to make available to the public for inspection and copying administrative staff manuals and staff instructions; official, published and unpublished policy statements; final orders deciding case adjudication; and other documents. Special exemptions have been reserved for nine categories of privileged material. The Act requires the party seeking the information to pay reasonable search and duplication costs.
Geothermal Steam Act of 1970, as amended	Authorizes and governs the lease of geothermal steam and related resources on public lands. Section 15 c of the Act prohibits issuing geothermal leases on virtually all Service-administrative lands.
Lacey Act of 1900, as amended	Originally designed to help states protect their native game animals and to safeguard U.S. crop production from harmful foreign species, this Act prohibits interstate and international transport and commerce of fish, wildlife or plants taken in violation of domestic or foreign laws. It regulates the introduction to America of foreign species.
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 for 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.
Marine Mammal Protection Act of 1972, as amended	The 1972 Marine Mammal Protection Act established a federal responsibility to conserve marine mammals with management vested in the Department of the Interior for sea otter, walrus, polar bear, dugong, and manatee. The Department of Commerce is responsible for cetaceans and pinnipeds, other than the walrus. With certain specified exceptions, the Act establishes a moratorium on the taking and importation of marine mammals, as well as products taken from them.
Migratory Bird Conservation Act of 1929	Established a Migratory Bird Conservation Commission to approve areas recommended by the Secretary of the Interior for acquisition with Migratory Bird Conservation Funds. The role of the commission was expanded by the North American Wetland Conservation Act to include approving wetlands acquisition, restoration, and enhancement proposals recommended by the North American Wetlands Conservation Council.
Migratory Bird Hunting and Conservation Stamp Act of 1934	Also commonly referred to as the “Duck Stamp Act,” requires waterfowl hunters 16 years of age or older to possess a valid federal hunting stamp. Receipts from the sale of the stamp are deposited into the Migratory Bird Conservation Fund for the acquisition of migratory bird refuges.

STATUTE	DESCRIPTION
Migratory Bird Treaty Act of 1918, as amended	This Act implements various treaties and conventions between the United States and Canada, Japan, Mexico, and the former Soviet Union for the protection of migratory birds. Except as allowed by special regulations, this Act makes it unlawful to pursue, hunt, kill, capture, possess, buy, sell, purchase, barter, export or import any migratory bird, part, nest, egg, or product.
Mineral Leasing Act for Acquired Lands (1947), as amended	Authorizes and governs mineral leasing on acquired public lands.
Minerals Leasing Act of 1920, as amended	Authorizes and governs leasing of public lands for development of deposits of coal, oil, gas, and other hydrocarbons; sulphur; phosphate; potassium; and sodium. Section 185 of this title contains provisions relating to granting rights-of-way over federal lands for pipelines.
Mining Act of 1872, as amended	Authorizes and governs prospecting and mining for the so-called "hardrock" minerals (i.e., gold and silver) on public lands.
National and Community Service Act of 1990	Authorizes several programs to engage citizens of the U.S. in full- and/or part-time projects designed to combat illiteracy and poverty, provide job skills, enhance educational skills, and fulfill environmental needs. Among other things, this law establishes the American Conservation and Youth Service Corps to engage young adults in approved human and natural resource projects, which will benefit the public or are carried out on federal or Indian lands.
National Environmental Policy Act of 1969	Requires analysis, public comment, and reporting for environmental impacts of federal actions. It stipulates the factors to be considered in environmental impact statements, and requires that federal agencies employ an interdisciplinary approach in related decision-making and develop means to ensure that unqualified environmental values are given appropriate consideration, along with economic and technical considerations.
National Historic Preservation Act of 1966, as amended	It establishes a National Register of Historic Places and a program of matching grants for preservation of significant historical features. Federal agencies are directed to take into account the effects of their actions on items or sites listed or eligible for listing in the National Register.
National Trails System Act (1968), as amended	Established the National Trails System to protect the recreational, scenic, and historic values of some important trails. National recreation trails may be established by the Secretaries of Interior or Agriculture on land wholly or partly within their jurisdiction, with the consent of the involved state(s), and other land managing agencies, if any. National scenic and national historic trails may only be designated by Congress. Several national trails cross units of the National Wildlife Refuge System.

STATUTE	DESCRIPTION
National Wildlife Refuge System Administration Act of 1966	Prior to 1966, there was no single federal law that governed the administration of the various national wildlife refuges that had been established. This 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(s) for which the refuge was established.
National Wildlife Refuge System Improvement Act of 1997	This Act amends the National Wildlife Refuge System Administration Act of 1966. This Act defines the mission of the National Wildlife Refuge System, establishes the legitimacy and appropriateness of six priority wildlife-dependent public uses, establishes a formal process for determining compatible uses of Refuge System lands, identifies the Secretary of the Interior as responsible for managing and protecting the Refuge System, and requires the development of a comprehensive conservation plan for all refuges outside of Alaska.
Native American Graves Protection and Repatriation Act of 1990	Requires federal agencies and museums to inventory, determine ownership of, and repatriate certain cultural items and human remains under their control or possession. The Act also addresses the repatriation of cultural items inadvertently discovered by construction activities on lands managed by the agency.
Neotropical Migratory Bird Conservation Act of 2000	Establishes a matching grant program to fund projects that promote the conservation of neotropical migratory birds in the united States, Latin America, and the Caribbean.
North American Wetlands Conservation Act of 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 North American Wetlands Conservation Council was created to recommend projects to be funded under the Act to the Migratory Bird Conservation Commission. Available funds may be expended for up to 50 percent of the United States' share cost of wetlands conservation projects in Canada, Mexico, or the United States (or 100 percent of the cost of projects on federal lands).
Refuge Recreation Act of 1962, as amended	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.

STATUTE	DESCRIPTION
Partnerships for Wildlife Act of 1992	Establishes a Wildlife Conservation and Appreciation Fund to receive appropriated funds and donations from the National Fish and Wildlife Foundation and other private sources to assist the state fish and game agencies in carrying out their responsibilities for conservation of non-game species. The funding formula is no more that 1/3 federal funds, at least 1/3 foundation funds, and at least 1/3 state funds.
Refuge Revenue Sharing Act of 1935, as amended	Provided for payments to counties in lieu of taxes from areas administered by the Fish and Wildlife Service. Counties are required to pass payments along to other units of local government within the county, which suffer losses in tax revenues due to the establishment of Service areas.
Rehabilitation Act of 1973	Requires nondiscrimination in the employment practices of federal agencies of the executive branch and contractors. It also requires all federally assisted programs, services, and activities to be available to people with disabilities.
Rivers and Harbors Appropriations Act of 1899, as amended	Requires the authorization by the U.S. Army Corps of Engineers prior to any work in, on, over, or under a navigable water of the United States. The Fish and Wildlife Coordination Act provides authority for the Service to review and comment on the effects on fish and wildlife activities proposed to be undertaken or permitted by the Corps of Engineers. Service concerns include contaminated sediments associated with dredge or fill projects in navigable waters.
Sikes Act (1960), as amended	Provides for the cooperation by the Departments of Interior and Defense with state agencies in planning, development, and maintenance of fish and wildlife resources and outdoor recreation facilities on military reservations throughout the United States. It requires the Secretary of each military department to use trained professionals to manage the wildlife and fishery resource under his jurisdiction, and requires that federal and state fish and wildlife agencies be given priority in management of fish and wildlife activities on military reservations.
Transfer of Certain Real Property for Wildlife Conservation Purposes Act of 1948	This Act provides that upon determination by the Administrator of the General Services Administration, real property no longer needed by a federal agency can be transferred, without reimbursement, to the Secretary of the Interior if the land has particular value for migratory birds, or to a state agency for other wildlife conservation purposes.
Transportation Equity Act for the 21st Century (1998)	Established the Refuge Roads Program, requires transportation planning that includes public involvement, and provides funding for approved public use roads and trails and associated parking lots, comfort stations, and bicycle/pedestrian facilities.

STATUTE	DESCRIPTION
Uniform Relocation and Assistance and Real Property Acquisition Policies Act (1970), as amended	Provides for uniform and equitable treatment of persons who sell their homes, businesses, or farms to the Service. The Act requires that any purchase offer be no less than the fair market value of the property.
Water Resources Planning Act of 1965	Established Water Resources Council to be composed of Cabinet representatives including the Secretary of the Interior. The Council reviews river basin plans with respect to agricultural, urban, energy, industrial, recreational and fish and wildlife needs. The act also established a grant program to assist States in participating in the development of related comprehensive water and land use plans.
Wild and Scenic Rivers Act of 1968, as amended	This Act selects certain rivers of the nation possessing remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values; preserves them in a free-flowing condition; and protects their local environments.
Wilderness Act of 1964, as amended	This Act directs the Secretary of the Interior to review every roadless area of 5,000 acres or more and every roadless island regardless of size within the National Wildlife Refuge System and to recommend suitability of each such area. The Act permits certain activities within designated wilderness areas that do not alter natural processes. Wilderness values are preserved through a “minimum tool” management approach, which requires refuge managers to use the least intrusive methods, equipment, and facilities necessary for administering the areas.
Youth Conservation Corps Act of 1970	Established a permanent Youth Conservation Corps (YCC) program within the Departments of Interior and Agriculture. Within the Service, YCC participants perform many tasks on refuges, fish hatcheries, and research stations.

EXECUTIVE ORDERS	DESCRIPTIONS
EO 11593, Protection and Enhancement of the Cultural Environment (1971)	States that if the Service proposes any development activities that may affect the archaeological or historic sites, the Service will consult with Federal and State Historic Preservation Officers to comply with Section 106 of the National Historic Preservation Act of 1966, as amended.
EO 11644, Use of Off-road Vehicles on Public Land (1972)	Established policies and procedures to ensure that the use of off-road vehicles on public lands will be controlled and directed so as to protect the resources of those lands, to promote the safety of all users of those lands, and to minimize conflicts among the various uses of those lands.
EO 11988, Floodplain Management (1977)	The purpose of this Executive Order 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 floodplain 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 floodplains."
EO 11989 (1977), Amends Section 2 of EO 11644	Directs agencies to close areas negatively impacted by off-road vehicles.
EO 11990, Protection of Wetlands (1977)	Federal agencies are directed to provide leadership and take action to minimize the destruction, loss of degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands.
EO 12372, Intergovernmental Review of Federal Programs (1982)	Seeks to foster intergovernmental partnerships by requiring federal agencies to use the state process to determine and address concerns of state and local elected officials with proposed federal assistance and development programs.
EO 12898, Environmental Justice (1994)	Requires federal agencies to identify and address disproportionately high and adverse effects of its programs, policies, and activities on minority and low-income populations.

EXECUTIVE ORDERS	DESCRIPTIONS
EO 12906, Coordinating Geographical Data Acquisition and Access (1994), Amended by EO 13286 (2003). Amendment of EOs and other actions in connection with transfer of certain functions to Secretary of DHS.	Recommended that the executive branch develop, in cooperation with state, local, and tribal governments, and the private sector, a coordinated National Spatial Data Infrastructure to support public and private sector applications of geospatial data. Of particular importance to comprehensive conservation planning is the National Vegetation Classification System (NVCS), which is the adopted standard for vegetation mapping. Using NVCS facilitates the compilation of regional and national summaries, which in turn, can provide an ecosystem context for individual refuges.
EO 12962, Recreational Fisheries (1995)	Federal agencies are directed to improve the quantity, function, sustainable productivity, and distribution of U.S. aquatic resources for increased recreational fishing opportunities in cooperation with states and tribes.
EO 13007, Native American Religious Practices (1996)	Provides for access to, and ceremonial use of, Indian sacred sites on federal lands used by Indian religious practitioners and direction to avoid adversely affecting the physical integrity of such sites.
EO 13061, Federal Support of Community Efforts Along American Heritage Rivers (1997)	Established the American Heritage Rivers initiative for the purpose of natural resource and environmental protection, economic revitalization, and historic and cultural preservation. The Act directs Federal agencies to preserve, protect, and restore rivers and their associated resources important to our history, culture, and natural heritage.
EO 13084, Consultation and Coordination With Indian Tribal Governments (2000)	Provides a mechanism for establishing regular and meaningful consultation and collaboration with tribal officials in the development of federal policies that have tribal implications.
EO 13112, Invasive Species (1999)	Federal agencies are directed to prevent the introduction of invasive species, detect and respond rapidly to and control populations of such species in a cost effective and environmentally sound manner, accurately monitor invasive species, provide for restoration of native species and habitat conditions, conduct research to prevent introductions and to control invasive species, and promote public education on invasive species and the means to address them. This EO replaces and rescinds EO 11987, Exotic Organisms (1977).

EXECUTIVE ORDERS	DESCRIPTIONS
EO 13186, Responsibilities of Federal Agencies to Protect Migratory Birds. (2001)	Instructs federal agencies to conserve migratory birds by several means, including the incorporation of strategies and recommendations found in Partners in Flight Bird Conservation plans, the North American Waterfowl Plan, the North American Waterbird Conservation Plan, and the United States Shorebird Conservation Plan, into agency management plans and guidance documents.

Appendix D. Public Involvement

SUMMARY OF PUBLIC SCOPING COMMENTS

Please refer to Section A, Chapter III, Plan Development, for a summary of the issues, concerns, and opportunities that were identified by the public during public scoping.

Summary of Public Comments on the Draft CCP/EA and Service Responses

The Draft CCP/EA for Sam D. Hamilton Noxubee NWR will be made available for a 60-day public review and comment period. A public meeting on the Draft CCP/EA will be held for those wishing to express their concerns in a public forum.

Appendix E. Appropriate Use Determinations

Sam D. Hamilton Noxubee National Wildlife Refuge Appropriate Use Determinations

An appropriate use determination is the initial decision process a refuge manager follows when first considering whether or not to allow a proposed use on a refuge. The refuge manager must find that a use is appropriate before undertaking a compatibility review of the use. This process clarifies and expands on the compatibility determination process by describing when refuge managers should deny a proposed use without determining compatibility. If a proposed use is not appropriate, it will not be allowed and a compatibility determination will not be undertaken.

Except for the uses noted below, the refuge manager must decide if a new or existing use is an appropriate refuge use. If an existing use is not appropriate, the refuge manager will eliminate or modify the use as expeditiously as practicable. If a new use is not appropriate, the refuge manager will deny the use without determining compatibility. Uses that have been administratively determined to be appropriate are:

- Six wildlife-dependent recreational uses - As defined by the National Wildlife Refuge System Improvement Act of 1997, the six wildlife-dependent recreational uses (hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation) are determined to be appropriate. However, the refuge manager must still determine if these uses are compatible.

- Take of fish and wildlife under state regulations - States have regulations concerning take of wildlife that includes hunting, fishing, and trapping. The Service considers take of wildlife under such regulations appropriate. However, the refuge manager must determine if the activity is compatible before allowing it on a refuge.

Statutory Authorities for this policy:

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. This law provides the authority for establishing policies and regulations governing refuge uses, including the authority to prohibit certain harmful activities. The Improvement Act does not authorize any particular use, but rather authorizes the Secretary of the Interior to allow uses only when they are compatible and "under such regulations as he may prescribe." This law specifically identifies certain public uses that, when compatible, are legitimate and appropriate uses within the Refuge System. The law states ". . . it is the policy of the United States that . . .compatible wildlife-dependent recreation is a legitimate and appropriate general public use of the System . . .compatible wildlife-dependent recreational uses are the priority general public uses of the System and shall receive priority consideration in refuge planning and management; and . . . when the Secretary determines that a proposed wildlife-dependent recreational use is a compatible use within a refuge, that activity should be facilitated . . . the Secretary shall . . . ensure that priority general public uses of the System receive enhanced consideration over other general public uses in planning and management within the System . . . ." The law also states "in administering the System, the Secretary is authorized to take the following actions: . . . issue regulations to carry out this Act." This policy implements the standards set in the Improvement Act by providing enhanced consideration of priority general public uses and ensuring other public uses do not interfere with our ability to provide quality, wildlife-dependent recreational uses.

Refuge Recreation Act of 1962, 16 U.S.C. 460k. The 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.

Other Statutes that Establish Refuges, including the Alaska National Interest Lands Conservation Act of 1980 (ANILCA) (16 U.S.C. 410hh - 410hh-5, 460 mm - 460mm-4, 539-539e, and 3101 - 3233; 43 U.S.C. 1631 et seq.).

Executive Orders. The Service must comply with Executive Order 11644 when allowing use of off-highway vehicles on refuges. This order requires the Service to designate areas as open or closed to off-highway vehicles in order to protect refuge resources, promote safety, and minimize conflict among the various refuge users; monitor the effects of these uses once they are allowed; and amend or rescind any area designation as necessary based on the information gathered. Furthermore, Executive Order 11989 requires the Service to close areas to off-highway vehicles when it is determined that the use causes or will cause considerable adverse effects on the soil, vegetation, wildlife, habitat, or cultural or historic resources. Statutes, such as ANILCA, take precedence over executive orders.

Definitions:

Appropriate Use
A proposed or existing use on a refuge that meets at least one of the following four conditions:

1) The use is a wildlife-dependent recreational use as identified in the Improvement Act.
2) The use contributes to fulfilling the refuge purpose(s), the Refuge System mission, or goals or objectives described in a refuge management plan approved after October 9, 1997, the date the Improvement Act was signed into law.
3) The use involves the take of fish and wildlife under state regulations.
4) The use has been found to be appropriate as specified in Section 1.11.

*Native American***.** American Indians in the conterminous United States and Alaska Natives (including Aleuts, Eskimos, and Indians) who are members of federally recognized tribes.

Priority General Public Use. A compatible wildlife-dependent recreational use of a refuge involving hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation.

Quality. The criteria used to determine a quality recreational experience include:

- Promotes safety of participants, other visitors, and facilities.
- Promotes compliance with applicable laws and regulations and responsible behavior.
- Minimizes or eliminates conflicts with fish and wildlife population or habitat goals or objectives in a plan approved after 1997.
- Minimizes or eliminates conflicts with other compatible wildlife-dependent recreation.
- Minimizes conflicts with neighboring landowners.
- Promotes accessibility and availability to a broad spectrum of the American people.
- Promotes resource stewardship and conservation.

- Promotes public understanding and increases public appreciation of America's natural resources and the Service's role in managing and protecting these resources.
- Provides reliable/reasonable opportunities to experience wildlife.
- Uses facilities that are accessible and blend into the natural setting.
- Uses visitor satisfaction to help define and evaluate programs.

*Wildlife-Dependent Recreational Use***.** As defined by the Improvement Act, a use of a refuge involving hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation.

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Sam D. Hamilton Noxubee NWR

Use: **Bee Keeping**

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	YES	NO
(a) Do we have jurisdiction over the use?	X	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	X	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?	X	
(d) Is the use consistent with public safety?	X	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?		X
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	X	
(g) Is the use manageable within available budget and staff?		X
(h) Will this be manageable in the future within existing resources?		X
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?		X
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?	X	

Where we do not have jurisdiction over the use ["no" to (a)], there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ["no" to (b), (c), or (d)] may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. **Yes: X No:**

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate: X **Appropriate:**

Refuge Manager:_____ Date:_____

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.
If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.
If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor:_____ Date:_____

A compatibility determination is required before the use may be allowed.

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Sam D. Hamilton Noxubee NWR

Use: **Bicycling for Wildlife Dependent Activities**

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	YES	NO
(a) Do we have jurisdiction over the use?	X	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	X	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?	X	
(d) Is the use consistent with public safety?	X	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	X	
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	X	
(g) Is the use manageable within available budget and staff?	X	
(h) Will this be manageable in the future within existing resources?	X	
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?	X	
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?	X	

Where we do not have jurisdiction over the use ["no" to (a)], there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ["no" to (b), (c), or (d)] may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. **Yes: X No:**

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate: **Appropriate: X**

Refuge Manager:_____ Date:_____

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.
If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.
If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor:_____ Date:_____

A compatibility determination is required before the use may be allowed.

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Sam D. Hamilton Noxubee NWR

Use: **Boating for Wildlife Dependent Activities**

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	YES	NO
(a) Do we have jurisdiction over the use?	X	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	X	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?	X	
(d) Is the use consistent with public safety?	X	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	X	
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	X	
(g) Is the use manageable within available budget and staff?	X	
(h) Will this be manageable in the future within existing resources?	X	
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?	X	
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?	X	

Where we do not have jurisdiction over the use ["no" to (a)], there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ["no" to (b), (c), or (d)] may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. **Yes: X No:**

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate: **Appropriate: X**

Refuge Manager:_____ Date:_____

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.
If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.
If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor:_____ Date:_____

A compatibility determination is required before the use may be allowed.

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Sam D. Hamilton Noxubee NWR

Use: **Camping**

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	YES	NO
(a) Do we have jurisdiction over the use?	X	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	X	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?	X	
(d) Is the use consistent with public safety?	X	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?		X
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?		X
(g) Is the use manageable within available budget and staff?		X
(h) Will this be manageable in the future within existing resources?		X
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?		X
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?		X

Where we do not have jurisdiction over the use ["no" to (a)], there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ["no" to (b), (c), or (d)] may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. **Yes: X No:**

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate: X **Appropriate:**

Refuge Manager:_____ Date:_____

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.
If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.
If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor:_____ Date:_____

A compatibility determination is required before the use may be allowed.

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Sam D. Hamilton Noxubee NWR

Use: **Commercial Forest Management Operation**

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	YES	NO
(a) Do we have jurisdiction over the use?	X	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	X	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?	X	
(d) Is the use consistent with public safety?	X	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	X	
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	X	
(g) Is the use manageable within available budget and staff?	X	
(h) Will this be manageable in the future within existing resources?	X	
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?	X	
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?	X	

Where we do not have jurisdiction over the use ["no" to (a)], there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ["no" to (b), (c), or (d)] may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. **Yes: X No:**

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate: **Appropriate: X**

Refuge Manager:_____ Date:_____

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.
If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.
If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor:_____ Date:_____

A compatibility determination is required before the use may be allowed.

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Sam D. Hamilton Noxubee NWR

Use: **Commercial Wildlife and Nature Photography and Filming**

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	YES	NO
(a) Do we have jurisdiction over the use?	X	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	X	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?	X	
(d) Is the use consistent with public safety?	X	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	X	
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	X	
(g) Is the use manageable within available budget and staff?	X	
(h) Will this be manageable in the future within existing resources?	X	
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?	X	
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?	X	

Where we do not have jurisdiction over the use ["no" to (a)], there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ["no" to (b), (c), or (d)] may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. **Yes: X No:**

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate: **Appropriate: X**

Refuge Manager:_____ Date:_____

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.
If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.
If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor:_____ Date:_____

A compatibility determination is required before the use may be allowed.

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Sam D. Hamilton Noxubee NWR

Use: **Commercially Guided Wildlife and Nature Observation**

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	YES	NO
(a) Do we have jurisdiction over the use?	X	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	X	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?	X	
(d) Is the use consistent with public safety?	X	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	X	
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	X	
(g) Is the use manageable within available budget and staff?	X	
(h) Will this be manageable in the future within existing resources?	X	
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?	X	
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?	X	

Where we do not have jurisdiction over the use ["no" to (a)], there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ["no" to (b), (c), or (d)] may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. **Yes: X No:**

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate: **Appropriate: X**

Refuge Manager:_____ Date:_____

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.
If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.
If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor:_____ Date:_____

A compatibility determination is required before the use may be allowed.

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Sam D. Hamilton Noxubee NWR

Use: **Commercial Fishing**

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	YES	NO
(a) Do we have jurisdiction over the use?	X	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	X	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?	X	
(d) Is the use consistent with public safety?	X	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?		X
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	X	
(g) Is the use manageable within available budget and staff?		X
(h) Will this be manageable in the future within existing resources?		X
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?		X
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?		X

Where we do not have jurisdiction over the use ["no" to (a)], there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ["no" to (b), (c), or (d)] may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. **Yes: X No:**

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate: X **Appropriate:**

Refuge Manager:_____ Date:_____

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.
If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.
If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor:_____ Date:_____

A compatibility determination is required before the use may be allowed.

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Sam D. Hamilton Noxubee NWR

Use: **Commercially Guided Hunting and Fishing**

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	YES	NO
(a) Do we have jurisdiction over the use?	X	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	X	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?	X	
(d) Is the use consistent with public safety?	X	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?		X
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	X	
(g) Is the use manageable within available budget and staff?		X
(h) Will this be manageable in the future within existing resources?		X
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?		X
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?		X

Where we do not have jurisdiction over the use ["no" to (a)], there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ["no" to (b), (c), or (d)] may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. **Yes: X** **No:**

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate: X **Appropriate:**

Refuge Manager:_____ Date:_____

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.
If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.
If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor:_____ Date:_____

A compatibility determination is required before the use may be allowed.

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Sam D. Hamilton Noxubee NWR

Use: **Firewood Cutting for Personal Use Only**

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	YES	NO
(a) Do we have jurisdiction over the use?	X	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	X	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?	X	
(d) Is the use consistent with public safety?	X	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	X	
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	X	
(g) Is the use manageable within available budget and staff?	X	
(h) Will this be manageable in the future within existing resources?	X	
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?	X	
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?	X	

Where we do not have jurisdiction over the use ["no" to (a)], there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ["no" to (b), (c), or (d)] may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. **Yes: X** **No:**

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate: **Appropriate: X**

Refuge Manager:_____ Date:_____

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.
If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.
If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor:_____ Date:_____

A compatibility determination is required before the use may be allowed.

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Sam D. Hamilton Noxubee NWR

Use: **Fishing Tournaments**

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	YES	NO
(a) Do we have jurisdiction over the use?	X	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	X	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?	X	
(d) Is the use consistent with public safety?	X	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?		X
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	X	
(g) Is the use manageable within available budget and staff?		X
(h) Will this be manageable in the future within existing resources?		X
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?		X
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?		X

Where we do not have jurisdiction over the use ["no" to (a)], there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ["no" to (b), (c), or (d)] may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. **Yes: X** **No:**

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate: X **Appropriate:**

Refuge Manager:_____ Date:_____

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.
If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.
If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor:_____ Date:_____

A compatibility determination is required before the use may be allowed.

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Sam D. Hamilton Noxubee NWR

Use: **Recreational Furbearer Management**

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	YES	NO
(a) Do we have jurisdiction over the use?	X	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	X	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?	X	
(d) Is the use consistent with public safety?	X	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	X	
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	X	
(g) Is the use manageable within available budget and staff?		X
(h) Will this be manageable in the future within existing resources?		X
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?	X	
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?	X	

Where we do not have jurisdiction over the use ["no" to (a)], there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ["no" to (b), (c), or (d)] may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. **Yes: X No:**

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate: X **Appropriate:**

Refuge Manager:_____ Date:_____

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.
If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.
If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor:_____ Date:_____

A compatibility determination is required before the use may be allowed.

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Sam D. Hamilton Noxubee NWR

Use: **Geocaching for Environmental Education**

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	YES	NO
(a) Do we have jurisdiction over the use?	X	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	X	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?	X	
(d) Is the use consistent with public safety?	X	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	X	
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	X	
(g) Is the use manageable within available budget and staff?	X	
(h) Will this be manageable in the future within existing resources?	X	
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?	X	
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?	X	

Where we do not have jurisdiction over the use ["no" to (a)], there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ["no" to (b), (c), or (d)] may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. **Yes: X No:**

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate: **Appropriate: X**

Refuge Manager:_____ Date:_____

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.
If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.
If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor:_____ Date:_____

A compatibility determination is required before the use may be allowed.

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Sam D. Hamilton Noxubee NWR

Use: **Horseback Riding**

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	YES	NO
(a) Do we have jurisdiction over the use?	X	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	X	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?		X
(d) Is the use consistent with public safety?		X
(e) Is the use consistent with goals and objectives in an approved management plan or other document?		X
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?		X
(g) Is the use manageable within available budget and staff?		X
(h) Will this be manageable in the future within existing resources?		X
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?		X
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?		X

Where we do not have jurisdiction over the use ["no" to (a)], there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ["no" to (b), (c), or (d)] may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. **Yes: X** **No:**

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate: X **Appropriate:**

Refuge Manager:_____ Date:_____

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.
If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.
If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor:_____ Date:_____

A compatibility determination is required before the use may be allowed.

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Sam D. Hamilton Noxubee NWR

Use: **Jogging, Running, and Competitive Races**

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	YES	NO
(a) Do we have jurisdiction over the use?	X	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	X	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?	X	
(d) Is the use consistent with public safety?	X	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	X	
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	X	
(g) Is the use manageable within available budget and staff?	X	
(h) Will this be manageable in the future within existing resources?	X	
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?	X	
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?	X	

Where we do not have jurisdiction over the use ["no" to (a)], there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ["no" to (b), (c), or (d)] may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. **Yes: X No:**

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate: **Appropriate: X**

Refuge Manager:_____ Date:_____

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.
If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.
If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor:_____ Date:_____

A compatibility determination is required before the use may be allowed.

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Sam D. Hamilton Noxubee NWR

Use: **Off-trail Bicycling**

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	YES	NO
(a) Do we have jurisdiction over the use?	X	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	X	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?	X	
(d) Is the use consistent with public safety?	X	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?		X
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	X	
(g) Is the use manageable within available budget and staff?		X
(h) Will this be manageable in the future within existing resources?		X
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?		X
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?		X

Where we do not have jurisdiction over the use ["no" to (a)], there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ["no" to (b), (c), or (d)] may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. **Yes: X No:**

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate: X **Appropriate:**

Refuge Manager:_____ Date:_____

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.
If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.
If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor:_____ Date:_____

A compatibility determination is required before the use may be allowed.

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Sam D. Hamilton Noxubee NWR

Use: **Operation of Model Planes and Boats**

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	YES	NO
(a) Do we have jurisdiction over the use?	X	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	X	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?	X	
(d) Is the use consistent with public safety?	X	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?		X
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	X	
(g) Is the use manageable within available budget and staff?		X
(h) Will this be manageable in the future within existing resources?		X
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?		X
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?		X

Where we do not have jurisdiction over the use ["no" to (a)], there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ["no" to (b), (c), or (d)] may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. **Yes: X No:**

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate: X **Appropriate:**

Refuge Manager:_____ Date:_____

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.
If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.
If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor:_____ Date:_____

A compatibility determination is required before the use may be allowed.

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Sam D. Hamilton Noxubee NWR

Use: **Picnicking associated with a Wildlife-Dependent Activity**

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	YES	NO
(a) Do we have jurisdiction over the use?	X	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	X	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?	X	
(d) Is the use consistent with public safety?	X	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	X	
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	X	
(g) Is the use manageable within available budget and staff?	X	
(h) Will this be manageable in the future within existing resources?	X	
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?	X	
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?	X	

Where we do not have jurisdiction over the use ["no" to (a)], there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ["no" to (b), (c), or (d)] may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. **Yes: X No:**

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate: **Appropriate: X**

Refuge Manager:_____ Date:_____

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.
If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.
If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor:_____ Date:_____

A compatibility determination is required before the use may be allowed.

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Sam D. Hamilton Noxubee NWR

Use: **Recreational Use of Off-road Vehicles**

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	YES	NO
(a) Do we have jurisdiction over the use?	X	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	X	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?		X
(d) Is the use consistent with public safety?		X
(e) Is the use consistent with goals and objectives in an approved management plan or other document?		X
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	X	
(g) Is the use manageable within available budget and staff?		X
(h) Will this be manageable in the future within existing resources?		X
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?		X
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?		X

Where we do not have jurisdiction over the use ["no" to (a)], there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ["no" to (b), (c), or (d)] may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. **Yes: X No:**

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate: X **Appropriate:**

Refuge Manager:_____ Date:_____

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.
If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.
If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor:_____ Date:_____

A compatibility determination is required before the use may be allowed.

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Sam D. Hamilton Noxubee NWR

Use: **Release of Non-native, Captive, or Feral Wildlife or Plants**

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	YES	NO
(a) Do we have jurisdiction over the use?	X	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	X	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?	X	
(d) Is the use consistent with public safety?		X
(e) Is the use consistent with goals and objectives in an approved management plan or other document?		X
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	X	
(g) Is the use manageable within available budget and staff?		X
(h) Will this be manageable in the future within existing resources?		X
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?		X
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?		X

Where we do not have jurisdiction over the use ["no" to (a)], there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ["no" to (b), (c), or (d)] may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. **Yes: X No:**

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate: X **Appropriate:**

Refuge Manager:_____ Date:_____

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.
If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.
If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor:_____ Date:_____

A compatibility determination is required before the use may be allowed.

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Sam D. Hamilton Noxubee NWR

Use: **Rollerblading and Skateboarding**

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	YES	NO
(a) Do we have jurisdiction over the use?	X	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	X	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?	X	
(d) Is the use consistent with public safety?		X
(e) Is the use consistent with goals and objectives in an approved management plan or other document?		X
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	X	
(g) Is the use manageable within available budget and staff?		X
(h) Will this be manageable in the future within existing resources?		X
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?		X
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?		X

Where we do not have jurisdiction over the use ["no" to (a)], there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ["no" to (b), (c), or (d)] may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. **Yes: X No:**

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate: X **Appropriate:**

Refuge Manager:_____ Date:_____

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.
If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.
If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor:_____ Date:_____

A compatibility determination is required before the use may be allowed.

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Sam D. Hamilton Noxubee NWR

Use: **Scientific Research**

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	YES	NO
(a) Do we have jurisdiction over the use?	X	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	X	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?	X	
(d) Is the use consistent with public safety?	X	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	X	
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	X	
(g) Is the use manageable within available budget and staff?	X	
(h) Will this be manageable in the future within existing resources?	X	
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?	X	
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?	X	

Where we do not have jurisdiction over the use ["no" to (a)], there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ["no" to (b), (c), or (d)] may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. **Yes: X No:**

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate: **Appropriate: X**

Refuge Manager:_____ Date:_____

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.
If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.
If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor:_____ Date:_____

A compatibility determination is required before the use may be allowed.

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Sam D. Hamilton Noxubee NWR

Use: **Swimming**

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	YES	NO
(a) Do we have jurisdiction over the use?	X	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	X	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?	X	
(d) Is the use consistent with public safety?		X
(e) Is the use consistent with goals and objectives in an approved management plan or other document?		X
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	X	
(g) Is the use manageable within available budget and staff?		X
(h) Will this be manageable in the future within existing resources?		X
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?		X
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?		X

Where we do not have jurisdiction over the use ["no" to (a)], there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ["no" to (b), (c), or (d)] may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. **Yes: X No:**

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate: X **Appropriate:**

Refuge Manager:_____ Date:_____

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.
If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.
If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor:_____ Date:_____

A compatibility determination is required before the use may be allowed.

Appendix F. Compatibility Determinations

Sam D. Hamilton Noxubee National Wildlife Refuge Compatibility Determination

Uses: The following uses were found to be appropriate and evaluated to determine their compatibility with the mission of the Refuge System and the purposes of the refuge.

1. Bicycle Use for Wildlife-Dependent Activities
2. Boating for Wildlife-Dependent Activities
3. Commercial Forest Management Operations
4. Commercial Wildlife and Nature Photography and Filming
5. Commercially Guided Wildlife and Nature Observation
6. Firewood Cutting for Personal Use Only
7. Geocaching for Environmental Education
8. Jogging, Running, and Competitive Races
9. Motorized and Non-Motorized Boating for Wildlife Observation
10. Picnicking in Association with Wildlife-Dependent Activities
11. Recreational Fishing
12. Recreational Hunting of Big Game, Small Game, and Waterfowl
13. Scientific Research
14. Wildlife Observation, Wildlife Photography, Environmental Education, and Interpretation

Refuge Name: Sam D. Hamilton Noxubee National Wildlife Refuge, hereafter referred to as the refuge, located in Oktibbeha, Noxubee, and Winston counties in Mississippi.

Date Established:

Establishing and Acquisition Authories:

(1) Migratory Bird Conservation Act (16 U.S.C. 715)

(2) National Wildlife Refuge System Administration Act (16 U.S.C. 668(a)(2))

(3) Fish and Wildlife Act of 1956 (16 U.S.C. 742 (b)(1))

(4) Refuge Recreation Act (16 U.S.C. 460 K-1)

Refuge Purpose:

(1) "…for use as a refuge and breeding ground for migratory birds and other wildlife…"
(16 U.S.C. 715; Migratory Bird Conservation Act)

(2) "…conservation, management, and restoration of the fish, wildlife, and plant resources and their habitats for the benefit of present and future generations of Americans" (16 U.S.C. 668(a)(2))

(3) "…for the development, advancement, management, conservation, and protection of fish and wildlife resources…" (16 U.S.C. 742 (b)(1))

(4) "…incidental fish and wildlife-oriented recreational development" (16 U.S.C. 460k-1; Refuge Recreation Act)

(5) "the protection of natural resources" (16 U.S.C. 460k-1; Refuge Recreation Act)

(6) "the conservation of endangered or threatened species…" (16 U.S.C. 460k-1; Refuge Recreation Act)

National Wildlife Refuge System Mission:

The mission of the 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.*

Other Applicable Laws, Regulations, and Policies:

Animal Welfare Act of 1966, Public Law 89-544 (7 U.S.C. 2131 et. seq.)
Antiquities Act of 1906 (34 Stat. 225)
Migratory Bird Treaty Act of 1918 (15 U.S.C. 703-711; 40 Stat. 755)
Migratory Bird Conservation Act of 1929 (16 U.S.C. 715r; 45 Stat. 1222)
Migratory Bird Hunting Stamp Act of 1934 (16 U.S.C. 718-178h; 48 Stat. 451)
Criminal Code Provisions of 1940 (18 U.S.C. 41)
Bald and Golden Eagle Protection Act (16 U.S.C. 668-668d; 54 Stat. 250)
Refuge Trespass Act of June 25, 1948 (18 U.S.C. 41; 62 Stat. 686)
Fish and Wildlife Act of 1956 (16 U.S.C. 742a-742j; 70 Stat.1119)
Refuge Recreation Act of 1962 (16 U.S.C. 460k-460k-4; 76 Stat. 653)
Wilderness Act (16 U.S.C. 1131; 78 Stat. 890)
Land and Water Conservation Fund Act of 1965
National Historic Preservation Act of 1966, as amended (16 U.S.C. 470, et seq.; 80 Stat. 915)
National Wildlife Refuge System Administration Act of 1966 (16 U.S.C. 668dd, 668ee; 80 Stat. 927)
National Environmental Policy Act of 1969, NEPA (42 U.S.C. 4321, et seq; 83 Stat. 852)
Use of Off-Road Vehicles on Public Lands (Executive Order 11644, as amended by Executive Order 10989)
Refuge Revenue Sharing Act of 1935, as amended in 1978 (16 U.S.C. 715s; 92 Stat. 1319)
Endangered Species Act of 1973 (16 U.S.C. 1531 et seq; 87 Stat. 884)
National Wildlife Refuge Regulations for the Most Recent Fiscal Year (50 CFR Subchapter C; 43 CFR 3101.3-3)
(Title 50 Code of Federal Regulations Subchapter C; 43 CFR 3103.3.3)
Title 50 Code of Federal Regulations, Parts 25-33

Emergency Wetlands Resources Act of 1986 (S.B. 740)
North American Wetlands Conservation Act of 1990
Food Security Act (Farm Bill) of 1990 as amended (HR 2100)
The Property Clause of the U.S. Constitution Article IV 3, Clause 2
The Commerce Clause of the U.S. Constitution Article 1, Section 8
The National Wildlife Refuge System Improvement Act of 1997 (Public Law 105-57, USC668dd)
Executive Order 12996, Management and General Public Use of the National Wildlife Refuge System. March 25, 1996
Executive Order 11644, Use of Off-Road Vehicles on Public Lands, as amended by E.O. 10989.
Archaeological Resources Protection Act of 1979
Native American Graves Protection and Repatriation Act of 1990
Consolidated Appropriations Act of 2004 - Section 145 of PL 108-199 is known as the Theodore Roosevelt National Wildlife Refuge Act

Compatibility determinations for each description listed were considered separately. Although for brevity, the preceding sections from "Uses" through "Other Applicable Laws, Regulations and Policies" and the succeeding sections, "Literature Cited," "Public Review," and the "Approval of Compatibility Determinations" are only written once within the Draft CCP/EA, they are part of each descriptive use and become part of that compatibility determination if considered outside of the CCP.

Use: Bicycling

Description of Use: Bicycling as a lone activity is not identified as a priority public use of the National Wildlife Refuge System under the National Wildlife Refuge System Improvement Act of 1997 (Public Law 105-57). Bicycles are considered legal modes of transportation on local state and county roads. Like walking, bicycling can be used as transport to wildlife observation and photography areas. Bicycling has also been used by hunters and anglers to reach areas along roads closed to vehicle use. Increasing numbers of visitors are using bicycles on the refuge as a form of exercise with some trails being used by mountain biking enthusiasts.

Availability of Resources: Approved compatible public uses will be the primary management focus. Maintenance, periodic upgrades, and improvements to public use facilities and roads will continue to be a major component of refuge activities.

The human resources to conduct a successful public use program will be provided by staff, volunteers, and partners. The Service will have to provide upgraded facilities and require a significant commitment in staff to be able to provide bicycling opportunities beyond that used for hunting and fishing. To date, annual requirements in time, materials, and supplies needed to manage and ensure the success of this area have been from within existing refuge resources. Estimated costs associated with this use include:

Creating "Connecting People with Nature" Bike Route: $50,000 per mile

Supplies and materials: $6,000; regulatory signs, interpretative brochures

Monitoring: $3,000 annually

Law Enforcement: $3,000 annually

Anticipated Impacts of the Use: For a complete analysis of the anticipated impacts of hunting, refer to Chapter IV of the Draft EA.

Impacts associated with bicycling as a form of transport for hunters, anglers, and wildlife observers are minimal on the refuge due to this use being limited to the paved or graveled roads and, if developed, some trails within the "Connecting People with Nature" area. Short-term and negligible disturbance to wildlife may occur due to visitor-wildlife encounters. In most cases, wildlife would be expected to become accustomed to the presence of visitors and their associated modes of transportation. Mountain bike activities, both on-trail and off-trail, would be prohibited.

In areas where the distance between trails, roads and wetlands is short, there may be some minor and short-term disturbances to shorebirds associated with bicycling. These areas may be seasonally closed to this use. No significant adverse impacts to non-target species are expected. Negative impacts between concurrent public use activities are not expected and no adverse socioeconomic impacts are anticipated. This use should not result in short- or long-term impacts that adversely affect the purpose for this refuge or the mission of the Refuge System. It is intended that the primary positive impact will be a better appreciation of the role of the Fish and Wildlife Service in the conservation arena.

Determination (check one below):

_____ Use is Not Compatible

__X__ Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility: We will permit bicycling only in designated areas specifically developed to prevent the erosion and degradation of wetlands or water quality and ensure public safety. Bicycles will not be allowed in areas or along trails if there are safety issues or wildlife disturbance issues. Bicycles are allowed for wildlife-dependent activities, including, but not limited to, access related to hunting, fishing, and wildlife observation.

Mountain biking activities and use of bicycles to go cross country or off designated trails will be prohibited.

Bicycle riding as a general mode of transportation is allowed on roads open to motor vehicles. Organized rides and club rides involving more than 10 bicycles will be required to obtain a special use permit as these large groups may require greater management to prevent negative interactions with other public users and wildlife.

Motorized vehicle speeds on roadways shared by bicycles will be limited to no higher than 35 miles per hour and 25 miles per hour with the Connecting People with Nature Area.

Justification: Hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation are the six priority public uses of the Refuge System, and have been determined to be compatible activities on many refuges nationwide. The Improvement Act instructs refuge managers to seek ways to accommodate those six uses. Bicycling is allowed as a means to facilitate these priority public uses on Sam D. Hamilton Noxubee NWR. Bicycling activities will not materially interfere with or detract from the mission of the Refuge System or the purposes for which the refuge was established. Bicycling will not pose significant adverse effects on refuge resources; interfere with public use of the refuge; nor cause an undue administrative burden.

This activity will not materially interfere with, or detract from, the mission of the Refuge System or purposes for which the refuge was established. In addition, this activity will fulfill one or more purposes of the refuge or Refuge System.

NEPA Compliance for Refuge Use Description: *Place an X in appropriate space.*

_____ Categorical Exclusion without Environmental Action Statement
_____ Categorical Exclusion and Environmental Action Statement
__X__ Environmental Assessment and Finding of No Significant Impact
_____ Environmental Impact Statement and Record of Decision

Mandatory 10-year Re-evaluation Date:

Use: Boating for Wildlife-Dependent Activities

Description of Use: Motorized and non-motorized boating as a lone activity is not a priority public use of the Refuge System under the Improvement Act. However, this use may provide transport for wildlife observation, wildlife photography, hunting, and fishing. Motorized and non-motorized boating will be conducted on all open waters including lakes and rivers within Sam D. Hamilton Noxubee NWR. One motorized boat access ramp will be available at Bluff Lake, Loakfoma Lake, and Ross Branch Reservoir. An additional non-motorized boat launch site will be available near Cypress Cove Boardwalk on Bluff Lake.

Availability of Resources: Estimated costs associated with this use include:

Routine maintenance: $35,000 annually; this is the expected cost to maintain the three public motorized boat launches and one non-motorized boat ramp and includes repairs to the ramps base material, vegetation control, maintenance of parking areas and regulator signs, removal of garbage; and maintenance of a restroom facility.

Supplies and materials: $3,000; this includes signs for closed launch sites, site closure signs, interpretive brochures, regulation brochures.

Monitoring: $3,000 annually, to be carried out in cooperation with the state and partners.

Law Enforcement: $3,000 annually.

Anticipated Impacts of the Use: Potential impacts of motorized and non-motorized boating:

- Accidental introduction of invasive plants, pathogens, or exotic invertebrates, attached to boats.
- Disturbance of wildlife (particularly waterfowl, eagles, and wading birds): Popular public use boating seasons in Mississippi coincide in part with spring-early summer nesting and brood-rearing periods for many species of aquatic-dependent birds. Boaters may disturb nesting birds by approaching too closely to nests, causing nesting birds to flush. Flushing may expose eggs to predation or cooling, resulting in egg mortality.
- Negative impacts on water quality from motorboat and other pollutants, human waste, and litter: Extensive water quality testing on the refuge has not been conducted. The levels of pollutants from boat fuel and impacts on local aquatic systems are unknown. Hydrocarbon contamination can be harmful to fish.
- Bank and trail erosion from human activity (boat landings, boat wakes, foot traffic) may increase aquatic sediment loads of streams and rivers or alter riparian or lakeshore habitat or vegetation in ways harmful to fish or other wildlife.

Determination (check one below):

_____ Use is Not Compatible

__X__ Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility: Use of motorized and non-motorized boats is considered acceptable for transportation as part of hunting, fishing, wildlife observation, and wildlife photography. The refuge will permit boat launching only at designated launches to prevent the erosion and degradation of wetlands or water quality and ensure public safety. Launching of trailered boats will not be allowed in areas without a designated developed launch.

The refuge will close wildlife nesting and brood-rearing areas seasonally to all boating activities, to prevent the disturbance of wildlife.

Boat launches will be constructed and situated in such a way as to provide for public safety and minimize the disturbance of wildlife and habitat or the effects of siltation.

The refuge will increase public outreach and education to minimize conflicts among user groups, help control aquatic invasive plants and lead in the environment, reduce the introduction of nonnative fish species, and minimize the disturbance of wildlife and habitat.

A refuge officer will help to promote compliance with refuge regulations, monitor public use patterns and public safety, and document visitor interactions.

Motorized and non-motorized boating willl be allowed as a means to facilitate refuge public use programs, namely the priority public use programs of hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation. The use will be conducted consistent with refuge and State of Mississippi regulations, with some additional restrictions to protect fish, wildlife and habitat, and reduce potential conflicts among public uses.

All waters within the entire refuge will be considered a no wake area.

The public must inspect all boats and boat trailers and clean them of aquatic invasive species before launching and leaving refuge sites. Cleaning of boats should take place on dry ground well away from the water. Exotic, nuisance plants or animals on boats, trailers, diving equipment, or in bait buckets can disrupt aquatic ecosystems and negatively affect native fish and plant species.

Regulatory signs along with educational materials will be made available in high use areas.

Justification: Hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation are the six priority public uses of the Refuge System, and have been determined to be compatible activities on many refuges nationwide. The Improvement Act instructs refuge managers to seek ways to accommodate those six uses. Motorized and non-motorized boating is allowed as a means to facilitate these priority public uses on Sam D. Hamilton NWR. Boating activities will not materially interfere with or detract from the mission of the Refuge System or the purposes for which the refuge was established. Motorized and non-motorized boating will not pose significant adverse effects on refuge resources; interfere with public use of the refuge; nor cause an undue administrative burden. In addition, this activity will fulfill one or more purposes of the refuge or Refuge System.

NEPA Compliance for Refuge Use Description: *Place an X in appropriate space.*

_____ Categorical Exclusion without Environmental Action Statement
_____ Categorical Exclusion and Environmental Action Statement
__X__ Environmental Assessment and Finding of No Significant Impact
_____ Environmental Impact Statement and Record of Decision

Mandatory 10-year Re-evaluation Date:

Use: Commercial Forest Management Operations

Description of Use: Commercial forest management operations are used to conduct timber thinning, regeneration of timber stands, treatment of pine beetle outbreaks, and other silvicultural practices used to improve forest habitat conditions. These operations are not priority public uses of the Refuge System under the Improvement Act of 1997, but instead are management activities.

Commercial forest management operations, including when necessary, the use of commercial silvicultural contractors and techniques, including the use of pesticides to control exotic and nuisance plant species, will contribute to the purposes for which the Sam D. Hamilton Noxubee NWR was established, the mission of the Refuge System, the enhancement of biological integrity, diversity, and environmental health and to facilitate the ability of the refuge to meet its habitat and wildlife management objectives.

The refuge has primarily forested habitat, being approximately 45,000 acres of forest on about 48,000 acres of land owned by the Service. The Comprehensive Conservation Plan details the concepts and specifics of desired future conditions of the forest to provide enhanced habitat for federally listed species and priority trust species.

To achieve goals over the next 15 years, manipulation through commercial forestry is essential. The refuge does not have the required staffing, equipment, and expertise to harvest timber on a large scale. Commercial forestry operations will be allowed to cut and remove timber from the refuge and sell the removed wood to commercial buyers (mills) and operators (loggers) that will pay market value for portions of the trees removed. All commercial activities occurring on the refuge require the business to obtain a special use permit. Work conducted under the authority of this permit will be closely monitored by the refuge manager or his designee. Revenue generated by the sale of refuge wood products will contribute to the Refuge Revenue Sharing fund that provides payments to the counties in lieu of property taxes.

Availability of Resources: The components needed to manage the process are already in place, such as salary and positions of the refuge, including the forester and forestry technicians. The project leader provides administrative oversight of the program and the administrative officer tracks and monitors the financial payments. The refuge's wildlife biologist is responsible for assessing impact to wildlife. Some amount of time is required by other positions including maintenance workers. The refuge does receive a limited amount of expense for sales funds that are used toward forestry-related operations.

Anticipated Impacts of the Use: The operation of heavy equipment for forest management over refuge roads and through natural habitats has the potential to impact soils, cause severe rutting, result in increased site erosion, or degrade nearby wetlands or water resources. Therefore, all commercial forest management actions will be mitigated by following forestry management procedures described in Mississippi's Forestry Best Management Practices Manual (2006).

Heavy equipment use required for timber harvesting operations also has the potential to result in localized impacts to vegetation and wildlife. Damage or destruction of understory vegetation, including rare plants and unique botanical communities, is of concern. These impacts can be prevented through careful management of stream-side management zones and use of exclusion zones.

Whole tree harvesting can result in a reduction of downed wood and snags in a forest ecosystem. Skidding operations can cause residual damage to trees remaining in the stand that can result in the introduction of disease and insects into an otherwise healthy forest. Harvesting trees may also leave the remaining trees more susceptible to wind throw, altering plant and animal communities, facilitating the spread of invasive plants, disturbing wildlife temporarily, or displacing it over the long term. Forest prescriptions are designed to minimize these impacts.

Determination (check one below):

_____ Use is Not Compatible

__X__ Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility: Close inspection and supervision of all timber operations are necessary to ensure that harvesting operations meet the special conditions of the special use permit and produce the outcome needed to meet refuge goals and objectives. The refuge's forester will inspect the treatment site and assess effectiveness of the treatment.

The following special conditions are included in the bid invitation and permits for all commercial forestry activities to further protect the resources of the refuge. These conditions may be modified at any time to provide better guidance to operators and protection of refuge resources.

1. A pre-entry conference with permittee and his loggers will be held prior to any work being done on the sale area or haul roads associated with the sale area. A pre-entry meeting will be held before initiation of activity within each compartment and stand prior to start of any work. The refuge manager or his representative retains authority to stop logging operations at any time if road, weather, water, or other unsatisfactory conditions exist.

2. The permittee will maintain any refuge road, right-of-way, or easements. The permittee will repair any damages to the haul roads, primary gravel roads or paved roads resulting from logging operations to standards existing prior to timber harvest activities. Repair and maintenance work may include, but is not limited to, grading, graveling, or rocking. Cost to repairs or replacements of damaged culverts or other infrastructure caused by logging equipment will be the sole responsibility of the permittee. When applicable, reasonable actual costs for work on refuge graveled roads will be refunded from performance deposits. The expense of work on dirt roads within the sale area is the sole responsibility of the permittee. No new roads will be created and all access will be limited to existing roads and infrastructure.

3. The location of loading decks and logging roads will be mutually agreed to by permittee (or his representative) and refuge manager or his designee prior to their placement. All primary haul roads used by permittee will be left in good condition or blocked after operations are completed by placing logging slash and/or dirt mounds across all entrance points as directed by refuge manager or his designee. Those roads to be left open will be built up enough so that the road will not hold standing water any more than the adjacent area. This will require the use of equipment such as a bulldozer and/or road grader. If required as determined by the refuge manager or his designee, blocked roads will be re-seeded with refuge approved grasses to prevent erosion.

4. In forestry operations, no trees planned to be left (leave trees) following the operation will be cut or excessively damaged. Excessive is defined more specifically as: (1) bole damage that exposes cambium more than 6 inches (in any dimension); and (2) crown damage of 1/3 or more of the crown. As determined by the refuge manager or his designee, penalties may be assessed for cutting or damaging leave trees at a rate of three (3) times the stumpage paid for the harvested merchantable timber.

5. Trees shall be cut so as to leave a stump not less than 4 inches high and no more than 12 inches high on the side adjacent to the highest ground. Ground level paint spot must be visible after the tree has been cut.

6. Skid trails with turn trees should be planned to prevent the damage to leave trees. Turn trees shall consist of trees being harvested and should be removed only after use of skid trails ends.

7. All logging operations shall be conducted during daylight hours.

8. Trees and tops cut shall not be left hanging or supported by any other living or dead tree or brush and shall be pulled down immediately after falling.

9. Tops and logging debris shall be kept pulled back 50 feet from highways, county roads, refuge roads, and trees with basal cavities. All openings and fields must be kept clear of tops and debris. The permittee and his employees will do all within their power to prevent and suppress fires; shall pay the Federal Government for any unnecessary damage to roads, fields, openings, and ditches resulting from operations.

10. Logging operations will be allowed only when site conditions allow. Logging will not be allowed when ground is wet and subject to rutting or severe soil compaction. At no time will rutting deeper than 6” be allowed.

11. The refuge manager or his designee shall have the authority to temporarily close down all or any part of the operation during a period of high fire danger, inclement weather, refuge hunts, safety reasons, or any other reason deemed necessary. Extensions to the special use permit time period equal to the closed period will be granted to the permittee. Extensions will not be granted due to inactivity during favorable harvesting conditions.

12. Logging operations will not be allowed in a stand containing red-cockaded woodpecker cluster sites during the breeding season, usually April 1 to June 30.

13. The permittee (or his representative) will not litter. Disposal of petroleum products onsite is prohibited. Equipment must be maintained and not leak more than a few drops of petroleum product per day. Performance bond monies may be used to pay for litter clean-up.

14. Tree-length logging and skidders will be allowed. Unnecessary damage to the residual stand will not be tolerated. As determined by the refuge manager or his designee, penalties may be assessed for damage to unmarked trees at a rate of three (3) times the stumpage paid for the harvested merchantable timber.

15. If spacing between trees does not allow cutter head grapples to be used without damage to leave trees, alternative harvest methods should be used.

16. Sufficient cut trees, trees that are to be removed as part of the operation, should be left along the skid trails and deck to prevent skidder damage to leave trees and these cut trees should be the last trees removed as part of the operation.

17. Each portion of the sale area must be completed before moving to other portions of the area unless authorized by the refuge manager.

18. The permittee will be responsible for job safety while operating on the refuge.

19. The possession and/or use of firearms and alcohol on the refuge are prohibited.

20. All of the best management practices for forestry in Mississippi will be followed as mandatory practices. Failure to follow these these practices is grounds for termination of the special use permit.

21. Logging decks must not be located within 200 feet of active or inactive red-cockaded woodpecker cavity trees.

22. Logging roads and trails shall not be established through red-cockaded woodpecker clusters.

23. When working immediately adjacent (<300 feet) to active red-cockaded woodpecker clusters, no activity will occur prior to 8 a.m. or after 4 p.m.

24. Trees being removed from areas adjacent to red-cockaded woodpecker clusters should be cut to fall away from the cluster do prevent damage to cluster trees.

Justification: Commercial forest management, to include such actions as commercial timber thinning, salvage, and other silvicultural practices, is used to improve forest habitat conditions. Commercial forest management allows the refuge to maintain and enhance necessary habitat for wildlife, including threatened and endangered species by promoting plant communities beneficial to these species. Additionally, use of commercial foresters can protect forest health during time requiring emergency forest actions to prevent unwanted spread of insect or disease outbreaks.

The primary goal of active forest management on the refuge will be to enhance and maintain habitat for species identified as resources of concern and associated habitat communities identified in the comprehensive conservation plan. Commercial forest management operations, including when necessary the use of commercial silvicultural contractors and techniques, will contribute to the purposes for which the refuge was established, the mission of the Refuge System, and the enhancement of biological integrity, diversity, and environmental health. These management operations will also facilitate the ability of the refuge to meet its habitat and wildlife objectives.

Commercial forest management operations will not materially interfere with, or detract from, the mission of the Refuge System or the purpose for which the refuge was established.

NEPA Compliance for Refuge Use Description: *Place an X in appropriate space.*

_____ Categorical Exclusion without Environmental Action Statement
_____ Categorical Exclusion and Environmental Action Statement
__X__ Environmental Assessment and Finding of No Significant Impact
_____ Environmental Impact Statement and Record of Decision

Mandatory 10-year Re-evaluation Date:

Use: Commercial Wildlife and Nature Photography and Filming

Description of Use: The use is commercial photography, either still or motion pictures, of wildlife, or nature scenes for conservation uses. This is not a priority public use, but will contribute to priority public uses.

This use typically involves creating a documentary film, taking still photographs, or recording wildlife sounds that are intended to be or could be sold for income or revenue or traded for goods or services. Commercial recording of natural, historical, or cultural subjects is covered under this compatibility determination. This compatibility determination does not apply to legitimate news media activities.

Each request for this use will be considered, and if appropriate, will be issued a special use permit by the refuge manager. Each request must be presented in writing with details of who, what, where, when, why, and how the commercial operation will be conducted. Each request will be evaluated on its own merit. The refuge manager will use professional judgment in ensuring that the request will have no considerable negative impacts to natural, cultural, or visitor services; will not violate refuge regulations; and that it will contribute to the achievement of the refuge purpose or the Refuge System mission. Special needs will be considered on a case-by-case basis and are subject to the refuge manager's approval. Any approved special use permit will outline the framework in which the use can be conducted, and refuge staff will ensure compliance with the permit.

Commercial photography is a popular enterprise on the refuge due to the scenic natural habitats and abundant wildlife in the area. The refuge staff anticipates that an increase in commercial photography will occur over the next few years as the refuge gains visibility and areas of natural habitat in the surrounding area decrease.

Availability of Resources: Permitting this use is within the resources available to administer the refuge's Visitor Services Program. Additional staff costs are incurred to review each request, analyze affected habitats and wildlife, coordinate with the outside entity, and process a special use permit, if necessary. Compliance with the terms of the permit is within the regular duties of the refuge's law enforcement officer. Anticipated costs for up to five requests are as follows:

● Refuge Biologist (GS-11) (review request and issue special use permit) – 1 day/yr = $476
● Visitor Services Manager (GS-09) (review requests, coordinate with entity, process special use permit) – 3 days/yr = $589
● Refuge Manager (GS-12) (review and approval) – 1 day/yr = $285
● Law Enforcement Officer (GS-09) (enforcement patrols) – 1 day/yr = $196

Anticipated Impacts of the Use: Commercial photography can result in positive or negative impacts to the wildlife resource. Visitors engaging in commercial photography are expected to use and stay on established trails or roads to access the interior of the refuge. To minimize disturbance to natural resources and ensure public safety, the refuge has implemented restrictions on public entry such as closed areas, seasonally restricted areas, and daily hour restrictions. Facilities most utilized by refuge visitors engaging in commercial photography are roads, parking lots, trails, and boat launching ramps. Maintenance or improvement of these facilities will cause negligible to short-term minor impacts to localized soils and waters and may cause some wildlife disturbances and damage to vegetation.

Commercial wildlife and nature photography is expected to have negligible short-term, long-term, or cumulative impacts on the economy of the towns or county in which the refuge lies based on findings regarding socioeconomic impacts. We do not expect this activity to considerably alter the demographic of economic characteristics of the local community. All refuge actions will neither disproportionately affect any communities nor damage or undermine any businesses or community organizations. No adverse impacts are foreseen to be associated with changes in the community character or demographic composition.

Commercial filming, as with other uses, has the potential to disrupt cultural resources. Refuge visitors may inadvertently or even intentionally damage or disturb known or undiscovered cultural artifacts or historic properties. Impacts are expected to be negligible based on our observations of past visitor impacts from these uses.

A Section 7 evaluation has been conducted as part of this review to address the endangered red-cockaded woodpecker and bald eagle. It was determined that proposed activities would not likely affect the red-cockaded woodpecker. Areas near active bald eagle nests will not be open at any time for commercial photography and, therefore, are not expected to have any negative impacts on bald eagles (USFWS 2007).

Commercial photography is expected to have negligible adverse short-term, long-term, or cumulative impacts on secretive marsh birds, waterbirds, and waterfowl. With the addition of new trails, commercial photography has the potential to increase disturbance to waterfowl, secretive marsh birds, and waterbirds. However, a majority of the photography takes place along the Bluff Lake Road, minimizing the impact to refuge habitats. To minimize waterfowl disturbance from this use, the refuge has designated approximately 200 acres as waterfowl sanctuaries that will be closed on a seasonal or annual basis.

Negligible adverse short-term, long-term, or cumulative impacts on landbirds are expected.

Impacts to fisheries from visitors engaged in commercial photography are expected to be temporary and minor. Use of boats and canoes will cause increased suspension of bottom sediments, which should not adversely affect biological oxygen demand for fisheries resources. Boat motors may also harm submerged or emergent vegetation, which may cause a negligible negative impact to protective cover for fisheries. Accidental introduction of invasive plants, pathogens, or exotic invertebrates attached to boats or canoes is a concern.

Commercial photography is expected to have negligible adverse short-term, long-term, or cumulative impacts on mammals. While developing this compatibility determination, we evaluated the use for its potential to benefit or adversely affect amphibians and reptiles or their habitats used for mating, reproduction, over-wintering, and foraging.

Impacts to invertebrates such as butterflies, moths, other insects, and spiders are expected to be negligible. Visitors participating in commercial photography are restricted to designated trail routes and interior roads, which minimizes disturbance to invertebrates.

Opportunities for commercial photography are available via new trails using existing and already maintained trail/road networks from one hour before sunrise to one hour after sunset. Using existing roads will minimize impacts to refuge resources. Moderate beneficial impacts are expected by providing additional opportunities and general appreciation of nature. Some conflict between refuge users is expected to result in short-term moderate adverse impacts, which will be managed through seasonal closures. These seasonal closures are highlighted below and apply mostly to non-consumptive users during the hunting season. Other seasonal closures are in place to minimize wildlife disturbance.

(a) Jones Creek Unit near Ross Branch Reservoir is closed year-round to all public entry
(b) Mobility Impaired Hunting Area during hunting seasons
(c) Eagle Nesting Areas in accordance with Service guidelines

Determination (check one below):

_____ Use is Not Compatible

__X__ Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility: Each request must comply with 43 CFR Part 5, Public Law 106-206 (May 2000), and 8 RM 16 (Refuge Manual). To ensure compatibility with the Refuge System and refuge goals and objectives and to minimize or exclude adverse impacts as described above, the activity will be subject to the following stipulations:

1. Only commercial photography in support of conservation, refuge purposes, the Refuge System mission, or for education and interpretive purposes will be permitted. Small scale wedding photography will be allowed.

2. Permittee shall provide a detailed description of photography and filming plans, including site specific location, support equipment, number of persons involved, client name, story board describing themes and key messaging, and other details that would allow for evaluation of the project.

3. Permittee(s), designated representative, and associates will comply with all refuge regulations and conditions of the special use permit as provided by the refuge manager. The special use permit will detail who, what, where, when, why, and how the commercial operation will be conducted.

4. Alterations to any vegetation are prohibited.

5. Permittee will be required to minimize potential impacts to refuge visitors and natural and/or cultural resources within the refuge.

6. Permittee is responsible for acquiring and/or renewing any necessary state and federal permits prior to beginning or continuing project.

7. The refuge manager or designee can suspend the project, modify conditions, and/or terminate the project that is already permitted and in progress should unacceptable, unforeseen, or unexpected impacts or issues arise or be noted.

8. Proper credit should be given to the refuge and the Service for all commercial filming, including commercial recordings of images and sounds collected on the refuge.

9. Permittee will clean up all sites of trash and litter to the satisfaction of the refuge manager.

10. Permittee will provide the Service with at least one free copy of all commercial products generated on the refuge.

11. Permittee will not capture or retain wildlife without specific written permission from the Service, as well as having all required permits.

The refuge shall also collect any costs incurred by the refuge as a result of photography activities, including but not limited to administrative, security and personnel costs. All costs recovered shall be in addition to any use fee. Public Law 106-206 states that fees for commercial photography must be based on several criteria, including:

● The number of days the commercial photography or still photography takes place on federal land ($50 per day);
● The size of the film crew present on federal land (No charge 0-2 persons and $25 per person per day for 3 or more persons; and
● The amount and type of equipment present on federal land (No charge for handheld equipment only and for non-handheld equipment the fee will be 1 percent of equipment value per day).

Justification: Commercial photography has the potential to inspire and educate the public about the Refuge System, natural habitats, and wildlife. Wildlife photography is a priority wildlife-dependent use of the Refuge System through which the public can develop an appreciation for fish and wildlife. The Service's policy is to provide expanded opportunities for wildlife-dependent uses when compatible and consistent with sound fish and wildlife management, ensuring that they receive enhanced attention during planning and management.

Specific refuge regulations address equity and quality of opportunities for visitors and help safeguard refuge habitats. Impacts from this proposal, short-term and long-term, direct, indirect, and cumulative, are expected to be minor and are not expected to diminish the value of the refuge for its stated objectives.

The stipulations listed above will ensure proper control of the use and provide management flexibility should detrimental impacts develop. Allowing this use also furthers the mission of the Refuge System by providing renewable resources for the benefit of the American public while conserving fish, wildlife, and plant resources on the refuge.

Commercial photography is considered an economic use of a national wildlife refuge and is guided by the following policies:

16 U.S.C. 668dd, 50 CFR 27.71, Motion or Sound Pictures

The taking or filming of any motion or sound pictures on a national wildlife refuge for subsequent commercial use is prohibited except as may be authorized under the provisions of 43 CFR 5.

16 U.S.C. 668dd, 50 CFR 27.97, Private Operations

Soliciting business or conducting a commercial enterprise on any national wildlife refuge is prohibited except as may be authorized by special permit.

16 U.S.C. 668dd, 50 CFR 27.86, Begging

Begging on any national wildlife refuge is prohibited. Soliciting of funds for the support or assistance of any cause or organization is also prohibited unless properly authorized.

16 U.S.C. 668dd, 50 CFR, Subpart A, 29.1, Allowing Economic Uses on National Wildlife Refuges

We may only authorize public or private economic use of the natural resources of any national wildlife refuge, in accordance with 16 U.S.C. 715, where we determine that the use contributes to the achievement of the national wildlife refuge purposes or the Refuge System mission.

8 RM 16, Audio Visual Productions

5 RM 17, Commercial and Economic Uses on National Wildlife Refuges

43 CFR Part 5, Making Pictures, Television Productions, or Sound Tracks on Certain Areas Under the Jurisdiction of the Department of the Interior

Public Law 106-206, Commercial Filming

Commercial photography and/or filming have the potential to inspire and educate the public about the Refuge System, natural habitats, and wildlife. These activities will not materially interfere with, or detract from, the mission of the Refuge System or purposes for which the refuge was established. In addition, these activities will fulfill one or more purposes of the refuge or the Refuge System. Commercial photography and/or filming are appropriate uses of the refuge with special conditions. A special use permit will be issued for each commercial operation and special conditions will be determined on an individual bases. In addition, this activity will fulfill one or more purposes of the refuge or Refuge System.

NEPA Compliance for Refuge Use Description: *Place an X in appropriate space.*

_____ Categorical Exclusion without Environmental Action Statement
_____ Categorical Exclusion and Environmental Action Statement
__X__ Environmental Assessment and Finding of No Significant Impact
_____ Environmental Impact Statement and Record of Decision

Mandatory 10-year Re-evaluation Date:

Use: Commercially Guided Wildlife and Nature Observation

Description of Use: The refuge will authorize commercially guided wildlife observation within the refuge and will regulate such use through the implementation of a commercial wildlife guide management program, including issuance of special use permits with conditions. Commercial means that clients pay a fee for the program and the intent of the permittee is to generate profit. Guiding also includes outfitting operations which may not provide an accompanying guide. Guiding does not include no-fee or not-for-profit guided tours conducted by non-profit groups, schools and colleges, or other agencies. This use is covered under the general wildlife observation compatibility determination.

This use also does not include tour bus or other road-based commercial tours which may stop at refuge administered overlooks or landings.

This activity provides recreational, and often educational, opportunities for the paying public who desire a successful, quality experience, but who may lack the necessary equipment, skills, or knowledge to observe wildlife or otherwise experience the refuge. Commercial guiding for wildlife or other observation is an existing activity on the refuge, but it has not been consistently administered. This use is not a priority public use but will contribute to priority public uses.

Each request for this use will be considered, and if appropriate, will be issued a special use permit by the refuge manager. Each request must be presented in writing with details of who, what, where, when, why, and how the commercial operation will be conducted. Each request will be evaluated on its own merit. The refuge manager will use professional judgment and ensure that the request will have no considerable negative impacts to natural, cultural, or visitor services, does not violate refuge regulations, and contributes to the achievement of the refuge purpose or the Refuge System mission. Special needs will be considered on a case-by-case basis and are subject to the refuge manager's approval. Any approved special use permit will outline the framework in which the use can be conducted and refuge staff will ensure compliance with the permit.

The use will be conducted within the refuge's boundary. While the refuge will be open to these uses, the majority of the public use infrastructure is located near the refuge headquarters. Currently, 7 miles of hiking trails, 3 observation towers, 2 boardwalks, informational kiosks, 2 boat ramps, and a visitor center are located near the refuge headquarters.

Opportunities for commercially guided wildlife observation is available via existing trails, already maintained trail/road networks, existing boardwalks, and existing observation tower around the lakes from one hour before sunrise to one hour after sunset. Using existing roads will minimize impacts to refuge resources. Moderate beneficial impacts are expected. Some conflict between refuge users is expected to result in short-term moderate adverse impacts, which will be managed through seasonal closures. These seasonal closures are highlighted below and apply mostly to nonconsumptive uses during the hunting season. Other seasonal closures are in place to minimize wildlife disturbance.

(a) Jones Creek Unit near Ross Branch Reservoir is closed year-round to all public entry
(b) Mobility Impaired Hunting Area during hunting seasons
(c) Eagle Nesting Areas in accordance with Service guidelines

Guided wildlife observation may involve the use of refuge boat ramps to access selected sites or routes. Often guides and clients use the same site, route, or one of several locations selected by the guide. Some guided programs may walk to sites/routes from parking lots or roadsides. Guided wildlife viewing operations have typically used existing refuge or other public observation sites. In addition to the observation activities, guides and clients may use refuge facilities for breaks, lunch, or other activities during the outing, and in accordance with refuge regulations.

The total number of wildlife observation guides and clients on the refuge is not known. A first step in establishing a commercial guiding program on the refuge will be to identify existing guides and outfitting businesses through a review of public records and outreach through news releases and special meetings. Until further information becomes available, the refuge manager will annually permit a maximum of three guides for each of the following uses: (1) commercially guided tours for canoeing/kayaking/boats (use of water trails); (2) commercially guided tours for birding or nature (use of upland trails); and (3) guided tours for continuing education. Organizations whose purpose supports refuge goals and objectives will also be able to use the refuge auditorium for meetings and workshops.

Administration of commercially guided wildlife activities will be conducted in accordance with commercial guide use stipulations developed to ensure consistency throughout the refuge; provide a safe, quality experience; protect resources; and to ensure compliance with pertinent Refuge System regulations and policies.

The guide use stipulations will address all aspects of the guided wildlife observation program, including the number of permits to be issued, guide qualifications, permit cost, and selection methods. Commercial Guide Use Areas will be established based on factors such as habitat and wildlife sensitivity, other refuge resources and users, and other pertinent issues.

Wildlife observation is a compatible educational and recreational opportunities for visitors to enjoy the resource and to gain understanding and appreciation for fish and wildlife, wild lands ecology and the relationships of plant and animal populations within the ecosystem, and wildlife management. Based on apparent existing client demand, a significant number of the public are willing to pay for the additional expertise and local knowledge provided by commercial businesses and guides. The refuge provides excellent populations of watchable wildlife in a wild and scenic setting. It is expected that demand for guided wildlife observation will continue to increase, and with it, the number of interested commercial operators.

Availability of Resources: This program will increase overall costs of refuge operations, including but not limited to, development and review of policy and procedure, yearly administration of permits (inquiries, screening and selecting applicants, issuing permits), and enforcement of permit conditions. In the short-term, existing staff is adequate if shifts in priorities and assignments are made to accommodate a modest guiding program. However, the size and scope of the guiding program, and the number of permits that will be available, will have to be limited in balance with permit fees received. In the long-term, a comprehensive guiding program, when combined with other new initiatives requiring permits, will require additional administrative and/or other personnel as identified in the comprehensive conservation plan. Existing facilities (launch ramps) and other infrastructure are currently sufficient to accommodate this use.

Permitting this use is within the resources available to administer our Visitor Services Program. Additional staff costs are incurred to review each request, coordinate with the outside entity and process a special use permit, if necessary. Compliance with the terms of the special use permit is within the regular duties of the refuge's law enforcement officer. Anticipated costs are as follows: $2000.

Anticipated Impacts of the Use: Commercially guided wildlife observation can result in positive or negative impacts to the wildlife resource. A positive effect of allowing visitor's access to the refuge will be the provision of additional wildlife-dependent recreational opportunities and a better appreciation and more complete understanding of the wildlife and habitats associated with the ecosystem. Each application will be evaluated on its own merit and stipulations will be adapted to individual requests to minimize impacts to vegetation and wildlife and ensure that the use is consistent with goals of the refuge and the Refuge System.

Visitors engaging in commercially guided activities are expected to use and stay on hiking and canoe trails or roads to access the interior of the refuge. Disturbance of refuge resources is the primary concern regarding commercially guided activities for wildlife observation. While field trip routes and observation sites are usually located in areas open to the public, disturbance caused by large groups could be more intense because the number of people, and desire to get close to wildlife, may be greater than what normally occurs during general public activities. This disturbance will displace individual animals to adjacent areas of the refuge. Commercially or recreationally, groups of 6 or more cyclists or groups of 15 or more pedestrian travelers will require a special use permit.

Facilities most utilized by refuge visitors engaging in commercially guided wildlife observation are roads, parking lots, trails, and boat launching ramps. Maintenance or improvement of these facilities will cause negligible short-term impacts to localized soils and waters and may cause some wildlife disturbances and damage to vegetation. Impacts from the construction of expanded facilities for visitor services programs that will accommodate commercially guided activities are expected to be negligible.

Commercially guided wildlife observation is expected to have negligible short-term, long-term, or cumulative impacts on the economy of the towns or county in which the refuge lies based on findings of economic activity. No adverse impacts are foreseen to be associated with changes in the community character or demographic composition.

This activity will result in several minor beneficial impacts on the social communities near the refuge and in the state and region as a whole. In the case of commercial guiding, additional economic benefit will be gained by any local businesses providing guided wildlife observation opportunities.

Commercially guided wildlife observation is expected to have negligible adverse short-term, long-term, or cumulative impacts on local or regional air and water quality. Localized increases in emissions from visitor's vehicles or boat motors will be negligible. The use of boats by these visitors has the potential to affect water quality negatively by increasing erosion, stirring up bottom sediments, or introducing pollutants into waterways. We do not expect emissions from vehicles or boat motors to substantially affect the water quality of the region due to the low level of use authorized.

Commercially guided wildlife observation is expected to have negligible adverse short-term, long-term, or cumulative impacts on soils and vegetation. Negligible disturbance to vegetation will occur during the construction of new trails, boardwalks, observation towers, and informational kiosks in the "Connecting People to Nature" Area to facilitate wildlife observation/photography activities due to the utilization of existing interior roads and access routes. Disturbance factors resulting from public use are always considered for all listed species. The red-cockaded woodpecker is listed as endangered by the Service and Bald eagles occur on the refuge and areas near active nests will not be open at any time for commercially guided wildlife observation and, therefore, are not expected to have any negative impacts (USFWS 2007).

Many of the impacts described for waterfowl, shorebirds, and secretive marsh and waterbirds are similar.

Commercially guided wildlife observation is expected to have negligible adverse short-term, long-term, or cumulative impacts on waterfowl. To minimize waterfowl disturbance from this use, the refuge has designated approximately 2,000 acres as waterfowl sanctuaries that will be closed on a seasonal or annual basis. This use is expected to have negligible adverse short-term, long-term, or cumulative impacts on secretive marsh and waterbirds, shorebirds, and landbirds. An increase in the number of hiking trails, particularly in or near wetland areas, has the potential to increase disturbance to secretive marsh and waterbirds, but the expectation is that impacts will be negligible for all of these species.

Impacts to fisheries from visitors engaged in commercially guided wildlife observation is expected to be temporary and minor. Use of boats and canoes will cause increased suspension of bottom sediments, which should not adversely affect biological oxygen demand for fisheries resources. Boat motors may also harm submerged or emergent vegetation, which may cause a negligible negative impact to protective cover for fisheries. Accidental introduction of invasive plants, pathogens, or exotic invertebrates attached to boats or canoes is a concern, but the expectation is that impacts will be negligible.

Commercially guided wildlife observation is expected to have negligible adverse short-term, long-term, or cumulative impacts on invertebrates and mammals. An increase in indirect impacts to mammals due to expansions such as new trails is also expected. The use was evaluated for its potential to benefit or adversely affect amphibians and reptiles or their habitats used for mating, reproduction, over-wintering, and foraging.

Guided tour activities may conflict with other refuge users, including commercial or non-commercial tours that will likely use the same areas as independent wildlife viewers, kayakers and canoeists, and hunters and anglers during open seasons. Unregulated or inadequately regulated commercial guiding operations may adversely affect the safety of other refuge users, the quality of their experience, and the equity of opportunity. The refuge's visitor use programs will be adjusted as needed to eliminate or minimize each conflict and provide quality wildlife-dependent recreational opportunities.

Determination (check one below):

_____ Use is Not Compatible

__X__ Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility: The following stipulations apply to the special use permits issued for commercial guided recreational tours. Law enforcement and administrative monitoring of permit holders will continue for compliance with the following conditions, which are incorporated into all permits to minimize impacts on refuge lands and resources:

1. Impacts of the commercial guiding for wildlife observation will continue to be assessed and adjustments made to the program to prevent conflicts to wildlife, habitats, and other refuge users.

2. Qualified individuals must apply 12 months in advance to conduct guided tours. Qualified individuals are defined as:

    a. Licensed as a commercial guide by the state in which they operate, as applicable and must also be certified by applicable associations such as the American Canoeing Association *(http://www.americancanoe.org/)* or similar certification if available.

    b. When operating a boat, possess a current vessel operator license issued by the U.S. Coast Guard, as applicable. Minimum license shall be Operator Uninspected Passenger Vessel. The license shall be valid for the area of operations and type(s) of vessel operated. This license applies to guides transporting patrons by water.

c. Possess and provide proof of a current CPR and First Aid training certificate issued by a recognized national organization.

d. Provide proof of insurance, including minimum coverage for general liability and comprehensive for all operations.

e. Certified as a "Certified Interpretive Guide" through the National Association for Interpretation *(http://www.interpnet.com)* and certified annually by the refuge manager through an orientation of current refuge news and information.

3. Administrative fee will be $100 yearly. In addition to the administrative fee, the permit fee will be 5 percent of gross revenues or $50, whichever is greater.

4. The permittee will not advertise on refuge property or distribute leaflets via the refuge visitor contact station, refuge headquarters, etc. Permittees may distribute leaflets only during the approved programs covered by the permit and only to those participants registered for that program.

5. All special use permits will expire on September 30, regardless of the date of issue. The permittee is responsible for accurate record-keeping and shall provide the refuge manager with the following information by October 10 of each year:

   a. Fee schedule for the year (charge per patron)
   b. Number of guided or outfitted trips performed on the refuge
   c. Number of individuals guided or outfitted
   d. Date of each trip
   e. Location of each trip, or general area of activity
   f. Individual names and description of duties for all additional staff that assist with a trip on the refuge.

6. A copy of a valid special use permit must be available for inspection on request by any law enforcement officer or refuge staff member, whenever an activity authorized by the permit is occurring. Storing permits in the glove box of a vehicle is acceptable; however, all guides must be knowledgeable about the permit and its conditions.

7. Violation of any special conditions of the permit or of any federal, state, local, or refuge regulations may result in a Notice of Violation being issued or the revocation or cancellation of the permit without written or verbal warning. In that case, the permit holder will receive immediate notification by phone, with follow-up notification by mail. The permit holders are responsible for the actions of their employees, agents, others working under their special use permit, and their clients.

8. Regardless of the reason for the revocation or cancellation of a permit, no refund will be made to the permit holder.

9. The refuge will issue permits on a year-to-year basis, and will not reissue them automatically on consecutive years.

10. Permit holders will provide all participants with relevant refuge information, including the public use brochures. The refuge will supply information to the permit holder.

11. Permittees may use assistants. These assistants must be named on the permit issued and possess any of the applicable state and Coast Guard licenses for duties conducted, as applicable. These assistants must also attend the required annual orientation by the refuge.

12. All boats must comply with U.S. Coast Guard, state and refuge requirements.

13. Tours must begin and end during daylight hours only.

14. Groups will police their routes for litter, vandalism, etc., and report any problems to the refuge office.

15. All vessels and vehicles used in guide operations shall be marked with a guide identifier.

Justification: Allowing commercially guided wildlife observation on the refuge will not materially interfere with the purposes of the refuge or the mission of the Refuge System because:

(1) Existing federal and state agency oversight and regulation of affected species and habitat are sufficient to ensure healthy populations. Disturbance to fish and wildlife will be local, short-term, and not adversely impact overall populations.

(2) There are adequate state and federal enforcement officials to enforce state and federal regulations.

(3) Qualifying standards for commercial operators will help ensure that the public is guided by competent individuals.

(4) Restricting the number of guides and managing how guided activities are conducted will reduce adverse habitat effects, conflicts between competing guide services, and conflicts between guided operations and other refuge users.

(5) Designated areas of operation (Guide Use Areas), operating requirements, and other regulation of guided activities will minimize conflicts with other refuge users.

(6) Administrative (application) and special use fees will help off-set costs to administer and provide oversight to this use.

(7) Regulating and limiting the number of commercial operators as stated in the refuge commercial guide program stipulations will provide a safe, quality experience to individuals who want to enjoy the resources of the refuge. It will also increase opportunities for those who wish to observe wildlife and experience the scenic and wild nature of the refuge, but may lack the required equipment, knowledge, or expertise.

This activity will not materially interfere with, or detract from, the mission of the Refuge System or purposes for which the refuge was established. In addition, this activity will fulfill one or more purposes of the refuge or Refuge System.

NEPA Compliance for Refuge Use Description: *Place an X in appropriate space.*

_____ Categorical Exclusion without Environmental Action Statement
_____ Categorical Exclusion and Environmental Action Statement
__X__ Environmental Assessment and Finding of No Significant Impact
_____ Environmental Impact Statement and Record of Decision

Mandatory 10-year Re-evaluation Date:

Use: Firewood Cutting for Personal Use Only

Description of Use: Firewood gathering is the cutting and removal of woody material for private use. Firewood gathering is offered to the public following timber stand improvements or forest thinning in small lots or areas, or at times when timber sales are not feasible. In young tree plantations, firewood gathering could be offered in lieu of a commercial timber harvest operation. It may also be permitted when trees that have fallen across roads, trails, or firebreaks must be removed.

Private individuals are permitted to remove, for personal use only, fallen timber or marked standing timber as designated by the refuge manager. The scope of the use will be determined by the management objective for the area and by the quantity and quality of available wood. Harvest sites will vary in size from a portion of an acre up to several hundred acres depending on the site and management objectives. Wood removal activities may be authorized throughout the year when ground conditions allow access without damaging refuge roads and resources.

Chainsaws and axes may be used to harvest firewood. Access may be by car and trailer or pickup truck. Differences in scope and necessary equipment will occur depending on the amount and type of wood available for removal. This activity will only occur where the Service has determined that a management need exists to remove wood.

Availability of Resources: Excess woody material is plentiful on the refuge. Public firewood gathering requires oversight and administration by the refuge forester, as time allows, or by other staff experienced with the program. Refuge operations and maintenance funding will be needed to cover salaries of staff members who complete paperwork and administer the program and for marking paint, flagging, vehicles, and fuel. Anticipated costs for up to five requests are as follows:

● Refuge Forester (GS-11) (review request and issue special use permit) – 10 day/yr = $4,760
● Visitor Services Manager (GS-09) (review requests, coordinate with entity, process special use permit) 3 days/yr = $589
● Refuge Manager (GS-12) (review and approval) – 1 day/yr = $285
● Law Enforcement Officer (GS-09) (enforcement patrols) – 1 day/yr = $196

Anticipated Impacts of the Use: The potential exists to directly impact wildlife by displacing animals from localized areas due to disturbance, noise, or removal of nesting areas. Due to the small scale of firewood gathering on the refuge, disturbance to wildlife will be negligible. Avoidance of nesting periods for migratory birds will reduce impacts on populations. Most impacts can easily be avoided by timing of season in accordance with site-specific characteristics.

Large, dead, and downed trees and standing snags are extremely important habitat components that should remain on the refuge unless they pose a danger to the public in concentrated use areas or to refuge operations. Unlikely incidents affecting hunters during general hunts will not be considered reason enough to remove snags. In some cases, the removal of trees along roads, trails, and dikes is necessary to reduce hazards to users caused by falling trees and limbs.

Impacts to refuge roads and trails due to soil compaction from vehicles, rutting, or root damage are possible but can be avoided by restricting use to dry ground conditions. Traffic on refuge roads will need to be carefully controlled (via special use permit) to avoid impacts such as rutting and potholes. Because few requests are received for this type of activity, halting the practice entirely should not create a problem as local residents do not generally rely upon a supply of wood for home heating. Firewood cutting benefits the public and can be used as a management tool in forested habitats and as a maintenance tool on roads, trails, and grounds. The removal of dead trees reduces litter buildup and the potential for damaging wildfires. Direct impacts on wildlife can be avoided by timing the activity so that it does not coincide with the breeding/production season. Individuals gathering firewood will be required to comply with special use permit conditions and site-specific stipulations to ensure that resources are protected and management goals are achieved.

Determination (check one below):

_____ Use is Not Compatible

__X__ Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility: Firewood gathering will be regulated by special use permit so that site-specific impacts can be reduced or eliminated and Service management goals are met. The permit will include stipulations that ensure the practice is allowed only when it benefits refuge operations or habitat conditions, areas and times of use are specified, ingress and egress points controlled, trees to be removed are marked by refuge staff, allowable equipment is identified, and other important conditions are specified.

The use will be restricted to periods of dry ground conditions to avoid rutting and soil compaction on refuge roads, to the extent practicable.

Firewood cutting will be limited to weekday only to allow for oversight by the refuge's administrative forester.

Firewood removed from refuge lands is for personal use only and may not be sold.

Chainsaws and axes may be used to harvest firewood.

Access with car and trailer or truck will only occur in areas already having developed access routes. No off-road vehicle use will be allowed under this program.

This activity will only occur where the Service has determined that a management need exists to remove wood.

Gathering of downed trees for firewood will be allowed from the surface of refuge roads without a special use permit. No downed wood will be allowed to be removed from outside the road drainage ditches or the wood's interior.

Justification: Firewood cutting and gathering allows the refuge the option to maintain and enhance necessary habitat for threatened and endangered species. This is accomplished by promoting plant communities beneficial to these species, managing forest stands by manipulating stand composition in order to produce high-quality habitats for trust resources, and manipulating forest stands to provide diverse plant successional stages ranging from regeneration to mature timber, which will support a variety of wildlife species. Additionally, forest health can be protected by emergency forest actions to prevent unwanted spread of insect or disease outbreaks. Silvicultural decisions will be based upon the resources of concern and their habitat requirements as they relate to forest composition and structure.

This activity will not materially interfere with, or detract from, the mission of the Refuge System or purposes for which the refuge was established. In addition, this activity will fulfill one or more purposes of the refuge or Refuge System.

NEPA Compliance for Refuge Use Description: *Place an X in appropriate space.*

_____ Categorical Exclusion without Environmental Action Statement
_____ Categorical Exclusion and Environmental Action Statement
__X__ Environmental Assessment and Finding of No Significant Impact
_____ Environmental Impact Statement and Record of Decision

Mandatory 10-year Re-evaluation Date:

Use: Geocaching for Environmental Education

Description of Use: Environmental education is a priority public use as defined by the Improvement Act, and if compatible, is to receive enhanced consideration over other general public uses. Geocaching at refuge established sites can be an important tool in connecting people with nature while educating them about nature, the mission of the Service, and the purposes for which the refuge was created.

Geocaching opportunities are conducted to provide compatible educational opportunities with a recreational flare for visitors to enjoy the resource and to gain understanding and appreciation for fish and wildlife, wild lands ecology and the relationships of plant and animal populations within the ecosystem, and wildlife management. This use will provide opportunities for visitors to observe and learn about wildlife and wild lands at their own pace in an unstructured environment and to observe wildlife habitats firsthand. This use will enhance the public's understanding of natural resource management programs and ecological concepts to enable the public to better understand the problems facing our wildlife/wild lands resources, to realize what effect the public has on wildlife resources, to learn about the Service's role in conservation, to better understand the biological facts upon which Service management programs are based, and to foster an appreciation for the importance of wildlife and wild lands. It is anticipated that participation in this use will result in a more informed public, with an enhanced stewardship ethic and enhanced support and advocacy for Service programs.

This use will also provide wholesome, safe, outdoor recreation in a scenic setting, with the realization that those who come strictly for recreational enjoyment will be enticed to participate in the more educational facets of the public use program, and can then become informed advocates for the refuge and the Service.

The use will be conducted within the refuge's boundary. While the entire refuge will be open to this use, the majority of the public use infrastructure is located near the refuge headquarters. Currently, 7 miles of hiking trails, 3 observation towers, 2 boardwalks, informational kiosks, 2 boat ramps, and a visitor center are located near the refuge headquarters. Refuge created geocache sites will be conducted for the general public, as well as for organized groups, including schools and scout groups. Brochures and maps depicting the roads and trails open for public use are available at the Visitor Contact Station, kiosks, and on the refuge's web site.

Environmental education will be conducted by way of personal presentations by staff and volunteers, teachers and other youth leaders, and at special events and displays both on and off the refuge. Educational and interpretive information will be provided via signage, kiosks, printed information, exhibits, audio-visual presentations, and lecture programs as traditionally offered, and geocache stations will provide visitors with unique opportunities for education and interpretation throughout the refuge.

Availability of Resources: Allowing the use of environmental education and interpretation is within the resources available to administer our visitor services program with the current level of participation and to ensure that the use remains compatible with the refuge purposes. Additional funding for visitor services improvements can also come from challenge cost-share projects, grant funds, and contributions. Compliance with refuge regulations is handled within the regular duties of the law enforcement officer. As funding is available, the refuge will complete and maintain projects and facilities. Volunteers and partners will be utilized to help with construction and maintenance.

Facilities or materials needed to support this use include maintaining access roads, parking areas, gates, roadside pull-offs, kiosks, signs, the Visitor Contact Station, boat launching areas, and hiking trails; creating a "Connecting People with Nature" area and trail; and providing information in refuge publications and the refuge's web site.

Sufficient staff and maintenance funding within our base budget of nearly $544,000 is not available to make annual progress toward completion of all the projects described above and to maintain those already completed.

Anticipated Impacts of the Use: The refuge expects that refuge established geocache locations as part of environmental education and environmental interpretation will have negligible short-term, long-term, or cumulative impacts on the economy of the towns or county in which the refuge lies. We do not expect these activities to considerably alter the demographic of economic characteristics of the local community. No adverse impacts are foreseen to be associated with changes in the community character or demographic composition. In addition, impacts are expected to be negligible based on our observations of past visitor impacts from these uses.

Disturbance factors resulting from public use are always considered. Of these, impacts on the red-cockaded woodpecker will be minimized through the seasonal closure of designated areas during nesting season. A Section 7 evaluation has been conducted as part of this review and it was determined that proposed activities will not likely affect the red-cockaded woodpecker. The bald eagle occurs on the refuge and areas near active bald eagle nests will not be open at any time for wildlife observation, wildlife photography, and environmental education and interpretation and, therefore, are not expected to have any negative impacts on bald eagles (USFWS Service 2007).

The beneficial impacts of providing the existing level of wildlife-dependent activities, with some modest increases, include helping meet existing and future demands for outdoor recreation and education. Visitor use is increasing over time as local residents and visitors become increasingly aware of refuge opportunities, and as we progress in creating new facilities and programs. The economic benefits of increased tourism likely will also benefit local communities.

Expanded facilities for environmental education and new or expanded visitor services programs are expected to increase public awareness of, and visitation to, the refuge, and enable staff to provide better customer service. We expect a certain level of inconvenience during the construction of refuge facilities. The adverse effects generally are short-term, and more than offset by the long-term gains in public education and appreciation. Impacts to refuge resources are expected to be negligible.

Determination (check one below):

_____ Use is Not Compatible

__X__ Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility: The refuge will manage this activity within the existing priority public uses (environmental education and interpretation) in accordance with federal and state regulations. It will be reviewed annually to ensure that the program is providing safe, quality experiences for participants. The refuge based these stipulations on our comprehensive conservation plan and refuge-specific regulations. To ensure compatibility with refuge purposes and the mission of the Refuge System, wildlife observation, wildlife photography, and environmental education and interpretation can occur on the refuge, if the refuge-specific regulations are followed and following stipulations are met:

(1) This use must be conducted in accordance with state and federal regulations and special refuge-specific regulations published in the Public Use Regulations brochure.

(2) The public use program will be reviewed annually to ensure that it contributes to refuge objectives in managing quality recreational opportunities and protecting habitats, and is subject to modification if on-site monitoring by refuge personnel or other authorized personnel results in unanticipated negative impacts to natural communities, wildlife species, or their habitats. Refuge law enforcement officer(s) will promote compliance with refuge regulations, monitor public use patterns and public safety, and document visitor interactions. Refuge law enforcement personnel will monitor all areas and enforce all applicable state and federal regulations.

(3) Refuge visitors are required to review and sign refuge-specific public use brochures.

(4) Areas may be closed on the refuge to protect resources or prevent unwanted disturbance.

(5) Pets allowed on a leash.

(6) The Visitor Contact Station is open weekdays from 8 a.m. to 4 p.m. and on weekends when staffing allows.

(7) Members of the public will not be allowed to establish their own geocache locations; only refuge established geocache sites are authorized for use as part of the environmental education and interpretation programs.

Justification: Environmental education and interpretation are priority wildlife-dependent uses for the Refuge System through which the public can develop an appreciation for fish and wildlife. The Service's policy is to provide expanded opportunities for wildlife-dependent uses when compatible and consistent with sound fish and wildlife management and ensure that they receive enhanced attention during planning and management.

Specific refuge regulations address equity and quality of opportunities for visitors and help safeguard refuge habitats. Impacts from this proposal, short-term and long-term, direct, indirect, and cumulative, are expected to be minor and are not expected to diminish the value of the refuge for its stated objectives. Available parking and size of the facilities will typically limit use at any given time, except during special events.

Conflicts between visitors are localized and are addressed through law enforcement, public education, and continuous review and updating to public use regulations. Conflicts are further reduced by the establishment of seasonal area closures.

Stipulations above will ensure proper control of the means of use and provide management flexibility should detrimental impacts develop. Allowing this use also furthers the mission of the Refuge System by providing renewable resources for the benefit of the American public while conserving fish, wildlife, and plant resources on the refuge.

This activity will not materially interfere with, or detract from, the mission of the Refuge System or the purpose for which the refuge was established.

NEPA Compliance for Refuge Use Description: *Place an X in appropriate space.*

_____ Categorical Exclusion without Environmental Action Statement
_____ Categorical Exclusion and Environmental Action Statement
__X__ Environmental Assessment and Finding of No Significant Impact
_____ Environmental Impact Statement and Record of Decision

Mandatory 10-year Re-evaluation Date:

Use: Jogging, Running, and Competitive Races

Description of Use: Jogging and running are not identified as a priority public use if the Refuge System under Improvement Act. Like walking and hiking, jogging and running can be another means to observe wildlife and reconnect with nature, but its primary goal is personal health. Currently, where refuge roads have been improved beyond graveled, jogging and running are occurring.

Jogging and running are not generally modes of transportation that facilitate wildlife-dependent recreation and are growing in popularity. Most of the current activity occurs within what will become the "Connecting People with Nature" area and the impact on the refuge and wildlife appears to be minimal. Total affected acreage is estimated at approximately 1,000 acres or 2 percent of the refuge property.

Availability of Resources: Approved compatible public uses will be the primary management focus. Maintenance, periodic upgrades, and improvements to public use facilities and roads will continue to be a major component of refuge activities.

The human resources to conduct a successful public use program will be provided by staff, volunteers, and partners. The Service will not have to provide special equipment or require a significant increase in staff expenditure for the available jogging opportunities, but will need to at least maintain the current staff levels. To date, annual requirements in time, materials, and supplies needed to manage and ensure the success of this area have been consistent and largely within existing refuge resources. Estimated costs associated with this use include:

Supplies and materials: $2,000. This includes signs for closed launch sites, site closure signs, interpretive brochures, regulation brochures.

Monitoring: $3,000 annually, to be carried out in cooperation with the states.

Law Enforcement: $3,000 annually for a refuge officer.

Anticipated Impacts of the Use: Jogging and running on native surfaces can cause structural damage to plants and increase soil compaction. The degree of surface compaction is dependent on topography, soil structure, and soil moisture. Impacts of trampling on vegetation and soils are unlikely to occur on the well-defined, mulched trails, gravel roads, or paved surfaces. The Service repairs, operates, and patrols the trails and roads. Maintenance activities include mulching, pesticide spraying, road grading, and gravel replenishment, as needed. Well-maintained paved roads provide an appropriate surface for this type of user.

Jogging and running can cause wildlife disturbance. Immediate responses by wildlife to recreational activity can range from behavioral changes, physiological changes, or mortality (Knight and Cole 1995). The long-term effects are more difficult to assess. Wildlife responses to human disturbance include avoidance, habituation, and attraction (Knight and Cole 1991). A key factor in predicting how wildlife would respond to disturbance is the predictability of the activity within the habitat. The use of trails or boardwalks for wildlife viewing during predictable times will mitigate the impacts (Oberbillig 2001). Wildlife species have a greater reaction to humans moving unpredictably (Gabrielsen and Smith 1995). Migratory wildlife species tend to be more susceptible to human disturbance (Klein 1993). Wildlife may also be attracted to human presence if provided a reward. Habituation of wildlife to visitors may increase mortality of wildlife due to nuisance behavior, vehicle collisions, or illegal harvest. General visitors may be encouraged to use developed trails, roads, boardwalks, and overlooks to limit disturbances and concentrate visitor activities to less-sensitive areas.

Trails attract a variety of user groups that often has conflicting needs. Cross-country jogging may appeal to many users, and greater impact to the environment and wildlife will be expected in these areas. People with disabilities may be particularly affected by trail conflicts if they do not have the ability to quickly detect or react to hazards or sudden changes in the environment. If the number of road users increases as expected, the potential for accidents or user group conflicts may also increase.

Determination (check one below):

_____ Use is Not Compatible

__X__ Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility: Jogging and running will occur on designated paved surfaces only and roads open to motor vehicles. No cross country or trail jogging and running will be allowed.

Competitive races, road races, and fun runs will be allowed, but will only occur as part of a scheduled and sponsored refuge event. Competitive races by outside groups for the purpose of revenue generation will not be allowed.

Training runs by collegian sports teams will be allowed to occur along refuge paved roads under a special use permit. Again, no cross-country or trail runs will be allowed. Jogging and running will be restricted to daylight hours only.
A refuge officer will help to promote compliance with refuge regulations, monitor public use patterns and public safety, and document visitor interactions.

Justification: Jogging and running is not a wildlife-dependent public use of the refuge as defined by statute (16 U.S.C. 668dd et seq.), but it can contribute to the fulfillment of refuge purposes by connecting people with nature. Potential for wildlife disturbance is minimal given the non-threatening, indirect approach of this activity. Restricting the disturbance to designated established roads will increase the predictability of public use on the refuge, allowing wildlife to habituate to non-threatening activities. Moreover, consolidating compatible recreational activities to the “Connecting People with Nature” area reduces habitat fragmentation, thereby maintaining a "sanctuary area" of the refuge for more sensitive species. These impacts will be monitored. Direct costs to administer existing levels of jogging on the refuge will be minor. This activity will not materially interfere with, or detract from, the mission of the Refuge System or purposes for which the refuge was established. In addition, this activity will fulfill one or more purposes of the refuge or Refuge System.

NEPA Compliance for Refuge Use Description: *Place an X in appropriate space.*

_____ Categorical Exclusion without Environmental Action Statement
_____ Categorical Exclusion and Environmental Action Statement
__X__ Environmental Assessment and Finding of No Significant Impact
_____ Environmental Impact Statement and Record of Decision

Mandatory 10-year Re-evaluation Date:

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Oberbillig, D.R. 2001. Providing positive wildlife viewing experiences. Deborah Richie Communications, Missoula, MT.

Use: Motorized and Non-Motorized Boating for Wildlife Observation

Description of Use: Motorized and non-motorized boating as a lone activity is not a priority public use of the Refuge System under the Improvement Act. However, these uses may provide transport for wildlife observation, wildlife photography, hunting, and fishing. Motorized and non-motorized boating will be conducted on all open waters, including lakes and rivers within the refuge. One motorized boat access ramp will be available at Bluff Lake, Loakfoma Lake, and Ross Branch Reservoir. An additional non-motorized boat launch site will be available near Cypress Cove Boardwalk on Bluff Lake.

Availability of Resources: Estimated costs associated with this use include:

Routine maintenance: $35,000 annually; this is the expected cost to maintain the three public motorized boat launches and one non-motorized boat ramp and includes repairs to the ramps base material, vegetation control, maintenance of parking areas and regulator signs, removal of garbage; and maintenance of a restroom facility.

Supplies and materials: $3,000; this includes signs for closed launch sites, site closure signs, interpretive brochures, and regulation brochures.

Monitoring: $3,000 annually, to be carried out in cooperation with the states and partners.

Law Enforcement: $3,000 annually

Anticipated Impacts of the Use: Potential impacts of motorized and non-motorized boating:

- Accidental introduction of invasive plants, pathogens, or exotic invertebrates, attached to boats.
- Disturbance of wildlife (particularly waterfowl, eagles, and wading birds): Popular public use boating seasons in Mississippi, coincide in part, with spring-early summer nesting and brood-rearing periods for many species of aquatic-dependent birds. Boaters may disturb nesting birds by approaching too closely to nests, causing nesting birds to flush. Flushing may expose eggs to predation or cooling, resulting in egg mortality.
- Negative impacts on water quality from motorboat and other pollutants, human waste, and litter: Extensive water quality testing on the refuge has not been carried out. The levels of pollutants from boat fuel and impacts on local aquatic systems are unknown. Hydrocarbon contamination can be harmful to fish.
- Bank and trail erosion from human activity (boat landings, boat wakes, foot traffic), which may increase aquatic sediment loads of streams and rivers or alter riparian or lakeshore habitat or vegetation in ways harmful to fish or other wildlife.

Determination (check one below):

_____ Use is Not Compatible

__X__ Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility: The refuge will permit boat launching only at designated launches to prevent the erosion and degradation of wetlands or water quality and ensure public safety.

The refuge will close wildlife-nesting and brood-rearing areas seasonally to all boating activities, to prevent the disturbance of wildlife.

Boat launches will be constructed and situated in such a way as to provide for public safety and minimize the disturbance of wildlife and habitat or the effects of siltation.

Launching of trailered boats will not be allowed in areas without a developed launch.

The refuge will increase public outreach and education to minimize conflicts among user groups, help control aquatic invasive plants and lead in the environment, reduce the introduction of nonnative fish species, and minimize the disturbance of wildlife and habitat.

A refuge officer will help to promote compliance with refuge regulations, monitor public use patterns and public safety, and document visitor interactions.

Motorized and non-motorized boating will be allowed as a means to facilitate refuge public use programs, namely the priority public use programs of hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation. The use will be conducted consistent with refuge and Mississippi regulations, with some additional restrictions to protect fish, wildlife and habitat, and reduce potential conflicts among public uses.

All waters within the entire refuge will be considered a no wake area.

The public must inspect all boats and boat trailers and clean them of aquatic invasive species before launching and leaving refuge sites. Cleaning of boats should take place on dry ground well away from the water. Exotic, nuisance plants or animals on boats, trailers, diving equipment, or in bait buckets can disrupt aquatic ecosystems and negatively affect native fish and plant species.

Regulatory signs along with educational materials will be made available in high use areas.

Justification: Hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation are the six priority public uses of the Refuge System, and have been determined to be compatible activities on many refuges nationwide. The Improvement Act instructs refuge managers to seek ways to accommodate those six uses. Motorized and non-motorized boating is allowed as a means to facilitate these priority public uses on the refuge. Boating activities will not materially interfere with or detract from the mission of the Refuge System or the purposes for which the refuge was established. Motorized and non-motorized boating will not pose significant adverse effects on refuge resources; interfere with public use of the refuge; nor cause an undue administrative burden. In addition, this activity will fulfill one or more purposes of the refuge or Refuge System.

NEPA Compliance for Refuge Use Description: *Place an X in appropriate space.*

_____ Categorical Exclusion without Environmental Action Statement
_____ Categorical Exclusion and Environmental Action Statement
__X__ Environmental Assessment and Finding of No Significant Impact
_____ Environmental Impact Statement and Record of Decision

Mandatory 10-year Re-evaluation Date:

Use: Picnicking in association with Wildlife-Dependent Activities

Description of Use: Hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation are priority public uses as defined by the Improvement Act, and if compatible, are to receive enhanced consideration over other general public uses.

These uses are conducted to provide compatible educational and recreational opportunities for visitors to enjoy the resources and to gain understanding and appreciation for fish and wildlife, wild lands ecology and the relationships of plant and animal populations within the ecosystem, and wildlife management. Following these activities, it is often customary for visitors to break for lunch or other meal under a picnic style setting. These activities, and the picnic that follows, provides wholesome, safe, outdoor recreation in a scenic setting, with the realization that those who come strictly for recreational enjoyment will be enticed to participate in the more educational facets of the public use program, and can then become informed advocates for the refuge and the Service.

Availability of Resources: Allowing picnicking as part of wildlife-dependent activities including hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation is within the resources available to administer our visitor services program with the current level of participation and to ensure that the use remains compatible with the refuge purposes. Additional funding for visitor services improvements can also come from challenge cost-share projects, grant funds, and contributions. Compliance with refuge regulations is handled within the regular duties of the law enforcement officer. As funding is available, the refuge will complete and maintain projects and facilities. Volunteers and partners will be utilized to help with construction and maintenance.

Facilities or materials needed to support this use include maintaining access roads, parking areas, roadside pull-offs, kiosks, the Visitor Contact Station, observation platforms, wheelchair-accessible fishing pier, boat launching areas, benches and tables; creating a "Connecting People with Nature" area and trail; and providing information in refuge publications and the refuge's web site.

Sufficient staff and maintenance funding within our base budget may not be available to make annual progress toward completion of all the projects described above and to maintain those already completed.

Anticipated Impacts of the Use: The refuge expects picnicking associated with that of hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation will have negligible short-term, long-term, or cumulative impacts on the economy of the towns or county in which the refuge lies. We do not expect these activities to considerably alter the demographic of economic characteristics of the local community. No adverse impacts are foreseen to be associated with changes in the community character or demographic composition. In addition, impacts are expected to be negligible based on our observations of past visitor impacts from these uses.

Picnicking is expected to have negligible adverse short-term, long-term, or cumulative impacts on soils, litter, local or regional air quality, and hydrology or water quality. Negative impacts to water quality can also result from human waste and litter.

Disturbance factors resulting from public use are always considered. Of these, impacts on the red-cockaded woodpecker will be minimized through the seasonal closure of designated areas during nesting season. A Section 7 evaluation has been conducted as part of this review and it was determined that proposed activities will not likely affect the red-cockaded woodpecker. The bald eagle occurs on the refuge and areas near active bald eagle nests will not be open at any time for wildlife observation, wildlife photography, and environmental education and interpretation and, therefore, are not expected to have any negative impacts on bald eagles (USFWS Service 2007).

Picnicking is expected to have negligible adverse short-term, long-term, or cumulative impacts on waterfowl. Providing waterfowl sanctuaries will minimize some of these impacts and allow waterfowl to have undisturbed access to these areas during biologically critical periods of the day. To minimize waterfowl disturbance from these uses, the refuge has designated waterfowl sanctuaries that closed to hunting and other recreational use on a seasonal or annual basis.

This use is expected to have negligible adverse short-term, long-term, or cumulative impacts on shorebirds and landbirds. Disturbance to landbirds in proposed areas for wildlife observation, photography, hunting and fishing, and subsequently picnicking, is expected to be negligible since all visitors will be required to be on designated walking trails and access routes.

Impacts to fisheries from visitors engaged in picnicking are expected to be temporary and minor. Public outreach and education efforts in areas used by picnickers will emphasize conservation and importance of buffering of wetlands, connectivity for wildlife between forest, grassland, and wetlands.

Visitor use is increasing over time as local residents and visitors become increasingly aware of refuge opportunities, and as we progress in creating new facilities and programs. The economic benefits of increased tourism likely will also benefit local communities. Expanded facilities for environmental education and new or expanded visitor services programs are expected to increase public awareness of, and visitation to, the refuge, and enable staff to provide better customer service.

Determination (check one below):

_____ Use is Not Compatible

__X__ Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility: The refuge will manage the six priority public uses (hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation) with the associated picnicking in accordance with federal and state regulations and review it annually to ensure wildlife and habitat goals are achieved and that these programs are providing safe, quality experiences for participants. To ensure compatibility with refuge purposes and the mission of the Refuge System, in addition to those refuge-specific regulations for hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation, the following stipulations will need to be met:

(1) No food is to be made available for use by wildlife and no wildlife shall be intentionally fed.

(2) The public use program will be reviewed annually to ensure that it contributes to refuge objectives in managing quality recreational opportunities and protecting habitats, and is subject to modification if on-site monitoring by refuge personnel or other authorized personnel results in unanticipated negative impacts to natural communities, wildlife species, or their habitats. Refuge law enforcement officer(s) will promote compliance with refuge regulations, monitor public use patterns and public safety, and document visitor interactions. Refuge law enforcement personnel will monitor all areas and enforce all applicable state and federal regulations.

(3) Refuge visitors are required to remove all trash and food products.

(4) Areas may be closed on the refuge to protect resources or prevent unwanted disturbance.

(5) Pets allowed on a leash.

(6) The Visitor Contact Station is open weekdays from 8 a.m. to 4 p.m. and on weekends when staffing allows.

(7) Picnicking as a sole activity or as part of non-wildlife dependent activities is prohibited.

Justification: Hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation are priority wildlife-dependent uses for the Refuge System through which the public can develop an appreciation for fish and wildlife. The Service's policy is to provide expanded opportunities for wildlife-dependent uses when compatible and consistent with sound fish and wildlife management and ensure that they receive enhanced attention during planning and management. Picnicking is seen as a reasonable part of these six priority activities.

Specific refuge regulations address equity and quality of opportunities for visitors and help safeguard refuge habitats. Impacts from this proposal, short-term and long-term, direct, indirect, and cumulative, are expected to be minor and are not expected to diminish the value of the refuge for its stated objectives. Available parking and size of the facilities will typically limit use at any given time, except during special events.

Conflicts between visitors are localized and are addressed through law enforcement, public education, and continuous review and updating to public use regulations. Conflicts are further reduced by the establishment of seasonal area closures.

Stipulations above will ensure proper control of the means of use and provide management flexibility should detrimental impacts develop. Allowing this use also furthers the mission of the Refuge System by providing renewable resources for the benefit of the American public while conserving fish, wildlife, and plant resources on the refuge.

This activity will not materially interfere with, or detract from, the mission of the Refuge System or the purpose for which the refuge was established.

NEPA Compliance for Refuge Use Description: *Place an X in appropriate space.*

_____ Categorical Exclusion without Environmental Action Statement
_____ Categorical Exclusion and Environmental Action Statement
__X__ Environmental Assessment and Finding of No Significant Impact
_____ Environmental Impact Statement and Record of Decision

Mandatory 10-year Re-evaluation Date:

Use: Recreational Fishing

Description of Use: Recreational fishing (a wildlife-dependent activity) has been identified in the Improvement Act as a priority public use, provided it is compatible with the purposes for which the refuge was established.

Sport fishing in refuge waters is an integral part of the overall public use program. Boat ramps have been installed to facilitate sport fishing at Bluff and Loakfoma lakes. The refuge has constructed accessible piers, signs, and information kiosks to inform the public of the need for stewardship of public lands and waters and to increase the awareness of our natural resources.

Recreational fishing is a common public use in refuge waters, where fish populations support a sustainable harvest under a regulated fishing program. The refuge annual hunting and fishing permit is required to fish on the refuge. Bank fishing is conducted year-round on designated areas of Bluff and Loakfoma lakes, Noxubee River, and the borrow pits along Highway 25 from sunrise to sunset and are subject to regulations established by the Mississippi Department of Wildlife, Fisheries, and Parks. Fishing by boat and areas managed for waterfowl are open from March 1 to October 31. The Service has specific regulations further restricting fishing by prohibiting commercial fishing, the use of certain fishing methods, and access after dark.

Several methods of fishing are employed, including boat fishing, wade fishing, and bank fishing. Boat and bank fishing are permitted, as provided by refuge special regulations and those published in 50 CFR. Bank fishing will take place on designated areas with shallow slopes, mostly near existing footpaths and access trails.

Availability of Resources: Costs to administer and manage fishing are estimated:

Interpretive and administrative signs and kiosks - $7,500

Establishment and maintenance of low impact fishing access trail - $5,000

Establishment of parking lot at Loakfoma Lake spillway - $10,000

Brochure - $1,000

Annual program management-salaries
(creel surveys, law enforcement, etc.) - $15,000

Totals - $38,000

Anticipated Impacts of the Use: Recreational fishing can impact the aquatic community by direct and indirect mortality (both of target and non-target species), changes in species composition and other trophic effects, and changes within species (i.e., stunting and changes in behavior) when fishing occurs at high levels (Blaber et al. 2000, Allen et al. 2005, Lewin et al. 2006). Many of the targeted species at the refuge are introduced species such as common carp that compete with native fish species. Removal of individuals of these non-native species may benefit native species by reducing competition and predation (Cornelius 2006).

Fishing can cause disturbance to birds and other wildlife that use the refuge. Species likely to experience some level of disturbance include alligators, foraging wading birds (e.g., great blue heron, American bittern, and snowy egret) foraging and nesting waterfowl (e.g., mallard, cinnamon teal, gadwall, Canada goose, and ring-necked duck), secretive marsh birds (e.g., rails), foraging and nesting passerines (e.g., red-winged blackbird and marsh wren), foraging raptors (e.g., osprey and bald eagle), and mammals (e.g., white-tailed deer and skunk).

Most research studies have focused on short-term responses to human disturbance such as flushing, nest abandonment, site avoidance, etc. Little information is available on long-term or large-scale responses such as relocation of major staging areas, changes in productivity and demographics, or changes in prey/forage selection. Fishing has been shown to affect the reproduction, distribution, behavior, and abundance of bird species (Bell and Austin 1985; Cooke 1987; Korschgen and Dahlgren 1992).

When lead fishing sinkers or jigs are lost through broken line or other means, birds can inadvertently eat them. Water birds often swallow lead when they scoop up pebbles from the bottom of a lake or river to help grind their food. Eagles ingest lead by eating fish which have themselves swallowed sinkers (Minnesota Pollution Control Agency 2012). Lead is highly toxic to fish, birds, and other animals (including humans) and therefore the use of lead fishing tackle is being banned in a growing number of states. Discarded tackle and line also pose a threat to fish-eating birds, is unsightly, and could cause a threat to aquatic biota.

Activities associated with fishing, such as human noise, will cause some birds to flush and go elsewhere. In addition, vegetation trampling, and deposition of litter or lost gear are likely to occur.

Bank stability, soil compaction, and water quality are impacted at the current participation levels and these impacts may increase should user numbers increase in the future.

As stated above, the number of anglers using the refuge is relatively low because there are limited places available for fishing opportunities. Since the level of fishing activity is low, there is very limited disturbance to birds and limited impacts to vegetation through trampling. Thus, impacts to fish and wildlife resources associated with this activity are not significant.

Determination (check one below):

_____ Use is Not Compatible

__X__ Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility: Anglers must park in designated parking areas and walk to fishing areas.

Camping, overnight use, and fires are prohibited.

Littering is prohibited.

All persons fishing shall be required to have a valid state license and follow applicable refuge and State of Mississippi regulations.

Law enforcement patrols will be conducted periodically to ensure compliance with state and refuge regulations.

Fishing will be allowed in designated areas. Areas showing high levels of soil compaction or erosion will be closed until repaired.

Justification: Fishing is listed as a priority wildlife-dependent use of the Refuge System through which the public can develop an appreciation for fish and wildlife. The Service's policy is to provide expanded opportunities for wildlife-dependent uses when compatible and consistent with sound fish and wildlife management and to ensure that they receive enhanced attention during planning and management. Although fishing can result in disturbance to wildlife and habitat, disturbances on the refuge are expected to be intermittent, minor, and short-term, and are not expected to diminish the value of the refuge for its stated purposes. Facilitating this use on the refuge will increase visitor knowledge and appreciation of fish and wildlife resources. This enhanced understanding will foster increased public stewardship of natural resources and support for the Service's management actions in achieving the refuge purposes and the mission of the Refuge System.

There is more than an adequate amount of undisturbed habitat available to the majority of waterfowl, waterbirds, and other wildlife for escape and cover, such that their abundance and use of the refuge will not be measurably lessened from allowing fishing to occur. Stipulations will help reduce or eliminate any unwanted impacts of the use. The relatively limited number of individual animals expected to be adversely affected due to fishing will not cause wildlife populations to materially decline, the physiological condition and production of wildlife species will not be impaired, their behavior and normal activity patterns will not be altered dramatically, and their overall welfare will not be negatively impacted. Thus, allowing fishing will not materially interfere with or detract from the mission of the Refuge System or the purposes for which the refuge was established.

NEPA Compliance for Refuge Use Description: *Place an X in appropriate space.*

_____ Categorical Exclusion without Environmental Action Statement
_____ Categorical Exclusion and Environmental Action Statement
__X__ Environmental Assessment and Finding of No Significant Impact
_____ Environmental Impact Statement and Record of Decision

Mandatory 15-year Re-evaluation Date:

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Use: Recreational Hunting of Big Game, Small Game, and Waterfowl

Description of Use: This compatibility determination considers hunting, which is one of the six priority wildlife-dependent recreation activities. The primary objectives of the hunting program (archery, firearm, handicapped and youth) on the refuge are to: (1) provide a quality recreational and educational experience for a diverse audience through a varied hunt program; (2) provide an opportunity for the youth of Mississippi to engage in hunting, instill a basic understanding of conservation measures, and the role of the Service in the conservation picture; (3) foster support and knowledge of refuge goals and objectives by working in close association with the general public, and the Mississippi Department of Wildlife, Fisheries and Parks through their assistance with the harvest and thus management of resident species on the refuge while providing safe, educational, and instructive opportunities; (4) allow for the harvest of big game, small game, and waterfowl on the refuge to help maintain healthy population levels and facilitate maintenance of quality habitat for endangered species, migratory birds, and native flora and fauna; and (5) to help control nuisance and exotic wildlife.

The refuge provides annual archery, primitive weapons, and firearms hunts for white-tailed deer and turkey, quota hunts for waterfowl, and small game hunts for rabbit, squirrel, quail, raccoon, opossum, and woodcock. Because hunting has been allowed on the refuge since the 1940s, the refuge is a relatively popular public hunting destination for local hunters. All regular hunts are by refuge permit only and are conducted during specific periods within the state's hunting seasons (general hunting seasons) for Oktibbeha, Noxubee, and Winston counties. Disabled hunters are allowed to hunt in special designated areas with the issuance of a special use permit. Over 42,000 acres are currently open to public big game and small game hunting. One greentree reservoir will be open each year for waterfowl hunting and a designated area of the refuge will be open for handicapped hunting.

Three designated periods are open to youth for hunts for white-tailed deer, squirrel, and turkey on the refuge. One special squirrel hunt, in which local kids participate, is hosted by the Mississippi Department of Wildlife, Fisheries and Parks and the refuge. The refuge provides the hunt site and facilities for training, sighting-in firearms, and cleaning game. Up to fifteen youth participate, along with parents, employees, presenters, and several volunteers. The Youth Hunting Program was established to increase youth participation in safe and ethical hunting and to promote the hunting heritage of Mississippi.

Specific changes to the hunt program include: (1) developing a special hunting program to improve existing hunts to better accommodate individuals with disabilities on the refuge; (2) developing quality, public hunts directed toward youth (e.g., family hunts) and under-represented groups in partnership with the state; (3) developing youth hunts to get the Refuge System message across; (4) providing permitted adult hunters opportunities for mentoring youth hunters; (5) updating the refuge website to provide bilingual public hunting information; (6) continuing with certain refinements to achieve a better economy in implementing and conducting the various hunts; (7) increasing law enforcement presence on the refuge during the various hunting seasons to prevent poaching and illegal hunting in partnership with the Law Enforcement Division of Mississippi Department of Wildlife, Fisheries and Parks; and (8) providing a web-based permitting system.

Availability of Resources: The annual cost of refuge activities to administer the hunting program is an estimated $66,000. These costs include staff (117 days, $36,000) and operating expenses ($30,000) for refuge law enforcement and hunter assistance during the hunting season. The estimate includes non-law enforcement staff activities associated with evaluating resources available for hunting (e.g., biological assessments of target species) as well as preparing for (e.g., special signage and access) and monitoring hunting activities.

Adequate refuge personnel and base operational funds are available to manage recreational hunting activities at existing and projected levels. Administrative staff time primarily involves phone conversations, written correspondence, and personal interaction with visitors at the visitor's center. There is also additional work entering activity data into a database for analysis. Field work associated with administering the program primarily involves conducting law enforcement patrols to increase recreational hunter compliance with state and federal regulations and to foster respect for local residents' activities and property.

Anticipated Impacts of the Use: Staff monitors both harvest trends and wildlife health to ensure that target species can be hunted at the refuge without appreciably adversely affecting these species populations. For the wildlife game species, these monitoring activities include direct observation, consultation with state and Service species specialists, and review of current species survey information and research. Recent assessments of species hunted in the vicinity of the refuge indicate that those species are not facing a general decline. For waterfowl, additional annual assessments are based upon the distribution and abundance of food resources. The State of Mississippi manages resident game across broad landscapes and allows harvest of annual surpluses through recreational hunting. Although hunting causes mortality and temporary disturbance to waterfowl and other wildlife, harvesting populations within the carrying capacity of existing habitat ensures long-term health and survival of the species.

The refuge excludes hunting activities on portions of certain refuge units. Certain areas of the refuge are not hunted specifically to provide areas of sanctuary. In some locations, special hunts are used to manage hunting pressure and overall harvest at appropriate levels.

Spring turkey hunting has the most potential for conflicting with biological activities, rookeries, and nesting sites. Areas within signed exclusion zones of the two known bald eagle nests are closed to all public use, including hunting, to avoid disturbance. Also when signed, buffer areas around colonial bird rookeries are closed to public use during the nesting season to minimize potential disturbance. This eliminates spring turkey hunting in the immediate vicinity of these vital nesting areas. Due to the dispersed and stealthy nature of turkey hunting, it presents minimal conflicts with other ground-nesting wildlife in the spring.

The refuge is open during the hunting season to other priority public uses such as fishing, wildlife observation, wildlife photography, and environmental education and interpretation. To safely provide both hunting and non-hunting recreational uses, the refuge enforces a series of refuge-specific hunting regulations. Hunting is not allowed on certain units or is restricted by location, date or methods of take.

Refuge management activities can be accomplished without conflict with hunting activities through the use of administratively closed areas, timing of hunts, and methods of hunt.

Determination (check one below):

_____ Use is Not Compatible

__X__ Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility: All applicable state and federal regulations will apply.

Hunting is allowed only in designated areas.

All hunters are required to understand and possess a signed refuge Hunting and Fishing Brochure along with all applicable licenses and stamps.

Hunting is prohibited on, across, or within 100 feet of any service road, parking lot, or designated trail.

For authorized hunting activities, the refuge is open one hour before legal shooting time to one hour after legal shooting time, except for authorized hunting of raccoon or opossum. Waterfowl hunting allowed on each Wednesday and Saturday of the designated season ends each day at noon.

Archery and firearms are allowed for hunting on designated areas of the refuge.

Magnum ammunition is not allowed for the take of any game species.

The use of toxic shot, drugs, and oversized shot for hunting is prohibited within all management units containing bottomland hardwood forests on the refuge.

All personal property except for tree stands, including boats and cameras, must be removed at the end of each day, except for the wilderness area where all equipment must be removed daily.

No motorized machines or mechanical equipment including carts and bicycles are allowed within the wilderness area.

Falconry is prohibited.

Refuge-specific authorization is required for all special hunts.

Justification: Suitable habitat exists on the refuge lands to support hunting as proposed. The viability of the game species populations proposed to be hunted will not be negatively affected by hunting according to state season guidelines, bag limits, and regulations. This use is being permitted because it is a priority public use. It will not diminish the primary purposes for which the refuge was established. This use is supported in the refuge's comprehensive conservation plan. It also meets the mission of the Refuge System by providing renewable resources for the benefit of the American public while conserving viable populations of fish, wildlife, and plant resources on these lands.

Hunting is a priority public use on over 42,000 acres of the refuge. By allowing this use, we are providing opportunities and facilitating refuge programs in a manner and location that offer quality, wildlife-dependent recreation and maintain the level of current wildlife values. The harvest of surplus animals is one tool used to manage wildlife populations at a level compatible with the environment, while providing wholesome recreational opportunities.

This activity will not materially interfere with, or detract from, the mission of the Refuge System or the purpose for which the refuge was established.

NEPA Compliance for Refuge Use Description: *Place an X in appropriate space.*

_____ Categorical Exclusion without Environmental Action Statement
_____ Categorical Exclusion and Environmental Action Statement
___X___ Environmental Assessment and Finding of No Significant Impact
_____ Environmental Impact Statement and Record of Decision

Mandatory 15-year Re-evaluation Date:

Use: Research

Description of Use: The use is research or other ecological or cultural investigations not conducted by the Service or a Service-authorized agent. Research is not a priority public use of the Refuge System under the Improvement Act.

In accordance with 16 U.S.C. 668dd(d) and 50 CFR Part 25, Subpart D, the refuge manager is responsible for reviewing applications for special use permits and determining whether to authorize a proposed use. Uses must be “appropriate,” and if so, also found to be “compatible” with the refuge purposes, and those of the Refuge System, prior to being approved and undertaken. These decisions are based on the Service’s best professional judgment, consistent with Service regulations and policy, including the Policy on Maintaining the Biological Integrity, Diversity, and Environmental Health of the National Wildlife Refuge System (66 Fed. Reg. 3810 (2001); 601 FW 3).

Research is conducted by federal, state, and private entities, including the U.S. Geological Survey, state departments of natural resources, students and professors at state and private universities, and independent non-government researchers and contractors. This activity will allow permitted researchers access to the refuge’s natural environment to conduct both short-term and long-term research projects.

The refuge issues special use permits for research studies investigating biological, physical, or social issues and concerns to address refuge management information needs, and to enhance the understanding of trust resources.

Research permit requests will be considered on a case-by-case basis by the refuge manager. Permitted research should result in better knowledge of the refuge's natural and cultural resources and improve methods to manage, monitor, and protect these resources.

The refuge manager will always have the discretion to reevaluate the appropriateness and compatibility of any specific request for research by non-Service personnel at any time [603 FW 2.1 H(1), (2)]. A specific research project denial will be based on the refuge manager exercising sound professional judgment based on field experiences, knowledge of the refuge's natural resources, particularly its biological resources and available scientific information. When a refuge manager is exercising sound professional judgment, the refuge manager will use available information that may include consulting with others both inside and outside the Service. The refuge manager will specify in writing the rationale, conclusions, and decision when denying a specific research project request.

Sites and techniques for this use will be dependent on the particular study being conducted and could occur in a variety of habitat types. Unmanned or remotely operated vehicles may be allowed as part of research. Access will be restricted by special use permit to only the study sites needed to meet the objectives of the research. Romotely operated vehicles may be of potential use depending on study design as described by the submitted proposals.

The timing of research will be dependent on the type and subject(s) of the research project. Research could potentially occur throughout the year. Time-of-year restrictions could be imposed to protect threatened or endangered species or to prevent conflicts with other refuge uses or management activities.

Certain volunteer-based bird surveys focus on specific seasons in the avian life cycle. For example, the Christmas Bird Count is conducted during the winter. Upland bird surveys will primarily be conducted in the spring and summer, whereas wetland bird surveys may also be conducted during migration and wintering periods as well.

The Service encourages and supports research and management studies on refuge lands that will improve and strengthen decisions on managing natural resources. The refuge manager encourages and seeks research that clearly relates to approved refuge objectives, improves habitat management, and promotes adaptive management. Priority research addresses information on better managing the Nation's biological resources that generally are important to agencies of the Department of the Interior, the Refuge System, and state wildlife agencies that address important management issues, or demonstrate techniques for managing species or habitats.

Consideration may also be given to research and scientific work for other purposes that may not relate directly to refuge-specific objectives, but contribute to the broader enhancement, protection, use, conservation, or management of native populations of fish, wildlife, and plants, and their natural diversity in the region or the Atlantic Flyway. All proposals must comply with Service policy on compatibility.

Both the Refuge Manual and the Service Manual provide guidance on allowing research on refuges. The Refuge Manual (4 RM 6.2) lists three objectives that can be met by permitting research on refuges:

> (1) Promote new information which will improve the quality of the refuge and other Service management decisions.
>
> (2) Expand the body of scientific knowledge about fish and wildlife, their habitats, use of these resources, appropriate resource management, and the environment in general.
>
> (3) Provide the opportunity for students and others to learn the principles of field research.

The Service Manual (603 FW 1.10D (4)) provides supplemental guidance in terms of the appropriateness of research on refuges, as follows: "We actively encourage cooperative natural and cultural research activities that address our management needs. We also encourage research related to the management of priority general public uses. Such research activities are generally appropriate. However, we must review all research activities to decide if they are appropriate or not as defined in section 1.11. Research that directly benefits refuge management has priority over other research."

The rationale for this conclusion is clearly stated in the preamble to that policy (71 Fed. Reg. 36415):

> Not all research may be appropriate. Some research may affect fish, wildlife, and plants in a manner neither consistent with refuge management plans nor compatible with refuge purposes or the Refuge System mission. Some research may interfere with or preclude refuge management activities, appropriate off the refuge, appropriate and compatible public uses, or other research. Some research may be appropriate off the refuge, but not on the refuge. For example, some natural and physical research may not be wildlife-dependent and may be accomplished successfully at locations off the refuge. Because not all research supports establishing purposes of refuges or the Refuge System mission, we cannot define research as a refuge management activity.

Availability of Resources: Refuge support for research may take the form of funding; in-kind services such as housing; the use of other refuge facilities, vehicles, boats, or equipment; and the direct assistance of refuge staff in collecting data, providing historical records, conducting management treatments, or providing other assistance as appropriate. Generally, however, the bulk of the costs are incurred in staff time to review research proposals, coordinate with researchers, and write special use permits. In some cases, a research project may require only a few hours of staff time to review the proposal, coordinate with other reviewers, and write a special use permit. In other cases, a research project may involve more significant staff time, because the refuge staff must coordinate with students and advisors and accompany researchers on site visits.

For projects conducted entirely by non-Service researchers, the following staff resources would be typical:

Proposal review, coordination, and special use permit preparation – Refuge Manager, 10 hours - $560; Refuge Biologist, 20 hours - $708; Total: $1,268

Anticipated Impacts of the Use: Short-term impacts: Research activities may disturb fish and wildlife and their habitats. For example, the presence of researchers can cause waterfowl to flush from resting and feeding areas, cause disruption of birds on nests or breeding territories, or increase predation on nests and individual animals as predators follow human scent or trails. This is a potential impact of both volunteer-based bird surveys, other bird survey activities, and anuran surveys. Efforts to capture animals, such as for migratory bird banding and certain red-cockaded woodpeckers monitoring techniques, can cause disturbance, injury, or death to groups of wildlife or to individuals. To wildlife, the energy cost of disturbance may be appreciable in terms of disruption of feeding, displacement from preferred habitat and the added energy expended to avoid disturbance. These activities have been authorized in the past and Service personnel have not observed any serious impacts to refuge resources.

The removal of vegetation or sediments by core sampling methods, a common method for use in wetland research, can cause increased localized turbidity and disrupt non-target plants and animals. Sampling activities associated with many types of research activities can cause compaction of soils and the trampling of vegetation. Installation of posts, equipment platforms, collection devices, and other research equipment in open water may present a hazard if said items are not adequately marked and/or removed at appropriate times or upon completion of the project. Research efforts may also discover methods that result in a reduction in impacts described above.

Long-term impacts: Long term effects should generally be beneficial by gaining information valuable to refuge management. No long-term negative impacts are expected from the research activities described as none have been observed in the past; and the refuge manager can control the potential of long-term impacts through special use permits. Permits for multi-year research projects are renewed annually, providing the opportunity for an analysis of any impacts before issuing a special use permit renewal.

Cumulative impacts: Cumulative impacts will occur if multiple research projects were occurring on the same resources at the same time or if the duration of the research is excessive. In particular, the refuge must consider the potential impacts of non-Service research, in conjunction with any Service-sponsored research also taking place. However, no cumulative impacts are expected because the refuge manager can control the potential for cumulative impacts through special use permits, prohibiting multiple research projects from affecting any given area or species at one time. Managers retain the option to prohibit research on the refuge which does not contribute to the mission of the Refuge System or causes undue disturbance or harm. Managers retain the right to revoke or deny renewal for any special use permit if unanticipated short-term, long-term, or cumulative impacts are noted.

Ideally, any research project conducted on the refuge will positively contribute to one or more of the refuge goals and/or objectives. There may be short-term disturbance to plants and wildlife during field investigations — this is unavoidable in most cases. We will conduct Intra-Service Section 7 Biological Evaluations for any proposal that could be anticipated to have an impact on any federally threatened or endangered species. We will pay particular attention to the joint Service-State Bald Eagle Protection Guidelines for Mississippi. These guidelines provide distance and time-of-year restrictions for activities that could disturb nesting or roosting eagles. We will ensure that the refuge or any non-Service researchers obtain any special permits, including collection and banding permits, required by state or federal law prior to issuing a special use permit.

Determination (check one below):

_____ Use is Not Compatible

_X_ Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility:

General

All refuge regulations will be in force and the permittee shall be responsible for the actions of all research and support personnel. Feeding any wildlife is prohibited. No fishing will be permitted while on location. Field personnel can fish on their own time when properly licensed and in areas open and accessible to the general public. No pets or other animals are allowed on the refuge during activities conducted under this permit. Violations of applicable laws or regulations may subject the permittee and/or their agents to prosecution under state and/or federal laws, and jeopardize the continuance of this permit.

The failure of the United States to enforce strict performance of the terms, conditions, covenants, agreements, or stipulations of this permit, for access to conduct research activities on national wildlife refuge lands, shall not constitute a waiver or relinquishment of the right of the United States to strictly enforce thereafter such terms, conditions, covenants, agreements, or stipulations which shall, at all times, continue in full force and effect.

The permittee shall save, hold harmless, defend, and indemnify the United States of America, its agents and employees for loss, damages, or judgments and expenses on account of bodily injury, death or property damage, or claims for bodily injury, death, or property damage of any nature whatsoever, and by whomever made, arising out of the permittees, his employees, subcontractors or agents with respect to conducting monitoring within the lands administered by the refuge.

Firearms of any kind are prohibited on the refuge. Killing or harassing of wildlife is prohibited. It is illegal to molest or destroy the homes, nests, or dens of wildlife. Adverse impacts on fish, wildlife, and the environment shall be minimized to the maximum extent possible.

Littering is prohibited. All cans, bottles, lunch papers, and operations trash must be removed daily. All vehicles will be equipped with a container to carry out and contain trash.
All applicable federal and state regulations apply.

Permittee shall provide at least one written update annually that summarizes the permitted research and its current findings. Written reports should be of peer-review quality. A final report, of peer-review quality, will be provided to the refuge within 12 months of the completion of field work. Copies of all publications related to this permit will be provided to the refuge free of cost.

Publications and presentations should provide appropriate credit to the Service and the refuge.

Permits shall not be altered, erased, or mutilated, and any permit which has been altered, erased, or mutilated shall immediately become invalid.

All individuals utilizing the refuge are subject to inspection of permit, equipment, vehicles, boats and their contents by federal or state officers upon request.

Pre- and Post-Research/Planning

All necessary collection permits must be completed at the permittee's expense. Copies of these permits shall be provided to the refuge prior to special use permit issuance.

At the time of the official permit request, a working proposal covering project name, specific study location, problem being addressed along with specific objectives, research methods and materials, product to be produced, primary investigator, cooperators and key field persons, estimated funding amount and source of funding, and start date and completion date will be provided. Only those activities described within the proposal will be covered under this special use permit. A telephone list shall be provided by the permittee, including names of key contacts in case of questions or emergencies.

The permittee shall provide detailed maps or plats to the refuge manager clearly showing the proposed project layout, travel/access routes, and work locations. The permittee shall also provide details specifying the proposed mode of transportation (vehicle type) and frequency of visits to work sites.

Field workers and supervisors must understand what is required of them. The permittee will be responsible for all actions conducted while under the authority of the permit.

Within thirty days of conclusion of the research, a final check to remove all field equipment and supplies will be made. All keys on loan from the refuge will need to be returned. All equipment left after project completion will be considered litter, unless written approval obtained from the refuge manager. Any equipment and supplies left on the refuge during the time of the study should not deter the scenic value of the area being studied. Any use of visual markers should be clearly presented within the study proposal.

Field Work

The permittee and their agents are required to possess a copy of this special use permit at all times when on the refuge.

The permittees and their agents are required to wear U.S. Coast Guard approved life jackets when in boats.

If access is needed behind locked gates, keys are to be checked out. The permittee will be responsible for any use of the key. All keys will be returned to the refuge once permitted research is complete for each field season. Lost keys, or key misuse, may require re-keying of all refuge locks at the cost of the permittee.

The permittee is not allowed to collect, remove, or disturb any natural materials not specifically covered within the permit.

All vehicles, boats, and equipment to be used will be in a safe and working condition. All vehicles and boats will meet or exceed federal and state requirements.

The permittee is required to contact the refuge prior to conducting initial fieldwork. A voice mail message will be sufficient. Messages shall describe planned start and end dates as well as number of personnel involved.

In the event an outboard or standard 4-wheel drive vehicle cannot be used to access interior refuge habitats, use of other specialized transportation vehicles will be approved on a case-by-case basis by the refuge manager.

All field personnel should remain in the designated work areas. All work-related travel to and from work areas will be confined to designated access routes. The permittee may acquire authorization to use motorized vehicles in areas generally closed to such, however, this authorization extends only to use of such vehicles on/in established roadways, trails, canals, and waterways. Motorized vehicles may not be used for cross-country travel unless specifically approved. Any questions field personnel have about where and how to access work areas must be directed to the refuge manager for guidance. All boat operators must have completed a boater's safety course.

Vehicle/equipment maintenance shall not occur in the field.

Any activities not specifically addressed and approved are not permitted without notifying the refuge manager and obtaining written specifications on the special use permit stating the activity is authorized.

At the end of the period of study, all equipment, materials, and supplies are to be removed at the expense of the permittee.

Justification: The Service encourages research on national wildlife refuges to promote new information which will improve the quality of refuge and other Service management decisions, to expand the body of scientific knowledge about fish and wildlife, their habitats, the use of these resources, appropriate resource management, and the environment in general, and to provide the opportunity for students and others to learn the principles of field research.

In accordance with 50 CFR 26.41, research conducted by non-Service personnel, as described in this compatibility determination, will not materially interfere with, or detract from, the fulfillment of the Refuge System mission or the purposes for which the refuge was established. In addition, this activity will fulfill one or more purposes of the refuge or Refuge System.

NEPA Compliance for Refuge Use Description: *Place an X in appropriate space.*

_____ Categorical Exclusion without Environmental Action Statement
_____ Categorical Exclusion and Environmental Action Statement
__X__ Environmental Assessment and Finding of No Significant Impact
_____ Environmental Impact Statement and Record of Decision

Mandatory 10-year Re-evaluation Date:

Use: Wildlife Observation, Wildlife Photography, and Environmental Education and Interpretation

Description of Use: Wildlife observation, wildlife photography, and environmental education and interpretation are priority public uses as defined by the Improvement Act, and if compatible, are to receive enhanced consideration over other general public uses.

These uses are conducted to provide compatible educational and recreational opportunities for visitors to enjoy the resource and to gain understanding and appreciation for fish and wildlife, wild lands ecology and the relationships of plant and animal populations within the ecosystem, and wildlife management. These uses will provide opportunities for visitors to observe and learn about wildlife and wild lands at their own pace in an unstructured environment and to observe wildlife habitats firsthand. These uses will enhance the public's understanding of natural resource management programs and ecological concepts to enable the public to better understand the problems facing our wildlife/wild lands resources, to realize what effect the public has on wildlife resources, to learn about the Service's role in conservation, to better understand the biological facts upon which Service management programs are based, and to foster an appreciation for the importance of wildlife and wild lands. It is anticipated that participation in these uses will result in a more informed public, with an enhanced stewardship ethic and enhanced support and advocacy for Service programs.

These uses will also provide wholesome, safe, outdoor recreation in a scenic setting, with the realization that those who come strictly for recreational enjoyment will be enticed to participate in the more educational facets of the public use program, and can then become informed advocates for the refuge and the Service.

The use will be conducted within the refuge's boundary. While the refuge will be open to these uses, the majority of the public use infrastructure is located near the refuge headquarters. Currently, 7 miles of hiking trails, 3 observation towers, 2 boardwalks, informational kiosks, 2 boat ramps, and a visitor center is located near the refuge headquarters. We plan to enhance this "Connecting People with Nature" area to provide additional opportunities. The "Connecting People with Nature" area will highlight wildlife observation, wildlife photography, and environmental education and Interpretation. This area will include interpretive signs, informational kiosks, observation towers, and benches along the trail.

Uses will be conducted for the general public, as well as for organized groups, including schools and scout groups. Brochures and maps depicting the roads and trails open for these uses are available at the Visitor Contact Station, kiosks, and on the refuge's web site.

Environmental education and interpretation will be conducted by way of personal presentations by staff and volunteers, teachers and other youth leaders, and at special events and displays both on and off the refuge. Educational and interpretive information will also be provided via signage, kiosks, printed information, exhibits, audiovisual presentations, and lecture programs. Wildlife observation and photography are self-conducted and are facilitated through the availability of trails, viewing areas, tours, and informational materials. Wildlife observation programs such as birding field trips, canoe trips, and other nature walks are frequently given. Viewing scopes are provided in designated areas. The refuge also promotes wildlife photography with the Friends group through the annual nature photography contest and exhibition.

Availability of Resources: Allowing the use of wildlife observation, wildlife photography, and environmental education and interpretation is within the resources available to administer our visitor services program with the current level of participation and to ensure that the use remains compatible with the refuge purposes. Additional funding for visitor service improvements can also come from challenge cost-share projects, grant funds, and contributions. Compliance with refuge regulations is handled within the regular duties of the law enforcement officer. As funding is available, the refuge will complete and maintain projects and facilities. Volunteers and partners will be utilized to help with construction and maintenance.

Facilities or materials needed to support this use include maintaining access roads, parking areas, gates, roadside pull-offs, kiosks, signs, the Visitor Contact Station, observation platforms, wheelchair-accessible fishing pier, boat launching areas, and hiking trails; creating a "Connecting People with Nature" area and trail; and providing information in refuge publications and the refuge's web site.

Sufficient staff and maintenance funding within our base budget of nearly $544,000 is not available to make annual progress toward completion of all the projects described above and to maintain those already completed.

Anticipated Impacts of the Use: The refuge expects that wildlife observation, wildlife photography, and environmental education and interpretation will have negligible short-term, long-term, or cumulative impacts on the economy of the towns or county in which the refuge lies. We do not expect these activities to considerably alter the demographic of economic characteristics of the local community. No adverse impacts are foreseen to be associated with changes in the community character or demographic composition. In addition, impacts are expected to be negligible based on our observations of past visitor impacts from these uses.

Wildlife observation, wildlife photography, and environmental education and interpretation are expected to have negligible adverse short-term, long-term, or cumulative impacts on soils, local or regional air quality, and hydrology or water quality. Environmental education activities that involve the sampling of wetlands and ponds could cause temporary, localized, minor impacts on water quality as the students disturb the bottom of the pond or walk on the marsh to gather specimens. Negative impacts to water quality can also result from human waste and litter.

Wildlife observation, wildlife photography, and environmental education and interpretation are expected to have negligible adverse short-term, long-term, or cumulative impacts on vegetation, because any increases in visitation are not expected to have any negative impacts to vegetation from what is already occurring.

Additionally, hiking, wildlife viewing, photography, and environmental education programs can result in trampling of vegetation. The staff has not observed any impacts as a result of trampling of vegetation under current conditions.

Disturbance factors resulting from public use are always considered. Of these, impacts on the red-cockaded woodpecker will be minimized through the seasonal closure of designated areas during nesting season. A Section 7 evaluation has been conducted as part of this review and it was determined that proposed activities will not likely affect the red-cockaded woodpecker. The bald eagle occurs on the refuge and areas near active bald eagle nests will not be open at any time for wildlife observation, wildlife photography, and environmental education and interpretation and, therefore, are not expected to have any negative impacts on bald eagles (USFWS Service 2007).

Wildlife observation, wildlife photography, and environmental education and interpretation are expected to have negligible adverse short-term, long-term, or cumulative impacts on waterfowl. Providing waterfowl sanctuaries will minimize some of these impacts and allow waterfowl to have undisturbed access to these areas during biologically critical periods of the day. To minimize waterfowl disturbance from these uses, the refuge has designated waterfowl sanctuaries that closed to hunting and other recreational use on a seasonal or annual basis.

This use is expected to have negligible adverse short-term, long-term, or cumulative impacts on shorebirds and landbirds. We expect indirect impacts to landbirds to increase due to proposed expansions in public use activities including wildlife observation, wildlife photography, and environmental education and interpretation. Disturbance to landbirds in proposed areas for wildlife observation, wildlife photography, and fishing is expected to be negligible, since all visitors will be required to be on designated walking trails and access routes.

Wildlife observation, wildlife photography, and environmental education and interpretation are expected to have negligible adverse short-term, long-term, or cumulative impacts on secretive marsh and waterbirds. An increase in the number of hiking trails, particularly in or near wetland areas, has the potential to increase disturbance to secretive marsh and waterbirds. We expect negligible impacts to secretive marsh and waterbirds due to proposed expansions in public use activities.

Impacts to fisheries from visitors engaged in wildlife observation, wildlife photography, and environmental education and interpretation are expected to be temporary and minor. Use of boats and canoes will cause increased suspension of bottom sediments, which should not adversely affect biological oxygen demand for fisheries resources. Boat motors may also harm submerged or emergent vegetation, which may cause a negligible negative impact to protective cover for fisheries.

Wildlife observation, wildlife photography, and environmental education and interpretation are expected to have negligible adverse short-term, long-term, or cumulative impacts on mammals. We also evaluated these uses for their potential to benefit or adversely affect amphibians and reptiles or their habitats used for mating, reproduction, over-wintering, and foraging. Public outreach and education efforts by the refuge that emphasize buffering of wetlands, connectivity and easy access between forests, grasslands, and wetlands, protection of vernal pools, and augmentation of patch size will benefit amphibians and reptiles on an even larger scale where embraced by other landowners. Additionally, impacts to invertebrates such as butterflies, moths, other insects, and spiders are expected to be negligible.

The beneficial impacts of providing the existing level of wildlife-dependent activities, with some modest increases, include helping meet existing and future demands for outdoor recreation and education. Visitor use is increasing over time as local residents and visitors become increasingly aware of refuge opportunities, and as we progress in creating new facilities and programs. The economic benefits of increased tourism likely will also benefit local communities.

Expanded facilities for environmental education and new or expanded visitor services programs are expected to increase public awareness of, and visitation to, the refuge, and enable staff to provide better customer service. We expect a certain level of inconvenience during the construction of refuge facilities. The adverse effects generally are short-term, and more than offset by the long-term gains in public education and appreciation. Impacts to refuge resources are expected to be negligible.

Determination (check one below):

_____ Use is Not Compatible

__X__ Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility: The refuge will manage these four priority public uses (wildlife observation, wildlife photography, and environmental education and interpretation) in accordance with federal and state regulations and review it annually to ensure wildlife and habitat goals are achieved and that these programs are providing safe, quality experiences for participants. The refuge based these stipulations on the 1993 public use plan, comprehensive conservation plan, and refuge-specific regulations.

To ensure compatibility with refuge purposes and the mission of the Refuge System, wildlife observation, wildlife photography, and environmental education and interpretation can occur on the refuge if the refuge-specific regulations are followed and following stipulations are met:

(1) These uses must be conducted in accordance with state and federal regulations (50 CFR), and special refuge-specific regulations published in the Public Use Regulations brochure.

(2) The public use program will be reviewed annually to ensure that it contributes to refuge objectives in managing quality recreational opportunities and protecting habitats, and is subject to modification if on-site monitoring by refuge personnel or other authorized personnel results in unanticipated negative impacts to natural communities, wildlife species, or their habitats. Refuge law enforcement officer(s) will promote compliance with refuge regulations, monitor public use patterns and public safety, and document visitor interactions. Refuge law enforcement personnel will monitor all areas and enforce all applicable state and federal regulations.

(3) Refuge visitors are required to review and sign refuge-specific public use brochures.

(4) Areas may be closed on the refuge to protect resources or prevent unwanted disturbance.

(5) Pets allowed on a leash.

(6) The Visitor Contact Station is open weekdays from 8 a.m. to 4 p.m. and on weekends when staffing allows.

(7) The following activities are prohibited, including, but not limited to: camping, roller blading, horseback riding, geocaching and metal detecting, off-road and mountain biking, off-road vehicles including ATVs, organized group events (e.g., cross-country races), operation of model boats and airplanes, swimming, waterskiing, personal watercraft, air thrust boats, soliciting of funds (per 50 CFR 27.97 for Private Operations and per 50 CFR 27.86 for Begging), and other activities identified in 50 CFR 27.

Justification: Wildlife observation, wildlife photography, and environmental education and interpretation are priority wildlife-dependent uses for the Refuge System through which the public can develop an appreciation for fish and wildlife (Executive Order 12996, March 25, 1996, and the Improvement Act.) The Service's policy is to provide expanded opportunities for wildlife-dependent uses when compatible and consistent with sound fish and wildlife management and ensure that they receive enhanced attention during planning and management.

Specific refuge regulations address equity and quality of opportunities for visitors and help safeguard refuge habitats. Impacts from this proposal, short-term and long-term, direct, indirect, and cumulative, are expected to be minor and are not expected to diminish the value of the refuge for its stated objectives. Available parking and size of the facilities will typically limit use at any given time, except during special events.

Conflicts between visitors are localized and are addressed through law enforcement, public education, and continuous review and updating of public use regulations. Conflicts are further reduced by the establishment of seasonal area closures.

Stipulations above will ensure proper control of the means of use and provide management flexibility should detrimental impacts develop. Allowing this use also furthers the mission of the Refuge System by providing renewable resources for the benefit of the American public while conserving fish, wildlife, and plant resources on the refuge.

This activity will not materially interfere with, or detract from, the mission of the Refuge System or the purpose for which the refuge was established.

NEPA Compliance for Refuge Use Description: *Place an X in appropriate space.*

_____ Categorical Exclusion without Environmental Action Statement
_____ Categorical Exclusion and Environmental Action Statement
__X__ Environmental Assessment and Finding of No Significant Impact
_____ Environmental Impact Statement and Record of Decision

Mandatory 15-year Re-evaluation Date:

Approval of Compatibility Determinations

The signature of approval is for all compatibility determinations considered within the Comprehensive Conservation Plan for Sam D. Hamilton Noxubee NWR. 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, Southeast Region: _____
(Signature/Date)

Appendix G. Intra-Service Section 7 Biological Evaluation

SOUTHEAST REGION
INTRA-SERVICE SECTION 7
BIOLOGICAL EVALUATION FORM
(Federally endangered, threatened, and candidate species)
[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 from to accommodate your responses.]

Originating Person: Steven Reagan
Phone: 662-323-5548 Email: steve_reagan@fws.gov
Date: February, 2014

PROJECT NAME: Sam D. Hamilton Noxubee National Wildlife Refuge Comprehensive Conservation Plan

I. Service Program: Refuges/Wildlife

II. State/Agency: Mississippi/ United States Fish and Wildlife Service

III. Station Name: Sam D. Hamilton Noxubee National Wildlife Refuge

IV. Description of Proposed Action:

Implementation of the Comprehensive Conservation Plan for Sam D. Hamilton Noxubee National Wildlife Refuge by adopting the preferred alternative: Focus on migratory birds, federally listed species, native wildlife, habitat diversity, and experiencing nature. This plan will provide guidance, management direction, and operation plans for the next 15 years.

V. Pertinent Species and Habitat:

A. Red-cockaded woodpeckers occur throughout refuge uplands in pine and pine/hardwood mixed forests.
B. Wood Storks occur in wetland and shallow water habitats on the refuge particularly those associated with the Jones Creek Unit and Bluff and Loakfoma lakes.

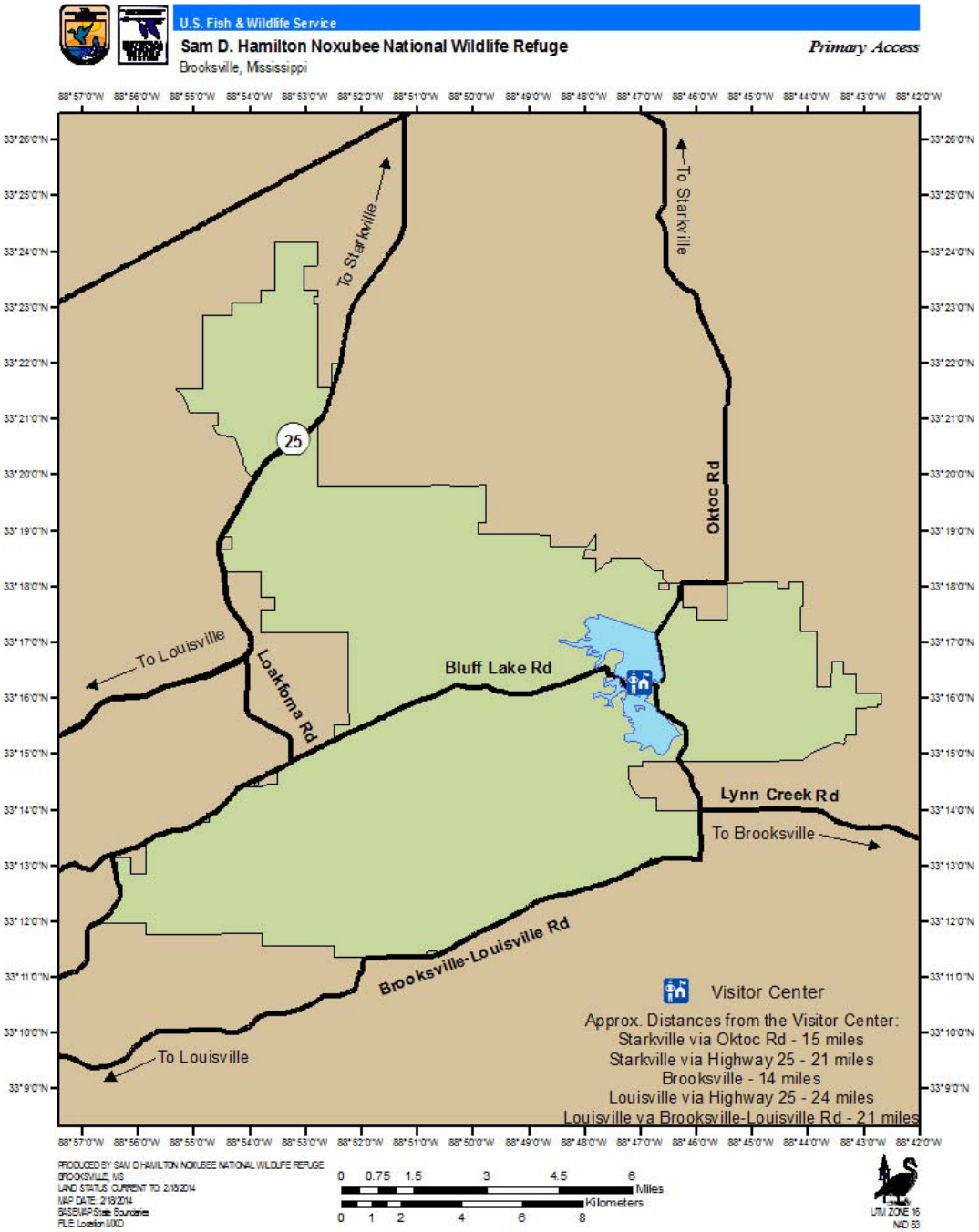


Figure 2: Location Map

A. Complete the Following table:

SPECIES/CRITICAL HABITAT	STATUS
Wood stork	T
Red-Cockaded Woodpecker	E

[1]STATUS: E=endangered, T=threatened, PE=proposed endangered, PT=proposed threatened, CH=critical habitat, PCH=proposed critical habitat, C=candidate species

VI. Location (attached 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: Latitude: 33 16; Longitude: 88 47

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

E. Sam D. Hamilton Noxubee National Wildlife Refuge Location:

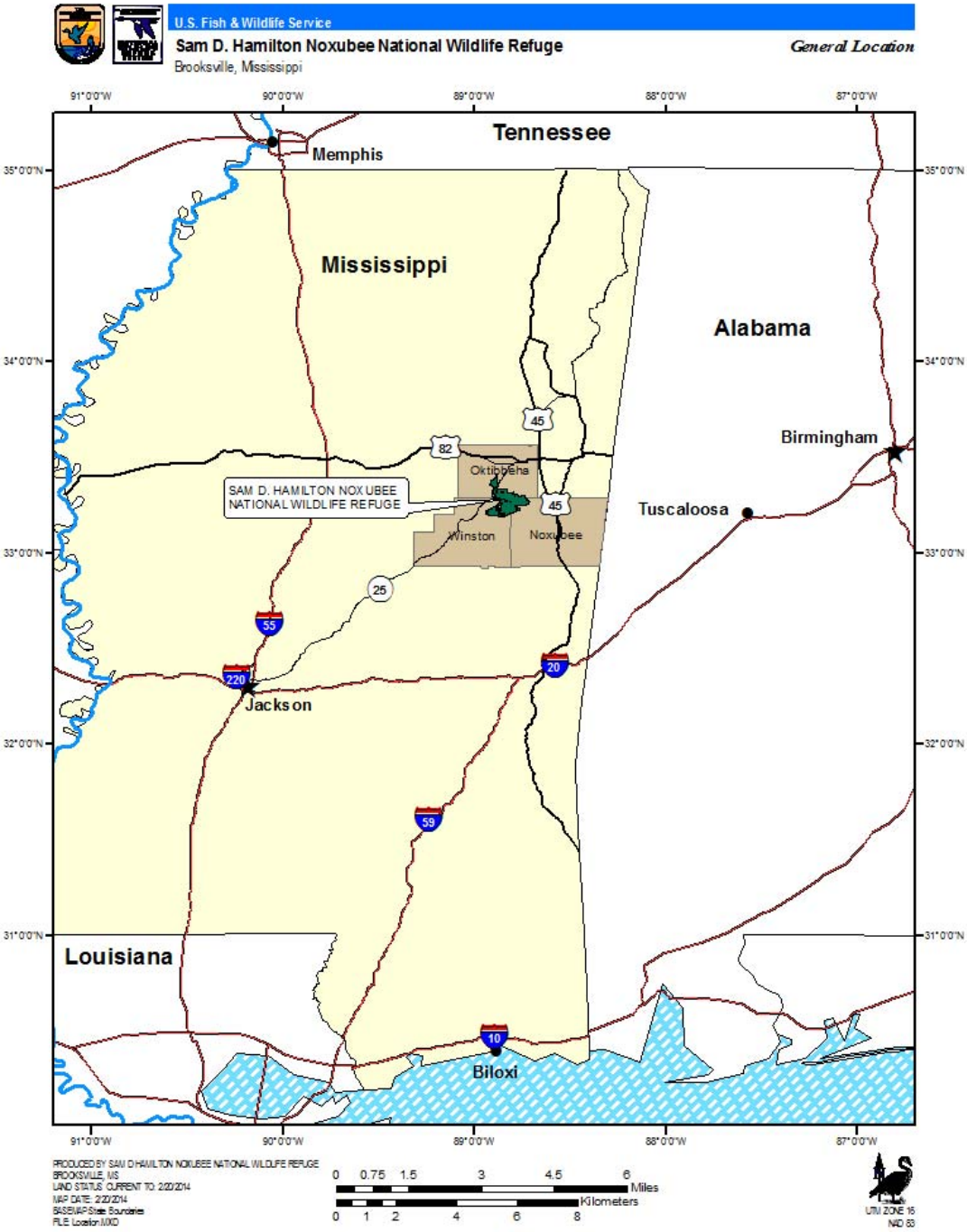


Figure 3: Location map

VII. Determination of effects

A. Explanation of effects of the action on species and critical habitats and mitigation:

Table 2. Species 1. Project impacts to listed/proposed species/critical habitat and actions to mitigate or minimize impacts. NOTE: Please see attached documentation as well.

Species/Critical Habitat	ACTIONS TO MITIGATE/MINIMIZE IMPACTS
Red-cockaded woodpecker/ Pine and mixed pine/hardwood forests	When regeneration occurs, suitable or potentially suitable foraging habitat will be temporarily reduced, but is not likely to adversely affect RCWs because sufficient habitat will remain at or in positive excess of the Managed Stability Standard (MSS). This habitat will be determined and allocated by foraging habitat analysis. The refuge will take no management actions that will reduce habitat below managed stability standard (MSS). (See Habitat Management Unit worksheet 11 & 17 below) Other silvicultural operations (i.e., thinning, mulching, right-of-way maintenance, emergency actions, integrate pest management and stand improvements) will be mitigated through reconnaissance and marking with white bands of known cavity trees prior to treatments and ongoing monitoring of work being completed. Operations will be prohibited from cutting or otherwise damaging cavity trees. The refuge will take no management actions that will reduce habitat below managed stability standard (MSS). (See Habitat Management Unit worksheet 11 & 17 below) RCWs will not be harassed during nesting/breeding season by the operation of forestry equipment and the refuge uses a buffer of 200 feet around each RCW cluster center. During the breeding season, forest equipment operations will be prohibited within clusters. The refuge is closed to all forestry activities after dark. Monitoring and research including the capture of birds, banding, inspecting cavities, and translocation will be conducted by properly trained individuals as authorized by Service permits issued under section 10(a)(1)(A) of the Endangered Species and permit conditions. The risk for injuring or killing RCWs during these activities by trained and experienced personnel is very low and authorized by the 2003 biological opinion and its required conditions for management, monitoring, and research permits issued to all private, state, and federal agencies and individuals involved with management, conservation, and recovery of the RCW

	throughout the range of the species. The refuge personnel will rake at least three feet in diameter around the trees to avoid high fuel loads, use low intensity burns on a sufficient burn cycle, spot fire around active trees while personnel are present and monitor cluster impacts after the fire. Prescribed burning is conducted within prescribed parameters. If actual conditions or fire behavior moves outside of prescription parameters after burn operations are initiated, the burn may be terminated or completed at the discretion of the burn boss based on firefighter/public safety, observed fire behavior, and other factors. Prescribed burning will not be conducted within active RCW cavity tree cluster sites during severe drought conditions (use an appropriate Keetch-Byram Drought Index (KBDI) for local conditions. (See Habitat Management Unit worksheet 11 & 17 below) The use of chemicals to control undesired woody understory or exotic/invasive species will be mitigated by ensuring employees' use all proper techniques that are outlined in the refuge pesticide use proposal system to include proper chemicals used, application rates followed, and use of trained applicators. (See Habitat Management Unit worksheet 11 & 17 below) Creation of new artificial cavities, bark shaving, use of restrictor plates, and use of excluders for RCWs will occur as often as possible by recycling of existing cavity trees (i.e., install new cavity in same tree) and avoid scarring of the cambium during bark shaving. Use of restrictor plates helps prolong the life of existing cavities thus delaying the need for new installations. The biggest risk with artificial cavities is if they are improperly installed, leak sap, or are not adequately maintained against sap leakage. The installation of such cavities will be conducted by trained personnel in accordance with the requirements of the existing programmatic BiOp for such activities. (See Habitat Management Unit worksheet 11 & 17 below) If any adverse effects from public use on the existing RCW Trail near cluster 14 on the refuge are documented in the future, measures will be taken to either close the area completely or at least during breeding/nesting season. Maintenance of roads, trails, and related infrastructure will be mitigated by limiting maintenance activities near clusters to non-nesting seasons and avoid early morning and late evening hours. No maintenance activities will occur after dark.

	Maintenance of facilities located near clusters will be mitigated by limiting maintenance activities to non-nesting seasons and avoid early morning and late evening hours. No maintenance activities will occur after dark. All administrative areas will be managed as habitat. Creating and maintain firebreaks will not be allowed within RCW clusters during the breeding and nesting season. Otherwise, there is no need to avoid such work whether early or late in the day elsewhere. Refuge boundary maintenance near clusters will be mitigated by limiting maintenance activities within clusters to non-nesting seasons. (See Habitat Management Unit worksheet 11 & 17 below)

B. **Explanation of effects of the action on species and critical habitats and mitigation:**

Table 3. Species 2. Project impacts to listed/proposed species/critical habitat and actions to mitigate or minimize impacts.

Species/Critical Habitat	Impacts to Critical Species/Habitat
Wood Stork/wetland and shallow water habitats	Sam D. Hamilton Noxubee National Wildlife Refuge is currently located in the migration route of both eastern and western populations of wood storks. Upwards of 10% of the post-breeding and non-breeding stork population migrates into eastern Mississippi. Each summer, wood storks forage in wetland and shallow water habitats on the refuge particularly those associated with the Jones Creek Unit and Bluff and Loakfoma lakes. Stork numbers gradually increase starting with June and peak in July as birds undergo a reverse summer migration following receding water conditions. Towards early September storks return to their breeding grounds. Currently, there are no breeding pairs of wood storks found on the refuge. Water management and the drawdowns of the lakes are used to provide wood stork with isolated water bodies where fish can be found stranded. Excessive drawdowns of the lakes could impact the wood stork through complete removal of the fisheries and depleting the bird's seasonal food resources. Given the bird's seasonal use of the refuge, there are no other management actions or proposed projects that are expected to impact the wood stork at this time.
Species/Critical Habitat	**ACTIONS TO MITIGATE/MINIMIZE IMPACTS**

Wood Stork/wetland and shallow water habitats	Creation of deep water habitat for fish can protect loss of fish during drawdowns and lead to the establishment of wooded islands for future roosting habitat. Water quality will be protected by using the BMPs and the Service's pesticide use proposal process. High water natural flood events from the Noxubee River will promote natural hydrological functions and restocking of Bluff Lake. Protection of streams from physical disturbance protects water quality and stream integrity and structure. Drawdowns of lakes encourage herbaceous growth and structure and increase fish productivity. Boating speed is limited to no wake and helps deter disturbance to wood stork and other waterbirds.

VIII. Effect Determination and Response Requested:

Table 4. The effect determination and response requested for Impact to each proposed/listed species/critical habitat.

SPECIES/ CRITICAL HABITAT	DETERMINATION[1]			RESPONSE1 REQUESTED
	NE	NA	A	
Red-cockaded woodpecker		X		
Wood stork	X			

[1]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 and candidate species is "Conference".

_____ _____

Signature Date
Refuge Manager

IX. Reviewing Ecological Services Office Evaluation:

A. Concurrence _____ Non-concurrence _____

B. Formal consultation required _____

C. Conference required _____

D. Informal conference required _____

E. Remarks (attach additional pages as needed):

_____ _____

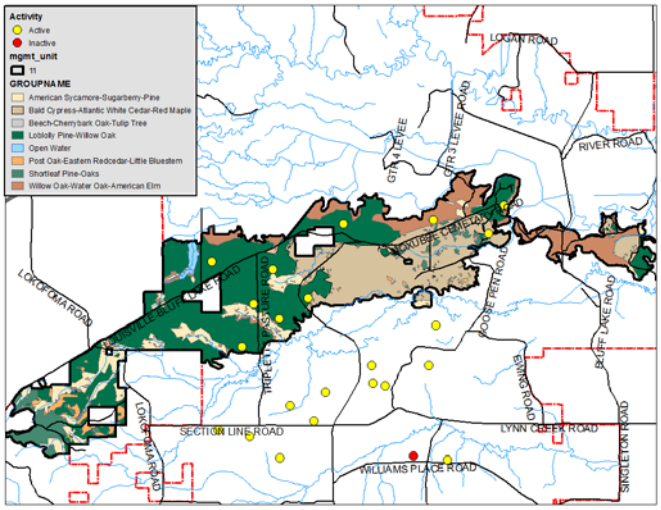
Signature **date**

_____ _____

Title **office**

Management Units 11 & 17 within the Habitat Management Plan

MANAGEMENT UNIT 11
(Bluff Lake Road Unit)



<u>Resources of Concern:</u>

Red-cockaded Woodpecker (*Picoides borealis*)

<u>Species of Complimentary Needs:</u>

Wild Turkey (*Meleagris gallopavo*)
Northern Bobwhite (*Colinus virginianus*)
Bachman's Sparrow (*Aimophila aestivalis*)
Brown-headed Nuthatch (*Sitta pusilla*)

<u>Description of Habitat Type and Current Condition along with Special Considerations (i.e., forest type, condition of habitat, constraints on Management):</u>

Management Unit 11 is a 5,190-acre management unit consisting predominantly of loblolly pine in the interior flatwoods and bottomland hardwoods in lower elevations. From 2010 to 2012 2,096 acres were burned. Overtime 60% of the area has been treated to control hardwood midstory. Chemical control occurred over 633 acres to control midstory. Active forest management has been conducted at the stand level. Based on the most current stand inventories the pine forest consists of the following age classes (6%, 0 – 10 years, 296acres; 2%, 11 – 20 years, 102 acres; 4.8%, 21 – 30 years, 238 acres; 0%, 31 – 40 years, 0 acres; .46%, 41 – 50 years, 23 acres; 5 %, 51 – 60 years, 261 acres; 42%, 61 – 70 years, 2108 acres; 27%, 71 – 80 years, 1358 acres; 2%, 81 – 90 years, 100 acres; 6.5%, 91 – 100 years, 324 acres and 3.6%, 101+ years, 179 acres. The management unit is bordered by bottomland hardwoods and is dissected by existing public use roads and existing fire lines that facilitate both administrative and public access and use of prescribed fire. The most recent Red-cockaded Woodpecker Forage Habitat Analysis shows this unit as not providing sufficient Good Quality Foraging Habitat for the 10 active clusters. Current constraints include overly dense clusters, dense mid-stories, lack of pine acres within the partition and lack of adequate spacing between partitions. A total of 10 active clusters currently exist within this unit. Historic habitat analysis for this unit indicates the area as having pine habitat type (LANDFIRE) and current condition is similar. Areas that are not predominantly pine spp. may be managed as hardwood stand to mimic historic conditions. *Lespedeza bicolor,* Japanese climbing fern (*Lygodium japonicum Thunb. Ex Murr.*), and cogon grass (*Imperata brasiliensis*) are threats

and some or all of these pests have been treated on 60 acres within this unit. Several private inholdings exist in the interior of the management unit along Bluff Lake Road and 16 Section property and other various landowners on the south border. The area also contains several out of condition hay fields that are occasionally mowed or disked every few years, but all fields show signs of regeneration into forest with significant sweet gum (*Liquidambar styraciflua*) and loblolly pine (*Pinus taeda*) establishment. The original management intended for these fields was to provide habitat for wild turkey and northern bobwhite.

The unit contains first and second order streams. Streamside management zones within Management Unit 11 consist of the red oak type. These areas have been included previously in forest management and protected following Mississippi's Best Management Practices for Forestry (2008). Numerous small perennial and intermittent streams along with drains are distributed throughout the unit. River cane is found within these zones and well distributed but sparse in occurrence. A shift in community type from pine to hardwood occurs in these areas. Due to the increased soil wetness, prescribed fire carries less readily and hardwood regeneration occurs more readily. These zones provide habitat components for a suite of species including wild turkey, white-tailed deer, pileated woodpecker (*Dryocopus pileatus*), southern flying squirrel (*Glaucomys volans*), and numerous species of herpetofauna. These hardwood streamside management zones will be protected from commercial logging disturbance based on the standards exceeding the Mississippi Best Management Practices document, but prescribed fire will be allowed to enter these zones. There may be areas where unusual or rare plant communities are encountered within the management unit that need to be protected from disturbance.

Unique Features:
Several private and public inholdings are located within this unit. There are numerous historical sites including old home sites, cisterns, and remnants of the Historic Robinson Road. The management unit also contains all of the refuge offices, shops, firetower, compounds, and residences. The area known as Douglas Bluff is a unique geological area in the unit that contains an abrupt shift in elevation from the interior flatwoods into a bottomland hardwood ecosystem.

Management:
Habitat within Management Unit 11 will be primarily directed toward providing for the needs of the federally listed endangered red-cockaded woodpecker. The site index for both pine and hardwood tree species within this unit is more than 60 square feet per acre. In areas outside the locations defined as SMZs, the forest will be managed to provide at least 120 acres of Good Quality Foraging Habitat (GQFH) per RCW cluster, as defined by the Red-cockaded Woodpecker Recovery Plan (Table 2). Individual hardwood trees having particular wildlife value (i.e., den trees, cavity trees, and other unique characters) may be left growing throughout the pine-dominated forest, but canopy hardwoods will be kept to below 30% of canopy.

Table 2. Description of good quality foraging habitat and the standard for managed stability for red-cockaded woodpeckers

Good Quality Foraging Habitat (GQFH) Criteria
• 18 or more stems per acre of pine that are at least 60 years of age and 14” dbh
• minimal pine BA of 20 square feet per acre
• BA of Pines 10-14” DBH is 0 to 40 square feet per acre
• BA of Pines less than 10” is 10 square feet per acre and less than 20 stems per acre.
• BA of all Pines more than 10” DBH is at least 40 square feet per acre
• groundcover of native bunchgrass or other native, fire-tolerant, fire dependent herbs total 40% or more of ground cover and midstory plants and are dense enough to carry growing season fire at least once every 5 years
• no hardwood midstory exist or it is sparse and less than 7 feet in height
• canopy hardwoods are absent or less than 30% of canopy
• the entire habitat is within 0.5 miles of center of cluster, and 50% is within 0.25 miles of center of cluster
• foraging habitat is not separated by more than 200 feet of non-foraging areas; non-foraging areas include: (1) any predominately hardwood forest, (2) pines stands less than 30 years in age, (3) cleared land, (4) paved roads, (5) utility rights-of-way, and (6) water
• total stand BA for loblolly forest should be kept below 80 square feet per acre
• minimum canopy spacing of 25 feet
Standard for Managed Stability
• Provide each group of red-cockaded woodpeckers a minimum of 689 m2 (3000 ft2) of pine basal area, including only pines > 25.4 cm (10 in) dbh.
• Provide the above pine basal area on a minimum of 30.4 ha (75 ac).
• Count only those pine stands in suitable habitat that, for this standard only, has each of the following characteristics:
o stands that are at least 30 years old and older
o an average pine basal area of pines > 25.4 cm (10 in) between 9.2 and 16.1 m2/ha (40 and 70ft2/ac)
o an average pine basal area of pines < 25.4 cm (10 in) less than 4.6 m2/ha (20 ft2/ac)
o no hardwood midstory or if a hardwood midstory is present, it is sparse and less than 2.1 m (7 ft) in height
o total stand basal area, including overstory hardwoods, less than 23.0 m2/ha (80 ft2/ac)
o all land counted as foraging habitat be within 0.4 km (0.25 mi) of the cluster, and that any stand counted as foraging habitat be within 61 m (200 ft) of another foraging stand or the cluster itself
o frequent prescribed burning of foraging habitat, especially during the growing season, is strongly recommended
o development and protection of herbaceous groundcovers facilitates prescribed burning and benefits red-cockaded woodpeckers

To accomplish the habitat management objectives for RCW within this unit, it will be necessary to manage clusters and their locations to provide a target of 308 acres of pine habitat per cluster to sustain a perpetual 120 acres of GQFH of pine for RCW. Various silvicultural practices will be used to promote GQFH and ensure the long-term regeneration of future forested habitat.

The use commercial logging operations will be a tool in managing the forest to meet the above criteria. The most common silvicultural method used in forestry management will be free-thinning to reduce pine basal area and remove hardwood midstory trees the negatively impact GQFH. Other methods may consist of manual or mechanized pre-commercial thinning, mulching, or permitted firewood cutting. Regardless of method, the goal will be to promote GQFH in stands that have become stagnant due to over stocking or contain a heavy hardwood midstory component. Timber stand improvement practices will also be used to manage tree species to reach the desired habitat conditions. Prescribed fire, mechanical control, and use of herbicides will be used to control hardwood growth and create desired understory and ground characteristics.

The methods used for regeneration of the pine forest in this management unit will likely consist of shelterwood, irregular shelterwood, seedtree harvest, patch cuts, single tree selection, group selection, use of herbicides, afforestation, and reforestation. The regeneration methods used will be site and habitat condition dependent based on observed site conditions and proximate location to the existing GQFH within the partition.

Existing fire lines will be maintained to contain fire and new lines will be established using heavy equipment or hand tools to protect regenerating tree species. All decisions on location, frequency, and intensity of treatments will be determined by habitat condition and needs of the RCW for foraging habitat. One area of exception is anticipated within Management Unit 11, is located to the west of the Smith fields and north of the Loakfoma Creek bottoms. This area within Management Unit 11 will likely be managed as a mixed hardwood-pine forest.

SMZs will be protected at minimum to that defined by Mississippi's Best Management Practices for Forestry (2008) (9.8 m or 30 feet) in association with drains and first order streams. The minimum level of protection provided within a SMZ will be based on the streams order: Order 1, 9.8 m; Order 2, 30 m or 98 feet; and, Order 3, 90 m or 295 feet. These distances represent not only those distances recommended to protect at least 80% of the amphibian community in riparian areas from direct impacts of timber harvest (Fogarty 2005), but also those distances that should provide protection from sediment concentration in streams due to disturbance of the forest floor near the stream (Keim and Schoenholtz 1999). Prescribed fire will normally be allowed to burn into SMZ with site conditions (e.g., wetness) limiting burn extent into the zone. Fire will be excluded from SMZ when SMZ condition indicates impact to regeneration, mortality of canopy trees, and increase soil erosion, as indicated by on-site surveys recording values below an average 70% hardwood overstory canopy cover, and hardwood basal area is less than 60 square feet per acre and 60% of the stocking and visual signs of erosion. The desired midstory and understory cover target will be between 25 – 40% and shade-intolerant regeneration should be present on 30 – 40% of the area. High-intensity prescribed fire will be avoided in these areas. Timber management may occur within the SMZs under guidelines within Mississippi's Best Management Practices for Forestry (2008) when applicable to maintain the desired protection for the resource. All temporary skid trails, roads, and decks used for forest management will be

installed, maintained, and rehabilitated to meet the requirements of Mississippi BMP Guidelines to minimize erosion, impacts to streams, and impacts to soil integrity.

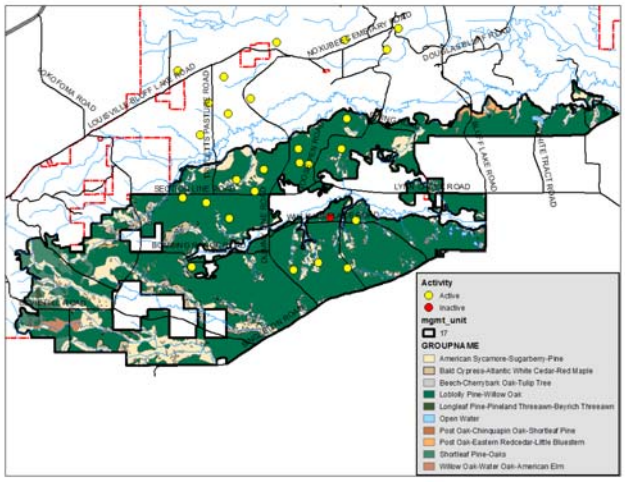
All old field locations determined to be needed for RCW management within Management Unit 11 will be reforested in pine species (i.e., loblolly, short-leaf pine, and long-leaf pine) that represent historical forest and site conditions using either natural reseeding or replanting of trees. These same species and techniques may also be used to regenerate damaged habitats within forest openings such as those caused by southern pine beetle, ips, or storms. All habitat management activity will occur when site and species conditions are favorable for the management activity to happen and minimally impact the habitat or resource of concern. The forest management operations within RCW areas will adhere to the RCW Recovery Plan Guidelines.

Open public and administrative roads within the unit may be maintained in a graveled state from ditch to ditch and will receive maintenance related activity throughout the year. Starting at the outside of the ditches, habitat will be maintained in the same manner as within the main unit. Vegetative barriers may be left along road edges to provide wildlife cover from road related disturbance and to deter road hunting activities, particularly where roads are adjacent to fields. Sections of the Old Robinson Road that are visible should be protected from disturbance to maintain the integrity of the old road bed. Areas around the immediate infrastructure of the shop, residences, and office will be maintained to be presentable to the public. Haul roads created to facilitate removal of timber will be abandoned, possibly replanted to forest and not maintained through time.

Adaptive Management Monitoring Elements:

- Conduct RCW monitoring according to the 2003 RCW Recovery Plan.
- The primary habitat response variables will be forest overstory structure and composition, forest midstory and understory structure and productivity for wildlife as measured by forest inventory data.
- The primary wildlife response variable will be forest breeding bird species composition and abundance using breeding landbird surveys (point counts).
- The refuge will consider herptafauna survey (according to PARC guidelines and protocol) (http://www.parcplace.org/publications/inventory-and-monitoring-guide.html).
- Monitor the effects of forest management activities to maintain integrity of desired species composition, habitat structure, and forest health.

MANAGEMENT UNIT 17
(Section Line Road Unit)



Resources of Concern:

Red-cockaded Woodpecker (*Picoides borealis*)

Species of Complimentary Needs:

Wild Turkey (*Meleagris gallopavo*)
Northern Bobwhite (*Colinus virginianus*)
Bachman's Sparrow (*Aimophila aestivalis*)
Brown-headed nuthatch (*Sitta pusilla*)

Description of Habitat Type and Current Condition along with Special Considerations (i.e., forest type, condition of habitat, constraints on Management):

Management Unit 17 consists primarily of loblolly pine with numerous streamside management zones and is partially bisected by a red oak hardwood bottom (Management Unit 23). From 2010 to 2013, 15,331 acres were burned. Over 60% of the area has been treated with fire to control hardwood midstory. Chemicals were used in over 633 acres to control hardwoods in the midstory. Active forest management has been conducted at the stand level and the pine forest consists of the following age classes currently based on the latest information from stand inventories: (5.1%, 0 – 10 years, 630 acres; 4.8%, 11 – 20 years, 589 acres; 2.8%, 21 – 30 years, 344 acres; 0.9%, 31 – 40 years, 115 acres; 1.4%, 41 – 50 years, 173 acres; 9.4%, 51 – 60 years, 1,161 acres; 46.9%, 61 – 70 years, 5,803 acres; 20.7%, 71 – 80 years, 2,555 acres; 3.7%, 81 – 90 years, 463 acres; and 2.8%, 91 – 100 years, 348 acres (1.5% unknown, 188 acres)). Within the unit are three small (<3 acre) demonstration plots where midstory hardwoods were either left untreated, treated with prescribed fire or treated with herbicides. There is no formal study design associated with these plots. The management unit is bounded and dissected by existing public use roads and existing fire lines that facilitate both administrative and public access and use of prescribed fire. A total of 16 active clusters currently exist within this unit. Historic habitat analysis for this unit indicates the area as having the potential pine habitat type (LANDFIRE) and current conditions are similar. *Lespedeza bicolor*, Japanese Climbing Fern (*Lygodium japonicum Thunb. Ex Murr.*) and cogon grass (*Imperata brasiliensis*) are a threat and some or all of these pests have been treated on 93 acres within this unit. Several large private inholdings exist at the western end of the unit. The area also contains several out of condition hay fields occasionally mowed or disked every few years, but all fields show signs of regeneration into forest with significant sweet gum (*Liquidambar styraciflua*). The original management intent for these fields was to provide habitat for wild turkey and northern bobwhite.

The unit contains first, second, and third order streams. Streamside management zones within Management Unit 17 consist of the red oak type. These areas have been included previously in forest management and protected following Mississippi's Best Management Practices for Forestry (2008). Yellow Creek, Horse Creek, and the upper fingers of Loakfoma Creek are named creeks included in this unit. Numerous other small perennial and intermittent streams along with drains are distributed throughout the unit. River cane is associated within these zones and well distributed but sparse in occurrence. A shift in community type from pine to hardwood occurs in these areas. Due to the increased soil wetness, prescribed fire carries less readily and hardwood regeneration occurs more readily. These zones provide habitat components for a suite of species including wild turkey, white-tailed deer, pileated woodpecker (*Dryocopus pileatus*), southern flying squirrel (*Glaucomys volans*) and numerous species of herpetofauna. These hardwood streamside management zones will be protected from commercial logging disturbance based on the standards exceeding the Mississippi Best Management Practices document, but prescribed fire will be allowed to enter these zones.

Unique Features:
This area is divided by Lynn Creek. It has significant amount of inholdings therefore causing possible fragmentation of habitats. An old bombing range is present. It borders CA Barge Timberlands Company to the south. Dummyline Road runs through the area and was utilized by a railroad company for timber transport. The prairie demonstration area consists of 33 acres of open field that have been restored to a prairie like condition by fire and mechanical means. The unit boundaries are Loakfoma Lake to the north and west, Bluff Lake road to the east, and Management Unit 18 to the south. The 0.40-mile Morgan Hill Overlook Trail accesses the Morgan Hill Overlook within the unit. There is also 0.28-mile trail that loops off of the Morgan Hill Overlook Trail and accesses a large portion prairie demonstration area. There are numerous historical sites including old home sites, cisterns, and saw dust piles. Saw dust piles and other sensitive sites are protected from fire by permanent fire lines.

Management:
Habitat within Management Unit 17 will be primarily directed toward providing for the needs of the federally listed endangered RCW. The site index for both pine and hardwood tree species within this unit is more than 60. Outside of the SMZs, the forest will be managed to provide at least 120 acres of Good Quality Foraging Habitat (GQFH) per RCW cluster, as defined by the Red-cockaded Woodpecker Recovery Plan. Individual hardwood trees having particular wildlife value (i.e., den trees, cavity trees, and other unique characters) may be left growing throughout the pine dominated forest but canopy hardwoods will be kept to below 30% of canopy. GQFH is defined as follows:

Good Quality Foraging Habitat (GQFH) Criteria
• 18 or more stems per acre of pine that are at least 60 years of age and 14” dbh
• minimal pine BA of 20 square feet per acre
• BA of Pines 10-14” DBH is 0 to 40 square feet per acre
• BA of Pines less than 10” is 10 square feet per acre and less than 20 stems per acre
• BA of all Pines more than 10” DBH is at least 40 square feet per acre
• groundcover of native bunchgrass or other native, fire-tolerant, fire dependent herbs total 40% or more of ground cover and midstory plants and are dense enough to carry growing season fire at least once every 5 years
• no hardwood midstory exist or it is sparse and less than 7 feet in height
• canopy hardwoods are absent or less than 30% of canopy
• the entire habitat is within 0.5-mile of center of cluster, and 50% is within 0.25-mile of center of cluster
• foraging habitat is not separated by more than 200 feet of non-foraging areas; non-foraging areas include: (1) any predominately hardwood forest, (2) pines stands less than 30 years in age, (3) cleared land, (4) paved roads, (5) utility ROW, and (6) water
• total stand BA for loblolly forest should be kept below 80 square feet per acre
• minimum canopy spacing of 25 feet
Standard for Managed Stability
• Provide each group of red-cockaded woodpeckers a minimum of 689 m2 (3000 ft2) of pine basal area, including only pines > 25.4 cm (10 in) dbh.
• Provide the above pine basal area on a minimum of 30.4 ha (75 ac).
• Count only those pine stands in suitable habitat that, for this standard only, has each of the following characteristics:
o stands that are at least 30 years old and older
o an average pine basal area of pines > 25.4 cm (10 in) between 9.2 and 16.1 m2/ha (40 and 70ft2/ac)
o an average pine basal area of pines < 25.4 cm (10 in) less than 4.6 m2/ha (20 ft2/ac)
o no hardwood midstory or if a hardwood midstory is present, it is sparse and less than 2.1 m (7 ft) in height
o total stand basal area, including overstory hardwoods, less than 23.0 m2/ha (80 ft2/ac)
o all land counted as foraging habitat be within 0.4-km (0.25-mi) of the cluster, and that any stand counted as foraging habitat be within 61 m (200 ft) of another foraging stand or the cluster itself
o frequent prescribed burning of foraging habitat, especially during the growing season, is strongly recommended
o development and protection of herbaceous groundcovers facilitates prescribed burning and benefits red-cockaded woodpeckers

To accomplish the habitat management objectives for RCW within this unit, it will be necessary to manage clusters and their locations to provide a target 308 acres of pine habitat per cluster to

sustain a perpetual 120 acres of GQFH of pine for red-cockaded woodpeckers. Various silvicultural practices will be used to promote GQFH and ensure the long-term regeneration of future forested habitat. The use of commercial logging operations will be a tool in managing the forest to meet the above criteria. The most common silvicultural method used in forestry management will be free-thinning to reduce pine basal area and remove hardwood midstory trees that negatively impact GQFH. Other methods may consist of manual or mechanized pre-commercial thinning, mulching, or permitted firewood cutting. Regardless of method, the goal will be to promote GQFH in stands that have become stagnant due to over-stocking or contain a heavy hardwood midstory component. Timber stand improvement practices will also be used to manage tree species to reach the desired habitat conditions. Prescribed fire, mechanical control, and use of herbicides will be used to control hardwood growth and create desired understory and ground characteristics.

The methods used for regeneration of the pine forest in this management unit will likely consist of shelterwood, irregular shelterwood, seedtree harvest, patch cuts, group selection, single tree selection, afforestation, and reforestation. The regeneration methods used will be site and habitat condition dependent based on observed site conditions and proximate location to the existing GQFH within the partition.

Existing fire lines will be maintained to contain fire and new lines will be established to protect regenerating tree species. All decisions on location, frequency, and intensity of treatments will be determined by habitat condition and needs of the RCW for foraging habitat.

Two areas of exception are anticipated within Management Unit 17, one located in the northeastern corner near Loakfoma Lake and the other near south of the private lands at the southern refuge boundary. These two areas within Management Unit 17 will likely be unmanaged as a mixed hardwood-pine forest due to their fragmented structure because of numerous SMZs and isolation within the management unit.

SMZs will be protected at minimum to that defined by Mississippi's Best Management Practices for Forestry (2008) (9.8 m or 30 feet) in association with drains and first order streams. The minimum level of protection provided within a SMZ will be based on the streams order: Order 1, 9.8 m; Order 2, 30 m or 98 feet; and, Order 3, 90 m or 295 feet. These distances represent not only those distances recommended to protect at least 80% of the amphibian community in riparian areas from direct impacts of timber harvest (Fogarty 2005), but also those distances that should provide protection from sediment concentration in streams due to disturbance of the forest floor near the stream (Keim and Schoenholtz 1999). Prescribed fire will normally be allowed to burn into a SMZ with site conditions (e.g. wetness) limiting burn extent into the zone. Fire will be excluded from SMZ when SMZ condition indicates impacts to regeneration, mortality of canopy trees, and increase soil erosion as indicated by: (a) on-site surveys recording values below an average 70% hardwood overstory canopy cover, (b) hardwood basal areas less than 60 square feet per acre and 60% of stocking, and (c) visual signs of erosion. The desired midstory and understory cover target will be between 25 – 40% and shade-intolerant regeneration should be present on 30 – 40% of the area. High-intensity prescribed fire will be avoided in these areas. Timber management may occur within the SMZs under guidelines within Mississippi's Best

Management Practices for Forestry (2008) when applicable to maintain the desired protection for the resource. All temporary skid trails, roads, and decks used for forest management will be installed, maintained, and rehabilitated to meet the requirements of Mississippi Best Management Practices guidelines to minimize erosion, impacts to streams, and impacts to soil integrity.

All old field locations determined to be needed for RCW management within Management Unit 17 will be reforested in pine species (i.e., loblolly, short-leaf pine, and long-leaf pine) that represent historical forest and site conditions using either natural reseeding or replanting of trees. These same species and techniques may also be used to regenerate damaged habitats within forest openings such as those caused by southern pine beetle, ips, or storms. All habitat management activity will occur, when site and species conditions are favorable for the management activity to happen, and minimally impact the habitat or resource of concern. The forest management operations within RCW areas will adhere to the RCW Recovery Plan guidelines.

Open public and administrative roads within the unit may be maintained in a graveled state from ditch to ditch and will receive maintenance related activity throughout the year. Starting at the outside of the ditches, habitat will be maintained in the same manner as within the main unit. Vegetative barriers may be left along road edges to provide wildlife cover from road-related disturbance and to deter road hunting activities, particularly where roads are adjacent to fields. Areas around the immediate infrastructure of the shop, residences, and office will be maintained to be presentable to the public. Haul road created to facilitate removal of timber will be abandoned, possibly replanted to forest and not maintained through time.

Adaptive Management Monitoring Elements:

- Conduct RCW monitoring according to the 2003 RCW Recovery Plan.
- The primary habitat response variables will be forest overstory structure and composition, forest midstory and understory structure within RCW partitions as measured by forest inventory data.
- The primary wildlife response variable will be forest breeding bird species composition and abundance using breeding landbird surveys (point counts).
- The refuge will consider herptafauna survey (according to PARC guidelines and protocol) (http://www.parcplace.org/publications/inventory-and-monitoring-guide.html).
- Monitor the effects of forest management activities to maintain integrity of desired species composition, habitat structure, and forest health.

Appendix H. Wilderness Review

WILDERNESS REVIEW:
SAM D. HAMILTON NOXUBEE NATIONAL WILDLIFE REFUGE

WILDERNESS REVIEW PROCESS

The purpose of a wilderness review is to identify and recommend for congressional designation National Wildlife Refuge System lands and waters that merit inclusion in the National Wilderness Preservation System. Wilderness reviews are a required element of Comprehensive Conservation Plans. They are conducted in accordance with the Service's wilderness review and evaluation policy guidance (610 FW 4) and according to the refuge planning process outlined in 602 FW 1 and 3, including public involvement and National Environmental Policy Act (NEPA) compliance.

There are three phases to the wilderness review process:

1) Wilderness Inventory. The wilderness inventory identifies lands and waters that meet the minimum criteria for wilderness. These areas are called wilderness study areas (WSAs).
2) Wilderness Study. The wilderness study evaluates a range of management alternatives to determine if a WSA is suitable for wilderness designation or management under an alternate set of goals and objectives that do not involve wilderness designation. The findings of the study determine whether we will recommend an area for wilderness designation in the Comprehensive Conservation Plan.
3) Wilderness Recommendation. The recommendation phase consists of reporting recommendations for wilderness designation from the Director of the Fish and Wildlife Service through the Secretary of the Interior and the President to Congress in a wilderness study report. The study report is prepared following completion of the CCP. Congress has reserved the authority to make final decisions on wilderness designation.

This appendix summarizes the inventory and study phases of the wilderness review for the Sam D. Hamilton Noxubee National Wildlife Refuge.

A team was established for conducting a wilderness review, including refuge staff, Andrea Dunstan, Bobbi Gentry, Lori Haygood, Steven Lewis, Michelle Paduani, Steve Reagan, Paul Reynolds, Kimberly Sykes, and Natalee Yates; Bev Smith, Director of the Larry Box Environmental Education Center; and Kathy Lunceford, Ecological Services Biologist. The group met at the refuge on July 8, 2013, to gather information and conduct an inventory of the refuge's lands and waters. This process required reviewing all land acquisitions since 1974, site knowledge with existing land status maps, photographs, available land use information and road inventory data to determine if any additional refuge lands and waters met the minimum criteria for wilderness. Aerial and non-aerial photographs along with Geographic Information System data were used to document the imprint of man's work, road locations, and other surface disturbances. There was a power point presentation that included maps, pictures, and descriptions of all the

WSA's on the refuge. The power point presentation with photos and maps is available in the administrative record.

Wilderness Inventory

The wilderness inventory consists of identifying areas that minimally meet the requirements for wilderness as defined in the Wilderness Act of 1964 (Wilderness Act). It represents a broad look at the planning area to identify WSAs.

The definition of wilderness is found in section 2(c) of the Wilderness Act: "A wilderness, in contrast with those areas where man and his works dominate the landscape, is hereby recognized as an area where the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain." In this act, an area of wilderness is further defined to mean an area of undeveloped federal land retaining its primeval character and influence, without permanent improvements or human habitation, which is protected and managed so as to preserve its natural conditions and which "(1) generally appears to have been affected primarily by the forces of nature, with the imprint of man substantially unnoticeable; (2) has outstanding opportunities for solitude or a primitive and unconfined type of recreation; (3) has at least five thousand acres of land or is of sufficient size as to make practicable its preservation and use in an unimpaired condition; and (4) may also contain ecological, geological, or other features of scientific, educational, scenic, or historic value."

Wilderness Study

During the study phase, lands and waters qualifying for wilderness as a result of the inventory are studied in greater detail to analyze values (e.g., ecological, recreational, cultural, economic, and symbolic), resources (e.g., wildlife, water, vegetation, minerals, and soils), public uses, and refuge management activities within the area. The analysis includes an evaluation of whether the WSA can be effectively managed to preserve its wilderness character.

The environmental analysis addresses benefits and impacts to wilderness values and other resources under each management alternative. The study evaluates how each alternate will:

- Achieve the purposes of the Wilderness Act and the NWPS;
- Affect achieving refuge or planning unit purpose(s);
- Affect the refuge's contribution toward achieving the Refuge System mission;
- Affect maintaining and, where appropriate, restoring biological integrity, diversity, and environmental health at various landscape scales; and
- Meet other legal and policy mandates

The findings of the study help determine the WSAs suitability for management and preservation as wilderness with regard to its primary purposes as a refuge. The information, analysis, and decisions in the CCP and associated NEPA document provide the rationale for wilderness suitability determinations and the basic source of information throughout the public, executive, and legislative review processes that follow.

Wilderness Recommendation

There is no requirement to recommend a WSA for congressional designation as wilderness. The final CCP and record of decision document the Service's determination on a WSA's suitability (or unsuitability) for wilderness and decision to recommend (or not recommend) an area for designation.

For a WSA recommended suitable for designation, additional steps will be required including preparing a wilderness study report that presents the results of the wilderness review, documentation of opportunities for public review, a copy of the final CCP, and a legislative Environmental Impact Statement (LEIS). Once these documents are prepared, they are transmitted from the Service Director to the Secretary of the Interior to the President, and ultimately to Congress for approval.

WSAs recommended as suitable for wilderness designation are managed according to the management direction provided in the final CCP. Recommended wilderness areas (RWAs) have been approved by the Director and forwarded to the Secretary for consideration. RWAs are managed to maintain their wilderness character. Proposed Wilderness Areas (PWAs) have been approved by the Secretary and forwarded to the President for consideration. PWAs are managed consistent with Service Wilderness Stewardship policy 610 FW 1-3 and sections 4.22B and C. Areas will be managed at their respective level of approval until either Congress legislatively designates the area as wilderness or the CCP is amended to modify or remove the wilderness proposal.

WILDERNESS INVENTORY OF Sam D. Hamilton Noxubee NWR

The wilderness inventory is a broad look at the CCP planning area to identify WSAs. WSAs are roadless areas within the refuge boundaries that meet the minimum criteria for wilderness identified in Section 2(c) of the Wilderness Act. A WSA must meet the minimum size requirement (or be a roadless island), appear natural, and provide outstanding opportunities for solitude or primitive recreation. Other supplemental values are evaluated, but not required.

Proposed Wilderness (Fish and Wildlife Service) in 1974

Lands that have been through a formal Wilderness Fish and Wildlife Service review and have been "proposed" to the Department of Interior Secretary for Wilderness designation are managed in the same manner as designated wilderness, so that, if they become wilderness, their Wilderness character is preserved. For the refuge, approximately 1,200 acres of seasonally flooded and timbered bottomland hardwoods were previously proposed as wilderness in 1974 (Figure 8). The wilderness study report proposed wilderness in the area bounded by the Noxubee River on the west and north, Oktoc Creek on the south, and Bluff Lake on the southeast. The area's timber and land has not been impacted by man since before the refuge was established in 1935. There is a 3-mile primitive loop foot trail in the proposed wilderness that has been periodically maintained by the Sierra Club. There also have been times when chain saws were used to clear the trail and trail markers have been put up in conflict with the Wilderness Act, and these actions are duly noted and will not continue to occur with the approval of this CCP.

Our inventory of potentially eligible lands and waters and the application of the wilderness criteria are described in the following sections.

Identification Lands of Potentially Eligible for Consideration as Wilderness

Identification of potentially eligible lands and waters required gathering land status maps, land acquisition documents including pre-acquisition surveys where available, land use and road inventory data, and aerial imagery of existing refuge tracts. First-hand knowledge by staff of the current and past history of tracts was also important in refining the analysis. All lands currently owned by the refuge were evaluated but especially roadless and undeveloped areas. "Roadless" refers to the absence of improved roads suitable and maintained for public travel by means of motorized vehicles primarily intended for highway use. Additionally, only lands and waters currently owned by the Service in fee-title were included in the evaluation. These lands and waters are included in three WSAs, all contiguous with the existing Wilderness Area. WSAs are described in greater detail in the Wilderness Study section of this review.

The Sam D. Hamilton Noxubee NWR Wilderness Inventory was divided into two separate and distinct steps. In step one, we inventoried all federal lands within the Sam D. Hamilton Noxubee NWR that were not proposed for Wilderness designation in 1974, including those lands that have been acquired. In step two, we inventoried the lands within Sam D. Hamilton Noxubee NWR that were proposed for Wilderness designation in 1974. These fee-title lands were initially assessed based on the size criteria.

The lands inventoried in step one included all refuge lands except those already in the proposed wilderness area and totaled 47,019 acres. The areas that were considered were Management Units 1, 2 and 3 located north of Highway 25 (Figure 5), Management Unit 16 in the Bevill's Hill area (Figure 6), and all named river, creek, stream, and waterway streamside management zones (Figure 7). Management Units 1, 2, 3 and 16 were inventoried in 1974 and the Service evaluated these areas again in 2014 during this Wilderness Review

<u>North Unit Wilderness Inventory Unit (Management Units 1, 2 and 3)</u>
The North Unit, consisting of approximately 4,274 acres of historically diverse forest with

bottomland hardwood, bald cypress, and pines including a few scattered parcels of upland hardwoods was used as agricultural croplands before the refuge was established (Figure 2). After being acquired by the Federal Government in 1935, the area was actively managed to encourage a mono-typical habitat of loblolly pines with open understory to increase red-cockaded woodpecker habitat. Red-cockaded woodpeckers are currently active within the area. The area will potentially continue to be actively managed to promote desired forest conditions for RCW as long as the current woodpecker clusters remain active.

Figure 5: North Unit Cistern

Figure 4: North Unit 1948

Bevill's Hill Wilderness Inventory Unit (Management Unit 16)
The Bevill's Hill area, consisting of 2,683 acres of pine with mixed upland hardwood, historically consisted of mixed pine with upland hardwood. Prior to acquisition by the Federal Government, the area was actively farmed and subjected to high rates of soil erosion (Figures 3 & 4). Following manual and natural reforestation, the area now sustains forests that have received active timber management in the form of tree harvest and chemical control of hardwood plant growth. The area contains a developed hiking trail and parking area. An approximate 5-acre borrow pit remains within the unit and was active as recently as 2006.

Figure 3: Bevill's Hill area active farming and bare soil.

Figure 4: Bevill's Hill soil erosion.

Streamside Management Zones Wilderness Inventory Units
Streamside management zones (Figure 10) are buffers around all rivers, creeks, and waterways found on the refuge. These lands total approximately 1,700 acres. These multiple tracts of land were not considered under previous wilderness reviews. Streamside management zones reach throughout the refuge and include a wide range of habitats. Roads and other man-made features are incorporated within these buffer areas.

Evaluation of Size Criteria

An inventory unit meets the size criteria for a WSA if any one of the following standards applies (610 FW 4.8):

- An area with over 5,000 contiguous acres. State and private lands are not included in making this acreage determination.
- A roadless island of any size. A roadless island is defined as an area surrounded by permanent waters or that is markedly distinguished from the surrounding lands by topographical or ecological features.
- An area of less than 5,000 contiguous federal acres that is of sufficient size as to make practicable its preservation and use in an unimpaired condition, and of a size suitable for wilderness management.
- An area of less than 5,000 contiguous federal acres that is contiguous with a designated wilderness, recommended wilderness, or area under wilderness review by another federal wilderness managing agency such as the Forest Service, National Park Service, or Bureau of Land Management.

1. Discussion

The following three areas were identified for further evaluation as potential WSAs:

(1) 4,274 acres in the North unit located above Highway 25 (Figure 8),
(2) 2,683 acres in the Bevill's Hill area (Figure 9), and
(3) 1,700 acres of combined streamside management zones (Figure 10).

2. Conclusion

The North Unit has one administrative access road bisecting the unit; part of the road is built over a man-made levee used in the creation of a 3-acre pond; a bridge allows passage over the Chinchahoma Creek; and the area is less than 5,000 acres in total size. This area does not fall within either of these size designations because the use will still not be unimpaired and practical.

The Bevill's Hill Unit has a refuge public access road and a county maintained road (Clearman Road) bisecting the area and it is less than 5,000 acres. This area does not fall within either of the size designations mentioned above because use of the area will still not be unimpaired, practical, or contiguous.

No single streamside management zone is larger than 5,000 acres, but together the areas represent significant amounts of land (1,700 acres) and are distributed throughout the refuge. This area does not fall within either of the size designations mentioned above because use of the area will still not be unimpaired, practical, or contiguous.

Evaluation of the Naturalness Criteria

To qualify as a WSA, an area must meet the naturalness criterion (610 FW 4.9). Section 2(c) of the Wilderness Act defines wilderness as an area that "…generally appears to have been affected primarily by the forces of nature with the imprint of man's work substantially unnoticeable." The area must appear "natural" to the average visitor rather than "pristine." The presence of ecologically intact, historic landscape conditions is not required. An area may include some man-made features and human impacts provided they are substantially unnoticeable in the unit overall. In the inventory phase, the naturalness evaluation focuses on the existing physical impacts of refuge management activities, refuge uses, or human-caused hazards. At this stage, we do not disqualify an area from further study solely on the basis of established or proposed activities or

uses that require the use of temporary roads, motor vehicles, motorized equipment, motorboats, mechanical transport, landing of aircraft, structures, and installations generally prohibited in designated wilderness. In addition, an area may not be considered unnatural in appearance solely on the basis of "sights and sounds" of human impacts and activities outside the boundary of the unit.

1. Discussion and Conclusion

In the North Unit the presence of humans is notable in a variety of ways including numerous fire lines used in conducting prescribed fire, stands of forest that have undergone timber harvest, a man-made levee on which the road was established and which a pond was created, and other cultural artifacts including old home sites and cisterns (Figure 2). There remains a good opportunity for solitude or primitive and unconfined recreation based on the location of the area relative to the more actively managed areas of the refuge, but because there is a possibility of active management to occur in the area, the team found that the naturalness will not be preserved.

Bevill's Hill Unit has many management actions that have been conducted in the past and may contribute to the area being perceived as less natural. Overtime, the predominantly pine area has been treated with some prescribed fire but not enough to control hardwood midstory. Chemical hardwood control has been used on approximately 300 acres recently used to control hardwood growth, but was a secondary benefit from spraying targeted at controlling bi-color lespedeza. Active forest management has been conducted at the stand level. These past management actions may not give the area a natural appeal to the average visitor now or in the future.

The steamside management zone units are frequently bisected by roads with bridges spanning waterways. Previously established fire lines and ditches can be found throughout these areas. Some areas have been subjected to low intensity timber harvest. Because of these past management activities, these areas may not be perceived as natural to the average visitor.

Evaluation of Outstanding Opportunities for Solitude or Primitive and Unconfined Recreation Criteria

In addition to meeting the size and naturalness criteria to qualify as WSA, an area must provide outstanding opportunities for solitude or primitive recreation (610 FW 4.10). The area does not have to possess outstanding opportunities for both solitude and primitive recreation, and does not need to have outstanding opportunities on every acre. Further, an area does not have to be open to public use and access to qualify under these criteria. Congress has designated a number of Refuge System Wilderness Areas that are closed to public access to protect ecological resource values.

Opportunity for solitude refers to the ability of a visitor to be alone and secluded from other visitors in the area. Primitive and unconfined recreation means non-motorized, dispersed outdoor recreation activities that do not require developed facilities or mechanical transport. These primitive recreation activities may provide opportunities to experience challenge and risk, self-reliance, and adventure.

These two opportunity "elements" are not well defined by the Wilderness Act but in most cases can be expected to occur together. However, an outstanding opportunity for solitude may be present in an area offering only limited primitive recreation potential. Conversely, an area may be so attractive for recreation use that experiencing solitude is not an option.

1. Discussion and Conclusion

The North Unit is currently possesses ample opportunities for solitude or primitive and unconfined recreation, especially in the more interior areas. While not far from human development, the area has the potential to provide visitors with an outstanding wilderness experience. There is a great potential for primitive recreation activities that provide opportunities to experience challenge and risk, self-reliance, and adventure.

The Bevill's Hill Unit provides a good opportunity for solitude or primitive and unconfined recreation due to the remoteness compared to the rest of the acres on the refuge. It is very attractive for recreation use because of the difference in topography and habitat.

The streamside management zone units do not provide a really good opportunity for solitude or primitive and unconfined recreation, because they are small areas strung between other areas that are heavily used for other purposes.

Supplemental Values

Supplemental values are defined by the Wilderness Act as "ecological, geological, or other features of scientific, educational, scenic, or historic value." These values are not required for consideration as a WSA but their presence is documented.

1. Discussion and Conclusion

The North Unit does not have any notable supplemental value.

The diversity of the habitats found in the Bevill's Hill Unit compared to the rest of the refuge is unique in its topography and habitat type. The current habitat consists of loblolly, shortleaf, longleaf pine, and upland hardwood forest with numerous stream side management zones extending down along the unit's topographic draws with more than 200 feet elevation change. The upland hardwood component of this management unit is comprised of primarily white oak, red oak, and mixed pine. The upland hardwood as described is an important and unique ecosystem on the refuge and surrounding lands. The area also contains cultural resources including old home sites, livestock dipping troughs, and a large saw dust pile from saw mills present until the 1950s. These cultural resources are valuable to the public and the refuge as they help to preserve the history of the area.

The streamside management zone units contain numerous cultural resources including saw dust piles from old timber mill sites and archaeological sites that are important to the public as well as the refuge as they help to preserve the history of the area. These areas have a special supplemental value because streamsides contain a diverse array of wildlife and habitat.

Summary

Prior to the acquisition of these lands by the Federal Government in 1935, most of the refuge was cleared and subjected to agricultural crops. The lands within the current refuge were highly eroded characteristic of bare exposed soils, deep ruts, and little wildlife. Thousands of acres were reforested yearly and a Civilian Conservation Corps (CCC) camp created numerous roads, levees, water control structures, and water bodies as part of management for wildlife. Throughout the history of the refuge, active management has played a major role on the land and its habitats. Other than the existing proposed wilderness area, the refuge lands are subjected to active management to meet the purposes for which it was established. Each area considered within

this review has been impacted to differing degrees and for these reasons, the Service finds all federal lands within the Sam D. Hamilton Noxubee NWR that were not proposed Wilderness in 1974 do not meet the minimum criteria as defined by the Wilderness Act and will not be considered further in this CCP for Wilderness designation. The Service will continue to manage the 1,200 acres of proposed wilderness in accordance with 610 FW 1 – 5 and will adjust management accordingly once Congress has made a final decision about designation.

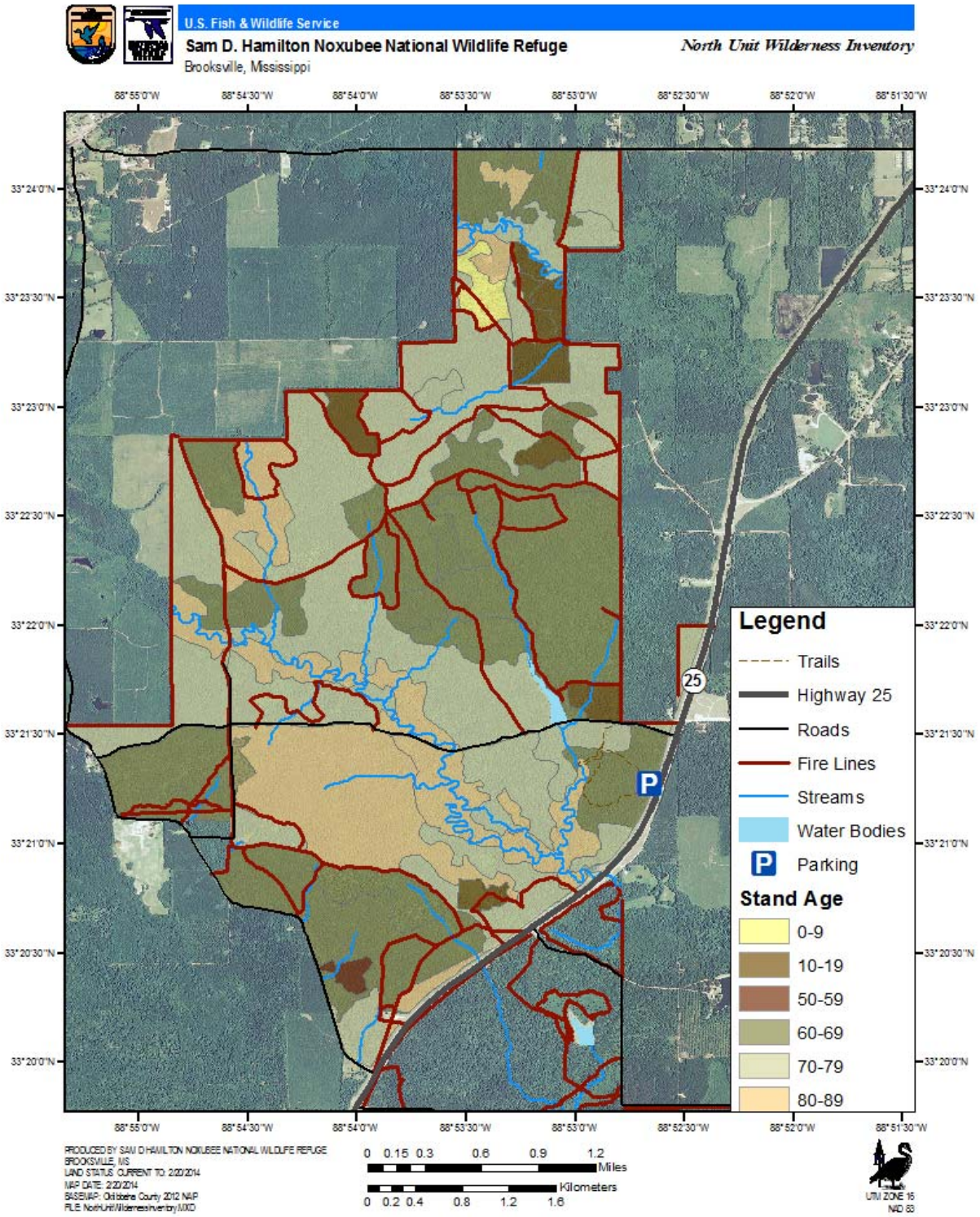


Figure 5: North Unit Wilderness Inventory

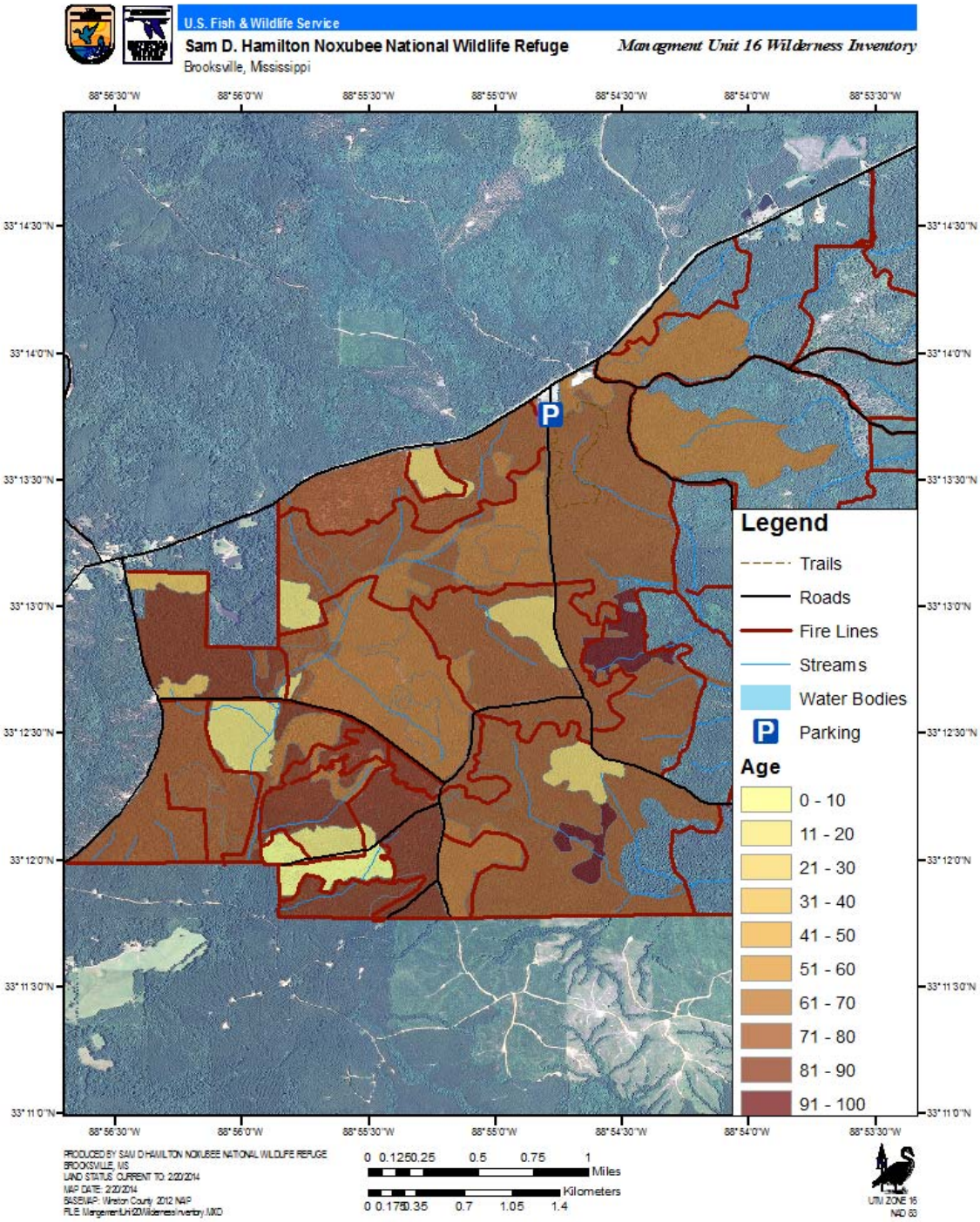


Figure 6: Bevill's Hill Area Wilderness Inventory

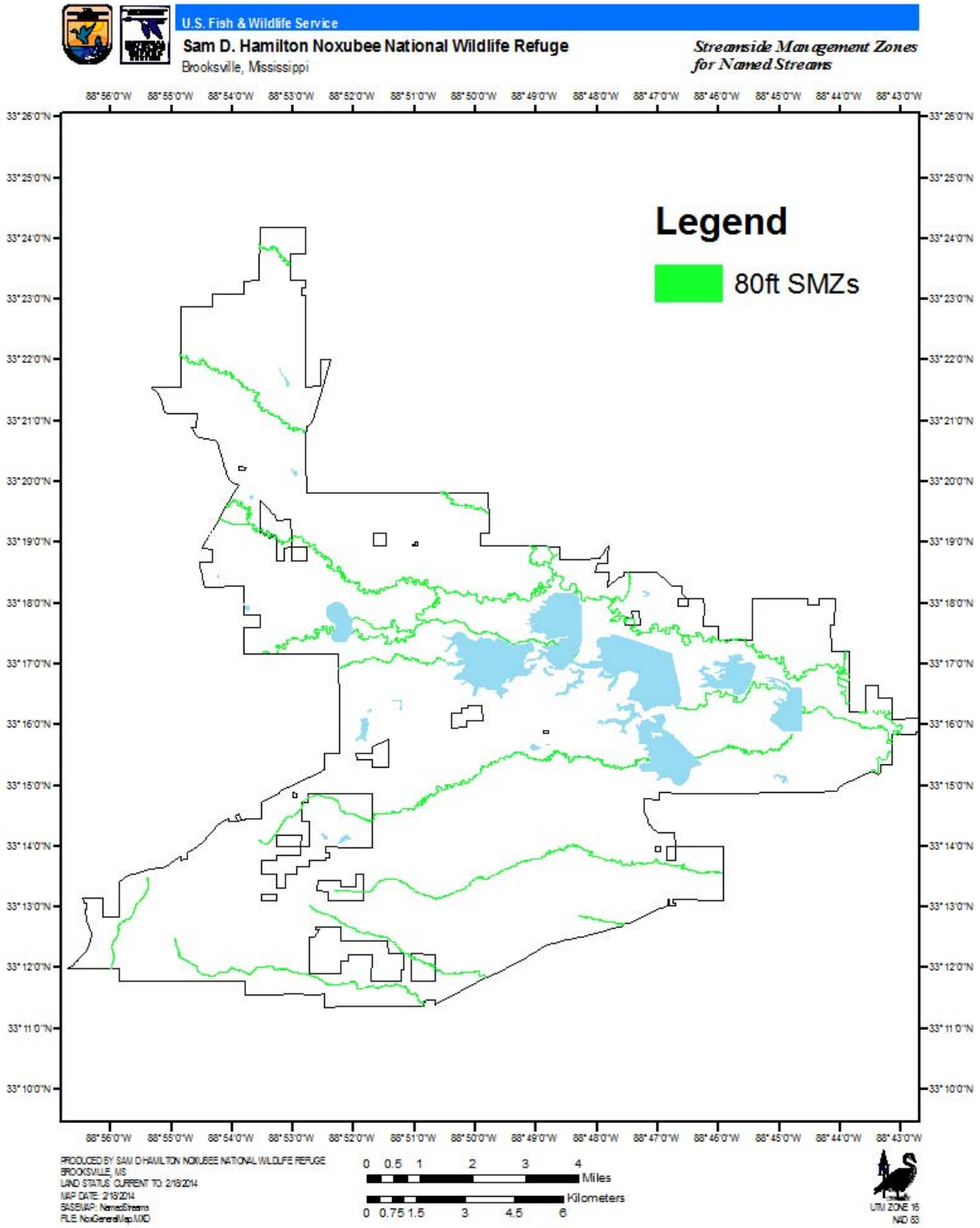


Figure 7: Streamside Management Zones Wilderness Inventory Unit with 80ft buffers on each side

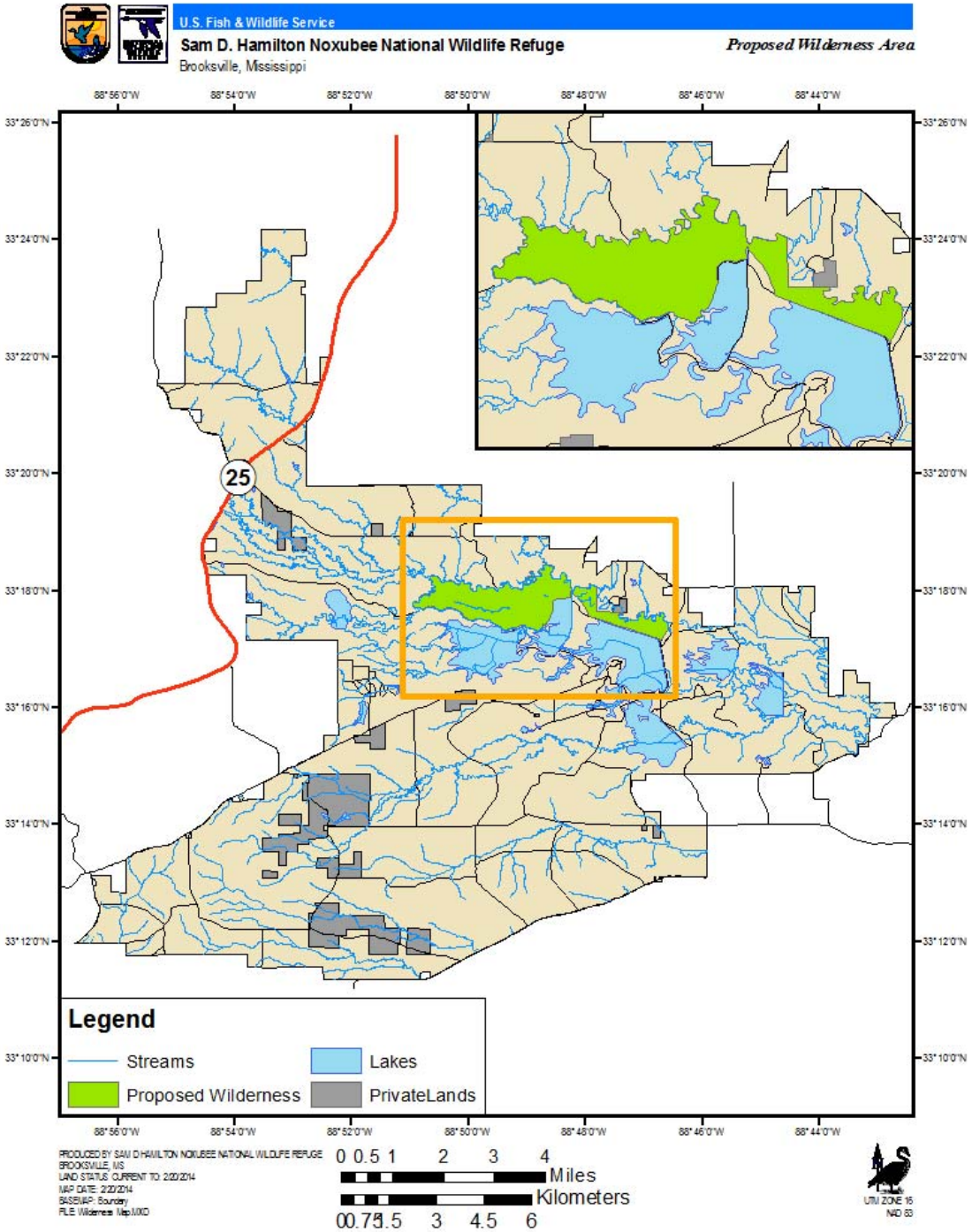


Figure 8: Existing Proposed Wilderness

Appendix I. Refuge Biota

Species	Federal T&E Species	State T&E Species	MS WCS	Scientific Name
Mitchell's Satyr Butterfly	X	X	X	*Neonympha mitchellii*
Alligator, American				*Alligator mississippiensis*
Amphiuma, Three-toed		X	X	*Amphiuma tridactylum*
Anole, Green				*Anolis carolinensis*
Frog, Bronze				*Rana clamitans*
Frog, Bull				*Rana catesbeiana*
Frog, Crawfish				*Rana areolata*
Frog, Eastern Gray Tree				*Hyla versicolor*
Frog, Green				*Lithobates clamitans*
Frog, Green Tree				*Hyla cinerea*
Frog, Northern Cricket				*Acris crepitans*
Frog, Northern Leopard				*Lithobates pipiens*
Frog, Northern Spring Peeper				*Pseudacris crucifer*
Frog, Pickerel				*Rana palustris*
Frog, Southern Cricket				*Acris gryllus*
Frog, Southern Leopard				*Lithobates sphenocephalus*
Frog, Squirrel Tree				*Hyla squirella*
Frog, Upland Chorus				*Pseudacris feriarum*
Frog, Western Bird-voiced Tree				*Hyla avivoca*
Lizard, Eastern Slender Glass			X	*Ophisaurus ventralis*
Lizard, Northern Fence Lizard				*Sceloporus undulatus*
Lizard, Six-lined Racerunner				*Aspidoscelis sexlineata*
Mudpuppy				*Necturus maculosus*
Newt, Broken-striped				*Notophthalmus viridescens dorsalis*
Newt, Central				*Notophthalmus viridescens*
Salamander, Dusky				*Desmognathus fuscus*
Salamander, Eastern Tiger				*Ambystoma tigrinum*
Salamander, Marbled				*Ambystoma opacum*
Salamander, Mississippi Slimy				*Plethodon cylindraceus*
Salamander, Mole				*Ambystoma talpoideum*
Salamander, Red				*Psuedotriton ruber*
Salamander, Siren, Lesser				*Siren intermedia*
Salamander, Smallmouth				*Ambystoma texanum*

Salamander, Southern Longtailed				*Eurycea longicauda longicauda*
Salamander, Southern Red				*Pseudotriton ruber*
Salamander, Southern Two-lined				*Eurycea cirrigera*
Salamander, Spotted				*Ambystoma maculatum*
Salamander, Webster's				*Plethodon websteri*
Skink, Broadhead				*Eumeces laticeps*
Skink, Five-lined				*Eumeces fasciatus*
Skink, Ground (little brown)				*Scincella lateralis*
Skink, Southeastern Five-lined				*Eumeces inexpectatus*
Snake, Black King				*Lampropeltis getula*
Snake, Corn				*Pantherophis guttatus guttatus*
Snake, Diamond-backed Water				*Nerodia rhombifer*
Snake, Eastern Coachwhip				*Masticophis flagellum*
Snake, Eastern Garter				*Thamnophis sirtalis*
Snake, Eastern Hognose				*Heterodon platirhinos*
Snake, Eastern Ribbon				*Thamnophis sauritus sauritus*
Snake, Florida Redbelly				*Storeria occipitomaculata*
Snake, Gray Rat				*Pantherophis spiloides*
Snake, Midland Brown				*Storeria dekayi wrightorum*
Snake, Midland Watersnake				*Nerodia sipedon pleuralis*
Snake, Midwest Worm				*Carphophis amoenus*
Snake, Mole King			X	*Lampropeltis calligaster*
Snake, Northern Red-bellied Water				*Storeria occipitomaculata occipitomaculata*
Snake, Northern Scarlet				*Cemophora coccinea copei*
Snake, Pigmy Rattlesnake				*Sistrurus miliarius*
Snake, Prairie King				*Lampropeltis calligaster calligaster*
Snake, Queen				*Regina sepemvittata*
Snake, Rainbow		X	X	*Farancia erytrogramma*
Snake, Red Milk				*Lampropeltis triangulum syspilia*
Snake, Rough Earth				*Virginia striatula*
Snake, Rough Green				*Opheodrys aestivus*
Snake, Scarlet King				*Lampropeltis triangulum elapsoides*
Snake, Smooth Earth				*Virginia valeriae*
Snake, Southeastern Crowned				*Tantilla coronata*
Snake, Southern Black Racer				*Coluber constricto priapus*
Snake, Southern Copperhead				*Agkistrodon contortrix*
Snake, Southern Ringneck				*Diadophis punctatus punctatus*

Snake, Speckled King				*Lampropeltis getula holbrooki*
Snake, Timber Rattlesnake				*Crotalus horridus*
Snake, Western Cottonmouth				*Agkistrodon piscivorus lecostoma*
Snake, Western Mud				*Farancia abacura reinwardtii*
Snake,Yellowbellied Water				*Nerodia erythrogaster flavigaster*
Toad, American				*Bufo americanus*
Toad, Eastern Narrow-mouthed				*Gastrophryne carolinensis*
Toad, Eastern Spadefoot				*Scaphiopus holbrookii*
Toad, Fowler's				*Anaxyrus fowleri*
Toad, Southern				*Anaxyrus terrestris*
Toad, Woodhouse's				*Bufo woodhousii*
Turtle, Alabama Map/ sawback				*Graptemys pulchra or pseudogeographica*
Turtle, Alligator Snapping			X	*Macrochelys temminckii*
Turtle, Black-knobbed Map		X		*Graptemys nigrinoda*
Turtle, Chicken				*Deirochelys reticularia*
Turtle, Common Snapping				*Chelydra serpentina*
Turtle, Cooter, River				*Pseudemys concinna concinna*
Turtle, Eastern Mud				*Kinosternon subrubrum*
Turtle, Loggerhead Musk				*Sternotherus minor*
Turtle, Red-eared Slider				*Trachemys scripta elegans*
Turtle, Southern Painted				*Crysemys picta*
Turtle, Spiny Softshell				*Apalone spinifera*
Turtle, Stinkpot(common musk)				*Sternotherus odoratus*
Turtle, Three-toed Box				*Terrapene carolina triunguis*
Waterdog, Alabama				*Necturus alabamensis*
Alabama Heelsplitter	X			*Lasmigona alabamensis*
Alabama Hickorynut			X	*Obvaira unicolor*
Alabama Orb				*Quadrula asperata*
Asiatic Clam				*Corbicula fluminea*
Bleufer				*Potamilus purpuratus*
Elephant-ear				*Elliptio crassidens*
Fat Mucket				*Lampsilis claibornensis*
Flat Floater				*Anodonta suborbiculata*
Fragile Papershell				*Leptodea fragilis*
Giant Floater				*Pyganodon grandis*
Gulf Pigtoe				*Fusconaia cerina*
Lilliput				*Toxolasma parvus*

Little Spectaclecase				*Villosa lienosa*
Orange-nacre Mucket	X	X		*Hamiota perovalis*
Pistol Grip				*Tritogonia verrucosa*
Pondhorn				*Uniomerus tetralasmus*
Rayed Creekshell			X	*Anodontoides radiatus*
Ridged Mapleleaf				*Quadrula rumphiana*
Rock Pocketbook				*Arcidens confragosus*
Southern Hickorynut			X	*Obovaria jacksoniana*
Southern Mapleleaf				*Quadrula apiculata*
Southern Pocketbook				*Lampsilis ornat*
Southern Rainbow				*Villosa vibex*
Threehorn Warty Back				*Obliquaria reflexa*
Threeridge				*Amblema plicata*
Washboard				*Megalonaias nervosa*
Yellow Sandshell				*Lampsilis teres*
A Crayfish				*Procambarus hagenianus vesticeps*
A Crayfish				*Hobbseus cristatus*
A Crayfish				*Orconectes mississippiensis*
A Crayfish				*Hobbseus prominens*
A Crayfish			X	*Orconectes jonesi*
A Crayfish			X	*Cambarus girardianus*
Bearded Red Crayfish				*Procambarus pogum*
Lagniappe Crayfish				*Procambarus lagniappe*
Mobile Crayfish			X	*Procambarus lecontei*
Oktibbeha Rivulet Crayfish				*Hobbseus orconectoides*
Tombigbee Crayfish				*Hobbseus petilus*
Bass, Hybrid Striped				*Micropterus salmoides*
Bass, Largemouth				*Ambloplites ariommus*
Bass, Rock				*Ambloplites rupestris*
Bass, Shadow				*Micropterus dolomieu*
Bass, Smallmouth				*Amia calva*
Bowfin				*Ictiobus cyprinellus*
Buffalo, Bigmouth				*Pomoxis nigromaculatus*
Buffalo, Black			X	*Ictiobus niger*
Carp, Common				*Ameiurus melas*
Catfish, Black Bullhead				*Ictalurus furcatus*
Catfish, Blue				*Ictalurus punctatus*
Catfish, Channel				*Pylodictis olivaris*

Catfish, Flathead				*Ameiurus natalis*
Catfish, Yellow Bullhead				*Lepisosteus osseus*
Crappie, Black				*Pomoxis annularis*
Crappie, White				*Cyprinus carpio*
Dace, Southern Redbelly				*Phoxinus erythrogaster*
Darter, Backwater				*Etheostoma zonifer*
Darter, Crystal		X	X	*Crystallaria asprella*
Darter, Freckled			X	*Percina lenticula*
Darter, Harlequin				*Etheostoma histrio*
Darter, Johnny				*Etheostoma nigrum*
Darter, Redfin				*Etheostoma whipplei*
Darter, Rock				*Etheostoma rupestre*
Darter, Southern Sand				*Ammocrypta meridiana*
Darter, Tombigbee				*Etheostoma lachnari*
Drum, Freshwater				*Percina lenticula*
Eel, American				*Anguilla rostrata*
Gar, Longnose				*Lepisosteus oculatus*
Gar, Spotted				*Aplodinotus grunniens*
Herring, Skipjack				*Alosa chrysochloris*
Lamprey, Chestnut			X	*Icthyomyzon castaneus*
Logperch, Mobile				*Percina kathae*
Madtom, Frecklebelly			X	*Noturus munitus*
Madtom, Speckled				*Noturus leptacanthus*
Minnow, Bluntnose				*Pimephales notatus*
Mosquitofish, Western				*Gambusia affinis*
Paddlefish			X	*Polyodon spathula*
Perch, Pirate				*Aphredoderus sayanus*
Pickerel, Chain				*Esox niger*
Redhorse, Blacktail				*Moxostoma poecilurum*
Redhorse, Golden			X	*Moxostoma erythrurum*
Redhorse, River			X	*Moxostoma carinatum*
Redhorse, Shorthead				*Moxostoma macrolepidotum*
Sauger			X	*Sander canadensis*
Shad, Alabama			X	*Alosa alabamae*
Shad, Gizzard				*Dorosoma cepedianum*
Shad, Threadfin				*Dorosoma petenense*
Shiner, Alabama				*Cyprinella callistia*
Shiner, Blackmouth			X	*Notropis melanostomus*
Shiner, Blacktail				*Syprinella venusta*

Shiner, Emerald				*Notropis atherinoides*
Shiner, Fluvial				*Notropis edwardraneyi*
Shiner, Golden				*Notemigonus crysoleucas*
Shiner, Pallid				*Notropis amnis*
Shiner, Pretty				*Lythrurus bellus*
Shiner, Redfin				*Lythrurus umbratilis*
Shiner, Silverside				*Notropis candidus*
Shiner, Weed				*Notropis texanus*
Silverside, Brook				*Labidesthes sicculus*
Silverside, Mississippi				*Menidia audens*
Sucker, Alabama Hog				*Hypentelium etowanum*
Sucker, Southeastern Blue			X	*Cycleptus meridionalis*
Sucker, White				*Catostomus commersonii*
Sunfish, Banded Pygmy				*Elassoma zonatum*
Sunfish, Bluegill				*Lepomis macrochirus*
Sunfish, Green				*Lepomis cyanellus*
Sunfish, Longear				*Lepomis megalotis*
Sunfish, Redear				*Lepomis microlophus*
Sunfish, Spotted				*Lepomis punctatus*
Sunfish, Warmouth				*Lepomis cyanellus*
Topminnow, Blackspotted				*Fundulus olivaceus*
Topminnow, Northern Starhead			X	*Fundulus dispar*
Walleye			X	*Stizostedion vitreum*
Walleye, Southern			X	*Stizostedion sp.*
Bat, Southeastern Myotis			X	*Myotis austroriparius*
Bat, Gray Myotis	X	X	X	*Myotis grisescens*
Bat, Keen's Myotis				*Myotis keenii*
Bat, Indiana Myotis	X	X		*Myotis sodalis*
Bat, Silver Haired				*Lasionycteris noctivagans*
Bat, Eastern Pipistrelle				*Perimyotis subflavus*
Bat, Big Brown				*Eptesicus fuscus*
Bat, Eastern Red				*Lasiurus borealis*
Bat, Hoary				*Lasiurus cinereus*
Bat, Little Brown			X	*Myotis lucifugus*
Bat, Seminole				*Lasiurus seminolus*
Bat, Evening				*Nycticeius humeralis*
Bat, Rafinesque Eastern Big Eared			X	*Plecotus rafinesquii*
Beaver				*Castor canadensis*

Bobcat				*Lynx rufus*
Coyote				*Canis latrans*
Fox, Red				*Vulpes vulpes*
Fox, Gray				*Urocyon cinereoargenteus*
Mink, American				*Neovison vison*
Mole, Eastern				*Scalopus aquaticus*
Mouse, Fulvous Harvest				*Reithrodontomys fulvescens*
Mouse, White footed				*Peromyscus leucopus*
Mouse, Golden				*Ochrotomys nuttalli*
Mouse, House				*Musca domestica*
Mouse, Eastern Harvest				*Reithrodontomys humulis*
Mouse, Oldfield			X	*Peromyscus polionotus*
Mouse, Cotton				*Peromyscus gossypinus*
Muskrat				*Ondatra zibethicus*
Nutria				*Myocastor coypus*
Opossum				*Didelphis virginiana*
Otter, River				*Lontra canadensis*
Pig, Wild				*Sus scrofa*
Rabbit, Swamp				*Sylvilagus aquaticus*
Rabbit, Eastern cottontail				*Sylvilagus floridanus*
Raccoon				*Procyon lotor*
Rat, Eastern Woods				*Neotoma floridana*
Rat, Black				*Rattus rattus*
Rat, Cotton				*Sigmodon hispidus*
Shrew, Least				*Cyrptotis parva*
Shrew, Short-tailed				*Blarina brevicauda*
Shrew, Southeastern				*Sorex longirostris*
Skunk, Striped				*Mephitis mephitis*
Skunk, Spotted				*Spilogale putorius*
Squirrel, Southern Flying				*Glaucomys volans*
Squirrel, Gray				*Sciurus carolinensis*
Squirrel, Fox				*Sciurus niger*
Vole, Pine				*Microtus pinetorum*
Weasel, Long-tailed			X	*Mustela frenata*
White-tailed Deer				*Odocoileus virginianus*
Acadian Flycatcher				*Empidonax virescens*
American Avocet				*Recurvirostra americana*
American Bittern			X	*Botaurus lentiginosus*

American Black Duck			X	*Anas rubripes*
American Coot				*Fulica americana*
American Crow				*Corvus brachyrhynchos*
American Goldfinch				*Spinus tristis*
American Kestrel			X	*Falco sparverius*
American Pipit				*Anthus rubescens*
American Redstart				*Setophaga ruticilla*
American Robin				*Turdus migratorius*
American Tree Sparrow				*Spizella arborea*
American Wigeon				*Anas americana*
American Woodcock			X	*Scolopax minor*
Anhinga			X	*Anhinga anhinga*
Bachman's Sparrow			X	*Peucaea aestivalis*
Bald Eagle		X	X	*Haliaeetus leucocephalus*
Bank Swallow				*Riparia riparia*
Barn Owl			X	*Tyto alba*
Barn Swallow				*Hirundo rustica*
Barred Owl				*Strix varia*
Bay-breasted Warbler				*Dendroica castanea*
Belted Kingfisher				*Megaceryle alcyon*
Bewick's Wren		X	X	*Thryomanes bewickii*
Black Tern				*Chlidonias niger*
Black Vulture				*Coragyps atratus*
Black-and-white Warbler				*Mniotilta varia*
Black-bellied Plover				*Pluvialis squatarola*
Black-billed Cuckoo				*Coccyzus erythropthalmus*
Blackburnian Warbler				*Dendroica fusca*
Black-crowned Night Heron			X	*Nycticorax nycticorax*
Blackpoll Warbler				*Dendroica striata*
Black-throated Blue Warbler				*Dendroica caerulescens*
Black-throated Green Warbler				*Dendroica virens*
Blue Grosbeak				*Passerina caerulea*
Blue Jay				*Cyanocitta cristata*
Blue-gray Gnatcatcher				*Polioptila caerulea*
Blue-winged Teal				*Anas discors*
Blue-winged Warbler				*Vermivora cyanoptera*
Bobolink				*Dolichonyx oryzivorus*
Bonaparte's Gull				*Chroicocephalus philadelphia*
Brewer's Blackbird				*Euphagus cyanocephalus*

Broad-winged Hawk				*Buteo platypterus*
Brown Creeper				*Certhia americana*
Brown Trasher				*Toxostoma rufum*
Brown-headed Cowbird				*Molothrus ater*
Brown-headed Nuthatch			X	*Sitta pusilla*
Buff-breasted Sandpiper				*Tryngites subruficollis*
Bufflehead				*Bucephala albeola*
Canada Goose				*Branta canadensis*
Canada Warbler				*Wilsonia canadensis*
Canvasback				*Aythya valisineria*
Carolina Chickadee				*Poecile carolinensis*
Carolina Wren				*Thrythorus ludovicianus*
Caspian Tern				*Hydroprogne caspia*
Cattle Egret				*Bubulcus ibis*
Cedar Waxwing				*Bombycilla cedrorum*
Cerulean Warbler			X	*Dendroica cerulea*
Chesnut-sided Warbler				*Dendroica pensylvanica*
Chick-will's-widow			X	*Caprimulgus carolinensis*
Chimney Swift				*Chaetura pelagica*
Chipping Sparrow				*Spizella passerina*
Cliff Swallow				*Petrochelidon pyrrhonota*
Common Goldeneye				*Bucephala clangula*
Common Grackle				*Quiscalus quiscula*
Common Loon				*Gavia immer*
Common Moorhen				*Gallinula chloropus*
Common Nighthawk				*Chordeiles minor*
Common Snipe				*Gallinago gallinago*
Common Tern				*Sterna hirundo*
Common Yellowthroat				*Geothlypis trichas*
Connecticut Warbler				*Oporornis agilis*
Cooper's Hawk				*Accipiter cooperii*
Dark-eyed Junco				*Junco hyemalis*
Dickcissel				*Spiza americana*
Double-crested Cormorant				*Phalacrocorax auritus*
Downy Woodpecker				*Picoides pubescens*
Dunlin			X	*Calidris alpina*
Eared Grebe				*Podiceps nigricollis*
Eastern Bluebird				*Sialia sialis*
Eastern Kingbird				*Tyrannus tyrannus*

Eastern Meadowlark				*Sturnella magna*
Eastern Phoebe				*Sayornis phoebe*
Eastern Screech Owl				*Megascops asio*
Eastern Towhee				*Pipilo erythrophthalmus*
Eastern Wood Pewee				*Contopus virens*
European Starling				*Sturnus vulgaris*
Evening Grosbeak				*Coccothraustes vespertinus*
Field Sparrow				*Spizella pusilla*
Fish Crow				*Corvus ossifragus*
Fox Sparrow				*Passerella iliaca*
Fulvous Whistling-Duck				*Dendrocygna bicolor*
Gadwall				*Anas strepera*
Glossy Ibis				*Plagadis falcinellus*
Golden Eagle				*Aquila chrysaetos*
Golden-crowned Kinglet				*Regulus satrapa*
Golden-winged Warbler				*Vermivora chrystoptera*
Grasshopper Sparrow				*Ammodramus savannarum*
Gray Catbird				*Dumetella carolinensis*
Gray-cheecked Thrush				*Catharus minimus*
Great Blue Heron				*Ardea herodias*
Great Crested Flycatcher				*Myiarchus crinitus*
Great Egret				*Ardea alba*
Great Horned Owl				*Bubo virginianus*
Greater White-Fronted Goose				*Anser albifrons*
Greater Yellowlegs				*Tringa melanoleuca*
Green Heron				*Butorides virescens*
Green-winged Teal				*Anas carolinensis*
Hairy Woodpecker				*Picoides villosus*
Henslow's Sparrow			X	*Ammodramus henslowii*
Hermit Thrush				*Catharus guttatus*
Herring Gull				*Larus argentatus*
Hooded Merganser				*Lophodytes cucullatus*
Hooded Warbler				*Wilsonia citrina*
Horned Grebe				*Podiceps gallardoi*
House Finch				*Carpodacus mexicanus*
House Sparrow				*Passer domesticus*
House Wren				*Troglodytes aedon*
Indigo Bunting				*Passerina cyanea*
Kentucky Warbler			X	*Oporornis formosus*

Killdeer				*Charadrius vociferus*
King Rail			X	*Rallus elegans*
Lark Sparrow				*Chondestes grammacus*
Le Conte's Sparrow			X	*Ammodramus leconteii*
Least Bittern			X	*Ixobrychus exilis*
Least Flycatcher				*Empidonax minimus*
Least Sandpiper				*Calidris minutilla*
Lesser Scaup			X	*Aythya affinis*
Lesser Yellowlegs				*Tringa flavipes*
Lincoln's Sparrow				*Melospiza lincolnii*
Little Blue Heron			X	*Egretta caerulea*
Loggerhead Shrike			X	*Lanius ludovicianus*
Long-billed Dowitcher				*Limnodromus scolopaceus*
Louisiana Waterthrush			X	*Parkesia motacilla*
Magnolia Warbler				*Dendroica magnolia*
Mallard				*Anas platyrhynchos*
Marsh Wren				*Cistothorus palustris*
Mourning Dove				*Zenaida macroura*
Mourning Warbler				*Oporornis philadelphia*
Nashville Warbler				*Vermivora reficapilla*
Northern Bobwhite			X	*Colinus virginianaus*
Northern Cardinal				*Cardinalis cardinalis*
Northern Flicker				*Colaptes auratus*
Northern Harrier				*Circus cyaneus*
Northern Mockingbird				*Mimus polyglottos*
Northern Oriole				*Icterus galbula*
Northern Parula				*Parula americana*
Northern Pintail			X	*Anas acuta*
Northern Shoveler				*Anas clypeata*
Northern Waterthrush				*Parkesia noveboracensis*
Nothern Rough-winged Swallow				*Stelgidopteryx serripennis*
Oldsquaw/ Long-tailed Duck				*Clangula hyemalis*
Olive-sided Flycatcher				*Contopus cooperi*
Orange-crowned Warbler				*Vermivora celata*
Orchard Oriole				*Icterus spurius*
Osprey			X	*Pandion haliaetus*
Ovenbird				*Seiurus aurocapillus*
Palm Warbler				*Dendroica palmarum*
Pectoral Sandpiper				*Calidris melanotos*

Philadelphia Vireo				*Vireo philadelphicus*
Pied-billed Grebe				*Podilymbus podiceps*
Pileated Woodpecker				*Dryocopus pileatus*
Pine Siskin				*Carduelis pinus*
Pine Warbler				*Dendroica pinus*
Piping Plover		X	X	*Charadrius melodus*
Prairie Warbler			X	*Dendroica discolor*
Prothonotary Warbler			X	*Protonotaria citrea*
Purple Finch				*Carpodacus purpureus*
Purple Gallinule			X	*Porphyrio martinica*
Purple Martin				*Progne subis*
Red Crossbill				*Loxia curvirostra*
Red-bellied Woodpecker				*Melanerpes carolinus*
Red-breasted Mergranser				*Mergus serrator*
Red-breasted Nuthatch				*Sitta canadensis*
Red-cockaded Woodpecker	X	X	X	*Picoides borealis*
Red-eyed Vireo				*Vireo olivaceus*
Redhead				*Aythya americana*
Red-headed Woodpecker			X	*Melanerpes erythrocephalus*
Red-shouldered Hawk				*Buteo lineatus*
Red-tailed Hawk				*Buteo jamaicensis*
Red-winged Blackbird				*Agelaius phoeniceus*
Ring-billed Gull				*Larus delawarensis*
Ring-necked Duck				*Aythya collaris*
Roseate Spoonbill				*Ajaja ajaja*
Rose-breasted Grosbeak				*Pheucticus ludovicianus*
Ruby-crowned Kinglet				*Regulus calendula*
Ruby-throated Hummingbird				*Archilochus colubris*
Ruddy Duck				*Oxyura jamaicensis*
Rusty Blackbird			X	*Euphagus carolinus*
Sanderling				*Caldris alba*
Savannah Sparrow				*Passerculus sandwichensis*
Scarlet Tanager			X	*Piranga olivacea*
Sedge Wren				*Cistothorus plantensis*
Semipalmated Plover				*Charadrius semipalmatus*
Semipalmated Sandpiper				*Calidris pusilla*
Sharp-shinned Hawk				*Accipiter striatus*
Sharp-tailed Sparrow				*Ammodramus caudacutus*
Short-billed Dowitcher				*Limnodromus griseus*

Short-eared Owl			X	*Asio flammeus*
Snow Goose				*Chen caerulescens*
Snowy Egret			X	*Egretta thula*
Solitary Sandpiper				*Tringa solitaria*
Solitary Vireo				*Vireo cassinii*
Song Sparrow				*Melospiza melodia*
Sora				*Porzana carolina*
Spotted Sandpiper				*Actitis macularius*
Stilt Sandpiper				*Calidris himantopus*
Summer Tanager				*Piranga rubra*
Surf Scoter				*Melanitta perspicillata*
Swainson's Thrush				*Catharus ustulatus*
Swainson's Warbler			X	*Limnothlypis swainsonii*
Swamp Sparrow				*Melospiza georgiana*
Tennessee Warbler				*Oreothlypis peregrina*
Tree Swallow				*Tachycineta bicolor*
Tricolored Heron			X	*Egretta tricolor*
Tufted Titmouse				*Baeolophus bicolor*
Tundra Swan				*Cygnus columbianus*
Turkey Vulture				*Cathartes aura*
Veery				*Cathartes fuscescens*
Vesper Sparrow				*Pooecetes gramineus*
Virginia Rail				*Rallus limicola*
Warbling Vireo				*Vireo gilvus*
Western Sandpiper				*Calidris mauri*
Whip-poor-will				*Caprimulgus vociferus*
White Ibis			X	*Eudocimus albus*
White Pelican			X	*Pelecanus erythrorhynchos*
White-breasted Nuthatch				*Sitta carolinensis*
White-crowned Sparrow				*Zonotrichia leucophrys*
White-eyed Vireo				*Vereo griseus*
White-rumped Sandpiper				*Calidris fuscicollis*
White-throated Sparrow				*Zonotrichia albicollis*
Wild Turkey				*Meleagris gallopavo*
Willow Flycatcher				*Empidonax traillii*
Wilson's Warbler				*Wilsonia pusilla*
Winter Wren				*Troglodytes hiemalis*
Wood Duck				*Aix sponsa*
Wood Stork	X	X	X	*Mycteria americana*

Wood Thrush			X	*Hylocichla mustelina*
Worm-eating Warbler			X	*Helmitheros vermivorum*
Yellow Warbler				*Dendroica petechia*
Yellow-bellied Sapsucker				*Sphyrapicus varius*
Yellow-billed Cuckoo				*Coccyzus americanus*
Yellow-breasted Chat				*Icteria virens*
Yellow-crowned Night-Heron			X	*Nyctanassa violacea*
Yellow-rumped Warbler				*Dendroica coronata*
Yellow-throated Vireo				*Vireo flavifrons*
Yellow-throated Warbler				*Dendroica dominca*
Price's Potato-bean	X	X	X	*Apios priceana*
Blackfoot Quillwort			X	*Isoetes melanopoda*

Appendix J. Budget Requests

The refuge's budget requests are contained in the Refuge Operating Needs System (RONS) and Service Asset and Maintenance Management System (SAMMS) databases that include a wide variety of new and maintenance refuge projects. The RONS and SAMMS lists are constantly updated and include priority projects. Contact the refuge for the most current RONS and SAMMS lists. Please refer to Chapter V, Plan Implementation, for the key budget requests associated with the proposed projects and staffing. Chapter V includes the proposed projects, which are linked to the applicable objectives, and Table 7, which identifies staff, first-year costs, and recurring costs for the outlined projects.

Appendix K. List of Preparers

- Dr. Steven Reagan, USFWS, Project Leader, Sam D. Hamilton Noxubee and Choctaw NWR
- Kimberly Sykes, USFWS, Deputy Manager, Sam D. Hamilton Noxubee and Choctaw NWR
- Michelle Paduani, USFWS, Natural Resource Planner
- Laura Housh, USFWS, Natural Resource Planner
- Andrea Dunstan, USFWS, Sam D. Hamilton Noxubee NWR, Visitor Services
- Richard Campbell, USFWS, Private John Allen NFH, Project Leader
- Kathy Lunceford, USFWS, Ecological Services, Biologist
- Beverly Smith, Starkville School District, Entomologist/Naturalist
- Randy Wilson, USFWS, Migratory Birds, Project Leader
- Dave Godwin, MDWFP, Biologist
- Dr. James Martin, Mississippi State University, Department of Wildlife, Fisheries, and Aquaculture

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August 2014