DRAFT COMPREHENSIVE CONSERVATION PLAN
AND ENVIRONMENTAL ASSESSMENT

RED RIVER NATIONAL WILDLIFE REFUGE

Caddo, Bossier, DeSoto, Red River, and Natchitoches Parishes, Louisiana

U.S. Department of the Interior
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TABLE OF CONTENTS

SECTION A. DRAFT COMPREHENSIVE CONSERVATION PLAN

APPENDICES

LIST OF FIGURES

LIST OF TABLES

SECTION A. DRAFT COMPREHENSIVE CONSERVATION PLAN

I. Background

INTRODUCTION

The U.S. Fish and Wildlife Service (Service) has developed this Draft Comprehensive Conservation Plan to guide the management actions and direction for Red River National Wildlife Refuge in northwestern Louisiana. 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.

A planning team developed a range of alternatives that best meet the goals and objectives of the refuge and that could be implemented within the 15-year planning period. This Draft Comprehensive Conservation Plan and its associated Environmental Assessment (Section B) describe the Service's proposed plan, as well as the other alternatives considered and their potential effects on the environment. Both the draft plan and environmental assessment are being made available to state and federal government agencies, conservation partners, and the general public for review and comment. All public comments will be considered in the development of the final plan.

PURPOSE AND NEED FOR THE PLAN

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

Specifically, the plan is needed to:

- provide a clear statement of refuge management direction;
- provide refuge neighbors, visitors, and government officials with an understanding of Service management actions on and around the refuge;
- ensure that the Service's management actions, including land protection and recreation/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.

U.S. FISH AND WILDLIFE SERVICE

The Service traces its roots to 1871 through the establishment of the Commission of Fisheries involved with research and fish culture. This 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 with the establishment of a Division of Economic Ornithology and Mammalogy in the Department of Agriculture. Research on the relationship of birds and animals to agriculture shifted to delineation of the range of plants and animals, so the name was changed to the Division of the Biological Survey in 1896.

The Department of Commerce, Bureau of Fisheries, was combined with the Department of Agriculture, Bureau of Biological Survey, on June 30, 1940, and transferred to the Department of the Interior as the Fish and Wildlife Service. The name was changed to the Bureau of Sport Fisheries and Wildlife in 1956 and finally to the Fish and Wildlife Service in 1974.

The Fish and Wildlife Service, working with others, is responsible for conserving, protecting, and enhancing fish and wildlife and their habitats for the continuing benefit of the American people through federal programs relating to migratory birds, endangered species, interjurisdictional fish and marine mammals, and inland sport fisheries.

As part of its mission, the Service manages more than 540 national wildlife refuges covering over 95 million acres. These areas comprise the National Wildlife Refuge System, the world's largest collection of lands set aside specifically for fish and wildlife. The majority of these lands, 77 million acres, are in Alaska. The remaining acres are spread across the other 49 states and several United States territories. In addition to refuges, the Service manages thousands of small wetlands, national fish hatcheries, 64 fishery resource offices, and 78 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; and helps foreign governments with their conservation efforts. It also oversees the Federal Aid program that 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 established, for the first time, a clear legislative mission of wildlife conservation for the National Wildlife 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 resources and recreation/education programs. Consistent with this Act, approved plans will serve as the guidelines for refuge management for the next 15 years. The Act states that each refuge shall be managed to:

- fulfill the mission of the National Wildlife 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; and
- recognize that wildlife-dependent recreation activities including hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation are legitimate and priority public uses; and
- provide refuge managers with the authority to determine compatible public uses.

The following illustrate a few examples of the Service's 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 and the brown pelican. Western refuges were established for American bison (1906), elk (1912), prong-horned antelope (1931), and desert bighorn sheep (1936) after overhunting, competition with cattle, and natural disasters decimated the once-abundant herds. The drought conditions of the Dust Bowl during the 1930s severely depleted breeding populations of ducks and geese. Refuges established during the Depression focused on waterfowl production areas (i.e., protection of prairie wetlands in America's heartland). The emphasis on waterfowl continues today but also includes protection of wintering habitat in response to a dramatic loss of bottomland hardwoods. By 1973, the Service had begun to focus on establishing refuges for endangered species.

Approximately 38 million people visited national wildlife refuges in 2002, most to observe wildlife in their natural habitats. As the number of visitors grows, there are significant economic benefits to local communities. In 2001, 82 million people, 16 years and older, fished, hunted, or observed wildlife, generating $108 billion. In a study completed in 2002 on 15 refuges, visitation had grown 36 percent in seven years. At the same time, the number of jobs generated in surrounding communities grew to 120 per refuge, up from 87 jobs in 1995, pouring more than $2.2 million into local economies. The 15 refuges in the study were Chincoteague (Virginia); National Elk (Wyoming); Crab Orchard (Illinois); Eufaula (Alabama); Charles M. Russell (Montana); Umatilla (Oregon); Quivira (Kansas); Mattamuskeet (North Carolina); Upper Souris (North Dakota); San Francisco Bay (California); Laguna Atacosa (Texas); Horicon (Wisconsin); Las Vegas (Nevada); Tule Lake (California); and Tensas River (Louisiana), the same refuges identified for the 1995 study. Other findings also validate the belief that communities near refuges benefit economically. Expenditures on food, lodging, and transportation grew to $6.8 million per refuge, up 31 percent from $5.2 million in 1995. For each dollar spent on the Refuge System, surrounding communities benefited with $4.43 in recreation expenditures and $1.42 in job-related income.

Volunteers continue to be a major contributor to the success of the Refuge System. In 2002, volunteers contributed more than 1.5 million hours on refuges nationwide, a service valued at more than $22 million.

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

The National Wildlife Refuge System Improvement Act of 1997 stipulates that comprehensive conservation plans be prepared in consultation with adjoining federal, state, and private landowners and that the Service develop and implement a process to ensure an opportunity for active public involvement in the preparation and revision (every 15 years) of the plans.

All lands of the Refuge System will be managed in accordance with an approved comprehensive conservation plan that will guide management decisions and set forth strategies for achieving refuge unit purposes. The plan will be consistent with sound resource management principles, practices, and legal mandates, including Service compatibility standards and other Service policies, guidelines, and planning documents.

Legal Mandates, Administrative and Policy Guidelines, and Other Special Considerations

Administration of national wildlife refuges is guided by the mission and goals of the National Wildlife 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. Appendix C provides selected legal summaries of the treaties and laws relevant to the administration of the National Wildlife Refuge System and the management of Red River National Wildlife Refuge.

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 Red River National Wildlife Refuge and its partners, such as the Louisiana Department of Wildlife and Fisheries, Natural Resource Conservation Service, The Nature Conservancy, Ducks Unlimited, and private landowners.

Lands within the National Wildlife Refuge System are closed to 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 the Refuge System or the purposes of the refuge. All programs and uses must be evaluated based on the mandates set forth in the National Wildlife Refuge System Improvement Act. Those mandates are to:

- contribute to ecosystem goals, as well as refuge purposes and goals;
- conserve, manage, and restore fish, wildlife, and plant resources and their habitats;
- monitor the trends of fish, wildlife, and plants;
- manage and ensure appropriate visitor uses 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 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 of the Refuge System, they receive priority consideration over other public uses in planning and management.

Biological Integrity, Diversity, and Environmental Health Policy

The National Wildlife Refuge System 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 habitats found on the refuges and their associated ecosystems. When evaluating the appropriate management direction for refuges, refuge managers will use sound professional judgment to determine their refuge's contribution to biological integrity, diversity, and environmental health at multiple landscape scales. Sound professional judgment incorporates field experience, knowledge of refuge resources, the role of the refuge within an ecosystem, applicable laws, and best available science, including consultation with others both inside and outside the Service.

Multiple partnerships have been developed among government and private entities to address the environmental problems affecting 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 comprehensive conservation plan.

This draft plan 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.

North American Bird Conservation Initiative

Started in 1999, the North American Bird Conservation Initiative is a coalition of government agencies, private organizations, academic institutions, and private industry leaders in the United States, Canada, and Mexico working to ensure the long-term health of North America's native bird populations by fostering an integrated approach to bird conservation for the benefit of all birds in all habitats. The four international and national bird initiatives include the North American Waterfowl Management Plan; Partners in Flight; Waterbird Conservation for the Americas; and the U.S. Shorebird Conservation Plan.

North American Waterfowl Management Plan

The North American Waterfowl Management Plan is an international action plan to conserve migratory birds throughout the continent. The plan's goal is to return waterfowl populations to the levels that were present during the 1970s by conserving wetland and upland habitat. Canada and the United States signed the plan in 1986 in reaction to critically low numbers of waterfowl. Mexico joined in 1994, making it a truly continental effort. The plan is a partnership of federal, provincial, state, and municipal governments, nongovernmental organizations, private companies, and many individuals, all working towards achieving better wetland habitat for the benefit of migratory birds, other wetland-associated species, and people. Plan projects are international in scope, but implemented at regional levels. These projects contribute to the protection of habitat and wildlife species across the North American landscape.

Partners in Flight Bird Conservation Plan

Managed as part of the Partners in Flight Plan, the West Gulf Coastal Plain physiographic area represents a scientifically based land bird conservation planning effort that ensures long-term maintenance of healthy populations of native land birds, primarily nongame land birds. Nongame land birds have been vastly under-represented in conservation efforts, and many are exhibiting significant declines. The Partners in Flight Plan is voluntary and nonregulatory, and focuses on relatively common species in areas where conservation actions can be most effective, rather than the frequent local emphasis on rare and peripheral populations.

Partners in Flight has developed bird conservation plans by bird conservation regions that set conservation priorities and habitat and population objectives. Habitats found on the Red River National Wildlife Refuge and associated bird species that are considered a priority in the West Gulf

Coastal Plain include (for bottomland hardwood forest) the swallow-tailed kite, Swainson's warbler, prothonotary warbler, white-eyed vireo, yellow-billed cuckoo and red-headed woodpecker.

U.S. Shorebird Conservation Plan

The U.S. Shorebird Conservation Plan is a partnership effort throughout the United States to ensure that stable and self-sustaining populations of shorebird species are restored and protected. The plan was developed by a wide range of agencies, organizations, and shorebird experts for separate regions of the country, and identifies conservation goals, critical habitat conservation needs, key research needs, and proposed education and outreach programs to increase awareness of shorebirds and the threats they face.

Red River National Wildlife Refuge is included in the Lower Mississippi/Western Gulf Coast Shorebird Planning Region and Bird Conservation Region. This plan recommends that public lands provide as much fall shorebird habitat as possible to meet the goal of 520 hectares of fall habitat in Louisiana. The Red River Valley's importance to shorebirds is high and the following species are considered high priority for the region: piping plover, American golden-plover, marbled godwit, ruddy turnstone, red knot, sanderling, buff-breasted sandpiper, American woodcock and Wilson's phalarope.

North American Waterbird Conservation Plan

The North American Waterbird Conservation Plan provides a framework for the conservation and management of 210 species of waterbirds in 29 nations. Threats to waterbird populations include destruction of inland and coastal wetlands, introduced predators and invasive species, pollutants, mortality from fisheries and industries, disturbance, and conflicts arising from abundant species. Particularly important habitats of the southeast region include pelagic areas, marshes, forested wetlands, and barrier and sea island complexes. Fifteen species of waterbirds are federally listed, including breeding populations of wood storks, Mississippi sandhill cranes, whooping cranes, interior least terns, and Gulf Coast populations of brown pelicans. A key objective of this plan is the standardization of data collection efforts to better recommend effective conservation measures.

RELATIONSHIP TO STATE WILDLIFE AGENCY

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

The Louisiana Department of Wildlife and Fisheries (LDWF) is a state-partnering agency with the Service, charged with managing state natural resources and approximately 1.4 million acres of coastal marshes and wildlife management areas. The LDWF coordinates the state's wildlife conservation program and provides public recreation opportunities on state wildlife management areas. The state's participation and contribution throughout this comprehensive conservation planning process provides for ongoing opportunities and open dialogue to improve the ecological health and diversity of fish and wildlife. A vital part of the comprehensive planning process is the integrating of common mission objectives where appropriate.

In 2005, the LDWF published a Comprehensive Wildlife Conservation Strategy (CWCS). The components or steps of the CWCS are as follows:

1. Assess the distribution and abundance of wildlife species, including rare and declining species that are indicative of the diversity and health of the State's wildlife.

2. Describe the location and relative condition of key habitats and community types essential to conservation of these species.

3. Identify problems that adversely affect these species and habitats as well as research and survey efforts needed to address these problems.

4. Identify conservation actions needed to conserve these species and habitats, and priorities for implementing these actions.

5. Develop plans for monitoring these species and habitats, monitoring the effectiveness of conservation actions, and adapting conservation actions to respond to new information or changing conditions.

6. Develop procedures to review the conservation strategy at intervals not to exceed ten years.

7. Coordinate plan development and implementation with federal, state, and local governments and other organizations that manage significant areas of the state or administer wildlife conservation programs.

8. Encourage public participation in the development, revision, and implementation of the conservation strategy.

II. Refuge Overview

INTRODUCTION

Red River National Wildlife Refuge is a unit of the North Louisiana Refuges Complex (Figure 1). This Complex includes the D'Arbonne, Upper Ouachita, Black Bayou Lake, Handy Brake, and Red River national wildlife refuges and the Service's Louisiana Wetlands Management District. Each refuge has its own unique issues that will require separate planning efforts and public involvement.

The Red River National Wildlife Refuge, stretching 120 miles along the Red River Valley from Colfax, Louisiana near its southern boundary to the Arkansas state line, will play an important role regionally in fulfilling the goals of the National Wildlife Refuge System. Its proximity to a major metropolitan center will afford the public the ability to participate in educational opportunities that promote wildlife stewardship.

REFUGE HISTORY AND PURPOSE

On October 13, 2000, House Resolution 4318, the Red River National Wildlife Refuge Act, was signed into law (Public Law 106-300). This legislation authorized the establishment of the Red River National Wildlife Refuge to provide for the restoration and conservation of fish and wildlife habitats in the Red River Valley ecosystem in northwest Louisiana. The legislation that established the refuge stated that the refuge shall consist of up to 50,000 acres of federal lands, waters, and interests therein within the boundaries of Colfax, Louisiana to the Arkansas State line (Figure 2). Currently, the refuge has acquired less than a fifth of the allowed 50,000 acres. The legislation allowed that when the U.S. Fish and Wildlife Service acquired sufficient property within these boundaries to constitute an area that could be effectively managed as a national wildlife refuge, then the establishment of the refuge would take effect. Sufficient property was acquired and the refuge was established on August 22, 2002, with the initial purchase of 1,377 acres in the Spanish Lake Lowlands Focus Area at a cost of one million dollars.

To guide land acquisition efforts, the Service identified four focus areas plus an additional area to establish a proposed headquarters and visitor center site, within the approved selection areas. These four units comprise the refuge, with a Headquarters Unit near the Shreveport and Bossier City area. The focus areas include Lower Cane River (Natchitoches Parish); Spanish Lake Lowlands (Natchitoches Parish); Bayou Pierre Floodplain (DeSoto and Red River parishes); and Wardview (Caddo and Bossier parishes). Figure 2 illustrates these locations.

The purposes for which the refuge was established are as follows:

1. To provide for the restoration and conservation of native plants and animal communities on suitable sites in the Red River basin, including restoration of extirpated species;

2. To provide habitat for migratory birds; and

3. To provide technical assistance to private landowners in the restoration of their lands for the benefit of fish and wildlife (114 Stat. 1056, dated October 13, 2000).

According to legislation, the refuge shall consist of up to 50,000 acres from the Headquarters Unit and four focus areas within a selection area covering 220,000 acres. Currently, the Service has acquired 9,787.90 acres and has 40,212.08 acres remaining to purchase. The lands within the five

Figure 1. North Louisiana National Wildlife Refuge Complex.

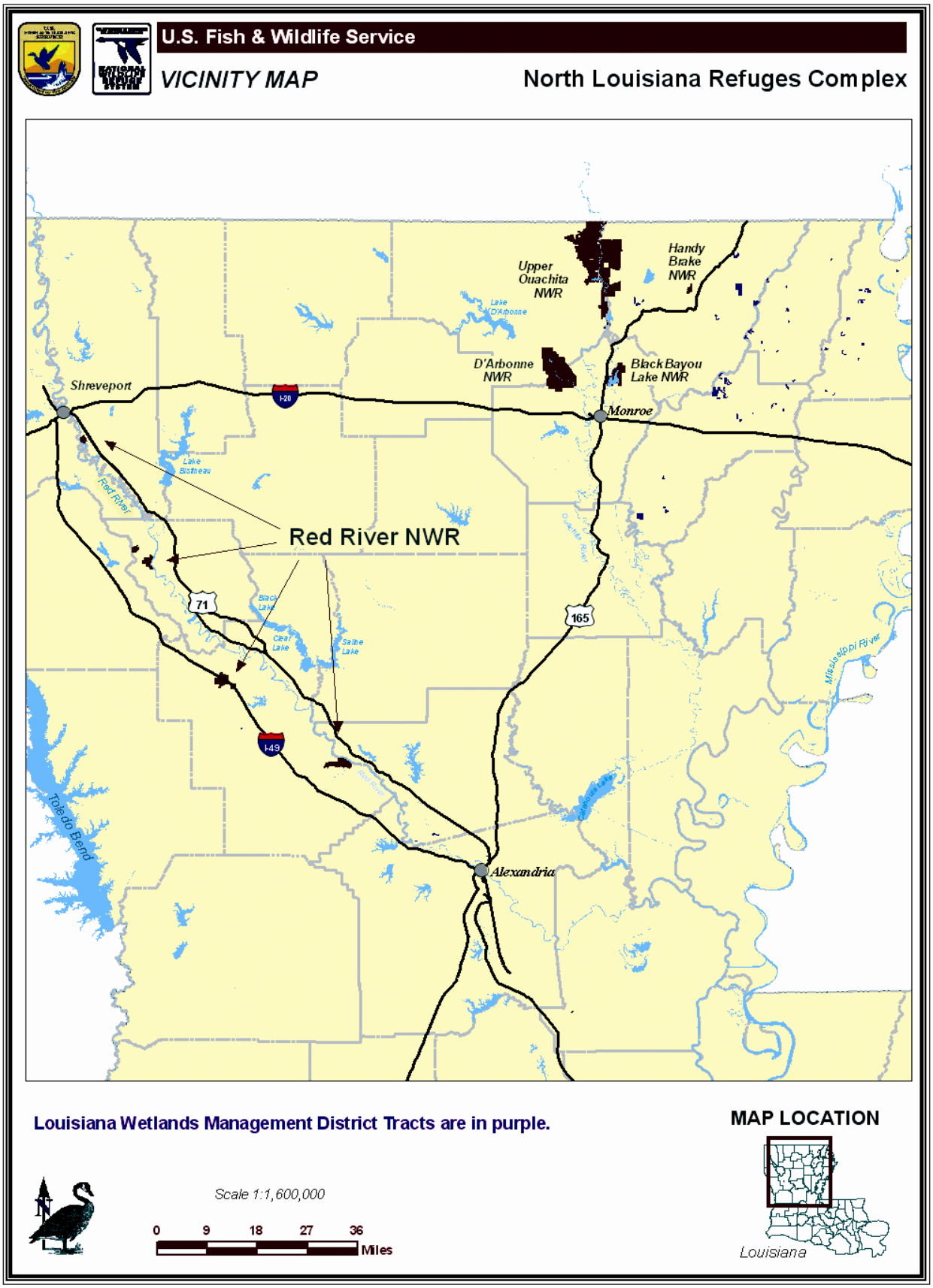
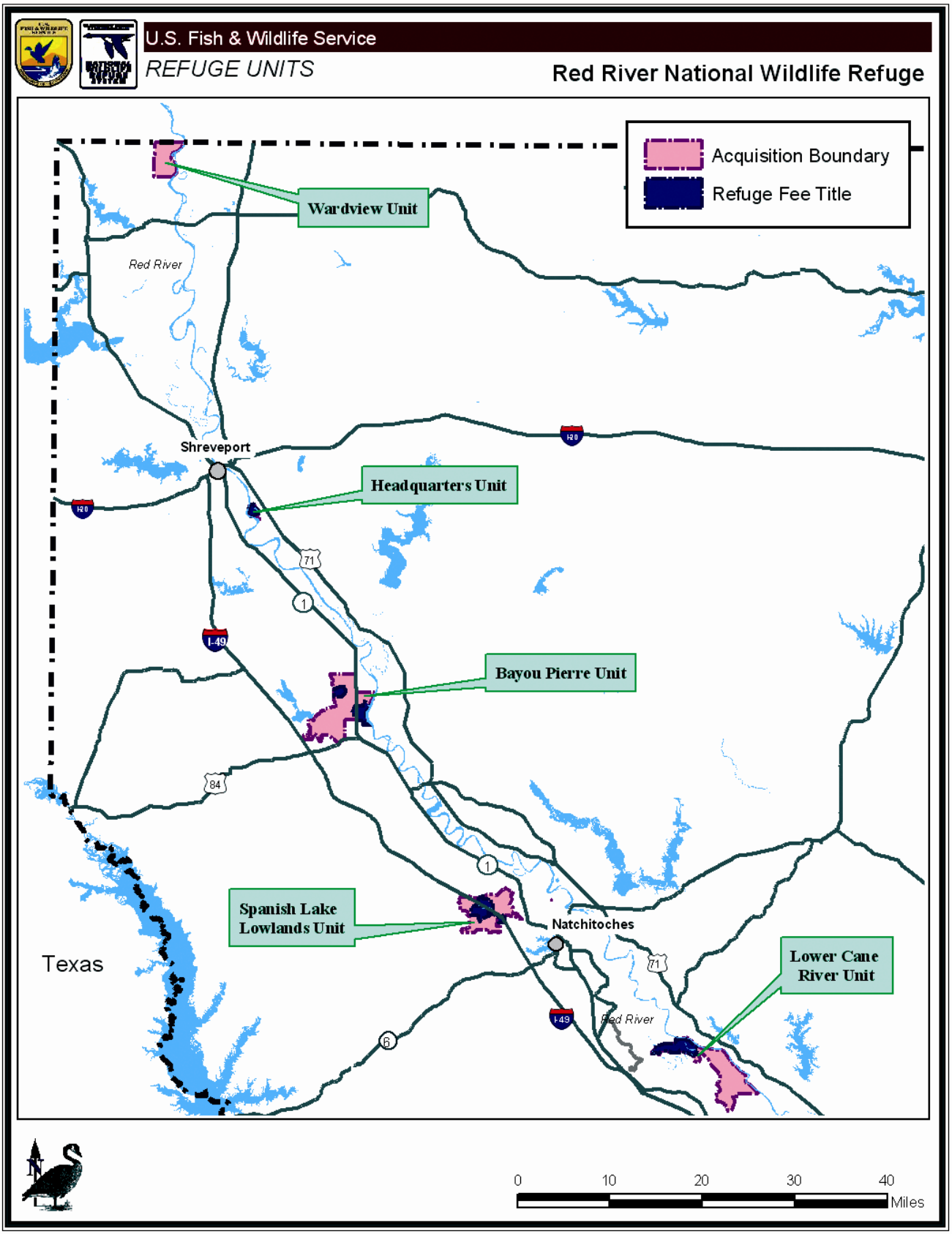


Figure 2. General location, Red River National Wildlife Refuge.



units (the Wardview, Headquarters, Spanish Lake Lowlands, Bayou Pierre, and Lower Cane River focus areas) will be acquired through a combination of fee title purchases from willing sellers and conservation easements, leases, and/or cooperative agreements from willing landowners. Currently, fee title lands have been purchased within portions of all the focus areas except Wardview.

Historically, the Red River Valley was forested with bottomland hardwoods, cypress sloughs, and shrub swamps. After the Louisiana Purchase in 1803, early settlers began to clear these areas for farms and homesteads. This forest clearing rapidly accelerated in the 1960s and 1970s with the rise in soybean prices. During the last three decades, the Red River Valley was used extensively for agricultural production. The river itself was very turbid due to seasonal fluctuation and agricultural runoff. The resulting wildlife and fishery habitats were poor compared to those in other parts of the state.

In 1964, Congress authorized construction of the Red River Waterway Project. This project, completed in 1994, consists of five lock and dam complexes located between the Old River Lock on the Mississippi River to a point just south of Shreveport and Bossier City. The river's water levels are now higher and more constant, which has greatly reduced turbidity. Higher seasonal retention of water and improved water quality has resulted in a rich diversity of aquatic plants.

Programs administered by the United States Department of Agriculture (USDA), such as the Wetlands Reserve Program (WRP) and Conservation Reserve Program (CRP), are restoring valuable wildlife habitats through the reforestation of previously converted wetlands and highly erodible lands in the Red River Valley. Changes in agricultural practices have also resulted in an increase in rice production and migratory bird habitat.

SPECIAL DESIGNATIONS

The refuge does not include any special designation sites such as Research Natural Areas.

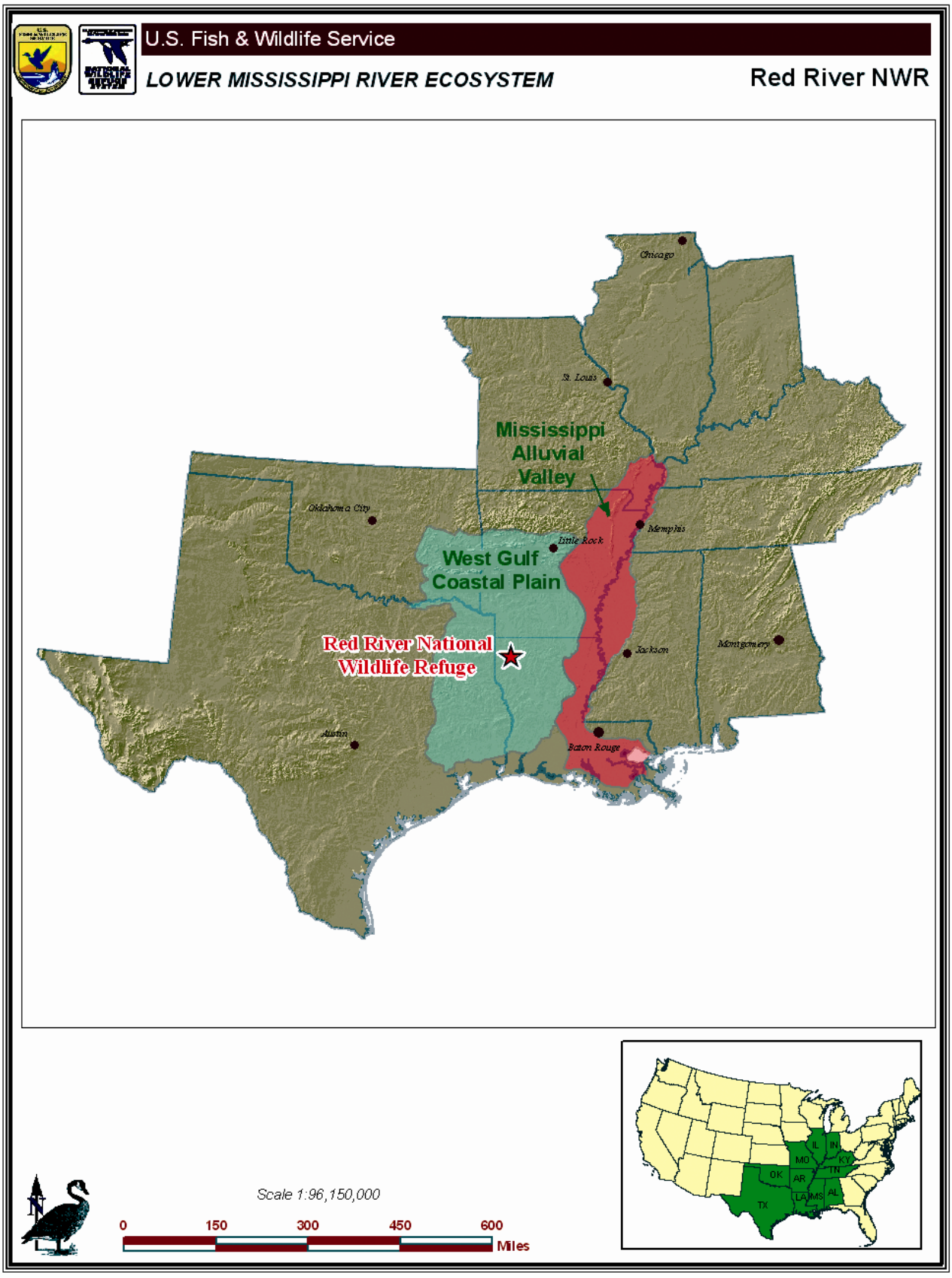
ECOSYSTEM CONTEXT

Lower Mississippi River Ecosystem

Red River National Wildlife Refuge (NWR) is situated in the West Gulf Coastal Plain Bird Conservation Region, the Lower Mississippi River Ecosystem, and in the confluence of the Central and Mississippi Flyways (Figure 3). The Lower Mississippi River Ecosystem (LMRE) includes the alluvial plain of the Mississippi River downstream of its confluence with the Ohio River and the delta plain and associated marshes and swamps created by the meanderings of the Mississippi River and its tributaries (USFWS 2002). Louisiana has twelve water quality management basins delineated on the basis of natural drainage patterns of the state's major river basins (Lester et al. 2005).

Red River NWR is in the heart of protected bottomland hardwood forest and wetlands of north Louisiana. Five national wildlife refuges (D'Arbonne, Upper Ouachita, Black Bayou Lake, Handy Brake and Tensas River), 36 U.S. Fish and Wildlife Service easements, and 36 Louisiana Department of Wildlife and Fisheries wildlife management areas are lands focused on preservation, enhancement, and restoration of bottomland hardwood forest, moist-soil management, endangered species management, environmental education, and compatible wildlife-oriented recreation in the Lower Mississippi River Ecosystem. The LMRE guides Service efforts to enhance, restore, and conserve the natural functional processes and habitat types of the Lower Mississippi River Ecosystem, while maintaining the economic productivity and recreational opportunities.

Figure 3. Lower Mississippi River Ecosystem.



The ecosystem serves as primary wintering habitat for midcontinental waterfowl populations, as well as breeding and migration habitat for migratory songbirds. The expansive floodplain forests of the past are now fragmented bottomland hardwood patches due to conversion from agriculture and flood control projects.

The LMRE developed eight goals that this comprehensive conservation plan will consider and promote when establishing the refuge's goals and objectives, to ensure the refuge continues its contribution to ecosystem conservation and integrity:

1. Conserve, enhance, protect, and monitor migratory bird populations and their habitats in the Lower Mississippi River Ecosystem.
2. Protect, restore, and manage the wetlands of the Lower Mississippi River Ecosystem.
3. Protect and/or restore imperiled habitats and viable populations of all endangered, threatened, and candidate species and species of concern in the Lower Mississippi River Ecosystem.
4. Protect, restore, and manage the fisheries and other aquatic resources historically associated with the wetlands and waters of the Lower Mississippi River Ecosystem.
5. Restore, manage, and protect National Wildlife Refuges and National Fish Hatcheries.
6. Increase public awareness and support for Lower Mississippi River Ecosystem resources and their management.
7. Enforce natural resource laws.
8. Protect, restore, and enhance water and air quality throughout the Lower Mississippi River Ecosystem.

The Red River originates in the plains of New Mexico, heads east to divide Texas and Oklahoma, turns south through southwestern Arkansas, and then travels southeast through the Louisiana farm belt toward the Mississippi River. In Louisiana, the Red River Valley contains some 800,000 acres of land from Alexandria, Louisiana to the Arkansas border. Historically, the Red River Valley was forested with bottomland hardwoods, cypress sloughs, and shrub swamps comprised of numerous species that were adaptable to the varying and complex soil types and moisture conditions.

Early explorers to the Red River Valley in Louisiana found a beautiful river with gentle currents and steep banks. A large prairie was reported north of Shreveport. After the Louisiana Purchase in 1803, early settlers began to clear these areas for farms and homesteads. The valley was almost totally cleared of its forest cover beginning in the 1820s, primarily for cotton production. This forest clearing rapidly accelerated in the 1960s and 1970s with the rise in soybean prices and conversion of forest to soybean fields. As a result, the Red River Valley became the most highly altered and degraded watershed in Louisiana. The river itself was subject to extreme seasonal fluctuations and maintained a constant turbid state. Consequently, the wildlife and fishery habitats were relatively poor compared to those in other parts of the state.

In the meantime, the expanding human population within this ecosystem is increasing demands on land and water resources to accommodate agriculture; timber production; grazing; transportation; urban expansion; and outdoor recreation pursuits such as birdwatching, fishing, hiking, boating and hunting. Sustainable communities and species conservation and recovery require the joint efforts of private landowners and local communities as well as state and federal governments. This synergy of federal, state, tribal, and private organizations working together will ensure that the Service not only protects the more important areas, but also reduces redundancy of effort, allowing precious resources to be directed where they are most needed.

Upper West Gulf Coastal Plain Bird Conservation Region

The Lower Mississippi River Ecosystem is covered primarily by two bird conservation regions: the Mississippi Alluvial Valley and the West Gulf Coastal Plain (Figure 3). The Upper West Gulf Coastal Plain includes all of Red River NWR. These forests are of high conservation priority for conserving the natural communities and the bird populations within these habitats. The primary threats to these forests include reservoir construction; stream modifications; destructive timber harvesting practices; and conversion to pine plantations, pastures, and other land uses (Neal, http://www.lmvjv.org/wgcp). The comprehensive conservation plan will develop conservation strategies to foster support for the priorities of the West Gulf Coastal Plain.

REGIONAL CONSERVATION PLANS AND INITIATIVES

American Woodcock Management Plan

Woodcock trends in the United States have been declining annually for the last 15 years despite actions that have been taken to ensure that hunting does not substantially promote declines, such as reduced bag limits and limited season lengths. An American Woodcock Management Plan, initiated in the 1990s, points out the need for improved breeding, migration, and wintering habitat to enhance population growth and survival. Much of the decline is thought to be a result of land use changes and the maturing of forest habitats resulting in less early successional shrub/scrub habitats preferred by woodcock.

Northern Bobwhite Conservation Initiative

The Northern Bobwhite Conservation Initiative's goal is to restore northern bobwhite populations, rangewide, to an average density equivalent to that which existed on improvable acres in 1980 (58,857,000 acres). The bobwhite population objective for the West Gulf Coastal Plain Bird Conservation Region is to add 131,033 new coveys, 21,833 of these in Louisiana. Habitat management is the primary vehicle for accomplishing this goal with three special objectives, which the refuge has considered during the development of this draft comprehensive conservation plan:

- Increase the amount and enhance the quality of agricultural lands for nesting, brood-rearing, and roosting by bobwhites and other grassland species by adding native warm season grasses.
- Conserve and enhance the quality of rangelands by utilizing vegetation management practices and grazing regimes that favor the retention and improvement of native plant communities beneficial to bobwhites and other wildlife.
- Convert tame grasses to warm-season grasses on CRPs, establish filter strips on croplands, and convert pastures to warm-season grasses.

Louisiana Comprehensive Wildlife Conservation Strategy

The Louisiana Comprehensive Wildlife Conservation Strategy is a program that seeks to direct the overall effort by the Louisiana Department of Wildlife and Fisheries over the next ten years in assessing the status of and managing, where appropriate, the varied habitats and wildlife species in Louisiana. Conservation actions have been developed for each ecoregion in the state in order to address threats to the habitats of these areas. The state will work with a variety of partners in carrying out these recommended conservation actions. The state considers the Service an important partner in this process and the Red River NWR an important part of actions to be taken in Red River Valley.

ECOLOGICAL THREATS AND PROBLEMS

In order to prepare a comprehensive conservation plan that will establish goals and objectives on how to manage the Red River NWR over the next 15 years, a number of planning steps were followed. One of those steps was an internal review of known ecological threats and problems that may hinder the ability of refuge personnel to fulfill the objectives of the refuge. This review developed the following list of concerns:

- Wildlife management in an urban environment
- Invasive and nuisance wildlife
- Invasive and nuisance plants

WILDLIFE MANAGEMENT IN AN URBAN ENVIRONMENT

The 600+ acre Headquarters Unit and visitor center area provides an opportunity for public/wildlife interaction and public education that is enhanced by its location within a suburban environment. This suburban setting also poses wildlife management problems.

As “natural” areas become reduced in size and more fragmented and isolated, urban/suburban “open space” landscapes such as the Red River NWR Headquarters Unit become more important for wildlife. As urbanization increases, habitats available to wildlife become more degraded, fragmented and isolated, and species diversity decreases. Managers of urban wildlife must understand human attitudes and social issues as well as they do ecological principles. The three species of concern here are deer, raccoons, and feral hogs (the hogs are discussed in a separate section below).

Dense deer populations occur in many urban/suburban areas and the Headquarters Unit is no exception. The deer herd at this unit is becoming more isolated as more of the land around the unit is being converted to housing subdivisions. Deer may excessively damage gardens and ornamental vegetation. They may also carry diseases or vectors of diseases. White-tailed deer are important hosts of the nymphal and adult stages of the vector of Lyme disease in the eastern United States. In addition, deer cross or feed alongside roadways and may cause auto accidents.

Because of the isolation of the Headquarters Unit deer herd, its size will have to be controlled. Control of deer can be accomplished by several methods, but none are inexpensive or necessarily always acceptable. The easiest way to keep deer out of a local area is to install a deer fence. However, there is a limit to the acreage that can be fenced as well as to the staff resources that are spent on fencing. Given the size and juxtaposition of the refuge, this would be nearly infeasible. After fencing an area, there is still a small, closed, reproducing deer population inside the fence that will have to be “controlled” by some means. Deer can also be shot or translocated. Controlled hunts are an alternative, but shooting in a suburban setting will require close control. Trapping and translocation is difficult, expensive, and not always successful.

Raccoons (and skunks and opossums) are probably the most efficient predators of birds, bird nests, and turtle nests to the extent that many species are experiencing population declines as a result. Raccoons are bold and probably the best adapted of North American carnivores for life in the “city.” Individual raccoons that may pose a threat include those that learn to raid trash cans, live in or under buildings, and raid vegetable gardens or pet food containers. Raccoons are one of the species that serve as a reservoir of rabies. As such, the potential contact of raccoons with pets or their owners poses a serious risk in some areas. Raccoons are also susceptible to other diseases carried by domestic dogs, including distemper, but this poses little threat to people or pets. Informing the public on how to manage raccoon problems will be an ongoing process at the Headquarters Unit.

Two invasive and nuisance wildlife species are of concern in varying degrees throughout the refuge because of their potential negative impacts to resource management: feral hogs (*Sus scrofa* spp.) and beaver (*Castor canadensis*).

Feral Hogs

The feral hog population in Louisiana constitutes an introduced exotic species. These hogs occur throughout all five units of the Red River NWR, and if not properly managed, have the potential of causing extensive damage to native wildlife, habitat and agricultural resources. The hog's Russian boar phenotype is considered by some to be a trophy game animal with an edible carcass. Many landowners manage their feral hog populations as they do their white-tailed deer herds. The presence of feral hogs on a hunting lease is sometimes considered more of an added selling feature than a problem.

Numerous reports have documented severe problems with feral hogs in parks, recreational areas, national seashores, refuges, wildlife management areas, and forest districts across the United States (Mayer and Brisbin 1991). Land and wildlife management agencies are finding that the feral hog is an aggressive and difficult invader species that threatens their natural resources and habitat. Hogs can cause resource management problems in the following ways:

- Feral hog populations cause damage to field crops. The variety of field crop resources damaged by hogs include corn, milo, rice, watermelon, peanuts, hay, turf, wheat, and other grains. Hog-caused damage to field crops results both from feeding and from feeding-related activities (such as trampling and rooting).

- Feral hogs prey on fawns and ground-nesting birds. Feral hogs have an acute sense of smell, are omnivorous and opportunistic, and can be efficient predators.

- Feral hog populations compete with resident deer and turkey populations for limited resources. Feral hogs are omnivorous and feed on a wide variety of items, many of which are staples for native fauna. One of the more important seasonal food item types for feral hogs is a fruit/nut crop, especially oak mast (Wood and Roark 1980). Oak mast is also an important food source for deer, wood duck, squirrels, and turkey. When feral hogs actively compete for mast food, resident deer and turkey may enter the winter with deficient fat reserves (Yarrow 1988).

- A feral hog population is a potential reservoir for numerous diseases and parasites that threaten livestock and deer. Because feral hogs tend to occupy the same areas as deer and livestock, disease and parasite spread is possible. One of the most probable points of contact is communal watering holes. Due to its inability to thermoregulate (control its own body temperature when it is hot), the hog is attracted to watering areas to wallow. In areas where water is plentiful, a wallowed-out watering hole may be avoided by other animals. But, during times of drought and in areas where water is limited, all animals are often obliged to water from wallowed-out watering holes. Infected pigs can spread parasites and diseases through both direct contact and by contaminating drinking water.

- The feral hog's rooting and wallowing activities damage pastures, spoil watering holes and generally deteriorate riparian habitat. Feral hogs are persistent in their rooting behavior. They methodically work an area until they have depleted the food item of interest. Given optimum conditions (i.e., pliable soils), hogs can do considerable damage.

Hogs are too large, too prolific, too destructive, and too widely spread throughout the refuge to be ignored. This introduced animal must be recognized as an exotic species that should be eradicated for the well-being of the refuge's native plants and wildlife.

Beaver

As long as beaver activity occurs where there is no negative impact on a significant cultural or natural resource or refuge development, typically few problems occur. Refuge management will act to protect beaver just as it would any other natural resource, according to the Service's policies and regulations.

Beaver typically become a problem when their tree-cutting or pond construction activities adversely affect significant resources or developments inside or outside of the refuge. Some examples of the kinds of adverse impacts, which either have occurred or could occur, are:

- Flooding that erodes, weakens or makes impassible roads, trails and railroads;
- Flooding that damages or prevents access to structures, facilities, or agricultural lands;
- Flooding that can kill thousands of acres of forest;
- Damming of drainage structures such as culverts, bridges, spillways and ditches, which protect facilities and developments;
- Redirection of normal water flow into new areas where erosion can occur; and
- Tree cutting near roads, parking lots, or other facilities that damages or threatens property, or creates a safety hazard.

The presence of private lands and public roads within and contiguous to refuge boundaries aggravates many of these problems. The location and geography of the refuge provide an environment with a large potential for beaver-related problems. A concentrated and complex network including roads, trails, and highways is imposed on a natural drainage system of the river and its numerous tributaries. Hundreds of drainage structures must be maintained to preserve cultural features, protect facilities and provide safe transportation for the public. Balancing these complicated and sometimes competing concerns will be a difficult but necessary task for refuge management.

INVASIVE AND NUISANCE PLANTS

Many species of exotic plants occur on the refuge and are rapidly spreading. Terrestrial exotic plants are the most serious threat to the biological integrity of the refuge. Many species have been recorded, such as tree-of-heaven, royal palownia, privet, Johnsongrass, and Sesbania. At least four species of invasive and nuisance plants are of concern in varying degrees throughout the refuge because of their potential negative impacts to resource management:

- Chinese tallow (*Triadica sebifera*)
- Royal paulownia (*Paulownia tomentosa*)
- Water hyacinth (*Eichornia crassipes*)
- American lotus (*Nelumbo lutea*)

Chinese Tallow

Chinese tallow grows in abandoned fields, pastures, waste areas, and forests. It grows in a wide range of environmental conditions, from wet to dry and from shade to full sun. It reproduces by seeds only, but one plant can produce hundreds of seeds, which have a tremendous ability to germinate under adverse conditions. It is a fast-growing tree, hence its popularity as a shade tree ornamental. To a horticulturalist this sounds like a dream tree, but to ecologists and land managers, it can be a nightmare, especially when it invades an area and displaces native vegetation.

Over the last 30 years, Chinese tallow has become a common tree in old fields and bottomland forests in Louisiana. Several studies at the U.S. Geological Survey's National Wetlands Research Center in Lafayette are aimed at understanding the factors that contribute to Chinese tallow growth, spread, and management. When tallow invades, it eventually monopolizes an area, creating a forest without native animal or plant species. This tree exhibits the classic traits of most nonnative invaders: it is attractive so people want to distribute it, it grows quickly and in a variety of soils, it has incredible resiliency, and it resists pests. Tallow reproduces and grows quickly and can cause large-scale ecosystem modification. For example, where it completely replaces native vegetation, it has a negative effect on birds by degrading the habitat.

Royal Paulownia

Royal paulownia is an introduced ornamental that has become well-established in North America. It is also known as princess-tree, empress-tree, or paulownia. It has a tropical look with very large catalpa-like leaves. The tree is a prodigious seeder and grows extremely fast. Unfortunately, because of this ability to grow nearly anywhere and at a rapid rate, it is now considered an invasive exotic tree species.

This native of China gives a most dramatic, coarse-textured appearance, with its huge heart-shaped leaves and large clusters of lavender flowers in the spring. Flowers are borne before leaf emergence so they stand out nicely, especially against an evergreen background. With a rapid growth rate, the princess-tree can reach 50 feet in height with an equal spread in an open landscape. Most trees are seen 30 to 40 feet tall and wide. It thrives best in deep, moist but well-drained soil, sheltered from the wind, and has become naturalized in many parts of the South. This Asian tree was initially promoted as a host tree for moth silk production. It rapidly spread because of its ability to grow quickly under adverse conditions.

Water Hyacinth

Water hyacinth is native to South America, but has been naturalized in most of the southern United States. Water hyacinth plants have a tremendous growth and reproductive rate and the free-floating mats cause substantial problems. Water hyacinth can form impenetrable mats of floating vegetation. It reproduces by seeds and by daughter plants which form on rhizomes and produce dense plant beds. Individual plants break off the mat and can be dispersed by wind and water currents. As many as 5,000 seeds can be produced by a single plant and these seeds are eaten and transported by waterfowl. Seedlings are common on mud banks exposed by low water levels. Large colonies of water hyacinth can interfere with small boat navigation and fishing, as well as provide habitat for mosquitoes. Water hyacinth is controlled through a number of methods including harvesting, aquatic herbicides, and biological control agents.

American Lotus

American lotus is a native, weedy aquatic species. Its leaves are circular and can be as large as three feet in diameter. Leaves may float on the water surface or extend as much as three feet above the water. Leaves and flowers are borne on an erect tuberous rootstock or stalk. This attractive plant is abundant in Southern ponds, lakes, swamps, and slow-moving streams. It can spread in dense mats of near-monoculture across vast areas, diminishing the potential value of these areas as wildlife and waterfowl habitat. Large colonies of American lotus can interfere with small boat navigation and fishing, as well as provide habitat for mosquitoes.

The value of vegetation in maintaining diverse aquatic and semiaquatic ecosystems, and the fact that aquatic plants are an important component of functioning fish and wildlife habitat, have been well documented. Aquatic and littoral vegetation provides fish, waterfowl, and some mammals with (1) oxygen, (2) habitat, (3) food sources, (4) breeding areas, (5) refuge for predators and prey, and (6) stabilized bottom sediments and nutrients (Kilgore et al. 1993). These resources are needed for healthy aquatic and littoral ecosystems, for good sport fisheries as well as other water-associated recreational activities, and for the aesthetic enjoyment of aquatic areas.

The spread of invasive or nuisance vegetation will alter the structure of aquatic ecosystems and result in ecosystem degradation, changes in water quality, and changes in habitat for fish and wildlife populations. Invasive aquatic vegetation spreads rapidly and colonizes water bodies with the ecological characteristics of early successional species, and will invade both degraded and healthy aquatic ecosystems. Invasive submersed aquatic vegetation typically creates monocultural stands with dense canopies above or below the surface that result in decreased water mixing and oxygen exchange, increased nutrient loading, and widely fluctuating temperatures (Charlebois 2002). This morphology reduces activity in other plants, so that the invasion of a lake by species such as water hyacinth or American lotus is often accompanied by the decline of indigenous aquatic vegetation. In addition to affecting water quality and reducing the density of indigenous aquatic vegetation, invasive aquatic vegetation alters animal communities in littoral zones and wetlands.

Controlling these terrestrial and aquatic plant species will be an ongoing management problem at the Red River Refuge. A variety of management techniques will need to be employed on a continuing basis in order to control and mitigate impacts to resource management. Public education, particularly for residents adjacent to the refuge's Headquarters Unit, will be an important element in this control program.

PHYSICAL RESOURCES

The climate, topography, geology, air quality, soils, and waterways form the foundation of the physical environment of the refuge.

CLIMATE

The climate at Red River NWR is humid-subtropical and is primarily influenced by the refuge's subtropical latitude and proximity to the Gulf of Mexico. The climate is controlled by two principal air masses. Warm, moist air from the Gulf of Mexico generally dominates in the spring and summer, and cooler, drier air from the Central Plains prevails during the winter months. Extended, hot, sultry summers and moderately cool winters are the norm. The average annual air temperature is 65 degrees Fahrenheit. During the winter, the average temperature is 50 degrees, with an average daily

minimum of 39 degrees. Average seasonal snowfall is less than one inch. The average temperature is 81 degrees during the summer, but temperatures above 90 degrees occur almost daily.

The mean annual precipitation is 60 inches. Half of this rainfall (30 inches) usually falls during April through September. The growing season is about 235 days long and begins in mid-March and ends during early November. Thunderstorms occur on average about 70 days each year, with most occurring during the summer months. The average relative humidity in the mid-afternoon is about 60 percent. Humidities are higher at night.

The sun shines 60 percent of the time during the summer, and 50 percent during winter. The prevailing wind is from the south. Average wind speed is highest, nine miles per hour, during the spring months. These climatic values play an important role in influencing the area's hydrologic regime, which subsequently shapes ecosystem process and functions.

GEOLOGY AND TOPOGRAPHY

As the climate has changed on the Earth, marine and deltaic sediments have been deposited in alternating cycles in Louisiana. Geologists have determined from studying these deposits that a major river system, corresponding to the modern Red River, has persisted here at least since the Gulf of Mexico began to form (Louisiana Geologic Survey 1990).

The topography of the refuge has been greatly influenced by the actions of the Red River and much of the geology is from Quaternary alluvial deposits. Although the continental ice sheets did not reach this far south, the lower Red River valley carried glacial meltwaters and outwash in a braided-stream pattern that concurrently widened and aggraded the valley during periods of waning glaciation. As each glacial cycle progressed and the sediment loads and stream discharges declined, the river abandoned its braided stream configuration in favor of a single-channel meandering pattern. This alluvium has been sorted, reworked, and deposited many times by riverine processes.

The Red River has a narrow floodplain, averaging 6 to 8 miles in width. The lands in the valley can, in general, be classified as alluvial floodplain or terrace uplands. The formations of alluvium described above comprise the bulk of the refuge. Relict channels and natural levees, often referred to as ridge and swale topography, are easily seen by visitors to the refuge. Human disturbances, including artificial levees and channelization projects, have drastically altered these natural alluvial processes within the Red River floodplain.

The elevation at the refuge averages 150 feet above sea level at its lower end below Natchitoches to 250 feet near the Arkansas border. The topography is complex, with numerous stream channels, small tributaries and depressions, old river meanders and oxbow lakes, multiple river terraces in various stages of erosion and deposition, and adjacent poorly drained lowlands. Added to this complexity are farming activities that have modified the hydrology of the area, resulting in a subtle but complex topography that has given rise to the flora and fauna found on the refuge.

SOILS

The soils of the floodplains range from loamy to clayey and from well-drained to very poorly drained. The loamy soils are on higher, natural levees of rivers and bayous. These soils are fertile and have few limitations for crops. Some of the clayey soils are flooded by runoff and stream overflow. The clayey soils, which are in the lower areas, are limited by wetness. The soils historically supported a diverse bottomland hardwood forest.

HYDROLOGY

Drainage in Louisiana is into the Gulf of Mexico. The Red River basin comprises the largest drainage area in the state. The Red River joins with the Atchafalaya and Old rivers, the latter forming an outlet to the Mississippi River. Most of the water from the Red River flows to the Gulf through the Atchafalaya system. At times, the Mississippi River is at higher levels causing much of its flow to be through Old River and then into the Atchafalaya. In times of high water, the lower Black basin, near the confluence of the Black and Red rivers, becomes a backwater storage basin. Because of an extensive artificial levee system, there is not much drainage directly into the Mississippi within the state. Lowlands bordering the Red and upper Atchafalaya are also protected by levees.

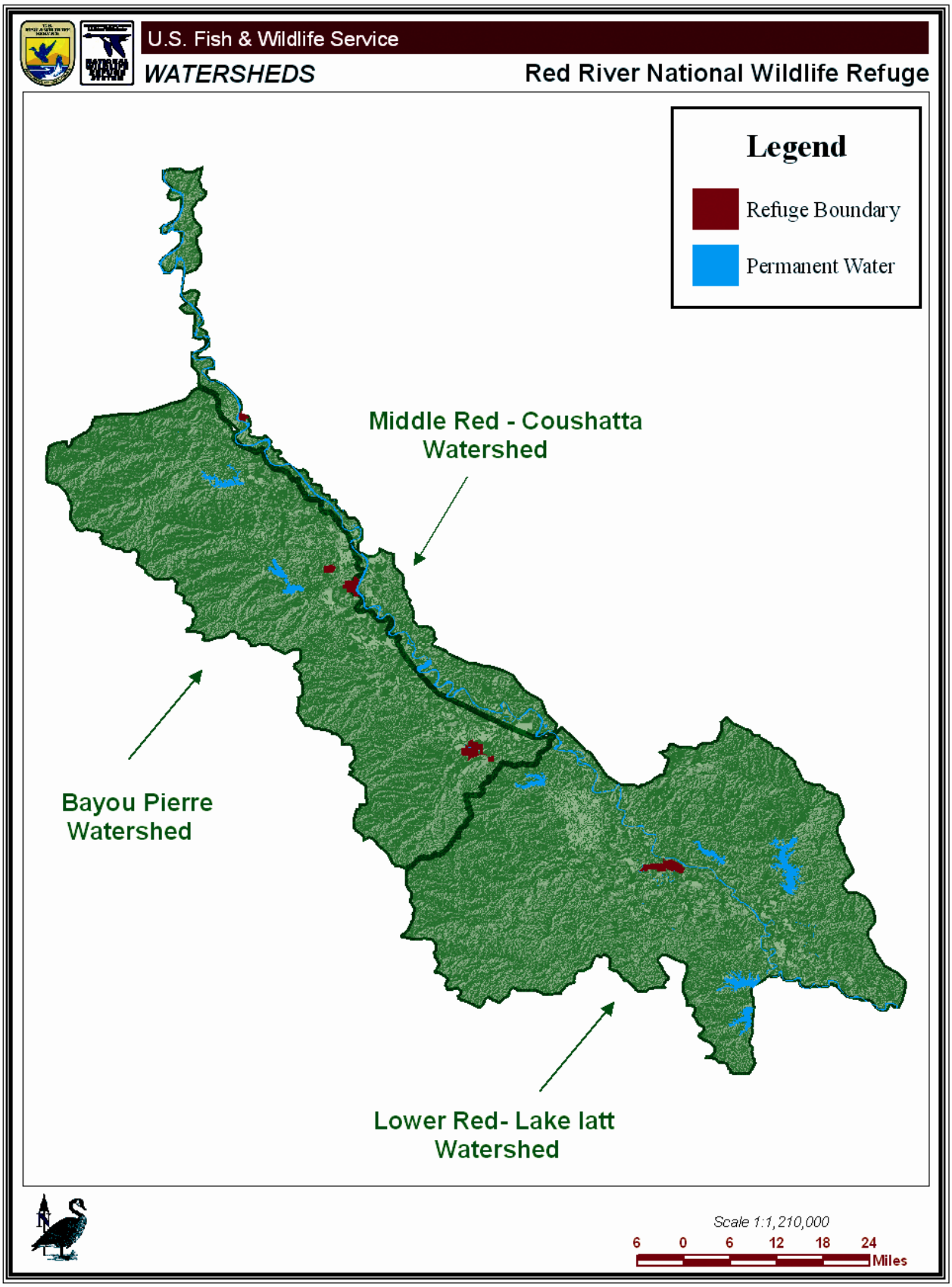
The five units of Red River NWR are located within three distinct watersheds of the Red River: the Bayou Pierre, Middle Red–Coushatta, and Lower Red–Lake Iatt watersheds (Figure 4). The Headquarters, Bayou Pierre, and Spanish Lakes units are located in the Bayou Pierre watershed which consists of approximately 395,715 acres of cropland, pasture/hayland, forestland and urban land. The major resource concerns are diminished water quality in Bayou Pierre and its tributary associated with intensive row crop agriculture and/or confined animal operations. The Wardview Unit is located in the Middle Red–Coushatta Watershed which runs parallel to the Red River. Lower Cane Unit is located in the Lower Red–Lake Iatt Watershed to the south of the Little River.

The hydrology of the refuge is dominated by the Red River, the three distinct watersheds, and the impacts of the Red River Waterway Project. For 500 years or more before it was finally cleared in 1870, the Great Red River Raft dominated hydrologic character along the stretch of the Red River that is now occupied by the five units of the refuge. The Red River raft was a result of the highly erodible soils of the Red River alluvial valley being carved by each high water event on the river. As the river moved back and forth across its alluvial plain, trees were undermined along the riverbanks and fell into the river. These trees formed a discontinuous series of logjams that extended approximately 150 miles along the river from the vicinity of present day Natchitoches to the Louisiana-Arkansas state line. The raft artificially raised the banks of the river and forced the creation of numerous distributaries of the Red, evidence of which can still be seen today.

Numerous raft lakes also formed in river low spots along the tributaries to the Red. These raft lakes were transitory in nature. The raft was not stationary; rather, it was inexorably moving upstream at about a fifth of a mile per year. As pieces of the raft broke up and floated downstream on the lower end, new logs and debris were added to the upper end. As the channel naturally cleared on the lower end, the Red River channel would deepen and drain the raft lakes and close off the distributaries, leaving a single river channel.

Piecemeal attempts were made to clear the raft starting in the 1830s. Portions of the raft were cleared for a brief period but it would eventually reform. Captain Henry Miller Shreve dramatically increased the pace of the natural clearing of the logjam with the invention of the snag-boat. By the mid 1870s, the raft had been cleared. Steamboats plying the Mississippi River could now go up the Red River to Shreveport and points north, as well as west into Texas along Cypress Bayou to Jefferson, Texas. However, as the railroad commerce expanded in the late 1800s, steamboat commerce declined. Removal of the Red River raft caused the river to scour its channel deeper making the river have unusually high banks. Because of these unnaturally high banks, bank erosion became a tremendous problem on the river. Thousands and thousands of acres of productive land were eroded by the river and deposited downstream as less productive sandbars. This continual erosion also led to shoaling in the river, making navigation treacherous.

Figure 4. Watersheds of Red River National Widlife Refuge.



High turbidity levels, wide fluctuations in river depth, and edge-to-edge farm practices had a dramatic impact on the carrying capacity of the land for wildlife. This began to change with the initiation of the Red River Waterway project, which Congress authorized in 1964. This project, completed in 1994, consists of five lock and dam complexes located between the Old River Lock on the Mississippi River to a point just south of Shreveport and Bossier City. The river's water levels are now higher and more constant, and its turbidity levels have been greatly reduced. Water quality has also improved, and the seasonal retention of water levels has resulted in a rich diversity of aquatic plants.

Increased water levels on the river have improved some adjacent habitats. Flooded timber and marginal agricultural fields characterized by wet, depressional areas are now common. The USDA's Wetlands Reserve Program and Conservation Reserve Program are restoring valuable wildlife habitats through the reforestation of previously cleared and highly erodible lands in the Red River Valley. Changes in agricultural practices have also resulted in an increase in rice production which created additional migratory bird habitat.

AIR QUALITY

Under the Clean Air Act, the U.S. Environmental Protection Agency (EPA) has established primary air quality standards to protect public health. The EPA has also set secondary standards to protect public welfare. Secondary standards relate to protecting ecosystems, including plants and animals, from harm, as well as protecting against decreased visibility and damage to crops, vegetation, and buildings.

The EPA has developed National Ambient Air Quality Standards (NAAQS) for six principal air pollutants (also called "criteria pollutants"). They are ground-level ozone (O_3), particulate matter (PM), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), carbon monoxide (CO), and lead (Pb).

The ambient air quality within the boundaries of the five units of the refuge can vary considerably from impacts due to varying sources such as electric power generation, paper mills, and proximity to a major metropolitan area. The Shreveport-Bossier City Metropolitan Statistical Area in northwest Louisiana has recorded ambient ozone concentrations that approach the maximum concentration permitted by the NAAQS for 8-hour ozone concentrations (Chambers et al. 2005).

WATER QUALITY AND QUANTITY

Water quality within the Red River has been affected by mercury contamination from an unknown source (LDEQ 1998). Recently, 26 refuges in the Mississippi Alluvial Valley were surveyed for chemical contamination. Samples of water, sediment, and fish were collected and passive sampling devices deployed. Residues of current use pesticides, organochlorine pesticides, polychlorinated biphenyls, polycyclic aromatic hydrocarbons, and mercury were measured and limited toxicity testing was conducted (Shea et al. 2001). All of these chemical contaminants were detected at Lake Ophelia NWR (located at the base of the Red River watershed), but none were detected at levels of concern to human health or fish/wildlife. Furthermore, the EPA's *Index of Watershed Indicators* shows that most water bodies within the lower Red River watershed are meeting designated uses, and that the streams in this area are characterized as having good overall water quality and a low vulnerability to problems related to runoff.

BIOLOGICAL RESOURCES

HABITAT

Currently, the five units of the refuge include 3,742 acres of reforested bottomland hardwood forest; 317 acres of bottomland forest; 261 acres of riparian habitat; 194 acres of cypress swamp; 600 acres of moist soils; 1,125 acres of agricultural fields; 124 acres in a pecan orchard, acres dominated by groundsel-tree (*Baccharis halimifolia*); a 217-acre area of honey locust; and a 153-acre old field that was grazed and currently invaded by wild plum and invasives (Figure 5). In addition, about 443 acres of the refuge is permanent water consisting of oxbow lakes, tributaries of the Red River, borrow pits, and irrigation ditches.

Prior to European settlement, the predominant habitat type throughout the area was bottomland hardwood forest. One goal of the refuge is to restore this once-dominant habitat type. The primary woody species in the lowest areas of bottomland hardwood forest are baldcypress, buttonbush, and swamp privet. Slightly higher on the floodplain are overcup oak, water hickory, Nuttall oak, persimmon, cedar elm, willow oak and water locust. The understory largely consists of swamp privet, greenbrier, poison ivy, and buttonbush. Riparian habitats consist of black willow, cottonwood, and sycamore.

The cleared bottomlands have been planted back to species that would have originally inhabited the area which include willow oak, water oak, overcup oak, Nuttall oak, shumard oak, cherrybark oak, sweet pecan, sycamore, sweetgum, green ash and baldcypress (Figure 6).

Bottomland hardwood forests can be classified in this area into four primary habitat types:

1. Baldcypress (*Taxodium distichum*) – Water Tupelo (*Nyssa aquatica*)
2. Overcup Oak (*Quercus lyrata*) – Water Hickory (*Carya aquatica*)
3. Sweetgum (*Liquidambar styraciflua*) – Willow Oak (*Quercus phellos*)
4. Swamp Chestnut Oak (*Quercus michauxii*) – Cherrybark Oak (*Quercus pagoda*)

Baldcypress – Water Tupelo

Baldcypress and water tupelo together make up the majority of stocking in this forest type, which occurs in swamps, deep sloughs, and very low poorly drained flats. The sites are always very wet, and surface water stands well into or throughout the growing season. Soils are generally mucks, clays, or fine sand. Common trees associated with this type are black willow (*Salix nigra*), water locust (*Gladitsia aquatica*), overcup oak, green ash (*Fraxinus pennsylvanica*), and persimmon (*Diospyros virginia*). Among the shrub species are swamp privet (*Forestiera acuminata*), buttonbush (*Cephalanthus occidentalis*), and planartree (*Planera aquatica*). Woody vines include redvine (*Brunnichia ovata*). A variety of herbaceous plants will be commonly seen and take the form of flotants, emergents, and submergents. Frequently a variety of mosses and lichens adorn the exposed tree trunks, and the crowns may be draped with Spanish moss (*Tillandsia usneoides*).

Overcup Oak – Water Hickory

This type usually occurs in low, poorly drained flats and sloughs with tight clay or silty clay soils. These sites are the lowest within the first bottoms and are subject to late spring inundations. Overcup oak and water hickory together constitute the majority. Associates include willow oak, Nuttall oak (*Quercus nutallii*), cedar elm (*Ulmus crassifolia*), green ash, and water locust. Minor associates include black willow, persimmon and sweetgum. Common shrub species often associated include redvine, peppervine (*Ampelopsis brevipedunculata*), trumpet-creeper (*Campsis radicans*), dewberry (*Rubus caesius*), and

Figure 5. Vegetation map of Red River National Wildlife Refuge.

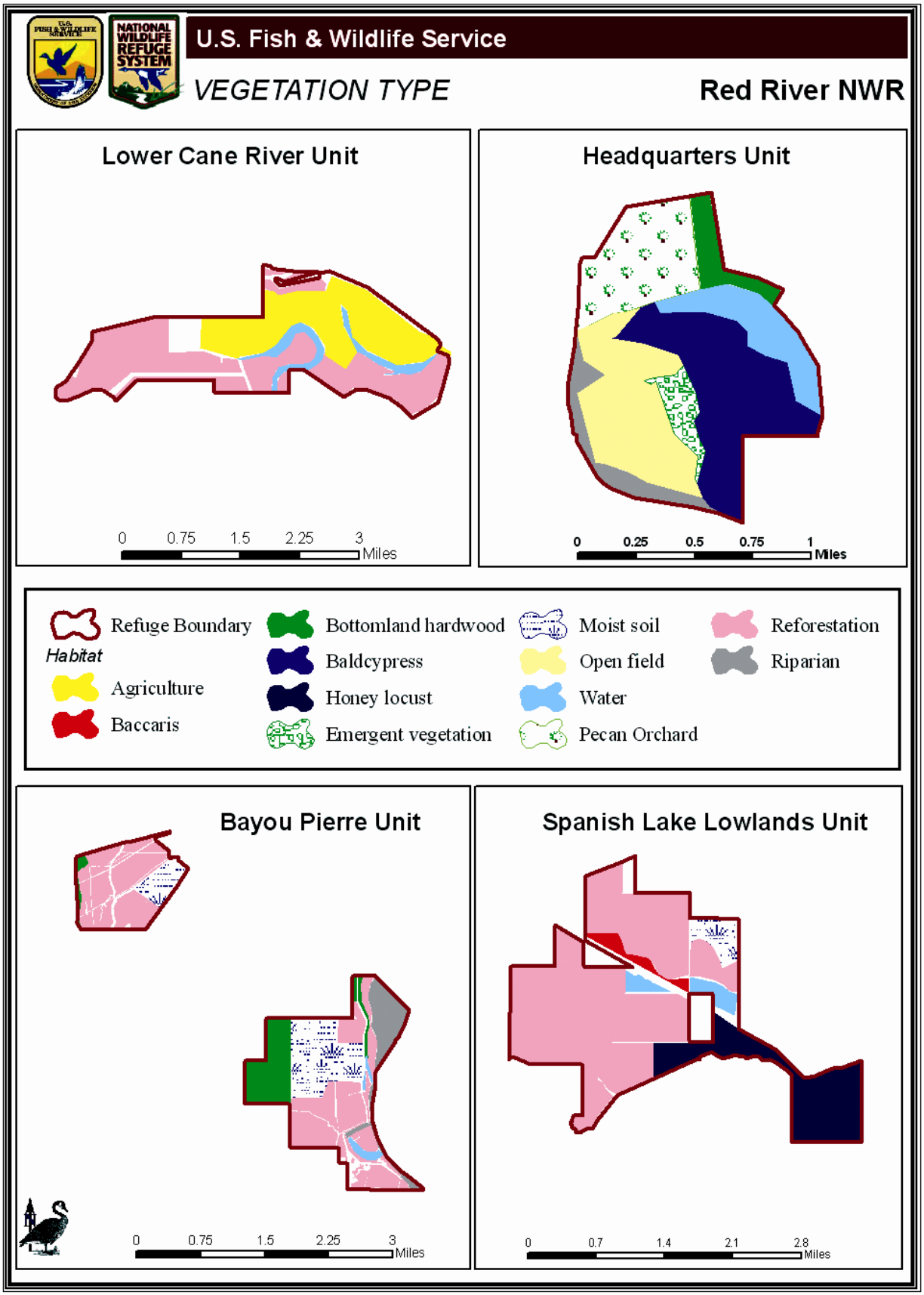
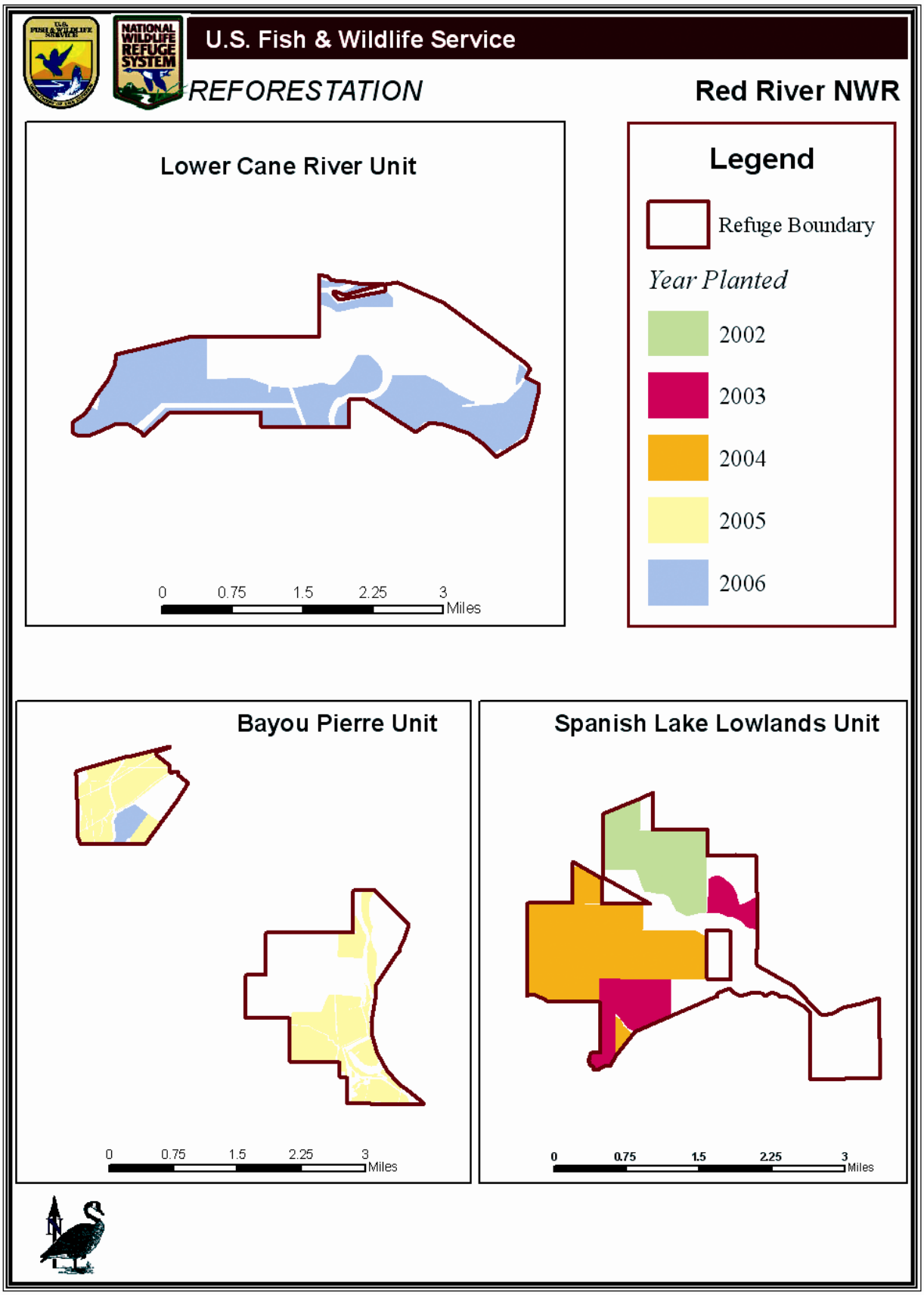


Figure 6. Reforestation on Red River National Wildlife Refuge.



possibly greenbier (*Smilax* spp.). Panicums, asters, annual grasses, and cocklebur (*Xanthium strumarium*) may occur in openings within the stand.

Sweetgum – Willow Oak

The low ridges in the broad slackwater areas of the first bottom are typically occupied by this forest type. Willow oak and sweetgum comprise the largest proportion of the stocking in stands of this type. A major associate on higher clay ridges and flats is Nuttall oak. Other trees associated with this forest type are sugarberry (*Celtis laevigata*), green ash, overcup oak, water oak (*Quercus nigra*), water hickory, cedar elm, persimmon and sometimes baldcypress. Common shrubs include swamp privet, American snowbell (*Styrax americana*), possumhaw (*Viburnum nudum*), hawthorn (*Crataegus douglasii*), and dull-leaf indigo (*Amorpha fruticosa*). Woody vines occasionally present include greenbrier, peppervine, and redvine.

Swamp Chestnut Oak – Cherrybark Oak

This forest type occurs on the best, most mature, fine sandy loam soils on the highest of the first bottom ridges and hammocks, and on the second bottoms or terraces down from the ridges. These well-drained sites are seldom covered with standing water and only rarely overflow. Species composition of this habitat type varies widely, though cherrybark oak will most likely be much more common than swamp chestnut oak. Many other species contribute to a well stocked stand: white oak (*Quercus alba*); post oak (*Quercus stellata*); sweetgum; blackgum (*Nyssa sylvatica*); hickory (*Carya* spp.); willow oak; water oak; southern red oak (*Quercus falcate*); winged elm (*Ulmus alata*); sassafras (*Sassafras albidum*); slippery elm (*Ulmus rubra*); Shumard oak (*Quercus shumardii*); black oak (*Quercus velutina*); black cherry (*Prunus serotina*); white ash (*Fraxinus americana*); green ash; red maple (*Acer rubrum*); and loblolly (*Pinus taeda*) and shortleaf pines (*Pinus echinata*). Common midstory plants include eastern redbud (*Cercis canadensis*); flowering dogwood (*Cornus florida*); American holly (*Ilex opaca*); red mulberry (*Morus rubra*); American hornbeam (*Carpinus caroliniana*); eastern hophornbeam (*Ostrya virginiana*); and witch-hazel (*Hamamelis virginiana*). Shrub species usually include red buckeye (*Aesculus pavia*), devil's walkingstick (*Aralia spinosa*), sweetleaf (*Symplocus tinctoria*), and *Viburnum* spp. Often included in this habitat type are grape vines (*Vitus rotundifolia*), Alabama supplejack (*Berchemia scandens*), Carolina jessamine (*Gelsemium sempervirens*), trumpet creeper, and greenbrier.

The four bottomland hardwood types described above are found only in remnants over most of the units of the refuge. It is the desire of refuge management to replicate these types where appropriate on the refuge. The cleared bottomlands have been reforested with species that originally inhabited the area, including willow oak, water oak, overcup oak, Nuttall oak, shumard oak, cherrybark oak, sweet pecan (*Carya illinoensis*), sycamore (*Platanus occidentalis*), sweetgum, green ash and baldcypress. The outcome will be structurally diverse bottomland hardwood forest ecosystems that support a variety of forest-dependent wildlife species.

Moist-soil plant species vary depending on the timing of drawdowns and soil disturbance, but usually consist of panic grass (*Panicum* spp.), sprangletop (*Leptochloa* spp.), millet (*Pennisetum americanum*), toothcup (*Rotala ramosior*), coffeeweed (*Senna obtusifolia*), *Paspalum, Polygonum,* and a variety of sedges (*Andropogon* spp.). Due to the lack of refuge staff, equipment and funding, active moist-soil management has not been possible to date on Red River NWR. Proper moist-soil management is very labor-intensive, requiring soil disturbance through discing and leaving fallow, or planting a food crop using cooperative farming or forced-account work to help set back succession every 2 to 4 years. Often, much of this habitat type can be obtained in conjunction with rice farming, which is currently being done on the Lower Cane River Unit, but other sites will need to be identified

as primary moist-soil areas. The keys to success of such areas are moisture and water control (levees, pumps, water control structures, ditches and monitoring). Without excellent water control, moist-soil management in the Southeast is a hit or miss activity. Timing of inundation, adequate disturbance, and sustained record-keeping are needed to assure good production on a yearly basis.

At Red River NWR, grain production is used to address the shortages to effectively manage moist-soil habitat. Under current funding and staffing limitations, cooperative farming is the only option available to the refuge to produce crops. Rice, milo, and corn are the top choices as grain crops for ducks. Rice is particularly resistant to decomposition even under flooded conditions. Milo and corn also provide high energy resources for waterfowl and can generally be kept above the water surface, but problems arise from depredation prior to flooding as well as seed degradation after flooding. It is important to manage the farm program to provide the best mix of waterfowl foods.

WILDLIFE

Waterfowl

The West Gulf Coastal Plain and the Red River Valley are important ecoregions for migrating and wintering ducks and geese in North America. Red River NWR provides important foraging and resting (refuge) habitats within the Red River Valley for these waterfowl and serves an integral role in a large, cooperative planning and habitat management effort known as the North American Waterfowl Management Plan (NAWMP).

The refuge provides habitat for thousands of wintering waterfowl and year-round habitat for nesting wood ducks (*Aix sponsa*). The Red River is a historic migration corridor for migratory birds that use the Central and Mississippi Flyways on their journey to the Gulf Coast. At least 14 species of migratory waterfowl use the refuge during some part of the year: mallard (*Anas platyrhynchos*); gadwall (*Anas strepera*); American widgeon (*Anas americana*); green-winged teal (*Anas crecca carolinensis*); blue-winged teal (*Anus discors*); northern shoveler (*Anas clypeata*); northern pintail (*Anas acuta*); hooded merganser (*Lophodytes cucullatus*); ring-necked duck (*Aythya collaris*); canvasback (*Aythya valisineria*); and lesser scaup (*Aythya affinis*). Other species that use the refuge less frequently include bufflehead (*Aythya marila*); redhead (*Aythya americana*); common merganser (*Mergus merganser*); red-breasted merganser (*Mergus serrator*); greater scaup (*Aythya marila*); ruddy duck (*Oxyura jamaicensis*); common goldeneye (*Bucephala clangula*); and American black duck (*Anas rubripes*). Wood ducks are year-round residents in Louisiana. Preferred habitats include forested wetlands, wooded and shrub swamps, tree-lined rivers, streams, sloughs and beaver ponds. Wood ducks seek food in the form of acorns, other soft and hard mast, weed seeds, and invertebrates found in shallow flooded timber, shrub swamps and along stream banks. They loaf and roost in more secluded areas and dense shrub swamps.

American Woodcock (*Scolopax minor*)

Long-term declines in American woodcock populations are apparent, and trend data from individual monitoring efforts correlate well. Hunting success indices for American woodcock also show that the annual harvest has been declining. The most serious threat is habitat loss and alteration through urbanization, reforestation, drainage of wetlands, and agricultural development (Keppie and Whiting 1994). Throughout the woodcock's southern breeding range, primary threats include water development, including land drainage and impoundments; and conversion of bottomland forests to cropland or forest monocultures (USFWS 1990). In addition, loss of marginal brush and increasing farm size increase vulnerability to hunting (Brauning 1992).

Shorebirds

An appropriate disturbance rotation at the old rice fields and old fish ponds on the Bayou Pierre Unit will allow the refuge to hold water on a portion of the impoundments through the summer. High quality habitat can be provided following a late summer drawdown, thus providing foraging habitat for wading birds in the summer and shorebird habitat during the peak of fall migration. This is all in addition to the benefits shorebird species will receive following the normal spring drawdown on the other units. An inclusive list of shorebird species is yet to be developed for this new refuge.

Neotropical Migratory Birds

More than 200 species of neotropical migratory birds use the Red River at various times of the year. Refuge habitats utilized include forested wetlands, scrub/shrub, open fields, sandbars, shallow flooded fields, and mudflats.

Water and Marsh Birds

The great blue heron (*Ardea herodias*); great egret (*Ardea alba*); snowy egret (*Egretta thula*); cattle egret (*Bubulcus ibis*); little blue heron (*Egretta caerulea*); white ibis (*Eudocimus albus*); green heron (*Butorides virescens*); yellow-crowned night-heron (*Nyctanassa violaceus*); black-crowned night-heron (*Nycticorax nycticorax*); American bittern (*Botaurus lentiginosus*); white-faced ibis (*Plegadis chihi*); pied-billed grebe (*Podilymbus podiceps*); common moorhen (*Gallinula hloropus*); purple gallinule (*Porphyrula martinica*); and sandhill crane (*Grus canadensis*) use the refuge's sloughs, bayous, flooded timber, scrub/shrub and open fields at different times of the year, depending upon the water levels. Roseate spoonbills (*Ajaia ajaja*), wood storks (*Mycteria americana*), and tricolored herons (*Egretta tricolor*) are seen irregularly, usually during post-breeding dispersal in late summer. Least bitterns (*Ixobrychus exilis*) most likely migrate through the refuge. Concentrations of double-crested cormorants (*Phalacrocorax auritus*) use the refuge during winter. Anhingas (*Anhinga anhinga*) are found along the river and associated oxbow lakes and sloughs during the summer. American white pelicans (*Pelecanus erythrorhynchos*) are sometimes seen in the open flooded fields in late summer and during migration. No major rookeries are known to occur on the refuge. Virginia rails (*Rallus limicola*) and sora rails (*Porzana carolina*) probably winter in appropriate habitat on the refuge. King rails (*Rallus elegans*) may breed irregularly in the open fields if water levels are suitable. American coots (*Fulica americana*) are present year-round and are especially abundant in winter.

Mammals

Forty-four species of mammals are known or are likely to occur on the refuge (Appendix I), although an inventory has not been conducted. White-tailed deer are the only big game on the refuge.

Furbearers found on the refuge include Virginia opossum (*Didelphis virginiana*); raccoon (*Procyon lotor*); striped skunk (*Mephitis mephitis*); river otter (*Lutra canadensis*); beaver (*Castor canadensis*); mink (*Mustela vison*); nutria (*Myocastor coypus*); and muskrat (*Ondatra zibethicus*). Gray fox (*Urocyon cincreoargenteus*), red fox (*Vulpes vulpes*), coyote (*Canis latrans*), and bobcats (*Felis rufus*) are also present. Both eastern cottontail (*Sylvilagus floridanus*) and swamp rabbits (*Sylvilagus aquaticus*) inhabit the refuge. Fox squirrels (*Sciurus niger*) and gray squirrels (*Sciurus carolinensis*) are found on the refuge, with fox squirrels in the more open woods and gray squirrels inhabiting the small amount of dense forest.

Serveral species of bats are known or are likely to occur on the refuge. These include the Rafinesque's big-eared bat (*Corynorhinus rafinesquii*); southeastern myotis (*Myotis aystroriparius*); big brown bat (*Eptesicus fuscus*); eastern red bat (*Lasiurus borealis*); Seminole bat (*Lasiurus seminolus*); evening bat (*Nycticeius humeralis*); and during migration, the hoary bat (*Lasiurus cinereus*).

No inventories have been conducted on small mammals such as mice, voles, or moles.

Reptiles and Amphibians

More than 70 species of reptiles and amphibians are likely to occur on the refuge. These species are listed in Appendix I.

Fish

Red River National Wildlife Refuge provides habitat for many species of freshwater fish (Appendix I). Important game species found in refuge waters include bluegill (*Lepomis macrochirus*); redear sunfish (*Lepomis microlophus*); longear sunfish (*Lepomis megalotis*); white crappie (*Pomoxis annularis*); black crappie (*Pomoxis nigromaculatus*); largemouth bass (*Micropterus salmoides*); yellow bass (*Morone mississippiensis*); and white bass (*Morone chrysops*). Other species include blue catfish (*Ictalurus furcatus*); flathead catfish (*Pylodictus olivaris*); channel catfish (*Ictalurus punctatus*); smallmouth buffalo (*Ictiobus bubalus*); bigmouth buffalo (*Ictiobus cyprinellus*); black buffalo (*Ictiobus niger*); freshwater drum (*Aplodinotus grunniens*); longnose gar (*Lepisosteus osseus*); shortnose gar (*Lepisosteus platostomus*); alligator gar (*Lepisosteus spatula*); spotted gar (*Lepisosteus oculatus*); bowfin (*Amia calva*); and carp (*Cyprinus carpio*).

Species of Concern

Priority bird species for conservation that may occur on or near the refuge include the cerulean warbler (*Dendroica cerulea*); Swainson's warbler (*Limnothlypis swainsonii*); the recently delisted bald eagle (*Haliaeetus leucocephalus*); and endangered interior least tern (*Sterna antillarum*), which nests on riverine sandbars. Other species of concern identified by the Louisiana Department of Wildlife and Fisheries (Lester et al. 2005) and others for the the Upper West Gulf Coastal Plain that may occur on or near the refuge are the alligator snapping turtle (*Macroclemys temminckii*), rusty blackbird (*Euphagus carolinus*), Rafinesque's big-eared bat, and southeastern myotis.

Cerulean Warbler. This warbler has a large breeding range in eastern North America, but is declining even with population expansion in some areas. This decline is apparently due to habitat loss and fragmentation, with the greatest effect perhaps occurring on the South American wintering range. North American Breeding Bird Survey data indicate a significant population decline in eastern North America. The decline has been most pronounced in the core of the breeding range (Robbins et al. 1992). Population size has declined across range in eastern U.S., but the species has experienced some range expansion particularly in the Northeastern U.S. and Ontario perhaps in response to forest maturation (Oliarnyk and Robertson 1996).

Swainson's Warbler. One of the most secretive and least observed of all North American birds, the Swainson's warbler is a skulking bird found in canebrakes and wooded wetland edges. The Swainson's warbler holds a large territory for such a small bird, defending between 7 to 45 acres. It is difficult to assess population numbers, but habitat specificity puts the species at risk from habitat loss, both on the breeding and wintering grounds.

Bald Eagle. Bald eagles breed throughout the United States and winter throughout the southern portion of its breeding range. Bald eagles have been seen near some of the refuge units. They feed on fish, waterfowl, coots, muskrats, and nutria. The bald eagle has officially been removed from the List of Endangered and Threatened Species as of August 8, 2007. Bald eagles nest in Louisiana from October through mid-May. Eagles typically nest in mature trees (e.g., bald cypress, sycamore, willow, etc.) near fresh to intermediate marshes or open water in the southeastern Parishes. Eagles also winter and infrequently nest in mature pine trees near large lakes in central and northern Louisiana. Major threats to this species include habitat alteration, human disturbance, and environmental contaminants (i.e., organochlorine pesticides and lead). Although the bald eagle has been removed from the threatened and endangered species list, it continues to be protected under the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act (BGEPA). The Service developed the National Bald Eagle Management (NBEM) Guidelines to provide landowners, land managers, and others with information and recommendations regarding how to minimize potential project impacts to bald eagles, particularly where such impacts may constitute "disturbance," which is prohibited by the BGEPA. A copy of the NBEM Guidelines is available on the Internet at http://www.fws.gov/migratorybirds/issues/BaldEagle/NationalBaldEagleManagementGuidelines.pdf.

Interior Least Tern. Interior populations of the least tern, formerly well distributed in the Mississippi Basin, now survive only in scattered remnants. Least tern habitat has been decimated by extensive water management projects and increased use of beaches and sandbars. The species is listed by the Service as Endangered with the following caveats: Louisiana, Mississippi River and tributaries north of Baton Rouge; Mississippi, Mississippi River only; and Texas, everywhere except the Texas coast and a 50-mile zone inland from the the coast.

Recorded interior least tern nesting locations occur on the Red River from Arkansas south to Natchitoches. Throughout the reach, the tern nests in shallow, inconspicuous depressions in open areas on sandbars and sand islands. These nests are subject to detrimental effects from a variety of predatory and nonpredatory impacts. Nonpredatory impacts include human recreational activity, most notably all terrain vehicles or other off road vehicles, livestock foraging and naturally occurring hydrologic conditions.

Alligator Snapping Turtle. Alligator snapping turtles are the largest freshwater turtles in the United States. They are protected from commercial harvest in every state. Louisiana protected them from commercial harvest starting in 2004. Commercial harvest of these turtles threatens their population because alligator snapping turtles do not breed until they are approximately 15 years old, and the harvest targets adults. Nest depredation by raccoons, skunks, opossums, and fire ants also harm the population significantly. The refuge has participated in alligator snapping turtle research studies on the Headquarters Unit; however, the number of turtles on the refuge remains unknown.

Rafinesque's Big-eared Bat. The Rafinesque's big-eared bat is the least studied bat in the eastern United States (Harvey et al. 1999) and is federally designated as a species of special management concern (USFWS 1999). This bat is associated with bottomland hardwoods, and since this habitat has decreased, many biologists are concerned about its status. Many states consider the species to be either threatened or endangered. However, Louisiana has no official designation for the Rafinesque's big-eared bat. Recent studies have shown that this species often roosts in water tupelo (*Nyssa aquatica*) trees (Gooding and Langford 2004; Trousdale and Beckett 2005)

Southeastern Myotis. Southeastern myotis are associated with riparian areas and/or bottomland hardwood forests and are listed as federal species of special management concern. They are often captured in mist nets more frequently than big-eared bats, but their populations are thought to be declining. Southeastern myotis roost in caves (Harvey 1992) in the northern part of their range, but

little is known about their roosting habits in areas where there are no caves, such as Louisiana. Recent research has revealed that this species also favors water tupelo trees as roosts (unpublished data, Bayou Cocodrie NWR and Upper Ouachita NWR).

CULTURAL RESOURCES

Section 106 of the National Historic Preservation Act provides the framework for federal review and consideration of cultural resources during federal project planning and execution. The implementing regulations for the Section 106 process (36 CFR Part 800) have been promulgated by the Advisory Council on Historic Preservation. The Secretary of the Interior maintains the National Register of Historic Places (NRHP) and sets forth significance criteria (36 CFR Part 60) for inclusion in the register. Cultural resources may be considered "historic properties" for the purpose of consideration by a federal undertaking if they meet NRHP criteria. The implementing regulations at 36 CFR 800.16(v) define an undertaking as "a project, activity, or program funded in whole or in part under the direct or indirect jurisdiction of a Federal agency, including those carried out by or on behalf of a Federal agency; those carried out with Federal financial assistance; those requiring a Federal permit, license or approval; and those subject to state or local regulation administered pursuant to a delegation or approval by a Federal agency." Historic properties are those that are formally placed in the NRHP by the Secretary of the Interior, and those that meet the criteria and are determined eligible for inclusion.

Like all federal agencies, the U.S. Fish and Wildlife Service must abide by Section 106 of the National Historic Preservation Act. Cultural resources management in the Service is the responsibility of the Regional Director and is not delegated for the Section 106 process when historic properties could be affected by Service undertakings, for issuing archeological permits, and for Indian tribal involvement. The Service's Regional Historic Preservation Officer (RHPO) advises the Regional Director about procedures, compliance, and implementation of the several cultural resources laws. The refuge manager assists the RHPO by informing the RHPO (early in the process) about Service undertakings, by protecting archeological sites and historic properties on Service-managed and administered lands, by monitoring archeological investigations by contractors and permittees, and by reporting violations.

Red River National Wildlife Refuge follows these procedures to protect the public's interest in preserving any cultural legacy that may potentially occur on the refuge. Whenever construction work is undertaken that involves any excavation with heavy earth-moving equipment such as tractors, graders, and bulldozers, the refuge contracts with a qualified archaeologist or cultural resources expert to conduct an archaeological survey of the subject property. The results of this survey are submitted to the RHPO as well as to the Louisiana State Historic Preservation Officer (SHPO). The SHPO reviews the surveys and determines whether cultural resources will be impacted, that is, whether any properties listed in or eligible for listing in the NRHP will be affected. If cultural resources are actually encountered during construction activities, the refuge is to notify the SHPO immediately. To date, no properties on the refuge have been determined to be eligible for the NRHP.

SOCIOECONOMIC ENVIRONMENT

The refuge is divided into five separate refuge units spread over 120 miles of the Red River Valley from the Arkansas/Louisiana state line to near Alexandria, Louisiana. The refuge units are located in parts of Caddo, Bossier, DeSoto, Red River, and Natchitoches parishes, Louisiana. The Red River Valley in Louisiana felt the pressure of European colonialization at an early stage. Continued agricultural development throughout the 1800s and early 1900s caused almost all the historic bottomland hardwood forest to be cleared. The valley is now one of the most environmentally degraded floodplains in the state. Four of the refuge units are in a rural setting; the fifth unit is

located in the major metropolitan area of Shreveport and Bossier City. Table 1 provides an overview of the demographics of the five parishes that contain portions of the refuge.

Table 1. Demographics of Bossier, Caddo, DeSoto, Natchitoches, and Red River parishes, Louisiana.

Parish	Population	Households	Percent Caucasian	Popu. Density (indiv/sq.mi.)	Median Income (per household)
Bossier	105,541	36,628	75.2	117.1	$40,581
Caddo	251,309	97,974	51.6	285.9	$32,575
DeSoto	26,383	9,691	58.4	29.1	$29,803
Natchitoches	38,541	14,263	57.8	31.1	$27,272
Red River	9622	3414	57.9	24.7	$23,153

(Based on 2000 Census data)

Data provided by the latest National Survey of Fishing, Hunting, and Wildlife-associated Recreation (USDI et al. 2003) show that for the year 2001, a total of 1.6 million people participated in fishing, hunting, and wildlife-watching activities in Louisiana. These activities resulted in roughly $1.6 billion in expenditures, with the majority spent on equipment (58%) and trip-related (36%) expenses. Of these totals, approximately 970,000 enthusiasts participated in fishing and 12.1 million fishing trips were made. The total expenditures for fishing were $703 million, with 57% trip-related, 39% for equipment, and 5% for other expenses. A total of 333,000 enthusiasts participated in hunting and 6.3 million hunting trips were made. Total hunting expenditures were $446 million, with 61% spent on equipment, 27% trip-related, and 12% for other expenses. A total of 935,000 enthusiasts participated in wildlife watching and 2.4 million trips were made. Total expenditures for wildlife watching were $168 million, with 58% spent on equipment, 33% trip-related, and 9% for other expenses.

REFUGE ADMINISTRATION AND MANAGEMENT

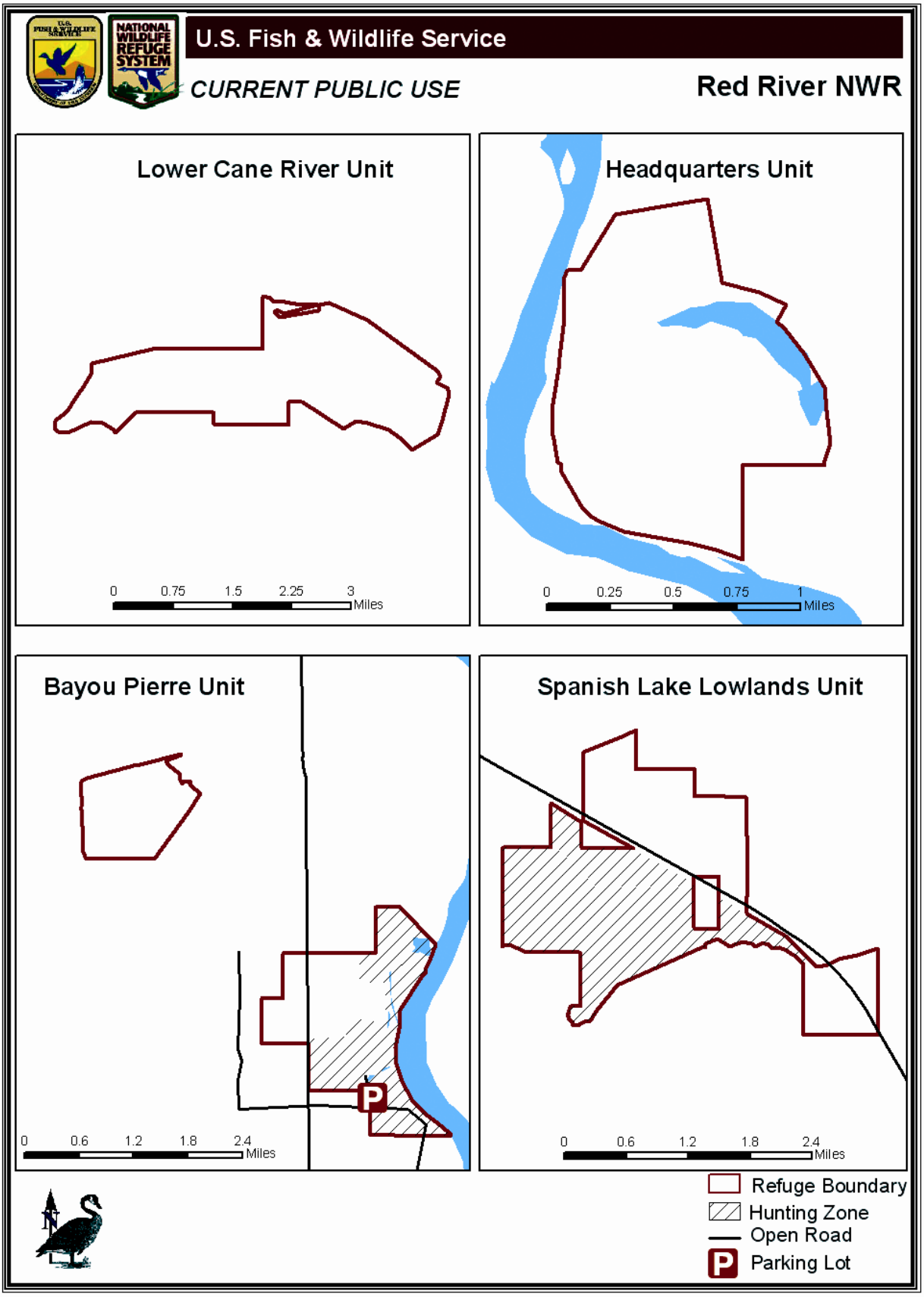
LAND PROTECTION AND CONSERVATION

The refuge now owns fee title to approximately 20% of the 50,000 acres within its legislatively designated acquisition boundary. The refuge is in an active land acquisition mode and pursuing partnership efforts such as the carbon sequestration/electric utility partnership to help in this acquisition effort.

VISITOR SERVICES

Currently, public use is available on only two of the five refuge units (Figure 7). Portions of the Spanish Lake Lowlands Unit and Bayou Pierre Unit are open to hunting. Species hunted are ducks, geese, coot, quail, woodcock, squirrel, raccoon, opossum, feral hogs, coyotes, beaver, and deer. Deer hunting is by archery only. The hunting seasons on the refuge are the same as

Figure 7. Current public use on Red River National Wildlife Refuge.



the state seasons. Although the Spanish Lake Lowlands Unit is open to hunting, no parking lots exist and access into the unit is poor.

Because Red River NWR is a young refuge, its visitor use program is not well-developed. An approved Visitor Services Plan has not yet been developed for the refuge. Currently little, if any, orientation information is provided to direct visitors to the refuge or to welcome visitors at the refuge. The refuge has completed an opening package for hunting and fishing on some portions of the refuge. Compatible public uses on the refuge (wildlife-dependent recreational uses as designated in the Land Protection Plan Interim Compatibility Determination, April 2002) currently include wildlife observation and photography; recreational fishing in accordance with State of Louisiana regulations; recreational hunting of migratory birds and resident game in accordance with State of Louisiana regulations; and wildlife-oriented environmental education activities. At present, the primary wildlife-dependent public uses of the refuge include fishing, hunting, and wildlife observation and photography.

Fishing and boating on the Spanish Lake Lowlands and Bayou Pierre units are permitted year-round during daylight hours only. Licenses, limits, and boating safety requirements are the same as those adopted by the Louisiana Department of Wildlife and Fisheries. Access to the Spanish Lake Lowlands fishing area is poor. There is interest in opening the Headquarters Unit to fishing, but improved access is currently unavailable.

Wildlife observation and photography are encouraged. However, currently the fee title land base is minimal, with very little public access. As acquisition continues, management foresees an increase in this use. Designated hiking trails, observation platforms, and photo blinds are not currently available. Opportunities for partnering with other agencies or organizations exist. The American Wetland Birding Trail has expressed an interest in establishing some stops for birders on the refuge, and the Natural Resources Conservation Service has offered to help establish a variety of habitats at the Headquarters Unit to increase birdwatching and other wildlife observation opportunities.

The refuge does not have an environmental education program at present. Kiosks, interpretive panels, and interpretive programs are not available at the refuge. As the refuge continues to buy land, there will be trails and observation areas developed. Funding has been provided to build an office/visitor center at the Headquarters Unit. Once the building is completed and the associated trails and kiosk are built, the refuge will then have the facilities for an education program; however, the refuge does not currently have staff to conduct an environmental education program or to staff the visitor center once it is opened.

PERSONNEL, OPERATIONS, AND MAINTENANCE

Currently, the refuge has a staff of one—the refuge manager. However, the refuge is a part of the Service's North Louisiana Refuges Complex and shares portions of the staff. Since it began operations, the refuge has relied on help from such groups as The Nature Conservancy and the Audubon Society, as well as the Red River Refuge Alliance. The Red River Refuge Alliance, in particular, has been instrumental in providing volunteers to increase public awareness and to increase support from local, state, and federal agencies regarding pressing refuge issues. In the years to come, the refuge will continue to rely on the assistance of these organizations to augment its resource management and public use activities.

III. Plan Development

SUMMARY OF ISSUES, CONCERNS, AND OPPORTUNITIES

In developing this comprehensive conservation plan, the planning team identified a number of issues, concerns and opportunities related to wildlife and habitat management, resource protection, public use and environmental education, and refuge administration. Additionally, the planning team considered federal and state mandates, as well as applicable local ordinances, regulations, and plans. The team also directed the process of obtaining public input through public scoping meetings, planning team meetings, comment packets, and personal contacts. All public and advisory team comments were considered. However, some issues important to the public fall outside the scope of the decision to be made within this planning process. The team has considered all issues that were raised through this planning process, and has developed a plan that attempts to balance competing opinions regarding important issues. The team identified those issues that, in its best professional judgment, are most significant to the refuge. These issues are summarized below.

FISH AND WILDLIFE POPULATION MANAGEMENT

Threatened and Endangered Species

The protection and recovery of threatened and endangered species is an important responsibility of the Service and its national wildlife refuges. One endangered species known to use areas on and/or near this refuge complex is the interior least tern. Terns travel along the Red River and nest along or within the refuge boundary. Surveys during the nesting season are needed to determine nest locations. The least terns primarily utilize the sandbars along the Red River as their primary habitat. Active management of these sandbars can encourage and promote benefits to these birds. The refuge will need to coordinate any management activities on these sandbars with the U.S. Corps of Engineers, the Red River Waterway Commission, and the Louisiana Department of Wildlife and Fisheries because many of the sandbars are not included in the fee-title property of the refuge. A complete inventory of species occurrence on the refuge is needed to determine if other species of concern occur on the refuge.

Resident Wildlife

To better understand the biodiversity and environmental health of refuge lands, baseline information on wildlife and their habitats must be collected. These data will document presence or absence, monitor trends, and identify the impacts of refuge programs on species. A variety of wildlife species indigenous to the Red River Valley inhabits the five units of the Red River National Wildlife Refuge. The refuge assumes responsibility for managing resident wildlife that is dependent on refuge resources.

White-tailed deer occur on the refuge and have the potential to adversely affect habitats unless their numbers are kept at or slightly below the carrying capacity of the habitat. Hunting programs also provide opportunities for raccoon, rabbits, squirrel, and the incidental taking of beaver, coyote, and feral hogs. Overpopulation of raccoon, beaver, coyote, and feral swine adversely impact other species. Raccoon predation on the nests of turkey, wood ducks, turtles and songbirds can limit the reproductive success of those species. Raccoons also spread canine distemper, a common close-contact disease, to other species such as fox. Beavers have become pests on parts of the refuge by building dams that flood trees, which can cause die-offs of large tracts of bottomland hardwoods. Feral hogs are destructive to habitats and compete with native wildlife for food.

Migratory Birds

Public opinion in the refuge area continues to overwhelmingly support efforts to expand habitat management programs for migratory and resident waterfowl. Habitat management actions to support waterfowl populations include providing high-calorie agricultural crops such as rice, corn, milo, and millet and managing and maintaining moist-soil areas and forested wetlands to meet the feeding, resting, and breeding needs of migratory and resident waterfowl. The refuge intends to support and be a part of the North American Waterfowl Management Plan. This will require a management plan for the refuge that determines a minimum acreage of habitat and objectives to provide sufficient water, food, sanctuary, and resting/loafing areas to meet the needs of wintering waterfowl.

Particular attention will be given to the amount of refuge croplands and moist-soil areas needed to meet habitat objectives and to the numbers of waterfowl that these cropland and moist-soil areas can support. Lands currently in agricultural crops that exceed acreages needed to meet objectives will be evaluated for conversions to moist-soil, early successional habitats, or reforestation to address the needs of other species of migratory birds and mammals.

Neotropical migratory birds are of special management concern. The Partners in Flight Conservation Plan is currently developing habitat objectives in the West Gulf Coastal Plain to support viable populations of these species. Large contiguous blocks of interior forest are extremely rare along the entire Red River valley due to land clearing, primarily for agriculture. The reforestation efforts underway at the Red River NWR will help restore this much-needed habitat.

HABITAT MANAGEMENT

Bottomland Hardwood Management and Restoration

Historically, the entire Red River valley along the stretch of the river encompassed by the refuge was almost completely covered in bottomland hardwood forest. As European settlers began to exploit the natural resources of the area following the removal of the Great Log Raft in the late 1800s, forest clearing eliminated virtually all forest cover. The Red River valley is now one of the most altered ecosystems in Louisiana.

One of the primary goals of the refuge is the restoration of bottomland hardwood forest. As explained in the Resource Protection section below, this goal is being helped through a cooperative agreement between the refuge and electric utility companies. This cooperative arrangement is an outgrowth of concerns about global warming and the potential mandated costs of addressing that environmental issue. Utility companies that believe they will eventually face limits on how much carbon dioxide (a greenhouse gas that contributes to global warming) they can emit are paying money into this program to fund the restoration of bottomland hardwood forests. The utility companies hope to use the documentation of their funding of this sequestration to offset carbon dioxide emissions from their power plants when regulatory limits on carbon dioxide emissions are someday imposed.

The challenge for refuge management is to ensure that this program does not lead to management practices that might not serve the best long-term interest of the refuge. As stated earlier, this is a program with many positive benefits. It has helped a young refuge acquire additional land and finance reforestation. The concern is the need for a longer-term vision on how to manage the program to get the best possible gains for the refuge. The program cannot be allowed to dominate management decisions that could impact the wisest and best use of the resources within the refuge. Therefore, the Red River Refuge should utilize the most recent guidelines for bottomland forest management developed by the Forest Habitat Working Group of the Lower Mississippi Valley Joint Venture.

Farming on the Refuge

Cooperative farming has long been an accepted, efficient, and necessary method of producing crops that benefit wildlife, particularly waterfowl. All farming operations are conducted in a manner beneficial to both the refuge and the local farmers. Cooperative farmers are allowed to farm refuge land under certain guidelines and restrictions, including crop location, crops planted, tilling techniques, and chemicals used. In return for providing the land, the refuge receives a share, usually 20–25 percent of the crop.

Depending on waterfowl needs, the refuge's shares of the crops are usually left in the field to provide immediate food and cover. Title 50, Part 29 of the *Code of Federal Regulations* and Service policies require that the value of a refuge's share of cooperatively grown crops be set at rates that reflect the fees and charges received by private landowners in the vicinity for similar privileges. The value can be established through the use of competition in selecting cooperators, or through an analysis of local market conditions to establish the prevailing rates in the nearest comparable area.

Moist-Soil Management

One part of the comprehensive planning process for the Red River NWR is the establishment of moist-soil objectives for the refuge complex in support of the North American Waterfowl Management Plan. Moist-soil management refers to management that promotes moist-soil conditions to encourage the natural production of beneficial plants. Seeds and plant parts produced by these plants often attract and concentrate waterfowl and other wetland-dependent wildlife species. The decomposing vegetative parts of moist-soil plants also provide substrata for invertebrates, which are vital foods for many wetland wildlife species. Factors that determine the success of moist-soil management include the timing and rate of drawdowns, soil disturbance and the stages of plant succession, and the timing and rate of reflooding. Best success is achieved when water levels can be controlled as well as the soil disturbed periodically, although good results can be obtained under natural conditions when artificial draining and flooding are not possible (Conservation Commission of Missouri 2002).

Waterfowl depend on nutrient-rich seeds and invertebrates for various periods of their lifecycles. While high-calorie agricultural crops provide the needed energy for wintering migratory waterfowl, it is equally important that waterfowl receive the nutrients needed year-round to remain healthy and to reproduce. Natural wetlands such as moist soil are best utilized when in close proximity to high-calorie agricultural crops to facilitate waterfowl access to aquatic invertebrates and other natural foods that are comparatively scarce in croplands, as is the case in much of the Red River valley (Kaminski and Davis 2002).

The refuge is fortunate to have a variety of locations within certain portions of some of its management units to practice controlled moist-soil management. Past agricultural practices on lands now within the refuge left in place a number of water control structures. An analysis of the individual management units, current acreage, and potential management of moist-soil areas is needed to maximize management of these areas. Particular attention should be given to proper record-keeping on water level management and subsequent plant/animal responses.

Carbon Sequestration Financed Reforestation Programs

As described in Chapter II, the Red River NWR is a young refuge, authorized in 2000 and established in 2002. It is located in an area that was historically dominated by bottomland hardwood forest which has been mostly cleared. Because of these circumstances, refuge management is in a very active land acquisition mode and would like to reforest much of the acquired land. Land acquisition and reforestation require money at a time when the National Wildlife Refuge System, like most governmental agencies, is under strict funding constraints. Into this backdrop, a public/private cooperative arrangement has emerged that can potentially go a long way toward facilitating reforestation and addressing the issues outlined above.

The agreements stipulate that utility companies buy and reforest land for carbon sequestration purposes and donate it to the Service. The utility companies also provide additional funding for reforestation of existing Service lands. This is currently being conducted on a ratio to reflect land and anticipated carbon value. That is, for every acre of donated reforested land, the utility companies also fund reforestation of an additional one acre of land already owned by the Service. The Service agrees to keep the donated land in forest, although it reserves the right to manage the forest habitat for wildlife values (e.g., conduct thinning or other silvicultural treatments). The utility company receives documentation that shows it was responsible for funding the reforestation on so many acres as of a given date, from which a calculation can be made of how much total carbon has been taken up by the forest and kept in organic form.

The question Red River NWR faces is whether privately funded financial assistance of a depleted ecosystem within the refuge poses any potential ecological problems. The danger exists that the sequestration program could come to dominate management decisions, requiring land that may not really be suitable or best used for forest to be reforested. It could also cause a rush to reforest that might not allow for the best mix of tree species. There are differences of opinion among biologists about this; some believe that what the Red River Valley lost most is forests and therefore, it needs trees; while others observe that the valley lost biodiversity and do not want to see it wholly turned into forest at the expense of prairie, moist soil (emergent vegetation), shrub/scrub savannah, and other ecosystem types with important wildlife values.

The carbon contracts require immediate reforestation of acquired, donated and matching reforestable land. This creates two problems: the first is the fact that the availability of tree seedlings is limited, because there are a lot of other reforestation projects going on (tree nurseries need at least a year or perhaps two years of advance planning to grow the desired mix of species). The second problem is the need to provide reforestable federal land to match the land donation from the utility company, which leads to short-term land management planning. The refuge is trying to meet its requirements under the carbon contracts to plant trees. To do this, it has had to compromise in terms of what tree species have been planted to meet its obligations.

Another problem is the flexibility of the carbon contracts in regard to precise acreages, i.e., the contract demands exact acreage, but the refuge often doesn't have exact acreage figures when it starts the negotiations. Thus, at times the refuge has come up short and been forced to quickly find more acres to reforest that may not be the best choice. The concern here is that the rush to reforest without an inventory of the area being reforested could result in lost opportunities or values.

As stated earlier, this is a program with many positive benefits. It has helped a young refuge acquire additional land and finance reforestation. The concern is the need for a longer-term vision on how to manage the program to get the best possible gains for the refuge resources.

Land Protection and Acquisition Boundary Expansion

Red River NWR is within the Red River Valley located along the Red River Waterway in Caddo, Bossier, Red River, Natchitoches, and DeSoto parishes. The current approved acquisition boundary is approximately 50,000 acres, of which 9,787.92 acres are currently owned in fee title. The approved acquisition boundary includes five focus areas for acquisition: Wardview, Headquarters, Bayou Pierre, Spanish Lake, and Lower Cane (Figure 2). Upon full attainment, the established refuge will consist of a complex of five separate refuge units. The five units were selected based on their natural resource values, management potential, restoration possibilities, hydrologic/watershed influences, partnership opportunities, and proximity to development (current and projected).

The Service's current anticipated near-term acquisitions at the Spanish Lake and Lower Cane River units will result in divided ownerships (part of a landowner's tract within the Service acquisition boundary and part outside the boundary). The landowners wish to sell their entire tracts to the Service. Also, the construction of the Arthur Teaque Parkway adjacent to the Headquarters Unit may result in a land exchange with Bossier Parish, Louisiana. A minor expansion of the current acquisition boundaries at the Spanish Lake Lowlands, Lower Cane River, and Headquarters units will rectify these significant boundary issues and also provide additional habitat for migratory birds and resident wildlife. In addition, these lands would provide for additional public use and access.

VISITOR SERVICES

Currently, minimal public use occurs on the refuge besides hunting, fishing, and some wildlife observation. The complex does not have the staff or facilities to provide environmental education, interpretive or other wildlife-dependent recreational programs. A big part of this comprehensive conservation plan, and the need for public involvement in its development, is planning for visitor services.

Environmental Education and Interpretation

From its inception, there has been the intention to locate a visitor center at the Headquarters Unit of the refuge, which was identified in the establishing legislation. This planned visitor center will play a significant environmental education and interpretation role for the refuge, particularly due to its location within a major metropolitan area. Where the visitor center will be located within the Headquarters Unit and how it will be utilized were issues brought up by the public. Partnerships with local schools and universities will be explored.

Beyond the important visitor center, and consistent with the provisions outlined in the National Wildlife Refuge System Improvement Act, the Service can provide high quality compatible wildlife-dependent recreational programs throughout the Red River Refuge. These recreational programs will include hunting, fishing, and observing and photographing wildlife, as well as environmental education and interpretation. These priority public uses will provide the public with an opportunity to learn about, enjoy, and appreciate the refuge's natural resources, but not at the expense of wildlife and their habitats.

Hunting and Fishing

Hunting and fishing are integral parts of Louisiana culture. It is not surprising that there is considerable state and local interest in expanding hunting opportunities. Any additional hunting opportunities will depend on whether the refuge can provide safe, quality experiences that are compatible with refuge purposes. The public has expressed an interest in increased opportunities to hunt dove, waterfowl, and deer and in having universally accessible accommodations.

Hunting is one management consideration for the isolated white-tailed deer population on the Headquarters Unit, but such a hunt would require careful coordination and control. Deer herds are now being actively managed on properties near some of the refuge units and any active management on these units will have to take into consideration the management techniques used on adjacent properties.

Fishing could be expanded at the Red River Refuge by developing bank fishing areas, better public access, improved or expanded fishing piers, and controlling aquatic weeds.

Wildlife Observation and Photography

A variety of wildlife observation and photography opportunities are available throughout the refuge. Expanding and enhancing these opportunities is integral to this comprehensive conservation plan. Walkways with interpretive wayside exhibits are a natural fit for the Headquarters Unit. Observation towers would increase wildlife watching at moist-soil areas within several of the refuge units.

REFUGE ADMINISTRATION

Currently the refuge has a resident staff of one—the refuge manager. Increases for staff, facilities, and equipment will help the refuge realize its purpose and management objectives.

WILDERNESS REVIEW

Refuge planning policy requires a wilderness review as part of the comprehensive conservation planning process that is consistent with provisions of the Wilderness Act, National Environmental Policy Act, National Historic Preservation Act, and other applicable legislation. Red River NWR lands were inventoried to identify whether areas met the defining wilderness criteria as set forth in the Wilderness Act of 1964. Please refer to Appendix H for that determination.

IV. Management Direction

INTRODUCTION

The Service manages fish and wildlife habitats considering the needs of all resources in decision-making, but first and foremost, fish and wildlife conservation assumes priority in refuge management. A requirement of the National Wildlife Refuge System Improvement Act of 1997 is for the Service to maintain the ecological health, diversity, and integrity of refuges. This chapter describes the goals, objectives, and strategies that will be used to implement a science-based stewardship program for the fish and wildlife resources on Red River National Wildlife Refuge.

On national wildlife refuges, public uses are allowed if they are appropriate and compatible with wildlife and habitat conservation. The Service has identified six priority wildlife-dependent public uses: hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation. These public uses are therefore emphasized in this plan.

Described below is the proposed comprehensive conservation plan (CCP) for managing Red River National Wildlife 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.

Three alternatives for managing the refuge were considered:

A. Current Management Direction (No Action Alternative)
B. Minimize Management and Public Use Management
C. Optimize Biological Program and Visitor Services

Each of these alternatives is described in the Environmental Assessment (Section B). The Service chose Alternative C, “Optimize Biological Program and Visitor Services,” as the proposed management action. This alternative best satisfies the vision of the refuge and best addresses the goals, objectives, and strategies expressed by the planning team, the refuge staff, governmental partners, and the public.

Implementing the proposed alternative will result in management based on sound science for the recreation and conservation of a structurally and species-diverse bottomland hardwood habitat (along with managed wetlands and associated prairies) for migratory birds and resident wildlife. A focused effort will be put toward reducing invasive species that threaten the biological integrity of the refuge. Wintering waterfowl habitat will be maintained through the development of important foraging habitat associated with cooperative farming efforts on the refuge and the management/manipulation of moist-soil areas. Baseline inventories and monitoring of management actions will be completed to gain information on a variety of species from reptiles and amphibians to game animals, as well as species of concern. Several cooperative projects will be conducted with universities, the Louisiana Department of Wildlife and Fisheries, and other agencies and individuals to provide biological information for use in management decision-making. The proposed alternative will also expand the current acquisition boundaries in the Spanish Lake Lowlands, Lower Cane River, and Headquarters units. Compatible wildlife-dependent recreational opportunities for hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation will be provided and enhanced, while achieving the refuge’s purposes.

VISION

The Red River National Wildlife Refuge will be managed to provide for the restoration, enhancement, and conservation of bottomland hardwood forests, managed wetlands, and associated prairies, as an integral component of the Red River ecosystem. These habitats will support a variety of migratory birds, species of special concern, and other associated wildlife and plants. This effort will be enhanced and encouraged through both strong private landowner partnerships and public support by providing opportunities for environmental education and interpretation, hunting, fishing, and wildlife observation and photography.

GOALS, OBJECTIVES, AND STRATEGIES

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

These goals, objectives, and strategies reflect the Service's commitment to achieve the mandates of the National Wildlife Refuge System Improvement Act of 1997, the mission of the National Wildlife Refuge System, and the purposes and vision of Red River National Wildlife Refuge. With adequate staffing and funding as outlined in Chapter V, the Service intends to accomplish these goals, objectives, and strategies within the next 15 years.

FISH AND WILDLIFE POPULATION MANAGEMENT

GOAL A. Fish and Wildlife Population Management: Promote the conservation and management of migratory bird diversity and resident wildlife in support of national, regional, and ecosystem habitat and population goals.

Discussion: Red River NWR is part of the Lower Mississippi River Ecosystem and is considered to be in the West Gulf Coastal Plain (WGCP) Bird Conservation Area. As such, Red River NWR is a component of many regional and ecosystem conservation planning initiatives. Wildlife species found on the refuge are typical of forested wetlands and fields. The refuge provides habitat for thousands of wintering waterfowl and year-round habitat for nesting wood ducks. The Red River is a historic migration corridor for migratory birds that use the Central and Mississippi Flyways on their journey to the Gulf Coast. Species range from diving ducks such as scaup, ring-necked duck, redhead, and canvasback to traditional puddle ducks like mallards and teal. More than 300 species of neotropical migrants use the Red River at various times of the year. Priority species for conservation include the swallow-tailed kite, cerulean warbler, Swainson's warbler, American woodcock, yellow-billed cuckoo, prothonotary warbler, worm-eating warbler, Louisiana waterthrush, Kentucky warbler, and hooded warbler. Listed species include the interior least tern, which nests on riverine sandbars. Other migratory birds such as woodcock and mourning doves are common in the cleared fields, while wading birds and shorebirds are numerous on sandbars, shallow flooded fields, and mudflats.

Resident game and furbearer species along the river include white-tailed deer, swamp rabbit, cottontail rabbit, gray and fox squirrels, mink, muskrat, beaver, fox, and coyote. The Red River Valley also supports a variety of nongame mammals, amphibians, and reptiles.

The river basin supports 133 species of fish ranging from game species such as largemouth bass, crappie, and catfish to big river species such as shovelnose sturgeon, freshwater drum, and gar. Two species of management concern, the blue sucker and paddlefish, are also found in the Red River.

Objective A-1. Migratory Waterfowl: Annually monitor winter waterfowl species abundance and habitat use on the refuge per the Southeast Region Waterfowl Survey Protocol in coordination with the State of Louisiana.

Discussion: Concern over waterfowl population declines in the 1980s resulted in establishment of the North American Waterfowl Management Plan (NAWMP), which focused the attention of federal, state and private conservation groups on critical wintering and breeding areas. The Lower Mississippi Valley Joint Venture (LMVJV) was selected as one of the wintering habitat focus areas. One of the first tasks faced by the LMVJV was to find a model or decision tool for determining how much habitat was needed and a way to relate this objective to the population goals of NAWMP. The solution was to view wintering areas as responsible for contributing to the spring breeding population goals of NAWMP proportional to the percentage of ducks historically counted in wintering areas (Loesch et al. 1994; Reinecke and Loesch 1996). To contribute ducks to spring populations, wintering areas have to provide sufficient habitat to ensure adequate winter survival. To quantify winter habitat requirements, the LMVJV had to identify limiting factors and the LMVJV assumed foraging habitat was most likely to limit waterfowl populations in the Mississippi Alluvial Valley (Reinecke et al. 1989). Many of these same factors and planning procedures were applied to the WGCP as the LMVJV expanded to include this important area.

Strategies:

- Implement Waterfowl Survey Protocol for refuges in the Southeast Region twice a month from mid-September to March.
- Design and implement an estimate of waterfowl use of flooded forest.
- Fly mid-winter survey each year, and coordination with Louisiana Department of Wildlife and Fisheries to conduct surveys in northwest Louisiana.
- Hire biologist to assist with surveys and data management.
- Archive complete digital data of all waterfowl surveys and vegetation responses to water management.
- Waterfowl survey objectives should be expanded beyond strictly determining peak waterfowl populations to record waterfowl numbers on a unit specific and species specific basis from September through February. Habitat conditions and waterfowl numbers should be correlated with habitat conditions throughout the winter period. Because of differences in species habitat preferences both within and among years, data should be recorded, archived and analyzed over a period of years before irreversible actions are taken.

Objective A-2. Waterfowl Sanctuary: Maintain at least 5% of refuge as waterfowl sanctuary to provide adequate resting and feeding areas and use adaptive management for yearly regulations, delineations, and modifications as lands are acquired.

Discussion: An essential component of waterfowl wintering habitat is sanctuary. Waterfowl need sanctuary from human disturbance during the winter to prepare biologically for spring migration and reproduction (Reinecke et al. 1989). Disturbance can interrupt resting and feeding bouts resulting in a loss of energy and lowering of body weight. Paulus (1984) found in Louisiana that increased foraging time by gadwalls was insufficient to counterbalance disturbance factors. Locally, the refuge can provide sanctuary for a portion of the waterfowl population.

Sanctuary is a priority for management of wintering waterfowl to ensure that adequate and preferred feeding habitats are available. Many of the public believe that sanctuaries affect the availability of waterfowl for the hunting season. Some believe that sanctuaries hold all the ducks, or a large portion, off of public and/or private hunting areas. In contrast, it has been seen in some areas that

creating sanctuary areas or areas with minimal human disturbance, among a diversity of habitat types that provide adequate food and cover resources, is probably the most effective management tool to encourage waterfowl use over time. Sanctuaries provide core use areas that enhance the use of adjacent areas by holding more birds closer to a hunting area (Bias et al. 1997).

Strategies:

- Post sanctuary boundary and continue to enforce no waterfowl hunting in the sanctuary.
- Monitor the sanctuary for disturbance thresholds from access during the key waterfowl wintering period of September–March.
- Evaluate the sanctuary in terms of size, location, and access as new lands are acquired.

Objective A-3. Wood Ducks: Within 5 years of CCP approval, add 50 additional wood duck nest boxes for a total of 100. These boxes should be placed in or adjacent to good brood habitat providing adequate cover and an abundance of aquatic insects. Cooperate and partner with Louisiana Department of Wildlife and Fisheries to meet preseason wood duck banding efforts.

Discussion: Wood ducks are year-round residents in the forest lands of the United States, including Red River NWR. Preferred habitats include forested wetlands, wooded and shrub swamps, tree-lined rivers, streams, sloughs and beaver ponds. Wood ducks seek food in the form of acorns, other soft and hard mast, weed seeds and invertebrates found in shallow flooded timber, shrub swamps and along stream banks. They loaf and roost in more secluded areas and dense shrub swamps.

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. Due to the loss of forested wetlands and competition for nest sites from a host of other species, natural cavities are the primary limiting factor to reproduction. Nest boxes are commonly used to supplement natural cavities and increase local production of wood ducks. Box programs are not an end to all nesting problems. They require laborious maintenance at least annually. Production can be increased by more frequent checks and cleaning of boxes, but this must be weighed with other time constraints.

An initial start of 25–40 boxes might be ambitious considering the current refuge staff level. As wood duck nest box usage exceeds 60 to 80% of the available boxes, the refuge should consider adding more boxes to minimize potential dump nesting. The decision to continue adding more boxes must be weighed with the available staff/volunteer time to properly monitor and maintain the boxes.

Small nest boxes have been used in some areas following recommendations provided by a study conducted by Stephens et al. (1998) that cited nest success comparable to large boxes and financial savings. Subsequent studies by Hunter (2000) and Davis et al. (1999) report lower (compared to larger boxes) or declining usage of small boxes due to high nest site competition with nesting passerine birds. If the purpose of putting up nest boxes is to increase wood duck production, it is recommended that large nest boxes be used.

Recent guidelines entitled, “Increasing Wood Duck Productivity: Guidelines for Management and Banding, USFWS Lands (Southeast Region) 2003 (update)” by the Division of Migratory Birds, provided direction for the use of wood duck nest box programs on refuges. Boxes should be placed in or adjacent to, good brood habitat in areas where they are not subject to flooding. It is critical that boxes have functional predator guards and are checked and repaired annually; otherwise, boxes are considered traps for the hen and her clutch. Conical predator guards should be maintained on all of the boxes to more effectively keep rat snakes from climbing into the boxes. Some reports indicate that if rat snakes learn there is a meal of eggs in the nest box, it becomes very difficult to exclude

them from the boxes. If boxes cannot be properly maintained, they should be boarded up until sufficient effort can be put toward operating an effective nest box program. Cleaning the boxes after the initial peak of nesting (about mid-April) will significantly improve annual production if competition for nest sites increase.

Adequate brood habitat can seriously affect duckling survival and reproductive success. Suitable brood habitat may be limiting recruitment in the vicinity of Red River NWR just as much as natural cavities. McGilvrey (1968) described preferred brood habitat as 30 to 50% shrubs, 40 to 70% herbaceous emergents and 25% open water. Overhead cover within 1 to 2 feet of the water surface is vital for wood duck broods. Optimum habitat should have 75% cover and 25% open water, with a minimum of 1/3 cover to 2/3's open water. Placement of boxes in or adjacent to good brood cover will significantly improve duckling survival to flight age. This information has been more recently supported by Davis (2001).

One other factor affecting duckling survival is aquatic insect production that is probably poor in highly turbid systems. Other than serving as access to good brood habitat (e.g., beaver ponds, oxbow lakes, etc.), these waterbodies appear to be relatively poor brood habitat and should not be considered as a suitable site for a significant number of nest boxes.

The Mississippi Flyway Council has established preseason wood duck banding quotas by state throughout the Mississippi Flyway to estimate survival. As staff time allows, the refuge should request a banding quota. In the interim, the refuge should consider making good banding sites available to the LA Department of Wildlife and Fisheries for banding.

Strategies:

- Nest boxes must be fitted with conical predator guards and inspected at least annually [see Increasing Wood Duck Productivity: Guidelines for Management and Banding, USFWS Lands (Southeast Region) 2003 (update) by the Division of Migratory Birds]. Boxes should be placed so that it is difficult to see from one box to the next or at least 100 yards apart. It is important to place boxes so that they are easy to access. As a minimum, box checks should be conducted in January, just prior to nest initiation. Preferably boxes should also be checked in late April, soon after the first round of nest exodus by ducklings and again in August, just after the nesting season is complete.
- Plant red oaks to achieve 30–60% overstory where feasible in floodable units for wintering wood ducks
- Beaver ponds provide excellent brood habitat for wood ducks (nesting, brooding and wintering) and numerous other wetland-dependent species (e.g., prothonotary warbler, otter, American alligator, etc). Some beaver ponds should be allowed to develop and mature, not to exceed 5% of the refuge.
- In cooperation with partners (LDWF), contribute to the Mississippi Flyway Council's Preseason Wood Duck Banding effort.

Objective A-4. American Woodcock: The refuge will develop and implement forest management plans that provide midstory and groundstory vegetation (thickets) in the forested lands for daytime cover and foraging habitat in grassland habitats for nighttime foraging by American woodcock to significantly contribute to the American Woodcock Management Plan (U.S. Department of the Interior, Fish and Wildlife Service 1990).

Discussion: American woodcock are migratory game birds that occur throughout the forested portions of the eastern United States. Woodcock populations in the Southeast Region have declined 19% from 1968 to 1990. Population declines are thought to be the result of land use changes associated with land conversion and the maturing of forest habitats.

In 1990, the American Woodcock Management Plan was completed, setting an objective to protect and enhance wintering and migration habitat on public lands to increase woodcock carrying capacity. The plan also set objectives to inventory and monitor woodcock habitat and develop management demonstration areas.

Wintering habitat includes moist bottomland hardwood forests with brush and understory, especially when found in close association with agricultural fields and old field succession. These sites are typically wet thickets with a high density of plant stems and open ground cover. Typical cover includes privet, cane and briars that result from openings in the canopy. Scrub-shrub and other dense habitats found on certain portions of the refuge provide good daytime cover for woodcock. These habitats result from reforestation, old field succession, ice storms, and forest management, which are recommended to benefit priority forest interior-nesting land birds (e.g., Swainson's warbler, cerulean warbler, etc.) and other wildlife.

At dusk, woodcock move to open or brushy fields to forage and conduct courtship activities throughout the night. These habitats include agricultural fields that were not fall disked and sparse grasslands that may have received a cool fall burn to create patchy openings of exposed soil interspersed between grass clumps 1 to 3 feet in height. Woodcock are closely tied to earthworms as their major food resource. Mowed or disked strips through reforestation areas will serve as sites for entry into these dense habitats.

Strategies:

- Develop forest management plans that provide preferred woodcock habitat.
- Diurnal (daytime) cover and foraging habitat for woodcock includes thickets and shrub areas with high vertical density in the understory and spongy wet soil. These habitats can be created in existing forest stands through patch group thinning and patch clearcuts that also benefit other high priority bird species. Preferred nocturnal habitat includes wet agricultural fields (not fall disked) and wet "old field" or grassland habitats with exposed soil and patchy cover 1 to 3 feet in height created by cool fall burns.
- Take advantage of rights-of-way and other permanent forest openings to create woodcock habitat.
- Inventory suitable woodcock wintering habitat on the refuge and conduct evening flight counts, nighttime counts and flush counts to assess woodcock usage of the refuge at least twice monthly from mid-November to mid-March.
- Develop woodcock habitat demonstration sites to serve as educational opportunities for public and private land managers, realizing that habitat management for woodcock is similar to management for other priority species.

Objective A-5. Scrub Shrub Birds: Maintain and create early successional habitats along buffer strips, prarie demonstration site, and pipeline rights-of-way for priority breeding shrub-scrub species.

Discussion: While bottomland hardwood forest is the habitat type that has been most disturbed and much effort to restore such habitat will be a focus on this refuge, there will be opportunities for

providing early successional habitats suitable for shrub-scrub birds. There will also be an opportunity to provide such habitat in a planned prairie demonstration area on the refuge.

Strategies:

- Encourage buffer strips ("feathered edges") along forest-field edges and riparian zones.
- Promote shrub-scrub habitats through the appropriate planting of shrub-scrub plant species (e.g., plum, swamp dogwood, devil's walking stick, deciduous holly, and hawthorn species).
- Where narrower corridor linkages between forest patches are created, consider establishment of shrub-scrub habitat.

Objective A-6. Shorebirds, Marsh birds, and Wading Birds: Implement standardized surveys within the managed wetlands and agricultural fields for shorebirds, wading birds and secretive marsh birds according to approved protocol.

Discussion: Many of the refuge units have moist-soil units that can be manipulated to enhance habitat for this group of birds. Monitoring data (i.e., which species are using the refuge, its impoundments, and condition of impoundments, etc.) will provide valuable information for adaptive management decisions that will provide benefits for a wide array of species.

Strategies:

- Implement shorebird surveys in coordination with the national plan.
- Implement secretive marsh bird surveys, locate nesting colonies, and count waders.

Objective A-7. Forest Breeding Birds: In addition to developing a bird list, within 5 year of CCP approval, implement point count surveys according to the LMVJV protocol and long-term research studies on bird community responses to habitat changes and nest productivity within existing forest stands. As these research studies mature, develop priority areas of conservation in the Red River Valley and target protection of these lands for forest breeding birds.

Discussion: Forest breeding birds, especially neotropical migratory birds, are declining in numbers (Robinson 1993). Much of the bottomland forests of the Red River Valley have been removed. The remaining forest habitat is fragmented and isolated. Information on species presence, abundance, population trends and productivity is needed to better understand the forest nesting birds that use the refuge. Long-term monitoring will allow the refuge to identify problems and benefits associated with management practices, land use changes surrounding the refuge, or ecosystem changes.

The Louisiana Department of Wildlife and Fisheries has developed a conservation strategy and has outlined bird species in need of conservation concern (Lester et al. 2005). The refuge will continue to cooperate with the state and develop a nesting productivity research project, which will include as many of the state's priority forest bird species as feasible.

Strategies focused on research:

- Develop a research project in cooperation with Louisiana Department of Wildlife and Fisheries and a university to determine abundance and production of songbirds for a minimum of three years and provide recommendations on best management practices that will maintain or increase production of Louisiana's species of concern.

- Monitor species diversity, abundance and productivity as habitat succession progresses.
- Complete baseline study to be conducted by graduate student or temporary employee.
- Refuge staff will determine which information need is the highest priority from forest management activities affecting migratory songbirds.
- In cooperation with LMVJV, design a study to determine bird community response to habitat changes.

Strategies focused on specific habitats:

- Tupelo Gum–Cypress: Overall passive management should be undertaken in this forest type. Some stands of tupelo could be thinned to increase value to wading birds, wood ducks and to encourage larger growth form based on site evaluations and at the discretion of the refuge manager.
- Frequently flooded oak-dominated flats (overcup, willow, Nuttall): Maintain forest in oak communities. Based on site inspection, regeneration will consist of using small clearcuts (about 10 acres) predominately as a regeneration tool. Adjacent sites will be used for subsequent entries. Experiment with leave-trees to provide dominant trees for future dens, cavities and super-emergent trees (for forest breeding birds). These super-emergent trees are recommended to be in 2 patches of 5 or so trees per regeneration site. Also, experiment with interspersed shelterwoods and thinnings.
- Higher sites (and sites with lower frequency of growing season flooding) with more diversity of tree species: These sites include ridges, sites with palmetto present, or otherwise infrequently flooded during growing (e.g., some of the forests between the levees). Overall future desired condition of mature wetland forests would be to emphasize (1) increasing stand structural diversity by favoring retention of largest trees (remove surrounding potentially competive trees); (2) opening up stands to allow light to reach the ground in support of better understory structure; and (3) group selection-sized openings to further structural complexity and support regeneration of shade-intolerant tree species (oaks) where needed. Retain at least two culls per acre for future potential cavities, dens, super-emergents (for forest breeding birds).
- Reforested stands older than 20 years: The inclination is to thin these stands, even if it sacrifices future merchantable practices. If the refuge staff waits until these stands are at least 30 years old, their marketability will provide flexibility for future forest habitat improvement in contrast to 10–20 years of wasted habitat condition for migratory birds.
- Reforested stands between 15–20 years: Recommend pre-commerical thinning as canopy closes, but may sacrifice future height, allowing light and species to come into stand. Perhaps for every 20 acres designate 5 acres for continued growth to be treated post 30 years, or vice versa. Also consider TSI (injections) to accomplish forest habitat improvement.
- Reforested stands between 2–15 years: Before trees reach 12–15 ft. in height, consider scarification and disking of small patches for clusters or groups of faster growing trees or patches of shrubs. Patches could be arranged in small groups of 4 to 6 trees or patches of up to ½ acre of trees.
- Reforested stands at planting: A diversity of tree species should be planted to include faster-growing species including such species as cottonwood, sycamore, honey locust, and sweetgum in addition to oaks and ash.

Objective A-8. Wildlife Diversity/Resident Wildlife: Create a species list of mammals, mussels, butterflies, moths, and insects that utilize the refuge; based on surveys, literature and collections.

Discussion: No inventory research has been conducted on the refuge; therefore, little information is available on their populations. Before management strategies can be planned, a basic understanding of which species use the refuge needs to be addressed. Trapping/surveying for all mammals on the refuge would be logistically time-consuming and expensive. Other alternatives, such as literature searches, would help initiate a species list. Target species or species of concern could then be focused on more intensive monitoring or research.

Strategies:

- Research the literature including range maps for species that should occur in northwest Louisiana.
- Review local university collections and determine if wildlife professors have species lists for the surrounding areas.
- Employ different surveying techniques, such as small mammal traps and mist-netting for bats, to sample for presence of all potential species.

Objective A-9. Game Mammal Management: Monitor white-tailed deer herd health, age, and sex structure every 3 to 5 years for disease and conditions that relate to exceeding carrying capacity on existing refuge lands and as lands are acquired and the hunting program is expanded. Maintain healthy populations of all game mammals at or just below carrying capacity.

Discussion: Deer can reproduce quickly and should be monitored for herd health issues as well as potential impacts on available habitats. This is especially true for the isolated herd that is found at the refuge's Headquarters Unit. For example, chronic wasting disease is a transmissible spongiform encephalopathy of deer and elk. It has not been found in Louisiana to date, but the high profile of this disease, combined with Service responsibilities for wildlife resources that span state and federal jurisdiction, makes it critical for the Service to cooperate with the state and other federal agencies in monitoring for the disease.

Hunting of white-tailed deer, squirrels, rabbits, raccoons, and opossums is allowed on the refuge. All of these species reproduce quickly and should not only be able to withstand hunting but their numbers will also be kept in check.

Strategies:

- Continue to use hunting as the primary tool for regulating resident game mammal populations.
- Use deer herd health checks every three to five years to determine status of deer populations on the refuge.
- Conduct browse surveys during spring following the LDWF's protocols.
- Conduct a very controlled deer harvest on the Headquarters Unit to maintain the proper carrying capacity.

Objective A-10. Nuisance Wildlife Control: Within 7 years of CCP approval, control feral hogs, nutria, beaver, and other exotic species by a variety of methods.

Discussion: Invasive wildlife species on the refuge include feral hogs, red fire ants, nutria, Eurasian collard doves and European starlings. Control of doves, starlings and fire ants is practically impossible. These species will be with us always. Nutria are established throughout Louisiana and

can damage levees and impact native vegetation if populations become high. Numbers can be reduced by shooting or trapping. Hogs root up native vegetation and compete with native wildlife for food. A variety of control methods will be explored to determine the best fit for use at this refuge.

The Red River acts as the primary source for intrusion by exotic fish species. Exotic carp are the primary species of concern in northeast Louisiana. Invasive carp have the ability to cause habitat degradation. Common carp (*Cyprinus carpio*) can cause increases in turbidity especially when abundant in shallow waterbodies. Grass carp feed on vegetation and may cause decline or eradication of native aquatic plants in certain situations. Silver (*Hypopthalmichthys molitrix*) and big head carp (*H. nobilils*) are primarily planktivores and may compete with native species, including bigmouth buffalo (*Ictiobus cyprinellus*) and paddlefish (*Polyodon spathula*), which is a protected species in Louisiana.

Freshwater mollusks and the young of most fish species may also be affected by increased competition with exotic planktivores. The silver and bighead species have not been here long enough to accurately determine their impacts. Another species, the Asian black carp (*Mylopharyngodon piceus*), has been found in at least one river in the southern part of the state. These fish feed primarily on mollusks and shellfish. If established, they have the potential to damage native mussel and snail populations and create additional competition for food with other fish, birds and mammals. Little can be done to prevent the introduction of these fish into the refuge. Periodic sampling may be done to inventory species and abundance, along with the noting of any changes in the condition of the fisheries that may be attributed to their presence. Eradication of these species without harm to other fish is not possible.

Strategy:

- Reduce numbers using an integrated pest management plan that utilizes both approved lethal and nonlethal methods of control.

Objective A-11. Herpetofuana: Determine the presence of all species of herpetofauna utilizing the refuge and their habitat associations.

Discussion: Although the prospective herpetofauna of the refuge is large (at least 80 species), the presence of relatively few of the species has been confirmed and associated with particular refuges or their habitats. Under the provisions of the National Wildlife Refuge System Improvement Act of 1997, refuges are called upon to conserve, manage and restore wildlife populations and their habitats. When confronted with a lack of knowledge concerning the species actually present on refuge lands, the first step in conserving them is learning of their presence and to the extent possible, associating their presence with particular habitats. These are fundamental aspects of biodiversity knowledge recommended as priorities for helping the Department of the Interior manage its lands.

Strategies:

- Initiate a survey using standard drift fences/pitfall trap arrays. Standard methodologies can be used to sample both amphibians and reptiles, with specific additional techniques aimed at sampling the most highly aquatic salamanders, snakes, and turtles. All major habitats on the refuge should be included in the survey and at least one full year of sampling should be conducted in order to account for seasonality of activity among the various groups.

- Sample anurans using the North American Amphibian Monitoring Program (NAAMP) protocol at a minimum of every other year in order to monitor population trends. Special effort should be expended during the late February to mid-April period to look for spadefoot toads (*Scaphiopus hurteri*) in areas with predominantly sandy soils.

Objective A-12. Fisheries: Protect, restore and manage the fisheries and other aquatic resources historically associated with the Red River Ecosystem, such as sunfish, bass and crappie.

Discussion: Fishing is an important recreational activity for many area residents. While some areas with good fishing opportunities currently have poor access, there is a 200-plus-acre oxbow lake immediately south of the proposed visitor center site that could expect high use due to its proximity to the urban areas of Bossier City and Shreveport. Enhancing these fishing opportunities requires study and careful fisheries management.

Strategies:

- Conduct fish surveys in all lakes, borrow pits, and backwater areas at perhaps 3–4 year intervals. Such a survey should be conducted after an influx of new water from the Red River during high water situations. The surveys should be for game species composition, relative abundance, size distribution and fish body condition. Collection methods may include boat electrofishing, trap and/or fyke netting and perhaps limited gill netting or hoop netting. The methods will depend upon the bottom topography and structure. Target species are crappie, sunfish, largemouth bass and catfish, plus any prey species. Electrofishing is done in the spring and/or fall, whereas netting is generally done in late fall or winter.
- Conduct creel surveys periodically to monitor fishing pressure, fish catch (species, sizes), angler satisfaction, and angler biographical, geographical and economic information (travel costs, fishing costs). Especially if the boat ramp is near the visitor center, anglers may be encouraged to voluntarily fill out angling experience/fish catch sheets.
- Based upon fish survey and fishing pressure information, it may be necessary to impose certain fishing regulations such as restrictive creel limits and/or size limits on certain species. It may be advisable to permit day only fishing, at least by boating. Effective fishing regulations require sufficient fishing pressure (which is likely here) and angler obedience; the latter is dependent upon education and enforcement. Displays and personal contact could be used for educating anglers as to the reason for the regulations.
- A map of all waterways, complete with bottom contours and bottom structure should be made.
- Water quality should be taken initially, especially during critical times of the year. For instance, dissolved oxygen and temperature profiles in mid to late summer would show stratification in the lake and areas devoid of sufficient oxygen for fish life and well being. Factors such as water hardness, alkalinity and salinity should be relatively stable until the lake receives an influx of new water from the Red River during high water situations.
- Determine if species of concern or invasive species are present and explore opportunities to enhance native fish habitat in these areas.

Objective A-13. Species of Concern: Ensure refuge management actions coincide with the recovery plan guidelines for bald eagle, interior least tern, pallid sturgeon, wood stork, paddlefish, slimy salamander, or other species of concern on the refuge, as identified by the Louisiana Wildlife Action Plan (Lester et al. 2005).

Discussion: One endangered species is known to use areas on and/or near this refuge complex: the interior least tern. Although bald eagles have recently been delisted, both species travel along the

Red River and nest along or within the refuge boundary. Eagles are often seen during the winter months when waterfowl numbers are abundant. They are occasionally seen perched in trees near the larger refuge water bodies. Surveys during the nesting season are needed to determine nest locations. The least tern utilizes the sandbars along the Red River as their primary habitat. Active management of these sandbars can encourage and promote benefits to these birds. The refuge will need to coordinate any management activities on these sandbars with the Service's Lafayette Ecological Services Office, the Louisiana Department of Wildlife and Fisheries, and the Red River Waterway Commission. A complete inventory of species occurrence on the refuge is needed to determine if other species of concern occur on the refuge.

Three species of Special Concern, the Louisiana slimy salamander (*Plethodon kisatchie*), alligator snapping turtle (*Macrochelys temminckii*) and western worm snake (*Carphophis vermis*) also occur on the refuge. The alligator snapping turtle is currently being studied by a graduate student at Louisiana State University-Shreveport. The Louisiana slimy salamander is listed by the Louisiana Natural Heritage Program as an S1S2 species and the western worm snake is listed as S1.

Strategies:

- The refuge will consult with the Ecological Services Office in Lafayette during future management actions that may affect threatened, endangered, or other species of concern within the state and ecoregion, to ensure appropriate review occurs and that necessary conservation actions are taken.
- Participate in the Mid-Winter Eagle Survey.
- Coordinate with the Interior Least Tern Working Group.
- Map any new eagle nest locations and implement the National Bald Eagle Nest Guidelines for the Southeast.
- Conduct surveys to determine the abundance of herpetile species of special concern.

Objective A-14. Inventorying and Mapping: Enhance refuge inventory and mapping capabilities through the use of Geographic Information Systems (GIS).

Discussion: Red River NWR is a young refuge with many mapping needs. A baseline GIS database is needed to provide maps to the public for hunting, fishing and other recreational opportunities and for refuge management decisions and reporting requirements. Vegetation cover, soil types, and digital elevation models are essential for reforestation planning. Data that can be collected using a Global Positioning System (GPS), such as roads, parking lots, bridges, buildings, etc. will be useful for SAMMS and RPI databases. Some of this information is available from the LMVJV.

Strategies:

- Acquire existing abiotic GIS data layers (e.g., topography, aerial photography, hydrography, soils, boundaries, roads, etc.).
- Develop GIS data layers depicting occurrence / abundance of plant and animal species (e.g., roost sites, vegetation cover maps) and management activities (e.g., forest management compartments, wood duck boxes, water management units, etc.).
- Continue working with the Lower Mississippi Valley Joint Venture Office and others to develop, maintain and update GIS data layers.

Objective A-15. Research: Determine top two or three management questions needing to be addressed through sound research and partner with local universities to conduct studies on the refuge.

Discussion: Red River NWR presents a unique opportunity for conservation and restoration research due to the current land uses of much of the property. A significant portion of the refuge is currently in pasture, crops, or other highly degraded habitat that will require intensive and extensive restoration and management activities. As such, the refuge has unlimited potential to be a natural laboratory for applied, management-oriented research along with basic ecological research. In particular, the opportunity to accurately observe and document plant succession (and the associated faunal responses) beginning at "ground zero" and proceeding over the long term can provide managers with useful information for many years to come.

The refuge's geographic location is also advantageous in that all refuge units are within a two-hour drive of two major state universities (Northwestern State University in Natchitoches and Louisiana State University in Shreveport). In addition, NSU's Aquaculture Research Center in Marco, Louisiana, is just a few miles from the southernmost refuge unit. This facility has a full-time research staff, a dormitory for visiting scientists, an indoor recirculating water facility, and numerous ponds of various sizes that can be used for cooperative research, possibly in the culture of endangered fish, mollusks, or aquatic plant species. Finally, the Service's Natchitoches National Fish Hatchery also has a full-time research staff along with numerous ponds that could be used cooperatively for the culture of aquatic species.

From an applied perspective, any management activity such as reforestation, hydrology alteration, or exotic species removal can be considered an experiment provided sufficient statistical controls (i.e., multiple reforestation blocks or pre-management action data) are available. Specific projects might include efficacy of management practices, wildlife-habitat relationships (particularly for threatened and endangered or regional indicator species), landscape-scale patterns of habitat use (considering the fragmented nature of the refuge tracts and surrounding private property), or reforestation and restoration ecology. Basic science topics might include plant succession or colonization patterns of native or exotic species.

An important first step would be to identify existing habitat types and the proposed management activity, if any, in those units. Once management objectives and an acceptable experimental design have been identified, permanent sampling plots can be established and preliminary or baseline data can be collected. Protocols for plot identification and biological sampling methods should be chosen so that long-term quality of data can be assured through consistent repetition. Protocols that allow for comparison with other regional or national databases (for example, Breeding Bird Survey routes, Continuous Forest Inventory plots, Monitoring Avian Productivity and Survivorship banding stations, etc.) should be considered.

Strategies:

- Work with local universities to develop an overall research strategy to identify best management practices for the refuge.
- Partner with universities to hire graduate students for 2–3 year research studies.
- Determine which research studies would be high priority in achieving refuge objectives and purposes.
- Apply for funding through federal and other grant programs.

Objective A-16. Grassland Birds. Develop bird list and monitor newly reforested, prairie restoration, and new acquisition areas for grassland birds.

Discussion: Currently, one of the primary management activities on the refuge is bottomland hardwood reforestation. These efforts will provide early successional habitat for many years to come. Also, there will be opportunities for grassland management with the prairie restoration area and potentially at the Wardview acquisition area if deemed appropriate.

Strategy:

- Survey early successional habitats for bird species presence, diversity and abundance using point counts.

HABITAT MANAGEMENT

GOAL B. Bottomland Hardwood Forest Habitat: Restore, enhance, and manage healthy bottomland hardwood forests and associated habitat in order to support a natural diversity of plant and animal species that will foster the ecological integrity of the Red River Valley ecosystem.

Discussion: Historically, the Red River Valley was forested with bottomland hardwoods, cypress sloughs, and shrub swamps. After the Louisiana Purchase in 1803, early settlers began to clear these areas for farms and homesteads. This forest clearing rapidly accelerated in the 1960s and 1970s with the rise in soybean prices. During the last three decades, the Red River Valley was used extensively for agricultural production. Thus, the valley is one of the most altered ecosystems in the state of Louisiana. Reforestation efforts are a priority on refuge lands in an attempt to restore these lands to their former function.

Objective B-1. Bottomland Hardwood Forest Restoration: Restore the forest cover on designated areas to reflect that of the historical Red River Valley. Utilize the carbon sequestration program to achieve restoration of bottomland hardwood forests.

Discussion: Bottomland hardwood forest restoration in the Red River Valley in large contiguous patches of habitat is important to provide restoration of fish, wildlife and plant resources and their habitats. Some of the funds for land purchases and reforestation within the refuge are being donated by energy companies so that they may be allowed to claim the carbon credits. All reforestation efforts must be accompanied by a thorough review of geomorphological features and complexities.

Strategies:

- Compile a comprehensive inventory of the soils, topography and hydrology of each of the focus areas within the refuge complex. It is well known that different vegetative communities are adapted to each combination of soil type, surface and subsurface hydrology and land surface gradient. It is important to know where each of the variations occur before a revegetation strategy can be developed.
- Complete forest inventory and GIS database of refuge forest to generate baseline data for development of Habitat Management Plan that will include a 10-year entry cycle, annual inventories by compartment, step-down prescriptions for desired conditions and monitoring protocols such as reforestation survival surveys.

- Develop a forest habitat management plan which includes the following components: Plant tree species that are adapted to each microenvironment within the designated areas; increase numbers of light seeded species; increase water oak and willow oak component and reduce number of nuttal oak being planted when possible; plant cypress and button bush along edges of drains and lakes where semi- to permanent water is present; request seedlings at least one year in advance of planned planting to ensure adequate seedlings and species will be available; and monitor seedling survival.
- Utilize recommended site preparation techniques, including sub-soiling. The Natural Resource Conservation Service's (NRCS) Conservation Practice Standard Forest Site Preparation (490) is a good reference to use for this purpose: (http://efotg.nrcs.usda.gov/treemenuFS.aspx?Fips=22079&MenuName=menuLA.zip, Section IVC). If sub-soiling is not used, it is recommended that machine planting be used instead of hand planting.
- Work cooperatively and support reforestation agreements with energy companies through the carbon sequestration program to provide quality restoration efforts on the refuge.

Objective B-2. Bottomland Hardwood Forest Management: Manage existing, reforested, and any future reforestation according to Bottomland Hardwood Guidelines to meet the various needs of many wildlife species including waterfowl, neotropical migrant songbirds and resident species while providing the public educational information on different habitat types.

Discussion: Currently, the forested habitat on Red River NWR is broken up and divided among four existing units of the refuge. Forest management needs, opportunities, and recommendations on the refuge are listed below by unit and forest conditions:

Strategies for the Headquarters Unit:

- Pecan Orchard: Manipulate trees in the orchard to simulate various habitat conditions for environmental education purposes such as leaving a portion in pecan orchard condition, discontinue mowing to allow natural invasion to occur, remove a portion of trees and allow natural plant succession to take place, remove a portion of trees and plant other species, etc.
- Baldcypress Swamp: Leave mature trees and plant seedlings of baldcypress and additional species to enhance swamp area along the edge of the lake.
- Riparian Forest: This area is found along the banks of Red River and should be left alone, at this time, to provide forested habitat for various wildlife species.
- Plum Shrub: Maintain area in this condition and supplemental plant with various shrub species such as eastern red cedar, swamp dogwood, deciduous holly, etc. to provide habitat for various wildlife species that prefer this habitat condition and as demonstration area on the refuge for this type of habitat native to the area.
- Partner with NRCS and others to restore a native prairie demo area along the southwestern portion of the plum shrub area.

Strategies for the Bayou Pierre Unit:

- Riparian Forest: This area is the largest single area of maturing forest found within the boundaries of the refuge and should be left unmanaged at this time to provide habitat for species that need these conditions.
- Clearcut Bottomland Hardwood and Reforestation Areas: Monitor the changes in forest conditions that occur in this area as the trees grow.

- Maturing Bottomland Forest: This area is the only stand of typical bottomland hardwood forest on the refuge units and should be left as is for now.
- Royal Palownia Area: This area is from ¼ to ½ acre in size and should be removed as soon as possible. Royal palownia is an exotic species and should be removed before is spreads to other areas of the refuge.
- Reforestation: Allow to develop as it is with some supplemental planting as needed.

Strategies for the Spanish Lake Lowlands Unit:

- Honeylocust Thicket: Allow this area to continue to develop much as a reforestation area would be left to grow. This area provides good shrub-scrub habitat for various migrant and resident bird species. Regeneration from other tree species will slowly start outcompeting the honeylocust.
- Reforestation: Allow to develop as it is with some supplemental planting as needed.

Strategy for the Lower Cane River Unit:

- Reforestation: Allow to develop as it is with some supplemental planting as needed.

Objective B-3. Invasive Plant Species: Inventory and map presence of invasives on the refuge and implement a management program for invasives on the refuge by 2012.

Discussion: There are numerous exotic/invasive plant species now on the refuge and expanding their range in the region. It is recommended that surveys be performed to inventory and monitor their presence and to determine their impacts. When deemed detrimental to the management goals of the refuge, control measures should be taken whenever possible. Control of these species should be prioritized by the refuge managers, as their levels of environmental impact are variable.

There are several species of invasive aquatic plants to be concerned with on the refuge. The majority of these are capable of forming dense mats over the surface of the water. When this occurs, dissolved oxygen levels in the water may become too low to support oxygen dependent aquatic species (fish, mollusks, etc.). All of these species compete with native species and can cause habitat degradation. They may also inhibit waterfowl and other animal use and boat navigation. The efficiency of water control structures may also be affected if left uncontrolled. When infestations occur, herbicidal applications are normally the most effective control measure. Biological control for certain species may also be achieved with the use of sterile grass carp (*Ctenopharyngodon idella)* in waterbodies that aren't prone to flooding. Table 2 lists the invasive aquatic plants that are known to exist in Louisiana and should be considered priorities for control.

Table 2. Invasive aquatic plant species and concerns.

Alligatorweed *Alternanthera philoxercoides*	grows from shoreline, degrades and competes with shoreline species, may impede navigation, very common in area
Common salvinia *Salvinia minima*	forms dense surface mats that may deplete oxygen in water, impedes navigation, fairly common in area
Giant salvinina *Salvinia molesta*	forms dense surface mats that may deplete oxygen in water, impedes navigation, more harmful than *minima*, currently exists in SW and SE LA
Hydrilla *Hydrilla verticillata*	can form dense "thickets" beneath water, may impede fish movement, navigation and water flow, fairly common in area
Water hyacinth *Eichhornia crassipes*	forms dense surface mats that may deplete oxygen in water, impedes navigation and water flow, very common in area

These species may spread naturally, intentionally or nonintentionally. The main source of nonintentional spread is by boat trailer transport. Signs should be placed at boat ramps to encourage boaters to inspect trailers for exotic plants before backing them into the water. Refuge waterbodies should be periodically checked for presence of any exotic species. If exotics are identified and serious detrimental impact is expected, a method of control should be taken immediately.

Many species of exotic plants occur on the refuge and are rapidly spreading. Terrestrial exotic plants are the most serious threat to the biological integrity of the refuge. Although many species have been recorded, such as tree-of-heaven, royal palownia, privet, Johnsngrass, and sesbania etc., the species of greatest concern is Chinese tallow tree. This plant aggressively spreads throughout the forest with little hope of being eradicated. Refuge personnel should also aggressively treat this species with the objective of keeping them from spreading as much as possible. Tallow is a small, fast-growing tree with high reproductive ability. They grow in a variety of habitats, having their most detrimental impacts in marsh type areas, where they have the ability to cause large-scale ecosystem modification by changing marshlands to forested communities. Tallow would be particularly detrimental to the refuge fields managed for waterfowl and shorebirds. Handpulling the seedlings is effective if their numbers aren't too high. Basal applications of triclopyr and cut-stem application of 50% triclopyr or 10% imazaypr can be effective. Fire usually won't completely kill the tree, but burning during winter followed by burning or mowing in the summer has shown some success. This species should be considered difficult to eliminate once established.

Strategies:

- Terrestrial and aquatic plants can be mapped using a GPS and entered into a GIS system.
- A basic species list (inventory) of invasive plant species needs to be created.
- Establish a monitoring program of invasive plants to determine rate of spread by annually mapping areas of infestation and comparing to previous year's range.
- After comparison, calculate rate of growth (spread) by tallow and any aquatic invasives.
- Treat 5% of invasive plants annually by hacking and squirting using chemical means, such as Roundup or other more appropriate chemicals.

GOAL C. Managed Wetlands and Agriculture: Promote efforts to combine farming and the management of closely associated moist-soil units in order to provide essential habitat for migratory birds and other wetland dependant species.

Discussion: The West Gulf Coastal Plain (WGCP) and Red River Valley (RRV) are important ecoregions for migrating and wintering ducks and geese in North America. Red River NWR provides important foraging and resting (refuge) habitats within the RRV for these waterfowl and serves an integral role in a large, cooperative planning and habitat management effort known as the North American Waterfowl Management Plan (NAWMP).

Concern over waterfowl population declines in the 1980s resulted in establishment of the NAWMP, which focused the attention of federal, state and private conservation groups on critical wintering and breeding areas. The Lower Mississippi Valley Joint Venture (LMVJV) was selected as one of the wintering habitat focus areas. One of the first tasks faced by the LMVJV was to find a model or decision tool for determining how much habitat was needed and a way to relate this objective to the population goals of NAWMP. The solution was to view wintering areas as responsible for contributing to the spring breeding population goals of the NAWMP proportional to the percentage of ducks historically counted in wintering areas (Loesch et al. 1994; Reinecke and Loesch 1996). To contribute ducks to spring populations, wintering areas have to provide sufficient habitat to ensure adequate winter survival. To quantify winter habitat requirements, the LMVJV had to identify limiting factors and the LMVJV assumed foraging habitat was most likely to limit waterfowl populations in the MAV (Reinecke et al. 1989). Many of these same factors/planning procedures were applied to the WGCP as the LMVJV expanded to include this important area.

In simple terms, the objective of the LMVJV is to provide enough foraging habitat (in duck-energy days) for (1) the continental duck population goal of NAWMP; (2) multiplied times the proportion of ducks typically wintering in the WGCP area; (3) adjusted for ducks that die during winter but require habitat before they die; (4) multiplied by the average number of days ducks are present; and (5) multiplied by the amount of food required per day. These calculations generate the need for millions of duck-energy days (DEDs) of foraging habitat value. Research indicates that foods used by mallards, pintails, wood ducks and other species emphasized by NAWMP generally are obtained in three primary habitats: moist-soil areas, croplands, and forested wetlands. The ability of these habitats to provide duck-energy days of foraging habitat have been summarized (Reinecke et al. 1989; Loesch et al. 1994; Reinecke and Loesch 1996) and are used by the LMVJV to calculate the acres of various combinations of habitat needed to satisfy population goals.

Habitat objectives are based on food production and acres by habitat type for the complex of habitats including harvested and unharvested cropland and moist-soil areas. Each of these habitats is required to provide an important part of the food resources (i.e., native weed seeds, small grains, and invertebrates) required by waterfowl wintering in the WGCP. Agricultural grains are high in carbohydrates (i.e., “hot foods”) needed by waterfowl to maintain body temperature during cold periods during winter. Native weed seeds (moist-soil seeds) and invertebrates provide higher levels of protein and other nutrients used by waterfowl to complete other important functions during the winter period, such as molting and improving body condition for return migration to the breeding grounds and egg-laying. A variety of both natural and agricultural foods provide a diversity of nutrients for waterfowl with temporally varying nutritional needs. Because of the high production of agricultural crops, unharvested grain provides much higher duck-use day values per acre than natural areas. For example, unharvested rice is estimated to provide 24,025 duck-energy days per acre, whereas moist-soil impoundments are predicted to provide 1,883 duck-energy days per acre, and bottomland hardwoods with a 40% red oak overstory component are predicted to provide 161 duck-use days per acre.

Many of the foraging requirements are met on agricultural lands or former agricultural lands (i.e., moist-soil habitat) that are naturally flooded or managed specifically for waterfowl. Flooded shrub swamps and bottomland forests provide some foraging habitat but may serve a greater function for isolation during pair bonding and thermal protection on cold, windy days. It is critical that each segment of habitat (i.e., agricultural grains, moist soil, and wooded swamp/bottomland forests) be provided if the wintering waterfowl habitat needs are to be met.

Objective C-1. Managed Wetlands: Develop infrastructure and increase cooperative farming to produce a minimum of 100 acres of unharvested rice/milo and at least 400 acres of moist-soil habitats or approximately 3.0 million DEDs of wintering waterfowl foraging habitat in coordination with LMVJV step-down objectives.

Discussion: The step-down objectives that were established for Red River NWR for moist-soil habitat was 388 acres (730,604 DEDs). The refuge has purchased additional acres since the date of this allocation process and has the ability to contribute significantly to waterfowl foraging habitat needs in the RRV and WGCP. Complicating the reliability of the DED objective is the need for a review of the step-down process to further refine objectives based on more up-to-date information. This refinement of foraging objectives is currently being conducted, and the updated objectives should be available for Red River NWR within the next 12 months.

Strategies:

- Setting habitat objectives is an ongoing process. Objectives set for Red River NWR should be reviewed and compared with actual performance at least annually to assure that refuge and landscape-based (e.g., WGCP) objectives are being met. The refuge should strive to provide 3.0 to 3.5 million DEDs of wintering waterfowl foraging habitat annually provided by a minimum of 100–125 acres of unharvested rice yielding about 5,000 pounds per acre and 400 to 500 acres of moist-soil fields yielding at least 480 pounds of desirable seed/tubers per acre.
- A water management plan should be developed and implemented to include flood dates and rotations for management units. Included in the plan should be 100 to 200 acres of water for early migrating waterfowl, teal and pintail, beginning no later than September 1 of each year and at least 50 acres at any one time for fall migrating shorebirds (July through October). Management for shorebirds and early migrating waterfowl should be integrated to the degree possible. Additional acres should be flooded from November through December to continually provide additional food resources for wintering waterfowl. By mid- to late January, water levels in some impoundments should be slowly lowered to concentrate invertebrates, a practice that should be continued into mid- to late April.
- For each waterfowl impoundment (moist soil, cropland and GTR), establish water level gauges and maintain accurate records of management actions, plant response and waterfowl response. Record water levels at weekly intervals, management actions by activity and date, vegetation response by percent plant cover (by species), and estimated food production and waterfowl response to those management action(s) by waterfowl surveys conducted at least twice monthly from October through February and at least once monthly in September, March, and April. The goal should be to at least meet the refuge foraging habitat acreage objective. Adapt management strategies to improve food production and waterfowl usage of the food resources produced on the refuge.
- Strive to develop management units capable of maintaining complete water control (ability to get the water on and off of fields as needed) of all waterfowl impoundments and improve water management effectiveness/efficiency.

- Nurture and promote a partnership between the refuge and research community to initiate research that will develop and evaluate the most effective methods for waterfowl management.

Objective C-2. Moist-Soil Management: Create and maintain at least 900 to 1,000 acres of early successional habitats utilizing discing, herbicides, small grain farming, and water management for wintering waterfowl (moist soil), shorebirds, and marshbirds. The goal is to produce 400–500 acres of quality moist soil, producing at least 480 pounds of desirable seed per acre.

Discussion: The high seed production of moist-soil plants and their value as waterfowl foods have been known since at least the 1940s (Low and Bellrose 1944). However, managing seasonally flooded herbaceous wetland impoundments or "moist-soil units" only became a widely accepted practice after many years of research in southeastern Missouri (Fredrickson and Taylor 1982; Fredrickson 1996).

Although geese sometimes use moist-soil impoundments and eat shoots of germinating plants, rhizomes, roots, or tubers, the primary emphasis of moist-soil management is to produce seeds that will provide food for ducks. Most research has focused on estimating seed production and studies have shown that, under intensive management, species of barnyard grass (*Echinochloa* spp.), sprangletop (*Leptochloa* spp.), flatsedge (*Cyperus* spp.), smartweed (*Polygonum* spp.) and panicum (*Panicum* spp.) can produce more than a 1,000 lbs/ac of seed (Fredrickson and Taylor 1982). However, we know far less about production that might be occurring under current conditions in the LMV. Reinecke et al. (1989) suggested an average of 450 kg/ha (400 lb/ac) of seed might be reasonable because of site and staff limitations. More recently, the LMVJV Waterfowl Working Group used available moist-soil seed estimates of nearly 500 pounds per acre reported by Kross (2006) to increase the value of tis habitat to 1,883 DEDs per acre. Regardless of the quantity of seed produced, moist-soil impoundments are highly recommended as a means of diversifying habitat (Fredrickson and Taylor 1982; Reinecke et al. 1989) and supplying food with nutrients not generally available in agricultural grains.

Moist-soil management is often referred to as an "art" more than a "science" because of the uniqueness of most moist-soil sites in terms of their local hydrology, hydroperiod, seed bank, prior and recent land use, and a host of other site-specific factors. Managers are strongly advised to keep complete and accurate records of management actions and subsequent plant and waterfowl responses. If data on manipulations and plant/animal responses are collected and archived, managers will more quickly begin to see desirable patterns, which can be replicated. Conversely, undesirable habitat responses can be prevented if managers know what manipulations caused the problems. Finally, keeping records enables communication of desirable management actions to future personnel. For more information on moist-soil management, see *Moist-Soil Management Guidelines for the U.S. Fish and Wildlife Service, Southeast Region* (Strader and Stinson 2005).

Due to the lack of refuge staff, equipment and funding, active moist-soil management has not been possible to date on Red River NWR. Proper moist-soil management is very labor-intensive, requiring soil disturbance through discing and leaving fallow, or planting a food crop using cooperative farming or forced account work to help set back succession every 2 to 4 years. Often, much of this habitat type can be obtained in conjunction with rice farming, which is currently being done on the Lower Cane River Unit, but other sites will need to be identified as primary moist-soil areas. The keys to success of such areas are moisture and water control (levees, pumps, structures, ditches and monitoring). Without excellent water control, moist-soil management in the Southeast is a hit-or-miss activity. Timing of inundation, adequate disturbance, and sustained record-keeping are needed to assure good production on a yearly basis.

Preferred moist-soil plants for foraging waterfowl are typically heavy seed producing annuals, such as wild millets, smartweeds, sprangletop, other grasses and sedges. Soil disturbance and moisture are critical for the production of these desirable plants. Failure to disturb the soil will allow the invasion of perennials, both herbaceous and woody, that outcompete annual plants and greatly reduce waterfowl food production. Therefore, it is critical that the moist-soil areas be maintained using whatever means available if the refuge is to meet its waterfowl foraging objectives.

The objective for Red River NWR of 388 acres of moist-soil habitat is based upon a minimum preferred seed yield of 480 pounds/acre. Recognizing that in any one year as much as 25–50% of the acreage could be in a rotational stage or providing shorebird habitat that will result in limited waterfowl foraging habitat, the review team agreed that 600–750 acres of moist-soil habitats are needed to provide the DUD objective on an annual basis. Additionally, a current deficit of moist-soil acreage within the West Gulf Coastal Plain BCR strengthens the need to provide as much of this habitat type as is feasible on the refuge.

The Yates Tract (375 acres) on the Bayou Pierre Unit probably offers the best opportunity for crop (rice or milo) production and/or intensive moist-soil management due to the readily available source of water from the Red River and the favorable slope of this tract. If crops are not an option, suitable habitat can always be provided for shorebirds, waterfowl and marshbirds by staggering the rotation among the existing moist-soil units. For example, a unit that is disced will provide mudflats for shorebirds during that first year, annual grasses and sedges for waterfowl during years 2 and 3, and perennial vegetation for marsh birds during years 4 and 5, at which time this unit could then be treated again to set back succession. A concern was raised during the review about the prevalence of cattail that dominated some units only after 3 years of no disturbance. It may be that these areas will provide marsh bird habitat by year 3, and the rotation would then be shorter, to prevent cattail from diminishing the production of annuals important to foraging waterfowl. The key is keeping complete and accurate records of vegetation production and bird response and then practicing adaptive management, to ensure the most favorable habitats are provided to the various wetland-dependent avian groups. The possibility of investigating the opportunity to have cooperative farming in the Yates Unit was also discussed during the review, which would provide a mixture of small grain crops (rice) and moist-soil habitats annually.

The moist-soil/rice rotation on the Lower Cane Unit would provide excellent annual moist-soil plants on approximately 500 acres. Up to 100 acres of this area could be dedicated to shorebird management, which would involve tilling in midsummer, then flooding and drawing down by early August to provide mudflats for shorebirds. The 106-acre open field on the Spanish Lake Lowlands Unit has the potential to be managed for moist soils, with the water source being an existing pump located on private land about two miles away. This unit will need to be disced in 2006 to set back succession and promote the production of desirable moist-soil plants. In addition, a series of rice levees will probably need to be constructed in order to provide shallow water to 100% of the unit. The review team recommended managing the 106 acres for moist soils for at least a couple of years, or until it becomes unfeasible due to pumping costs, manpower, etc.

The abandoned catfish ponds located on the Dill Tract of the Bayou Pierre Unit offer some potential for moist-soil management, but are dependent upon the the condition of an existing well and the degree of slope of these pond beds. Possible management options for catfish ponds include a mix of habitats, including moist soils for waterfowl and secretive marsh birds; deeper water buttonbush/willow areas for wood ducks and wading birds; mudflats provided for shorebirds; and eventually reforestation. All of these options and strategies will be more readily apparent following an investigation into the condition of the well and surveys to determine the slope.

Managing approximately 1,000 acres of moist-soil habitats annually is a massive endeavor, even with the assistance available from a cooperative farmer. It is particularly challenging given the current lack of staff and budget. It is critical that a biologist be added to the refuge staff as soon as possible to focus management efforts on waterfowl habitat objectives. Vegetative surveys should be conducted once or twice annually in managed impoundments to assess waterfowl food production and vegetative treatment recommendations. An equally important key to success is water control, good record keeping, proper timing of management treatments and adaptive management (feedback and adjustments). Additional staff and equipment needs have been identified by the review team, which will greatly assist in the performance of these moist-soil management functions. In addition, the migratory bird biologist assigned to this area can play an important role in assisting the refuge in developing treatment alternatives and monitoring results.

Strategies:

- Manipulate annually at least 1/4 to 1/3 of the moist-soil units by discing, planting, etc. to ensure production of quality foods and prevent succession to undesirable plants.
- Strive to improve production of preferred moist-soil plant production by implementing good management practices, including timely and slow drawdowns of water levels to maintain moist-soil conditions, deep disk, spray herbicides, mow, hold the flood through a growing season, etc. Include the often forgotten below ground foods such as yellow nut sedge (chufa) (*Cyperus esculentus*) and duck potato (*Sagitarria platyphylum*) as preferred moist-soil plants in all evaluations. The goal should be to produce a minimum of 480 pounds per acre of preferred waterfowl food or at least 50% coverage of good to preferred plants in all moist-soil areas annually.
- Monitor moist-soil units at least weekly throughout the growing season, keeping records of all management actions, water levels, etc. by management unit.
- Use water as a management tool throughout the growing season to maintain moist-soil conditions and flood as necessary to promote preferred plant production and eliminate pest plants, especially cocklebur (*Xanthium strumarium*) and coffeebean (*Sesbania macrocarpa*). Mowing, disking and herbicide treatment should also be used to promote production of preferred moist-soil plants.
- Work closely with the Migratory Bird biologists in conducting plant surveys and developing management recommendations.

Objective C-3. Agricultural Land: Maintain current level or expand grain crop production to annually produce a minimum of 100–125 acres of unharvested rice and milo that can be flooded for wintering waterfowl and a diversity of other species. Farm operations can also help the refuge meet objectives by maintaining early successional habitats and providing water at critical times.

Discussion: There is little question that grain production can provide high DEDs on a minimum of acres. At Red River NWR, grain production can be used to address the WGCP's DED deficit and/or offset inadequacies associated with current manpower shortages to effectively manage moist-soil habitat. Under current funding and staffing limitations, cooperative farming is the only option available to the refuge to produce crops. Rice, milo and corn are the top choices as grain crops for ducks. Rice is particularly resistant to decomposition even under flooded conditions. Milo and corn also provide high energy resources for waterfowl and can generally be kept above the water surface, but problems arise from depredation prior to flooding as well as seed degradation after flooding. It is important to manage the farm program to provide the best mix of waterfowl foods.

If grain crops are being planted in moist-soil units to supplement native seed production, rice and milo are the obvious choices. It is important to select varieties and planting methods that will encourage quick germination and successful competition with the native plants. Cypress and Lamont are two rice varieties that germinate quickly. Soaking rice seed prior to planting will encourage rapid germination. The soil should remain shallowly flooded or moist to ensure proper growth and survival.

Milo is the most productive when planted in drier fields. Large dabbling ducks, such as mallard and northern pintail, can readily obtain seeds from standing milo plants. Short varieties of milo (~2 ft in height) are recommended to facilitate waterfowl feeding activities after the field is flooded. Milo appears to be the crop of choice for supplemental planting in moist-soil areas due to the low input necessary to control moisture, fertility, insects and competitive vegetation.

Leveled fields maintain a limited change in topography that provide some diversity, but are intended to allow the manager the opportunity to flood a large area with only a few inches of water. This is particularly important when managing for moist-soil plants, mudflats for shorebirds, or crops.

It should be noted that the refuge is highly dependent upon cooperative farming to produce crops and a diversity of waterfowl foods needed to fulfill the refuge purposes. Any significant reduction in cooperative farming will require significant increases in staff and equipment needs dedicated to Red River NWR to partially offset the loss of foraging habitat. With adequate staff and equipment, the refuge could farm by forced account or contract, and it is estimated that as much as 40% to 60% of the cropland acreage could be converted to moist-soil management and shorebird habitat. In a refuge-operated farm program, a significant reduction in yield occurs as a result of decreased pesticide use in the field. Reforestation should be considered after other, early successional species habitat needs are met.

Strategies:

- Refuge crops should be limited to grains, including rice, milo, or corn. Soybeans are not a crop of choice because of the low energetic value to waterfowl. It is recognized that unusual circumstances could make soybeans the only available choice to achieve specific management goals.
- Continue implementing the Red River NWR pond and rice field restoration project funded through the DOI Secretary's "American Landscape Initiative."

RESOURCE PROTECTION

Goal D. Resource Protection: Identify and protect natural and cultural resources and acquire lands within the congressionally approved acquisition boundary through programs such as carbon sequestration partnerships, migratory bird programs, and other funding sources.

Discussion: Red River NWR has an approved acquisition boundary of 50,000 acres, and currently the refuge owns less than a third of this amount. Acquiring new land requires adequate financing and willing sellers. Pulling all this together calls for partnerships and concerted efforts by all stakeholders in resource protection.

Objective D-1. Land Protection: Continue under legislative mandate to expand the refuge up to 50,000 acres and expand the approved acquisition boundary to incorporate 1,413 acres in the Spanish Lake Lowlands Unit (Figure 8), 87 acres in the Headquarters Unit (Figure 9), and 1,938 acres in the Lower Cane Unit (Figure 10). Work with landowners and nongovernmental organizations (NGOs), where appropriate, to acquire the largest inholding properties within the current refuge acquisition boundaries at each unit.

Figure 8. Spanish Lake Lowlands Unit proposed acquisition boundary expansion, Red River National Wildlife Refuge.

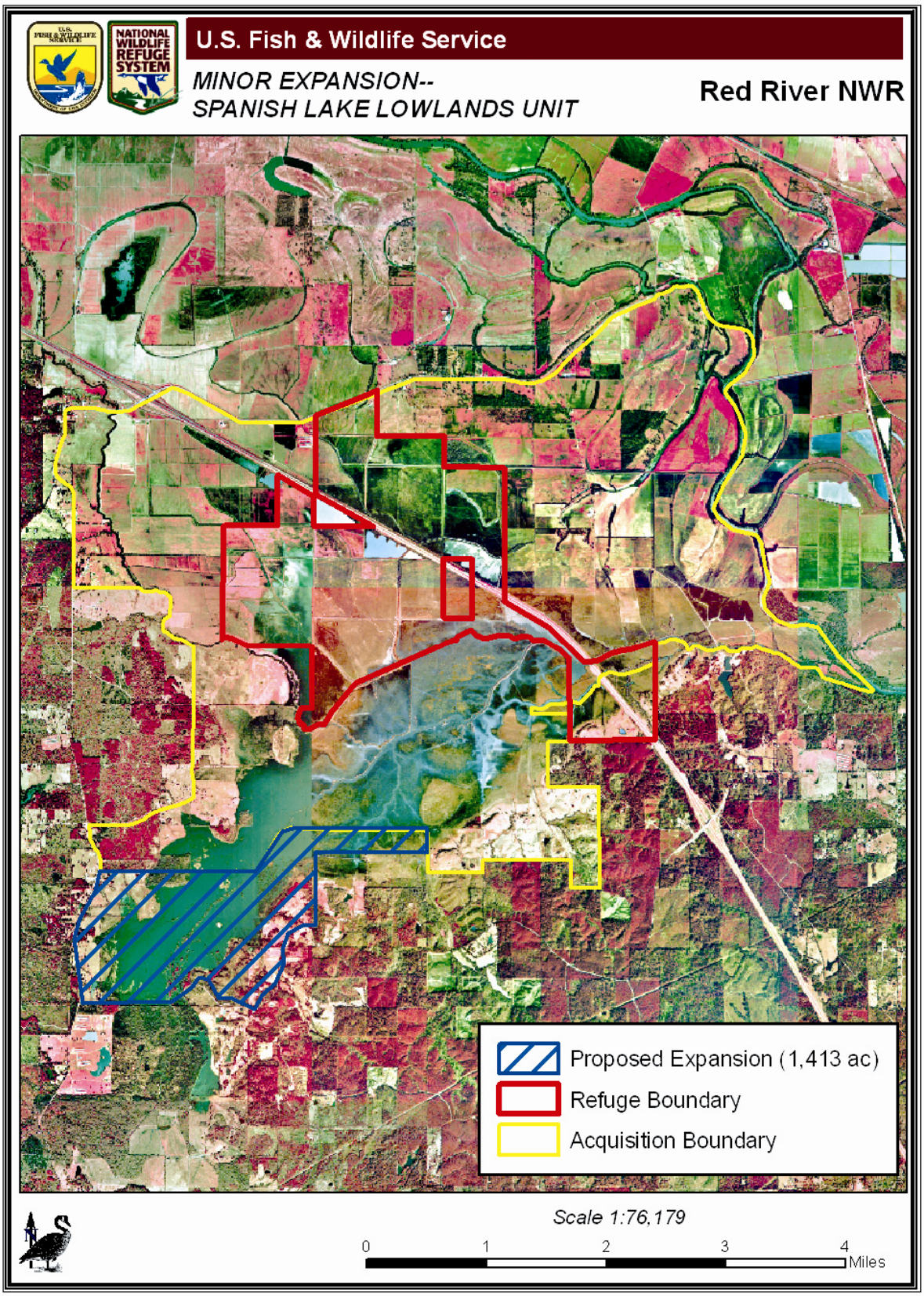


Figure 9. Headquarters Unit proposed acquisition boundary expansion, Red River National Wildlife Refuge.

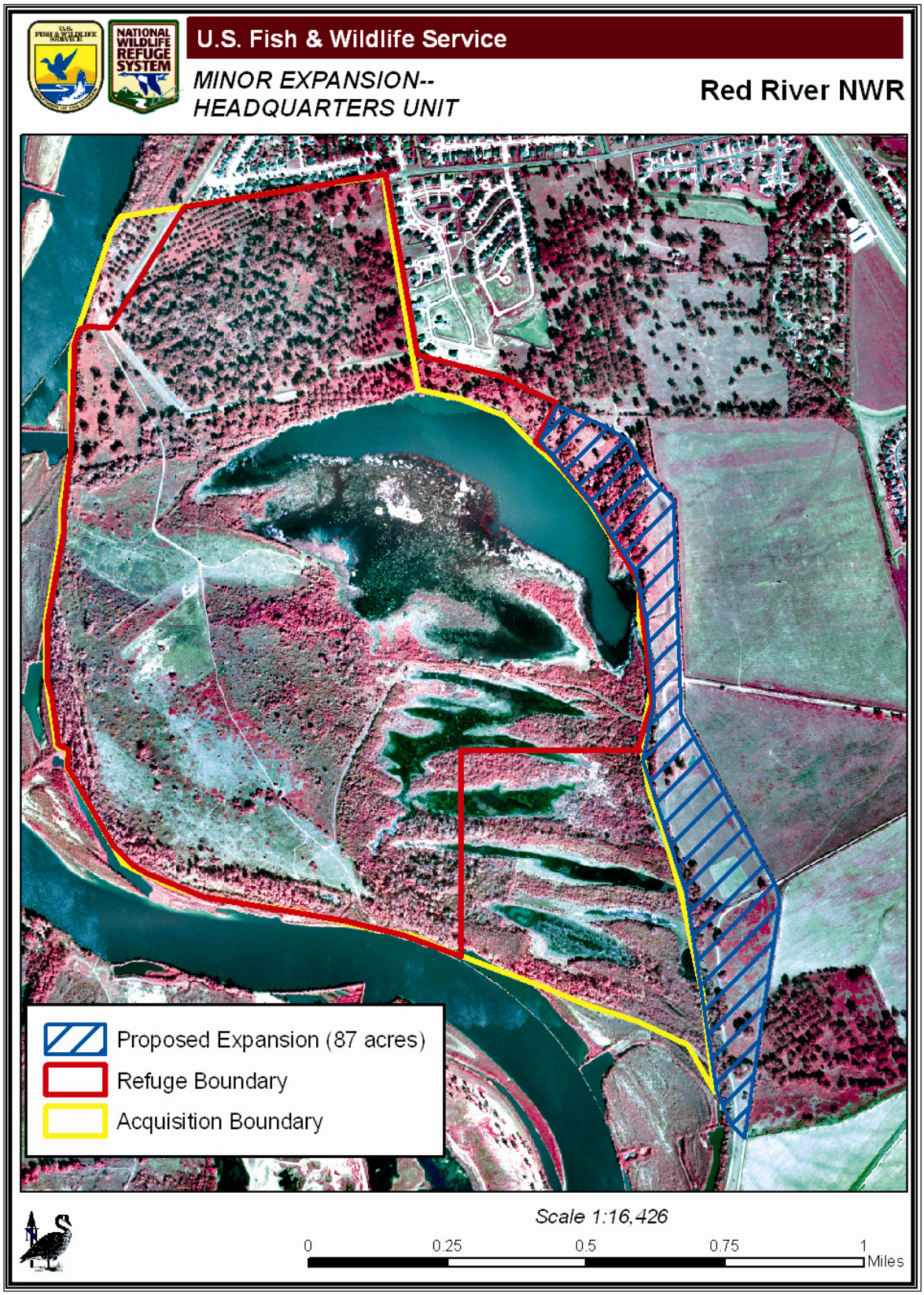
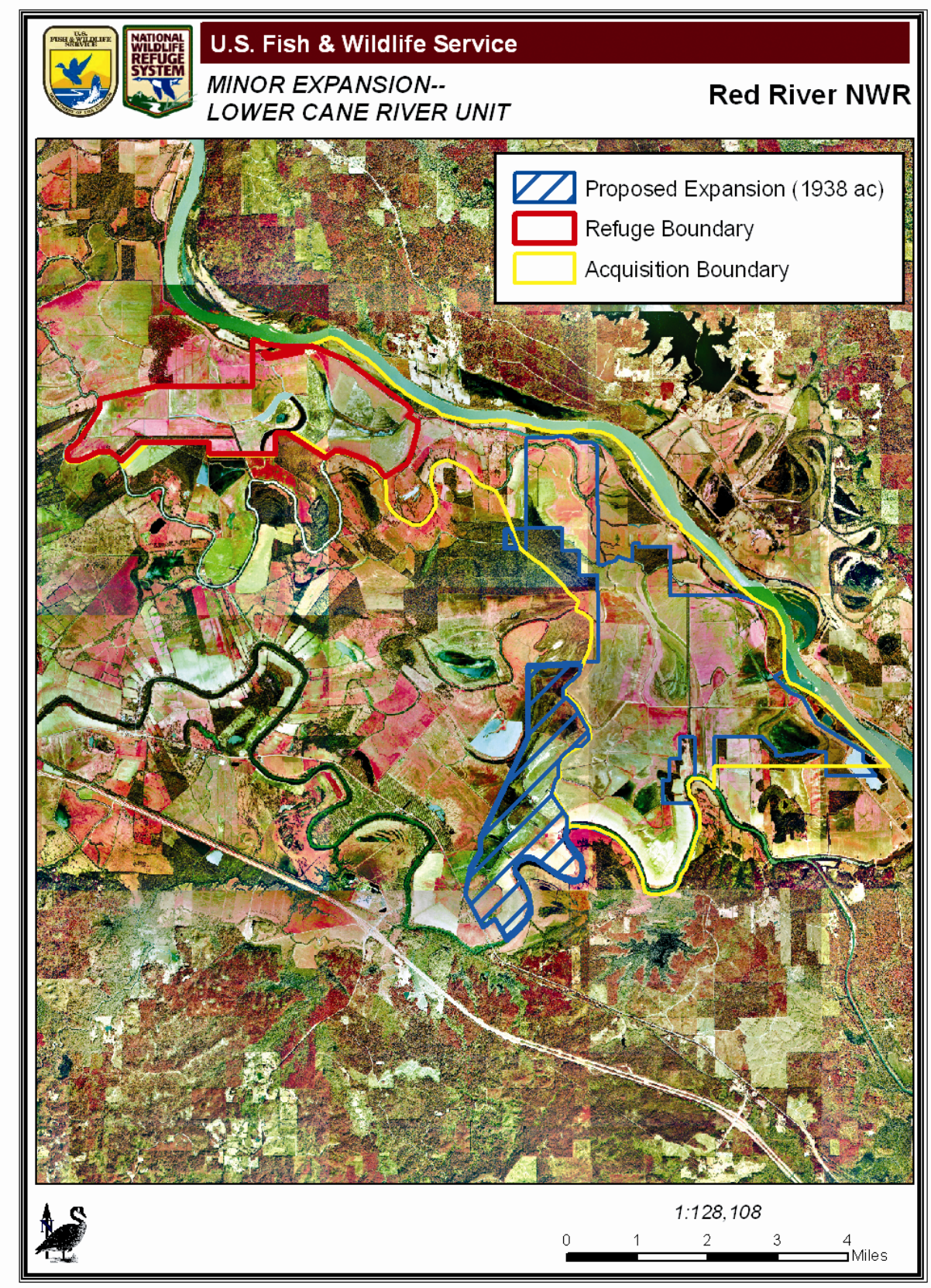


Figure 10. Lower Cane Unit proposed acquisition boundary expansion, Red River National Wildlife Refuge.



Discussion: The current approved refuge acquisition boundary encompasses 50,000 acres, within which 9,787.92 acres have been acquired by the Service. Numerous smaller inholding properties ranging in size from a few acres to several hundred acres are located within the refuge acquisition boundary. These inholdings are mostly agricultural and/or recreational hunting properties of various sizes distributed throughout the refuge units. Acquisition of these private inholdings would greatly facilitate refuge management by incorporating these smaller parcels into the larger contiguous blocks of refuge lands.

The Service's current anticipated acquisitions at the Spanish Lake and Lower Cane River units will result in divided ownerships (part of a landowner's tract within the Service acquisition boundary and part outside the boundary). The landowners wish to sell their entire tracts to the Service. Also, the construction of the Arthur Teaque Parkway adjacent to the Headquarters Unit may result in a land exchange with Bossier Parish, Louisiana. All of these acquisitions require an expansion of the current acquisition boundary and will provide benefits to the wildlife resources on the refuge.

The Spanish Lake Lowlands Unit is a low-lying wet area characterized by fallow fields, wet pasture lands, and row crop agriculture. It has excellent migratory bird habitat and outstanding opportunities for reforestation projects. Partnerships have already developed with the Conservation Fund and energy companies for carbon sequestration projects. The approximate 1,413-acre addition to the unit is primarily early successional bottomland hardwood reforestation projects that will provide excellent migratory bird habitat and act as a buffer from nearby rural development.

The Lower Cane River Unit sits approximately 20 miles south of Natchitoches, Louisiana, and is immediately adjacent to the Red River. The majority of the 1,938-acre expansion area is in row crop agricultural production. This area is broken into several large fields separated by sparse hedge rows, small bayous, roads and irrigation canals. The area also has a few widely dispersed blocks of timber. If included in the acquisition area, the new area will provide a great opportunity for future reforestation and active management for migratory birds through moist-soil management and cooperative farming agreements.

The Headquarters Unit is characterized by a mosaic of habitats that include a pecan grove on the north end of the property, old pastureland that is progressing toward a shrub type habitat, and a backswamp area that includes an oxbow lake. The 87 acres outlined within the scope of the expansion is currently active pastureland that will provide a great opportunity for reforestation in the future and protection of riparian habitat. This land exchange and expansion will also provide improved access to the visitor center and other recreational facilities.

Strategies:

- Obtain permission from landowners to appraise their property, with the intent to offer purchase.
- Work through the Department of the Interior's Appraisal Services Directorate and obtain approved fair market value appraisals of the properties.
- Obtain signed purchase agreements for acquisition of the properties from willing sellers.
- Work through the Service's Realty Division to request funding from the Land and Water Conservation Fund (LWCF), Inholding and Emergency Account, Migratory Bird Conservation Fund (MBCF), or other sources in the amount needed to acquire the properties.
- When funding is available, acquire the properties under the terms of the purchase agreements. When closing is completed, vest title in the United States and begin managing the properties as part of the refuge.

Objective D-2. Private Lands: Annually provide technical assistance and target up to 3 private land conservation programs (where appropriate) to develop partnerships with other federal and state agencies, universities, nongovernmental wildlife organizations and landowners within the Red River Alluvial Valley and West Gulf Coastal Plain, acquisition boundary and prioritized areas, to help achieve wildlife and habitat objectives.

Discussion: The current focus areas of Red River National Wildlife Refuge are widely situated and separated among private agricultural ownership within the Red River Alluvial Valley, making the vast private land a critical part of any landscape level conservation initiative within this area. The U.S. Fish and Wildlife Service with the assistance of partners can provide technical and financial assistance to private landowners interested in conserving, restoring, enhancing and managing fish and wildlife resources and high priority habitats on their property. Conservation tools such as conservation easements, Farm Bill programs, partnership agreements and technical assistance are available, many with significant financial incentives and technical support, which could be utilized to achieve this goal. Existing threats, linkages to protected habitats, value of habitats to trust species, accessibility and the potential to provide opportunities for wildlife-related environmental education and recreation should be analyzed when considering conservation initiatives. Refuge staff also will help deliver land conservation assistance in concert with other federal and state environmental agencies and similarly affiliated private organizations and individuals. Providing conservation assistance to private landowners through partnerships is a critical element in achieving landscape-level habitat initiatives within the Red River Alluvial Valley.

Strategies:

- Through partnerships, identify funding sources which may support Red River NWR, local ecosystems and overall U.S. Fish and Wildlife Service objectives related to conservation.
- Establish formal partnerships with agencies, organizations and individuals interested in habitat conservation within the Red River Alluvial Valley.
- Establish specific partnerships with landowners within the Red River NWR acquisition boundary to achieve conservation goals and habitat objectives.
- Assist agencies of the U.S. Department of Agriculture (Natural Resources Conservation Service and Farm Service Agency) in the delivery of various private lands programs, including the Wetland Reserve Program, Conservation Reserve Program, Wildlife Habitat Incentives Program, Grassland Reserve Program, Environmental Quality Incentives Program, and other such programs and initiatives which emphasize habitat conservation and restoration.
- With partner involvement, develop and distribute public information and outreach material related to eligible private lands conservation within the Red River Alluvial Valley and employ techniques which aid in enrolling private landowners in conservation programs.
- Use the Red River NWR, especially the Headquarters Unit, as a showcase/field trial for aquatic and terrestrial habitat conservation, highlighting projects related to restoration of native and declining habitats.

Objective D-3. Contaminants: Determine what, if any, contaminants may exist on the refuge, what their impacts to the refuge are, and how to mitigate the impacts.

Discussion: During a review of the contaminant issues at the refuge, it was noted that a Level I contaminants survey was completed for each tract of land prior to acquisition. As stated in the policy, "While not precluded, sampling is neither required nor recommended for a Level I survey." Having not reviewed the survey, it is not known if a Level II survey or a Level III survey was recommended

and whether sampling was to be a part of either of those surveys. These recommendations are based solely on the visual inspections that took place during site visits on December 6–7, 2005.

There are two airstrips located on refuge property. The airstrips were used for crop dusting. The potential for releases during loading of fertilizer and fuel spills over time at these two sites is possible. Two abandoned oil well sites are located within the refuge boundary. A paper mill is located adjacent and upstream from refuge property and it will need to be determined if there are possible impacts to resources on the refuge, both direct wastewater discharges and aerial drift. There are no consumption fish advisories in the associated water bodies of the refuge, although high levels of mercury in the water have been issues in the past.

Strategies for Oil and Gas Exploration:

- Utilize the Service's Oil and Gas Handbook to oversee all oil and gas activities on the refuge, including mitigation for potential spills.
- Provide refuge monitoring of oil and gas operations to provide first alert services in the event of spills or potential threats of spills from accidents, noncompliant facilities and faulty gas operations. In the event of an unavoidable spill or other natural resources injuries from oil and gas operations, a cooperative Natural Resources Damage Assessment and Restoration action should be pursued consistent with Department of the Interior guidance. This process is to include all interested state and federal agencies, as well as the responsible party.
- Incorporate the refuge special use permit system into all phases of oil and gas management on the refuge when possible. Special conditions within each permit will allow clear communications to operators regarding refuge requirements for wildlife benefits.
- Determine the ownership and future use of wells through the Regional Bureau of Land Management (BLM) or the Department of Natural Resources (DNR). Review the Louisiana DEQ permit for the paper mill.
- Pursue plugging and abandonment of wells by the responsible party.
- Reforest well pad sites.
- Sample the oxbow lake, including sampling of the water, sediments and fish.
- When sampling fish, include whole body burden sampling as well as tissue sampling of most likely species i.e. bream, crappie, catfish and bass.

Strategies for Bayou Pierre Unit:

- Sample soils for fertilizer and fuel spills from airstrip use.
- Determine what, if any, discharges are occurring into Bayou Pierre from the paper mill located west of the Dill Tract of the Bayou Pierre Unit. Provide mitigation options if contamination found.

Strategies for Spanish Lakes Lowlands Unit:

- Sample water quality of borrow pits for contaminants.
- If necessary, issue public consumption warnings and determine management or mitigative measures.

Strategies for Lower Cane River Unit:

- Determine if any contaminants occur in the two lakes at the Lower Cane River Unit from the use of agricultural chemicals on adjacent farmland.

- Sample water quality of lakes for contaminants and determine if management or migative measures are necessary.

Objective D-4. Cultural Resources: Within 10 years of CCP approval, identify, evaluate the importance of, and seek the appropriate protective designation of cultural resources on the refuge in accordance with existing legal requirements, regulations and professional standards.

Discussion: Protection and preservation of our Nation's cultural resources is an important part in maintaining its heritage. This is just as true in the rural areas of our country as it is in our cities. In order to assure that no historial and/or cultural resources are ignored or inadvertently damaged on the refuge, an inventory of possible sites should be identified and evaluated.

Strategies:

- Perform a search of historical records on all properties in the refuge for any indication of the presence of cultural resources.
- Have a professional historian inspect any potential sites.
- If any potential cultural resources are found on the refuge, seek appropriate protective designation.

VISITOR SERVICES

GOAL E. Visitor Services: Utilize the urban proximity of the refuge's headquarters location to promote environmental education and interpretation opportunities and enhance wildlife-dependent public uses, including hunting, fishing, wildlife observation, and wildlife photography on the Refuge.

Discussion: Currently, use that occurs on the refuge includes hunting, fishing, and wildlife observation. The complex does not have the staff or facilities to provide environmental education or interpretive or other wildlife-dependent recreational programs. A big part of this CCP, and the need for public involvement in its development, is planning for visitor services.

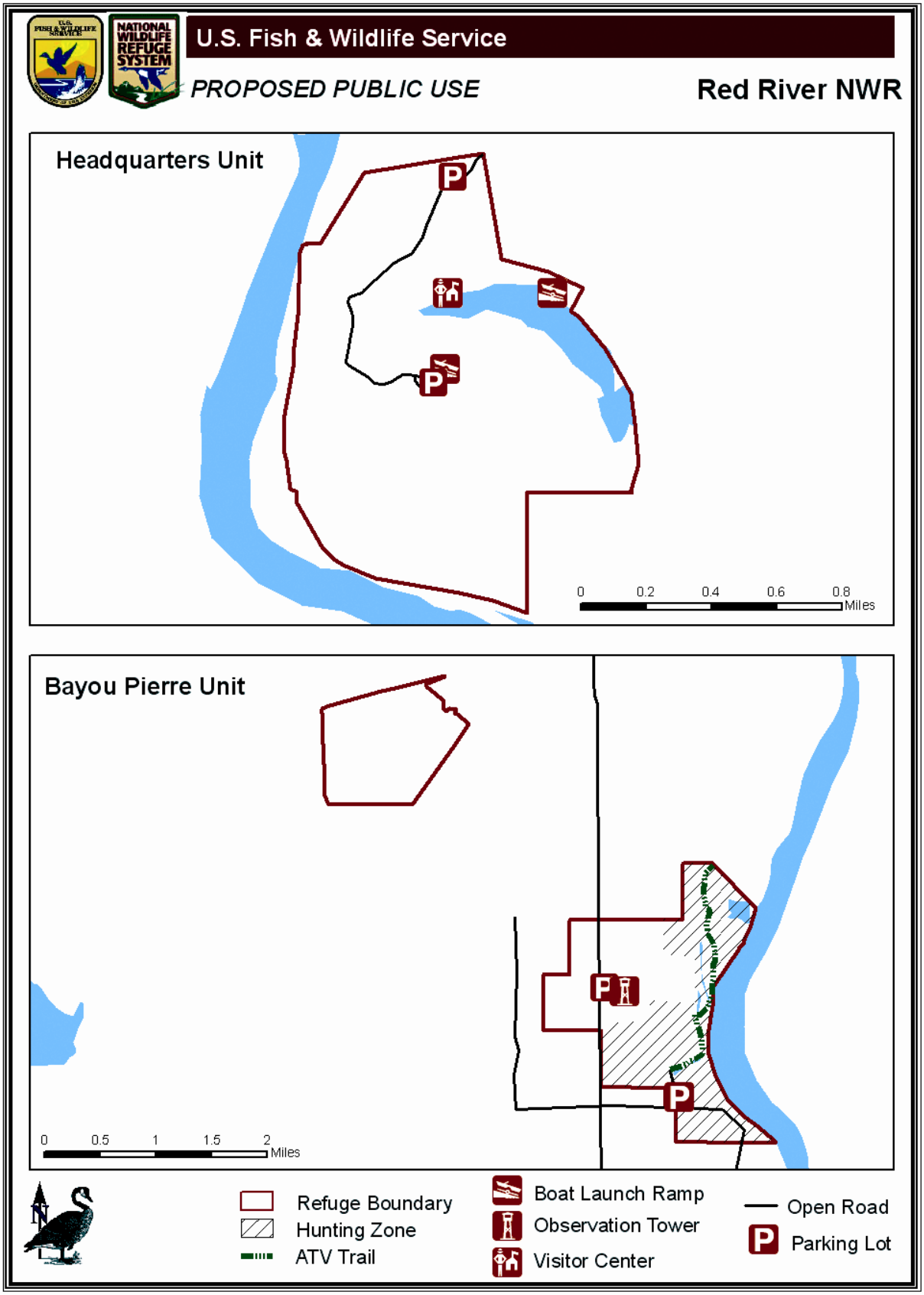
Objective E-1. Visitor Services Program: Develop and improve visitor access, facilities, and program support to promote priority wildlife-dependent recreational uses.

Discussion: The National Wildlife Refuge System Improvement Act of 1997 identifies six priority wildlife-dependent public use activities: hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation. Fundamental to the provision of these uses are viable and diverse fish and wildlife populations and the habitats upon which they depend. These priority uses, along with all other proposed uses, must be compatible with the refuge purpose and the mission of the National Wildlife Refuge System. The proposed visitor facilities are illustrated in Figure 11.

Strategies:

- Develop and implement a Visitor Service Plan by 2010.
- Utilize the recreational fee program to maintain and enhance visitor facilities, (i.e., interpretive information, waterfowl hunting blinds, fishing pier, bank fishing areas, and trail access).
- Promote youth education through participation in the Youth Conservation Corps Program.
- Use consistent signage at all visitor service areas (e.g., parking, hiking, hunting, fishing, and all-terrain vehicles [ATVs]).
- Place standardized refuge information in parking areas.

Figure 11. Proposed visitor service facilities on Red River National Wildlife Refuge.



- As use increases, improve parking areas (e.g., gravel and add bumpers).
- Expand the volunteer program to help implement the visitor services program.

Objective E-2. Hunting: Provide safe, quality hunting opportunities in appropriate areas consistent with the refuge's established purposes and wildlife and habitat objectives for 1,000 visitors.

Discussion: Hunting, when conducted under carefully controlled conditions, is not detrimental to most wildlife populations. In addition, hunting is an opportunity to participate in one of the identified priority wildlife-dependent recreational uses. Development of a hunt plan, based on sound biological information, is a vital component for assuring quality hunting experiences and viable wildlife populations.

Hunting on newly acquired lands will be conducted in accordance with refuge purposes reflected in the authorizing legislation and Refuge System policy. If lands within the current refuge acquisition boundary are acquired, the number of hunting opportunities and hunting visits could be increased.

Hunting seasons will be scheduled and managed to ensure that negative effects to nongame wildlife and migratory birds are minimized during critical periods. Hunting seasons will be set in close coordination with the Louisiana Department of Wildlife and Fisheries.

Strategies:

- Continue the hunting opportunities at Bayou Pierre and Spanish Lakes.
- Evaluate additional opportunities (species, methods) as more land is acquired.
- Consider a youth waterfowl hunt on Headquarters Unit and in closed area of Bayou Pierre.
- As use increases consider lottery hunts if needed.
- Make hunt brochures available at main entry kiosks.
- Identify that ATV trails are for seasonal and hunting use only.

Objective E-3. Fishing: Provide quality fishing opportunities in the Spanish Lake Lowlands Unit and Bayou Pierre Unit for 2,500 visitors.

Discussion: Fishing and boating on the Spanish Lake Lowlands Unit and Bayou Pierre Unit are permitted year-round during daylight hours only. Licenses, limits, and boating safety requirements are the same as those adopted by the Louisiana Department of Wildlife and Fisheries.

Strategies:

- Continue to improve access and fishing opportunities at Bayou Pierre and Spanish Lakes.
- Build a boat launch to access the oxbow lake at the headquarters site and use vegetation to screen parking from the visitor center.
- Put a fishing pier at the high site of the Headquarters Unit.
- As more land is acquired and access is improved, explore ways to increase bank fishing opportunities.

Objective E-4. Wildlife Observation and Photography: Develop and provide opportunities and facilities for wildlife observation and photography on all units of the refuge, with emphasis on the Headquarters Unit.

Discussion: The public is free to walk throughout the refuge units for wildlife observation and photography, except in designated closed areas. Currently the fee title land base is minimal and there is very little public access. As acquisition continues, more lands will be accessible for wildlife viewing. There are no designated hiking trails, no observation platforms and no photo blinds. The America's Wetland Birding Trail has expressed an interest in establishing some stops for birders on the refuge. During the station's biological review, the Natural Resources Conservation Service (NRCS) suggested partnering with the refuge to establish a variety of habitats. This diversity of habitats would increase opportunities for birding and other wildlife observation.

Strategies throughout refuge:

- On all units open to the public, provide some form of observation/trail opportunity.
- Develop diverse habitats to increase birding opportunities.

Strategies for the Bayou Pierre Unit:

- Build the proposed observation tower.
- Designate the ATV trail as a hiking trail also. Sign it as a hiking trail with directional signs and mileage indicators. (If necessary, manage this trail seasonally to avoid user conflicts.)
- Consider developing a hiking trail west of Highway 1. (This trail could provide access to existing bottomland hardwood forest.)
- Develop sites to be included on the America's Wetland Birding Trail.

Strategies for the Headquarters Unit:

- Work with a landscape architect to develop a master site plan for this area.
- During the master planning for the Headquarters site, consider a "central parking area" with the trail system developed out from it. (Locate this across the lake from the visitor center site.)
- In partnership with NRCS and others, develop the habitat restoration areas and trail system.
- Develop a trail to the Red River.
- Develop a photo blind somewhere overlooking the lake.
- Build an observation deck overlooking the lake associated with the proposed visitor center location.

Objective E-5. Environmental Education: Develop a community-based environmental education program in coordination with area schools and other area educational organizations.

Discussion: The refuge does not have an environmental education program at present. Funding has been provided to build an office/visitor center at the Headquarters Unit. Once the building is completed and the associated trails and kiosk are built, the refuge will then have the facilities for an education program. The refuge does not have staff to conduct environmental education programs or to staff the visitor center once it is opened.

Strategies:

- In the absence of dedicated public use staff at the refuge, work with the Red River Refuge Alliance to establish and coordinate a volunteer corps to deliver education programs.
- Select an individual to serve as the "volunteer" coordinator.
- Hold a discussion about how volunteer education staffing will change when the refuge is permanently staffed with Service personnel.
- Assuming successful volunteer development, offer by fall 2009, a program to school groups consisting of a discovery hike and/or activities to learn about the refuge and its plants, animals and ecology. The initial program may target a specific age/grade level.
- Establish an environmental education work group to keep the program focused. Determine what is already being offered in the community (nature centers, Sci-port), and consider what the refuge's environmental education program can provide to best fit within the existing community programs. Determine what to offer. Determine how much programming to offer (days per week, etc.)
- Incorporate environmental education considerations into site planning for Headquarters Unit.
- Provide temporary restroom facilities right away if programs are offered.

Objective E-6. Environmental Interpretation: Develop an interpretive program that will increase awareness of the habitat features, wildlife values, and management programs on the refuge.

Discussion: There are no kiosks, interpretive panels or interpretive programs available at the refuge. As the refuge continues to buy land, trails and observation areas will be developed and many of these will include panels that interpret the natural resources of the refuge. There will also be interpretive exhibits in the new visitor center.

Strategies for the Headquarters Unit:

- Develop a looped trail through the pecan grove area to the edge of the lake.
- Develop panels for this trail which could include: Habitats, human activities, agriculture, backyard habitats/urban wildlife.
- Develop trail in wetland/prairie area (including a boardwalk into the cypress area)
- Develop panels for this trail which could include: prairie restoration, habitat transition zones, landowner opportunities, invasives and biodiversity, cypress trees.

Strategies for the Bayou Pierre Unit:

- Develop observation deck with panels depicting migratory birds, wetlands, NWRS, agriculture for wildlife.
- Develop Bottomland Hardwoods trail (west side of Hwy. 1) with panels depicting bottomland hardwood ecology.

Strategies for the Visitor Center:

- Exhibits in the visitor center should be used to tell all of the identified messages plus the NWRS story.
- Develop presentations of volunteer-led guided trail walks that are a regularly scheduled event (i.e., a First Friday Night Talk) or could happen more opportunistically as appropriate (i.e., a birding talk for Migratory Bird Week, or have someone available to provide a special presentation.)

Objective E-7. Refuge Support: Within the next 10 years, complete steps to develop the refuge's infrastructure and operations to provide for quality, wildlife-dependent public use.

Discussion: A refuge that is well used by the public for a variety of interests will generate support from the public for the refuge. Supporting a variety of public involvement activities requires personnel, equipment, training, and a well-designed public outreach program.

Strategies:

- Provide up-to-date training and equipment to all full-time and dual function officers.
- Develop Memorandums of Understanding with state and parish law enforcement agencies to facilitate cooperation and assistance in law enforcement activities. Update current Law Enforcement Plan.
- Provide education and outreach programs in the local community as part of a preventive law enforcement effort.
- Provide assistance to the Service's special agents and state conservation officers for off-refuge activities as requested.

REFUGE ADMINISTRATION

Goal F. Refuge Administration: Secure and enhance staffing, funding, and facilities to maintain the long-term integrity of habitats and wildlife resources of the refuge in support of the achievement of the National Wildlife Refuge System's mission.

Discussion: The Red River NWR is a young refuge with little permanent staff or facilities to support a large refuge divided into four units spread over 120 miles of the Red River Valley. In order to provide the support and management needed to provide visitor services and wildlife protection on this refuge there will be a need to secure sufficient staff, funding and facilities.

Objective F-1. Staffing: Provide the refuge with adequate staffing.

Discussion: Sufficient personnel permanently assigned to the refuge are needed to provide the level of services necessary to support the achievement of the National Wildlife Refuge System's mission.

Strategy:

- Add 7 full-time equivalent positions (FTEs), including 1 administrative assistant, 1 assistant refuge manager, 1 outdoor recreation specialist, 1 wildlife biologist, 1 refuge law enforcement officer, 1 engineering equipment operator, and 1 maintenance worker.

Objective F-2. Facilities: Provide the refuge with the facilities necessary to fulfill its Vision.

Discussion: With its Headquarters Unit located in an urban environment, the refuge needs a visitor center/ headquarters facility that can showcase the mission of not only this refuge but the natural resource protection mission of the Service. With this new visitor center as a base, the rest of the refuge needs to be adequately maintained to support a strong level of compatible visitor services.

Strategy:

- Over the life of the CCP, repair, maintain and replace existing facilities, buildings, and roads, while adding an administrative/visitor center at the Headquarters Unit.

Objective F-3. Partnerships: Expand and create new partnerships for the refuge what will help support its mission.

Discussion: Partnerships with state agencies, nongovernmental organizations, and interested volunteers is an integral part of maintaining and expanding local and regional associations that can help in the activities of the refuge.

Strategy:

- Continue to collaborate with all existing partners and look for opportunities to expand cooperation with existing and new partners.

Objective F-4. Equipment: Provide the refuge staff with vehicles and equipment appropriate to the work intended.

Discussion: This is a large, young refuge with no equipment permanently assigned to this facility. There are a variety of equipment needs to address the work associated with maintaining a refuge of this size.

Strategy:

- Over the life of the CCP, provide additional safe and efficient equipment, including additional vehicles as necessary: 2 boats, 1 dozer, 1 grader, 1 excavator, 1 backhoe, 2 additional farm tractors and associated implements, one 1-ton pickup truck, 1 ATV, and 1 semi-truck and trailer to perform needed refuge operations and maintenance.

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.

The goals and objectives outlined in Chapter IV addressed specific refuge management needs for fish and wildlife population management; habitats and habitat restoration; land protection and acquisition; cultural resources; visitor services; and refuge management on five units stretched over 120 miles along the Red River that is the Red River National Wildlife Refuge. Habitat management will be tailored to meet priority species needs, while meeting the needs of other fish and wildlife that are dependent upon refuge lands. Because the rate at which each unit of the refuge achieves its full potential is dependent on the level of resources that are invested, wildlife populations that are locally, regionally, and nationally important may be delayed until staffing and funding are adequate to meet the identified needs. Proposed priority public use programs (such as the planned visitor center) that would establish and expand opportunities for wildlife-dependent public recreation cannot be implemented and accomplished without specialized staff and substantial funding increases.

(Note: This plan does not constitute a commitment from Congress for staffing increases, operational and maintenance increases, or funding for future land acquisition.)

To accomplish the purpose, vision, goals, and objectives contained in this comprehensive conservation plan (CCP) for Red River National Wildlife Refuge, this chapter identifies projects, funding and personnel needs, volunteers, partnerships opportunities, step-down management plans, a monitoring and adaptive management plan, and plan review and revision.

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, the 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.

Annual funding requests for new projects or personnel that are needed to implement the goals, objectives, and strategies outlined in this CCP will be included in the Refuge Operating Needs System (RONS), a national database that contains the unfunded operational needs for each refuge. Projects requiring new equipment, road projects, required maintenance, and other refuge management needs will be included in the Service Assessment Maintenance Management System (SAMMS) database, a computerized database and management tool used for planning and budgeting maintenance, capital improvements, and equipment replacement.

Substantial changes in habitat management may be needed over time, as new information becomes available, new lands are acquired, and habitat conditions evolve. These changes will be included in CCP revisions. Step-down plans (not included in this CCP) will be developed in conjunction with future visitor services program plans and forest management plans, among others.

FISH AND WILDLIFE POPULATION MANAGEMENT

Science-based Inventories and Monitoring of Wildlife Populations: Science-based inventories and monitoring of wildlife populations are critical to ensuring the biological integrity of the refuge. Information collected will serve as the basis for developing habitat management plans and will influence all refuge management activities. A systematic inventory and monitoring program will enable the refuge to make informed management decisions and valuable long-term contributions to national and regional objectives for waterfowl, shorebirds, forest breeding birds, wintering forest and scrub/shrub birds, among others.

Standardized census and survey techniques will be employed and all data compiled into databases, including GIS, for spatial analysis. This information is critical to formulating management actions and evaluating bottomland hardwood reforestation, moist-soil unit manipulation, and other refuge programs. All data will be shared with appropriate state and federal partners in an effort to further ecosystem management. This project will add one permanent wildlife biologist (GS-486-7/9/11).

Recurring Costs: $124,000 Special Project Cost: $154,000

Control Invasive Wildlife Species: Red River NWR has an established population of invasive feral swine. The scientific literature has documented many adverse effects caused by feral swine on the habitat productivity and reproduction of most native wildlife. Being omnivores, feral swine utilize virtually every component of the habitat and directly compete with native wildlife, reducing habitat carrying capacity and adversely affecting their reproduction and recruitment. Feral swine are compromising the refuge's efforts in bottomland hardwood reforestation, wetland restoration, and species recovery.

The refuge lands also contain extensive wetland acreage with varying sources and duration of hydrology that can be impacted by beaver activity. Beaver have constructed dams that hold water and kill trees. Although beaver ponds do provide habitat for some waterfowl and aquatic species such as wading birds, reptiles, and amphibians, forest losses can be substantial if not controlled. Beaver suppression will be required in many areas throughout the refuge, and nutria are also a problem.

The refuge will use a multifaceted control program including public hunting, staff control, trapping, and various other techniques. This project will require professional animal damage control personnel to supplement the refuge staff's invasive wildlife control efforts. Control work will be contracted with the USDA Animal Damage Control and/or other professional nuisance animal control personnel. This project will add one permanent maintenance worker (WG-4749-9) and supplies.

Recurring Costs: $90,000 Special Project Cost: $108,000

Manage Deer Herds on Refuge: Because of the urban location of the refuge Headquarters Unit, the resident deer herd is isolated and contained within the headquarters boundary. In order to protect the health of this isolated herd, control of the population size is essential. Hunting practices that would be routine in rural settings will not work here due to the close proximity of homes. The refuge will use a multifaceted control program including tightly

controlled public hunting, staff control, trapping, and various other techniques. This project will include adding one permanent park ranger (LE) (GS-0025-7/9) ($140,000), educational and interpretive materials ($5,000), and miscellaneous expenses ($3,000).

Recurring Costs: $115,000 Special Project Cost: $148,000

HABITAT MANAGEMENT

Provide and Protect Habitat for Endangered Species on the Refuge (i.e., Interior Least Tern): Interior least terns have historically bred and nested from late April to August on barren and sparsely vegetated sandbars, and sand and gravel pits along the Red, Ohio, Missouri, Mississippi, and Rio Grande rivers. They feed in shallow waters on fish, insects, crustaceans, mollusks, and annelids. However, river chanrnel alterations for navigation, hydropower, irrigation, and flood control have destroyed much of their nesting and breeding habitat. Many remaining sandbars are unsuitable for nesting due to vegetation encroachment or frequent flooding. In 1985, interior least terns were placed on the Endangered Species list in many states, including Louisiana, and the Fish and Wildlife Service developed a recovery plan in 1990.

Proper management of sandbars (i.e., discing to control vegetation) along the Red River adjacent to the refuge boundary can play an integral role in the national recovery plan. These sandbars are outside the boundary of the refuge and belong to the State of Louisiana. Coordination and cooperation with the Louisiana Department of Wildlife and Fisheries, the Red River Waterway Commission, the Service's Ecological Services Lafayette Field Office, and the Army Corps of Engineers is needed to protect and preserve habitat for the interior least tern. This project would include conducting a feasibility study and analysis. Contract work cost is unknown at this time.

Recurring Costs: Cost Unknown Special Project Cost: Cost Unknown

Water Management System Operation and Maintenance: Man-made hydrological alterations have all but eliminated the natural flooding regimes that once supported historical numbers of waterfowl and shorebirds. In this altered floodplain, a system of levees, water control structures, and weirs are necessary to provide dependable flooded habitats that correspond with the migration chronologies of migratory birds. The timing of water management is critical not only to meet the needs of migratory birds, but also to stimulate the production of desirable moist-soil plants and to control undesirable plants. Water management includes monitoring water flow, water levels, and pumping—coordinated with a GIS database to more efficiently manage resources.

The refuge uses a system of levees, water control structures, and wells in an effort to mimic historic flooding regimes and provide dependable flooded habitat for migratory birds. Habitat management for these moist-soil units requires discing every two to three years to maintain desirable plant composition. For the functional operations of the entire water management system to work reliably, annual maintenance must be performed on the levees, water control structures, wells, and power units. This project includes monitoring equipment maintenance, water flow, water levels, pumping, etc. and supports adding one permanent Assistant Refuge Manager (GS-401-9/11,128K). Installation of water control structures and levee plow is estimated at $80,000.

Recurring Costs: $102,000 Special Project Cost: $208,000

Bottomland Hardwood Forest Restoration: Prior to European settlement, the Red River Valley was almost completely covered with a mature bottomland hardwood forest ecosystem. Today, almost all of that original forest type has been lost to land clearing for agriculture, transportation,

industrialization, and urbanization. The remaining bottomland hardwood forests (what little is left) lie in numerous isolated islands that are often surrounded by a sea of agriculture. One of the primary goals of the refuge is to restore this lost habitat in large integral tracts in order to support interior bottomland hardwood forest function where possible. This project will support the addition of a Complex forestry technician proposed in the Upper Ouachita NWR CCP. The estimated cost of evaluation and reforestation is for a total cost of $240,000. Much of the existing reforestation had been completed with carbon sequestration funds with little or no cost to the Service. Recurring costs associated with fire suppression, monitoring, and management will average $5 per acre per year.

Recurring Costs: $1,000 Special Project Cost: $240,000

Control of Invasive Plants: The refuge's biological integrity is threatened by a variety of invasive plant species. This project will develop and implement an integrated pest management program (IPM) to control invasive plants. Invasive plant occurrence will be mapped and quantified. Appropriate IPM strategies will be used to control water hyacinth, American lotus, etc. in all water bodies; sesbania and Johnsongrass in moist-soil and cropland fields; and Chinese tallow and pawlonia in reforestation areas. Strategies will include chemical, mechanical, and biological control techniques.

Recurring Costs: $40,000 Special Project Cost: $75,000

RESOURCE PROTECTION

Land Acquisition and Priority Areas of Conservation Interest: Through a combination of fee title purchases from willing sellers and leases, cooperative agreements, and conservation easements with willing landowners, the Service will continue to purchase sufficient interest in lands within the 50,000-acre approved refuge acquisition boundary. The Service will acquire sufficient interest in the identified lands to prevent conflicting land uses and to provide the management flexibility required to protect and manage the habitat as a national wildlife refuge. Technical assistance will be provided to private landowners in the area that are interested in forest management, habitat management, and wildlife conservation. Pursuing this project will help this young refuge significantly reduce forest fragmentation and contribute to the biological integrity and environmental health of the entire Red River Valley. Additionally, this project will eliminate numerous small inholdings and consolidate refuge boundaries, eliminating many administrative and public access issues. The acquired lands will be made available to the public for additional wildlife-dependent recreation. All acquisitions will be made from willing sellers. Potential funding sources for this project include the Migratory Bird Conservation Fund, the Land and Water Conservation Fund, carbon sequestration and cooperative efforts with various Service partners. The estimated cost to acquire the remaining 43,438 acres within the current acquisition boundary ($1,200 per acre) is $52,125,600.

Archeological Survey: A comprehensive archeological survey of all the units of the refuge will be conducted. This project is essential to meet federal cultural resource mandates and will provide the baseline information needed for protection of existing resources and resource/public use development activities. Surveys and interpretation are estimated to cost $75,000.

Recurring Costs: $10,000 Special Project Cost: $75,000

VISITOR SERVICES

Visitor Center Construction and Operation: The planned visitor center at the Headquarters Unit will be a focal point for environmental education and interpretation for the Shreveport/Bossier City metropolitan area. This center will provide a great opportunity to educate the public on the Service and what the entire refuge has to offer in the way of natural resource management and visitor services. The size and design of the visitor venter will incorporate space for housing the administrative staff of the refuge. The estimated cost of this project includes $3 million for construction of the visitor center; a $1.2 million match from Service partners; $150,000 to construct a concrete boat landing; $520,000 to construct a photo blind, observation tower, trails, two kiosks, and a fishing pier; and $24,000 for interpretive and orienting signage. This project would also add a permanent park ranger, outdoor recreation specialist (GS-0025-9/11) at $154,000 and a permanent administrative officer (GS-0341-7) at $40,000.

Recurring Costs: $260,000 Special Project Cost: $5,135,000

REFUGE ADMINISTRATION

Expand the Ability to Meet Growing Maintenance Needs: With five distinct refuge units spread over 120 miles along the Red River, the maintenance staff is challenged to adequately provide for existing needs. To adequately maintain existing needs and develop future infrastructure for public use activities and habitat management, and to comply with SAMMS database requirements, additional staff, equipment, office space, and funding is needed. Additional funding and personnel would be used to construct new roads and trails, maintain existing roads and trails, develop and maintain observation platforms, maintain water control structures, levees and refuge facilities, maintain equipment and vehicles, input and manage information in SAMMS, and other refuge maintenance needs. This project will construct an equipment storage facility ($250,000); require the acquisition of a 175-horsepower tractor ($80,000), an 18-foot offset disk ($20,000), a 15-foot flex-wing bush hog ($45,000), grading implement ($160,000), boxblade ($25,000), backhoe loader ($75,000), 650JD or D5 Cat size dozer ($150,000), diesel transport truck ($90,000), and lowboy trailer ($40,000). This project will also support a permanent equipment operator (WG-5716-10) at $137,000.

Recurring Costs: $150,000 Special Project Cost: $950,000

FUNDING AND PERSONNEL

Table 3 and Figure 12 summarize the project funding and personnel needs.

PARTNERSHIP/VOLUNTEER OPPORTUNITIES

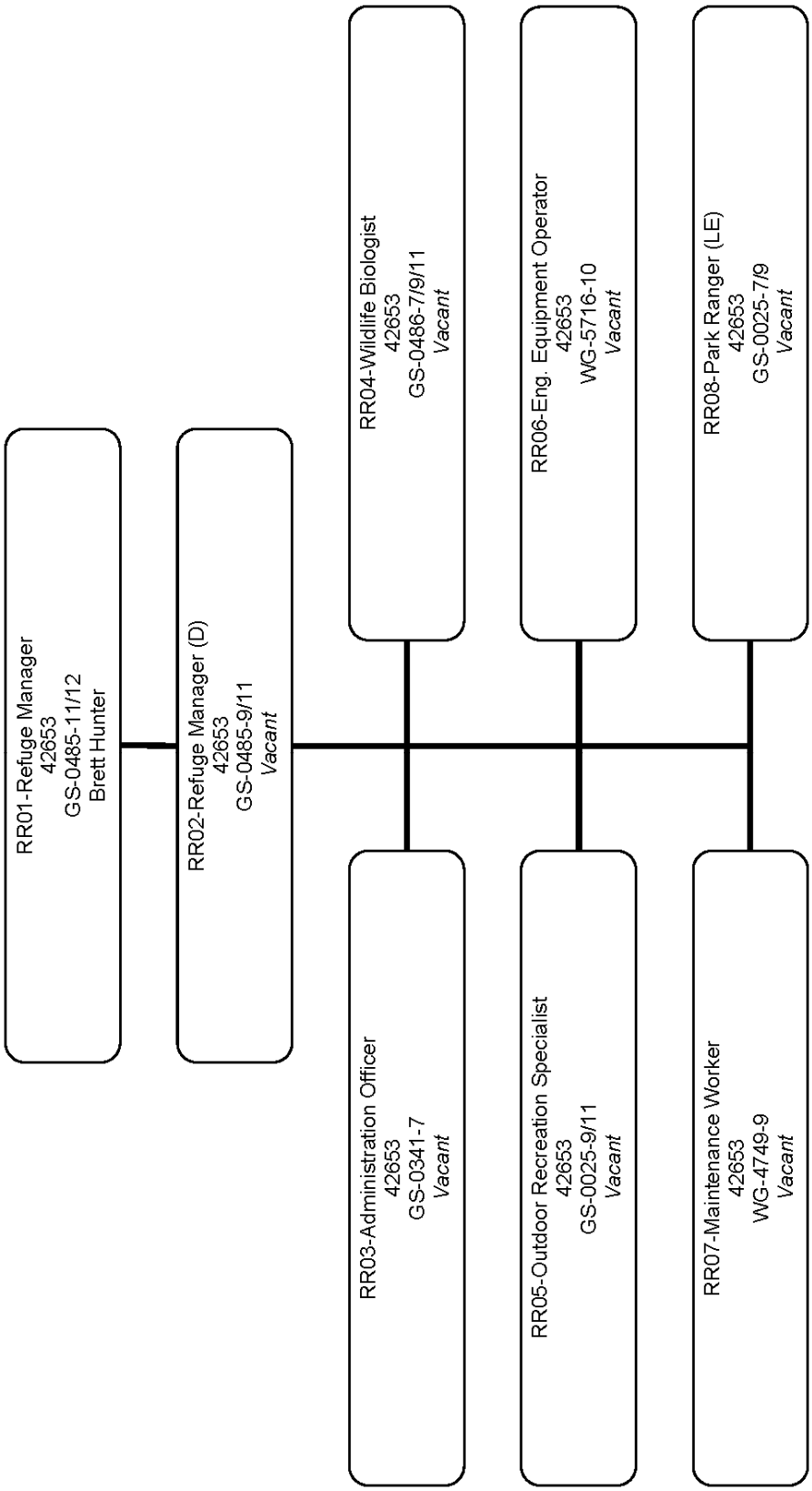
The refuge currently has an excellent partnership with the volunteer group called the “Red River Refuge Alliance” and will use it as a model for other partnerships. This group of volunteers is actively involved in helping to make the refuge a part of the surrounding community. The refuge will continue to work with the Red River Refuge Alliance and recruit others to assist in such activities as wood duck and blue bird box management, migratory songbird point count surveys, amphibian and reptile surveys, grounds maintenance, etc.

Table 3. Summary of projects with funding and staffing needs.

PROJECT NUMBER	PROJECT TITLE	FIRST YEAR COST ($)	RECURRING ANNUAL COST ($)	STAFF (FTE'S)
1	Science-based Inventory and Monitoring of Fish And Wildlife Populations	**154,000**	**124,000**	**1**
2	Control Invasive Wildlife	**108,000**	**90,000**	**1**
3	Manage Deer Herd on the Refuge	**148,000**	**115,000**	**1**
4	Provide and Protect Habitat for Threatened and Endangered Species on the Refuge	*	*	
5	Water Management System Operation and Maintenance	**208,000**	**102,000**	**1**
6	Bottomland Hardwood Forest Restoration	**240,000**	**1,000**	
7	Control of Invasive Plants	**75,000**	**40,000**	
8	Land Acquisition	**53,000,000**	**Unkown**	
9	Archaeological Survey	**75,000**	**10,000**	
10	Visitor Center Construction and Operation	**5,135,000**	**260,000**	**2**
11	Expand the Ability to Meet Growing Maintenance Needs	**950,000**	**260,000**	**1**

* Cost unknown at this time.

Figure 12. Red River National Wildlife Refuge proposed organizational chart.



A major objective of this comprehensive conservation plan is to establish partnerships with local volunteers, landowners, private organizations, and state and federal natural resource agencies. In the immediate vicinity of the refuge, opportunities exist to establish partnerships with sporting clubs, elementary and secondary schools, universities, and community organizations. At the regional and state level, partnerships might be established with organizations such as the Louisiana Department of Wildlife and Fisheries, Ducks Unlimited, The Nature Conservancy, and the Audubon Society, among others.

The refuge volunteer program and other partnerships generated will depend upon the number of staff positions the Service provides the refuge. As staff and resources are committed to the refuge, opportunities to expand the volunteer program and develop partnerships will be enhanced.

If staff can be expanded to allow time for additional outreach to local communities, there may be opportunities to expand existing volunteer opportunities on the refuge. The refuge already has an active and growing volunteer program, managed by the refuge manager. Properly supervised and directed, these volunteers could make even more valuable contributions to the refuge by assisting future staff with any number of activities, including projects to monitor habitat and wildlife populations and environmental education both on and off the refuge.

The goals and objectives outlined in this CCP need the support and the partnerships of federal, state, and local agencies, nongovernmental organizations, and private citizens. This broad-based approach to managing fish and wildlife resources extends beyond social and political boundaries and requires a foundation of support from many stakeholders. The refuge will continue to seek creative partnership opportunities to achieve its vision for the future.

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 management. These step-down plans (Table 4) are also developed in accordance with the National Environmental Policy Act (NEPA), which requires the identification and evaluation of alternatives and public review and involvement prior to their implementation.

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 survey, inventory, 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 evaluation indicate undesirable effects for target and nontarget species and/or communities, then alterations to the management projects will be made. Subsequently, the comprehensive conservation plan will be revised. Specific monitoring and evaluation activities will be described in the step-down management plans.

Table 4. Red River National Wildlife Refuge step-down management plans.
(Related to the goals and objectives of the comprehensive conservation plan)

Step-down Plan	Completion Date
Station Safety Plan	2017
Law Enforcement Plan	2015
Fishery Management Plan	2018
Fire Management Plan	2015
Forest Management Plan	2016
Water Management Plan	2011
Animal Control Plan	2018
Biological Inventory and Monitoring Plan	2010
Trapping Plan	2018
Hunt Plan	2008
Cultural Resource Protection Plan	2015
Habitat Management Plan	2012
Visitor Services Management Plan	2010
Invasives Management Plan	2015

PLAN REVIEW AND REVISION

This comprehensive conservation plan 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 plan 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 comprehensive conservation plan and the step-down management plans will be subject to public review and NEPA compliance.

SECTION B. ENVIRONMENTAL ASSESSMENT

I. Background

INTRODUCTION

On October 13, 2000, House Resolution 4318, the Red River National Wildlife Refuge Act, was signed into law. This legislation authorized the establishment of Red River National Wildlife Refuge to provide for the restoration and conservation of fish and wildlife habitats in the Red River Valley ecosystem in northwest Louisiana. The goals of the refuge are to (1) provide for the restoration and conservation of native plant and animal communities on suitable sites in the Red River Valley, including restoration of extirpated species; (2) provide habitat for migratory birds; and (3) provide technical assistance to private landowners in the restoration of their lands for the benefit of fish and wildlife.

The U.S. Fish and Wildlife Service (Service) has prepared this Environmental Assessment for Red River National Wildlife Refuge in compliance with the National Environmental Policy Act and the National Wildlife Refuge System Improvement Act of 1997. The National Wildlife Refuge System Improvement Act requires the development of comprehensive conservation plans (CCPs) for all refuges. Following a public review and comment period on the Draft CCP (Section A), a final decision will be made by the Service that will guide management actions and decisions for Red River National Wildlife Refuge over the next 15 years, provide understanding about the refuge and its management activities, and incorporate information and suggestions from the public and refuge partners.

The Draft CCP proposes a management direction, which is described in detail through a set of goals, objectives, and strategies. The Draft CCP addresses current management issues, provides long-term management direction and guidance for the refuge, and satisfies the legislative mandates of the National Wildlife Refuge System Improvement Act of 1997. While the plan provides general management direction, subsequent step-down plans will provide more detailed management direction and actions.

This Environmental Assessment (EA) for Red River National Wildlife Refuge has been prepared in compliance with the National Environmental Policy Act. It discusses the purpose and need for the CCP for the refuge, which is located in Caddo, Bossier, DeSoto, Red River, and Natchitoches parishes, Louisiana, and provides an analysis of the environmental impacts that could be expected from each of the management proposals outlined in the plan. This analysis assists the Service in determining if it will need to prepare an Environmental Impact Statement (EIS) or a Finding of No Significant Impact (FONSI) for the refuge's proposed CCP. An EIS is generally a more exhaustive and time-consuming analysis than an EA, and must be prepared if there is a strong indication that a proposed action may entail one or more potentially significant environmental impacts.

The U.S. Fish and Wildlife Service is the Nation's primary conservation agency concerned with the protection and long-term management of wildlife resources. The Service administers the National Wildlife Refuge System, a system of more than 540 national wildlife refuges embracing over 93 million acres, much of which is primarily managed for the enhancement of migratory bird populations and federally listed threatened and endangered fish, wildlife, and plants.

This plan is needed to address current management issues, to provide long-term management direction for the refuge, and to satisfy the legislative mandates of the National Wildlife Refuge System Improvement Act of 1997.

PURPOSE AND NEED FOR ACTION

The purpose of this Draft CCP/EA is to establish and implement management direction for Red River National Wildlife Refuge for the next 15 years.

The EA is needed to set forth and evaluate a range of reasonable management alternatives for the refuge. Each alternative was generated with the potential to be fully developed into a final CCP and to describe the predicted biological, physical, social, and economic impacts of implementing each alternative. The Service will select an alternative to be fully developed for this refuge.

The Service has identified the issues, concerns, and needs for the Red River Refuge through discussions with the public, agency managers, conservation partners, and others. In particular, the Service's planning team identified a range of alternatives, evaluated the possible consequences of implementing each, and selected Alternative C as the proposed management action. In the opinion of the Service and the planning team, Alternative C is the best approach to guide the refuge's future direction.

There is no current plan that identifies priorities and ensures consistent and integrated management of the refuge, thus necessitating the need for this plan. The National Wildlife Refuge System Improvement Act of 1997 requires that all national wildlife refuges have a comprehensive conservation plan in place within 15 years (by 2012).

DECISION FRAMEWORK

The Service's Southeast Regional Director will need to make two decisions based on the Environmental Assessment described in this document: (1) Select an alternative to implement the Comprehensive Conservation Plan for Red River National Wildlife Refuge, and (2) determine if the selected alternative is a major federal action significantly affecting the quality of the human environment, thus requiring the preparation of an Environmental Impact Statement; or prepare a finalized CCP with a Finding of No Significant Impact (FONSI). A FONSI is a statement that explains why the selected alternative will not have a significant effect on the quality of the human environment.

The recommendation of Alternative C as the proposed action to be implemented in the CCP was based on an evaluation of the purposes for which the Red River National Wildlife Refuge was established; the goals of the refuge; the missions of the Service and the National Wildlife Refuge System; and other legal mandates and pertinent plans. The Draft CCP (Section A) was developed for implementation based on this recommendation. Assuming that no significant impact is found, implementation of the plan will begin, and the plan will be monitored annually and revised when necessary.

PLANNING STUDY AREA

The planning study area for this EA consists of the refuge itself and the neighboring areas of Caddo, Bossier, DeSoto, Natchitoches, and Red River parishes in northwestern Louisiana. When Public Law 106-300 was enacted to establish the Red River Refuge, Congress directed the Service to acquire up to 50,000 acres from within a selection area covering approximately 220,000 acres (see Figure 2 in the Draft CCP, Section A). Under this legislative direction, the Service identified five focus areas as priority sites for acquisition activities, as follows:

Wardview Unit (Caddo and Bossier parishes) – This 27,743-acre site of low-lying lands is adjacent (along both sides) to a natural 10-mile section of the Red River. Streams and waterbodies include Halfmoon Lake, Plametta Lake, Stillhouse Bayou, and Scotts Slough. This area is bordered on the north by the Arkansas state line, on the south by State Highway 2, Stillhouse Bayou on the east, and Kelly Bayou in the west (Figure 2 of the Draft CCP).

Headquarters Unit (Bossier Parish) – This 756-acre site includes Eagle Bend Point and is located along the east side of the Red River in the Bossier City limits (Figure 2 of the Draft CCP).

Bayou Pierre Unit (DeSoto and Red River parishes) – This 19,938-acre area is bounded by U.S. Highway 84 on the south, Bayou Pierre on the west, a state highway that runs west from Williams on the north, and the Red River on the east (Figure 2 of the Draft CCP).

Spanish Lake Lowlands Unit (Natchitoches Parish) – This 16,437-acre area begins at the hill line just north of the town of Natchitoches. Bayou Pierre, Little River, and Johnson Chute are in the southern part of the area. State Highway 485 is on the west and north, and State Highway 1 is on the east (Figure 2 of the Draft CCP).

Lower Cane River Unit (Natchitoches Parish) – This is a 21,449-acre area approximately 20 miles south of Natchitoches and located between State Highway 1 and the Red River. The area is north of the confluence of the Lower Cane and Red rivers, and south of Bayou Bourbeaux (Figure 2 of the Draft CCP).

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

AUTHORITY, LEGAL COMPLIANCE, AND COMPATIBILITY

The Service has developed this plan in compliance with the National Wildlife Refuge System Improvement Act of 1997 and Part 602 (National Wildlife Refuge System Planning) of the Fish and Wildlife Service Manual. The actions described within this plan also meet the requirements of the National Environmental Policy Act of 1969. The refuge staff achieved compliance with this Act through the involvement of the public and the incorporation of an environmental assessment 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 plan will strive to achieve the vision and purposes of Red River National Wildlife Refuge.

The plan'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 national wildlife refuges must be protected from incompatible or harmful human activities to ensure that Americans can enjoy Refuge System lands and waters. Before activities or uses are allowed on a national wildlife refuge, the uses must be found to be compatible. A compatible use "... will not materially interfere with or detract from the

fulfillment of the mission of the Refuge System or the purposes of the refuge." In addition, "wildlife-dependent recreational uses may be authorized on a refuge when they are compatible and not inconsistent with public safety."

An interim compatibility determination is a document that assesses the compatibility of an activity during the period of time the Service first acquires a parcel of land to the time a formal, long-term management plan for that parcel is prepared and adopted. The Service has completed an interim compatibility determination for the six priority general public uses of the system, as listed in the National Wildlife Refuge System Improvement Act of 1997. These uses are hunting, fishing, wildlife observation, wildlife photography, environmental education and interpretation.

PUBLIC INVOLVEMENT AND THE PLANNING PROCESS

In accordance with Service guidelines and National Environmental Policy Act recommendations, public involvement has been a crucial factor throughout the development of the Draft Comprehensive Conservation Plan for Red River National Wildlife Refuge. This plan has been written with input and assistance from interested citizens, conservation organizations, and employees of local and state agencies. The Service, as a whole, and the refuge staff, in particular, are very 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.

Generally speaking, scoping refers to the process by which the planning team gathers input from a variety of internal and external sources in order to identify the key issues, concerns and opportunities that are likely to be associated with the conservation and management of the refuge. Sources of internal scoping include the refuge staff and other biologists and professionals from within the Service. External scoping sources include concerned private citizens; research and educational institutions; members of conservation, sportsmen, and civic groups; refuge neighbors; citizens of the local community; and state, tribal, and local agencies. These various interests are referred to collectively as "stakeholders," that is, those individuals and groups that have a stake in how the refuge is (and will be) managed. The participation of these stakeholders and their ideas has been of great value in setting the management direction for the Red River NWR.

The first step in developing the plan was a biological review that took place on December 6–8, 2005. The biological review team included 27 Service biologists, managers, foresters, and non-Service managers and biologists. The review involved onsite evaluations to assist the refuge in meeting its purpose and determining the role(s) the refuge could play regarding its wildlife needs and objectives at various geographical scales (local, ecosystem, regional, and national). The approach was to take a holistic look at achieving refuge and landscape-level conservation needs, while still giving priority to accomplishing the original purposes for the refuge's establishment. The team presented its recommendations in a Biological Review Report. In keeping with the planning process, these recommendations took the form of goals, objectives and strategies for the management of the refuge's biological resources. These preliminary goals, objectives and strategies were studied by the CCP planning team and modified and adapted for this plan.

A visitor services review was also conducted in 2005. The three-member visitor services review team consisted of recreation planners and specialists from the Service's Southeast Regional Office, Visitor Services and Outreach Division; Black Bayou Lake National Wildlife Refuge; and the Southeast Louisiana Refuges Complex. The team met with the refuge staff to discuss the refuge's visitor services program and its current recreational, educational and interpretive opportunities. The refuge manager then led the team on a tour of all the different public use areas on the refuge. After

discussions with some of the staff, the review team met to discuss the current status of the programs and to make recommendations. On the final day of the review, the team presented its recommendations to the staff and held an open discussion of the pros and cons of the various recommendations. Later the team submitted a report with a number of recommendations for improving and expanding the refuge's visitor service facilities and operations.

The nucleus of the CCP planning team itself, comprised of the refuge manager, a wildlife biologist, a Service natural resource planner, and an outside professional contractor (see Chapter V, Consultation and Coordination) met for the first time on February 21–23, 2006, for a tour of the refuge and an overview of its habitat and wildlife resources and public use programs, facilities, and opportunities. At that time, the planning team also conducted additional internal scoping and prepared a preliminary schedule and plans for public involvement.

Scoping continued with an open house and public meetings on May 15 and 17, 2006. Since the refuge itself does not have meeting or conference facilities and because the refuge is spread over 120 miles of the Red River Valley, two public scoping meetings were held: one on May 15th at the Broadmoor Public Library in Shreveport, Louisiana, and the other on May 17th in Natchitoches, Louisiana, on the campus of Northwestern State University. Approximately 15 citizens attended the open house and scoping meetings. The attendees were able to interact with the refuge staff and look at the exhibits and maps that were provided. The refuge manager was on hand to answer questions, as was a consultant from the Mangi Environmental Group, a Service contractor. During this period, the meeting participants were given the opportunity to publicly express their concerns about the refuge and their ideas and suggestions for its future management. In addition, a comment form was distributed for the attendees and other interested parties to submit written comments. The written comments could either be submitted right at the meeting, mailed subsequently, or sent via e-mail.

A wide range of issues, concerns, and opportunities were identified and addressed during the public scoping and planning process. However, some issues that are very important to the public fall outside the scope of the decision to be made within this planning process. In those instances, the Service cannot resolve them because they are beyond the scope of the Service's authority. 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.

A complete summary of these issues and concerns is provided in Appendix D, Public Involvement. Appendix D contains the following:

- A copy of the cover letter that invited the public to participate in the planning process;
- A copy of the Public Comment Form submitted with the above letter and used at the public scoping meetings to solicit comments;
- A copy of the news release that was submitted to local television, radio, and newspaper media in order to promote attendance at the public meetings; and
- A summary of the public comments that were received.

II. Affected Environment

For a description of the affected environment, please refer to Chapter II, Refuge Overview, in the Draft Comprehensive Conservation Plan (Section A).

III. Description of Alternatives

FORMULATION OF ALTERNATIVES

Alternatives are different approaches or combinations of management objectives and strategies designed to achieve the refuge's purpose and vision; the goals identified in the CCP; the priorities and goals of the Lower Mississippi Valley Ecosystem Team; the goals of the National Wildlife Refuge System; and the mission of the Fish and Wildlife Service. Alternatives are formulated to address the significant issues, concerns, and problems that were identified by the Service and the public during the public scoping process.

The three alternatives identified and evaluated represent different approaches to provide permanent protection, restoration, and management of the refuge's fish, wildlife, plants, habitats, and other resources, as well as compatible wildlife-dependent recreation. The refuge staff assessed the biological conditions and analyzed the external relationships affecting the refuge. This information contributed to the development of refuge's goals and, in turn, helped to formulate the alternatives. As a result, each alternative presents different sets of objectives for reaching the refuge's goals. Each alternative was evaluated based on how much progress it would make and how it would address the identified issues related to fish and wildlife populations, habitat management, resource protection and conservation, visitor services, and refuge administration.

DESCRIPTION OF ALTERNATIVES

Serving as a basis for each alternative, a number of goals and sets of objectives were developed to help achieve the purposes of Red River National Wildlife Refuge and the mission of the National Wildlife Refuge System. Objectives are desired conditions or outcomes that are grouped into sets and, for this planning effort, were consolidated into three alternatives. These alternatives represent different management approaches for managing the refuge over a 15-year timeframe, while still meeting the refuge's purposes and goals. The three alternatives are:

Alternative A: Current Management Direction (No Action Alternative)
Alternative B: Minimize Management and Public Use
Alternative C: Optimize Biological Program and Visitor Services (Proposed Action)

Each alternative is summarized below.

ALTERNATIVE A: CURRENT MANAGEMENT DIRECTION (NO ACTION ALTERNATIVE)

Red River NWR is part of the Lower Mississippi River Ecosystem and is considered to be in the West Gulf Coastal Plain Bird Conservation Area. As such, the refuge is a component of many regional and ecosystem conservation planning initiatives. Under Alternative A, the No Action alternative, the refuge would continue to be managed at its current level of participation in these initiatives through the 15-year duration of the CCP. Current approaches to managing wildlife and habitats, protecting resources, and allowing for public use would remain unchanged.

The main habitats the refuge strives to restore and manage are bottomland hardwood forests, managed wetlands, agricultural areas, and moist-soil areas. Under Alternative A, refuge management would continue to work with electric utility companies and partners to acquire land for refuge expansion and bottomland hardwood reforestation through the Carbon Sequestration Program, which is described in Chapter III of the Draft CCP (Section A). The refuge would

continue to furnish benefits for native wildlife. The refuge would continue to provide habitat for thousands of wintering waterfowl and year-round habitat for nesting wood ducks. It would also maintain the current habitat mix for the benefit of other migratory birds, shorebirds, marsh birds, and landbirds. The refuge staff would continue existing surveys to monitor the long-term population trends and health of resident wildlife.

Currently, little public use and environmental education programs exist at the refuge. The refuge would continue to serve the public without being guided by a Visitor Services Management Plan, relying instead on experience, general Service mandates and practices, and guidance and advice from the recreation staff at the Service's Southeast Regional Office. A new headquarters/visitor center has been budgeted and would be constructed.

ALTERNATIVE B: MINIMIZE MANAGEMENT AND PUBLIC USE

This alternative is driven by reducing the costs of funding and staff with fewer habitats and wildlife management and a reduced public use program. The biological information would be enhanced and encouraged to develop management programs that can be implemented less frequently, yet still accomplish the objectives. Extensive baseline inventories and monitoring programs would be conducted with several partners to provide a solid foundation of the current condition of refuge habitat and wildlife, while monitoring for changes in trends.

Additional research projects would be implemented in the alternative with success in gaining granting opportunities and partnerships with other agencies and universities. An intensive inventory of bottomland hardwood forest to define current conditions and monitor natural successional changes would be implemented. Management in the bottoms would be limited so that the forest would go through natural succession, as defined in a revised Habitat Management Plan. Open fields would be allowed to go through natural succession to bottomland hardwood forest and moist-soil units would not be maintained. Invasives management would become a priority to establish baseline information on location and density. Partnerships would continue to be fostered for several biological programs, hunting regulations, law enforcement issues, and research projects.

Public use would be limited under this alternative with custodial-level maintenance. Public use would be monitored for impacts to wildlife. An extensive survey for monitoring the deer population and its association with habitat conditions would be implemented. Fishing would continue as currently managed. Environmental education, wildlife observation, and wildlife photography would be accommodated at present levels; but access would be limited to July–October and February–April to minimize disturbance to migratory birds. Staffing would increase by five positions (e.g., biologist, maintenance worker, equipment operator, administrative officer, and a law enforcement park ranger) to handle the increase in biological inventory and monitoring and invasives control.

ALTERNATIVE C: OPTIMIZE BIOLOGICAL PROGRAM AND VISITOR SERVICES (PROPOSED ACTION)

Under Alternative C, the refuge would strive to optimize both its biological program and visitor services program. As explained in the Draft CCP (Section A), Louisiana's Red River Valley is one of the most heavily degraded ecosystems in the state. The greatest habitat type lost was bottomland hardwood forest; therefore, bottomland hardwood habitat restoration and management will continue to be an important goal under Alternative C. Under this alternative, the refuge will continue its current level of participation in the Carbon Sequestration Program. Any lands within the refuge's acquisition boundary that have had their forest cover removed will be targeted for acquisition and reforestation.

Prior farming practices on lands acquired by the refuge have left, in place, a number of water control structures. Under Alternative C, these water control structures will be maintained and enhanced to control water levels on several thousand acres of refuge lands. This will allow the maintenance of moist-soil units that will attract a variety of wildlife, especially waterfowl.

The refuge would also continue to furnish benefits to resident wildlife species in Alternative C and would aim to increase the refuge's knowledge base about migratory birds by developing and implementing monitoring programs, while continuing to provide habitats for the benefit of waterfowl, shorebirds, marsh birds, nesting colonial waterbirds, and landbirds. The refuge will use its resources to create and/or maintain a variety of habitats compatible with historic habitat types in the Red River Valley. These will include the above-mentioned bottomland hardwood habitat, as well as moist prairie. Efforts to control invasive species would increase from Alternative A.

Under Alternative C, land acquisition, reforestation, and resource protection at Red River National Wildlife Refuge would be intensified from the level now maintained in the No Action alternative. The refuge would expand the approved acquisition boundary to incorporate 1,413 acres in the Spanish Lake Lowlands Unit (Figure 8); 87 acres in the Headquarters Unit (Figure 9); and 1,938 acres in the Lower Cane Unit (Figure 10). In the refuge's Private Lands Program, staff would work with private landowners on adjacent tracts to manage and improve habitats. Staff would also explore opportunities with partners to protect existing and extend potential foraging areas off-refuge.

Alternative C would provide a full-time law enforcement officer, an equipment operator, a maintenance worker, a wildlife biologist, an assistant manager, an administrative assistant, and an outdoor recreational specialist. With regard to cultural resources, including those of an archeological or historical nature, within 15 years of CCP approval, the refuge would develop and begin to implement a Cultural Resources Management Plan (CRMP). Until such time as the CRMP is completed and implemented, the refuge would follow standard Service protocol and procedures in conducting cultural resource surveys by qualified professionals, in consultation with the RHPO and the SHPO, prior to commencing projects that entail extensive excavation.

Public use and environmental education would increase from the No Action alternative under Alternative C. Within three years of CCP completion, the refuge would develop a Visitor Services Plan to be used in expanding public use facilities and opportunities. This step-down management plan would provide overall, long-term direction and guidance in developing and running a larger public use program at the Red River Refuge. Federal funds are now available to construct a refuge headquarters/visitor center at the Headquarters Unit. The new visitor center would include a small auditorium for use in talks, meetings, films, videos, and other audiovisual presentations. Alternative C would also increase opportunities for visitors by adding facilities such as photo blinds, observation sites, and trails.

Over the 15-year life of this plan, the refuge staff would increase the emphasis on environmental education and interpretation under Alternative C to lead to increases in our understanding of the importance of habitat and resources in the Red River Valley. Within five years of CCP approval, the Red River Refuge would prepare a Fishing Plan that would outline and expand permissible fishing opportunities within the refuge. The refuge would also construct a fishing pier at the Headquarters Unit. Staff would investigate opportunities for expanding hunting possibilities.

COMPARISON OF ALTERNATIVES

Table 5 compares the three management alternatives relative to the refuge's goals and objectives.

Table 5. Comparison of alternatives by goals and objectives for Red River National Wildlife Refuge.

Objectives	Alternative A Current Management (No Action Alternative)	Alternative B Minimize Management and Public Use	Alternative C Optimized Biological Program and Visitor Services
GOAL A. FISH AND WILDLIFE POPULATION MANAGEMENT: **Promote the conservation and management of migratory bird diversity and resident wildlife in support of national, regional, and ecosystem habitat and population goals.**			
Objective A-1. Migratory Waterfowl:	Working with volunteers, continue to opportunistically monitor wintering waterfowl species numbers on the refuge and conduct a mid-winter waterfowl survey in the Red River Valley.	Improve monitoring procedures by designing and implementing a statistically valid survey protocol.	Annually monitor winter waterfowl species abundance and habitat use on the refuge per the Southeast Region Waterfowl Survey protocol in coordination with the State of Louisiana.
Objective A-2. Waterfowl Sanctuary:	Maintain 2,942 acres of the refuge as waterfowl sanctuary.	Increase sanctuary on the refuge by 20 percent.	Maintain at least 5% of the refuge in waterfowl sanctuary to provide adequate resting and feeding areas as lands are acquired.
Objective A-3. Wood Ducks:	Maintain 50 wood duck nest boxes according to the Southeast Regional nest box guidelines.	Same as Alternative A	Within 5 years of CCP approval, add 50 for a total of 100 well-maintained wood duck nest boxes placed in or adjacent to good brood habitat providing adequate cover and an abundance of aquatic insects. Cooperate and partner with Louisiana Department of Wildlife and Fisheries to meet preseason wood duck banding efforts.

Objectives	Alternative A Current Management (No Action Alternative)	Alternative B Minimize Management and Public Use	Alternative C Optimized Biological Program and Visitor Services
Objective A-4. American Woodcock:	No active monitoring other than keeping incidental records.	Refuge personnel will work with area biologist and foresters to develop forest management plans that provide moist midstory and ground-story vegetation.	The refuge will develop and implement forest management plans that provide midstory and ground vegetation (thickets) in the forested lands for daytime cover and foraging habitat in grassland habitats for nighttime foraging by American woodcock to significantly contribute to the American Woodcock Management Plan.
Objective A-5. Scrub Shrub Birds:	No active monitoring other than keeping incidental records.	Maintain existing early successional habitats along buffer strips.	Maintain existing early successional habitats along buffer strips and create early successional habitats suitable for priority breeding shrub-scrub species.
Objective A-6. Shorebirds, Marsh birds, and Wading Birds:	No active monitoring other than keeping incidental records.	Same as Alternative C.	Implement standardized surveys within the managed wetlands and agricultural fields for shorebirds, wading birds and secretive marsh birds according to approved protocol.

Objectives	Alternative A Current Management (No Action Alternative)	Alternative B Minimize Management and Public Use	Alternative C Optimized Biological Program and Visitor Services
Objective A-7. Forest Breeding Birds:	No active monitoring other than keeping incidental records.	Same as Alternative C.	Within 5 year of CCP approval develop a bird list, implement point count surveys according the LMVJV protocol, and conduct research studies on bird community responses to habitat changes and nest productivity within existing forest stands.
Objective A-8. Wildlife Diversity/Resident Wildlife:	No active management of resident wildlife.	Same as Alternative C.	Create a species list of mammals, mussels, butterflies, moths, and insects utilizing the refuge; based on surveys, literature and collections.
Objective A-9. Wildlife Diversity/Resident Wildlife:	Continue to conduct browse surveys annually on the Headquarters Unit alone.	Same as Alternative A.	Monitor white-tailed deer herd health, age, and sex structure every 3 to 5 years for disease and conditions that relate to exceeding carrying capacity on existing refuge lands and as lands are acquired and the hunting program is expanded. Maintain healthy populations of all game mammals at or just below carrying capacity.
Objective A-10. Nuisance Wildlife Control:	No active control of nuisance wildlife on the Refuge such as feral hogs, nutria and beaver.	Same as Alternative A.	Within 7 years of CCP approval, control feral hogs, nutria and beaver by a variety of methods.

Objectives	Alternative A Current Management (No Action Alternative)	Alternative B Minimize Management and Public Use	Alternative C Optimized Biological Program and Visitor Services
Objective A-11. Herpetofauna:	No active monitoring other than keeping incidental records.	Same as Alternative C.	Determine the presence of all species of herpetofauna utilizing the refuge, including species of concern, and their habitat associations.
Objective A-12. Fisheries:	Fisheries and other aquatic resources historically associated with the Red River ecosystem will remain largely unknown.	Protect the fisheries and other aquatic resources historically associated with the Red River ecosystem, such as sunfish, bass and crappie.	Protect, restore and manage the fisheries and other aquatic resources historically associated with the Red River ecosystem, such as sunfish, bass and crappie.
Objective A-13. Species of Concern:	No active monitoring other than keeping incidental records.	Same as Alternative C.	Ensure refuge management actions coincide with the recovery plan guidelines for bald eagle, interior least tern, pallid sturgeon, wood stork, paddlefish, slimy salamander, or other species of concern on the refuge.
Objective A-14. Inventorying and Mapping:	No active monitoring.	Same as Alternative C.	Enhance refuge inventory and mapping capabilities through the use of Geographic Information Systems (GIS) as outlined in Fulfilling the Promise and recommendations from the WH-8-1 Promises Team.

Objectives	Alternative A Current Management (No Action Alternative)	Alternative B Minimize Management and Public Use	Alternative C Optimized Biological Program and Visitor Services
Objective A-15. Research:	No active monitoring.	Same as Alternative C.	Determine top two or three management questions needing to be addressed through sound research and partner with local universities to conduct studies on the refuge.
Objective A-16. Grassland Birds:	No active monitoring other than keeping incidental records.	Same as Alternative A.	Develop bird list and monitor newly reforested, prairie restoration, and new acquisition areas for grassland birds.
GOAL B. BOTTOMLAND HARDWOOD HABITAT: **Restore, enhance, and manage healthy bottomland hardwood forests and associated habitat in order to support a natural diversity of plant and animal species that will foster the ecological integrity of the Red River Valley ecosystem.**			
Objective B-1. Bottomland Hardwood Forest:	Continue to reforest land as it becomes available.	Use passive reforestation to allow bottomland hardwood forest to eventually dominate the landscape.	Restore bottomland hardwood forest cover on designated areas to reflect that of the historical Red River Valley.
Objective B-2. Bottomland Hardwood Forest Management:	No active forest management. Continue current level of forest monitoring such as reforestation survival checks	Use passive management to allow bottomland hardwood forest to eventually dominate the landscape.	Manage existing, reforested, and any future reforestation according to Bottomland Hardwood Guidelines (UFSFW 2005) to meet the various needs of many wildlife species including waterfowl, neotropical migrant songbirds and resident species while providing the public educational information on different habitat types.

Objectives	Alternative A Current Management (No Action Alternative)	Alternative B Minimize Management and Public Use	Alternative C Optimized Biological Program and Visitor Services
Objective B-3. Invasive Species:	Working with partners, employ efforts to opportunistically control Chinese tallow as resources allow.	Inventory and map presence of invasives on the refugeand work with partners to opportunistically control Chinese tallow and other invasive species.	Inventory and map presence of invasives on the refuge, implement a monitoring program for invasives on the refuge by 2008, and maintain biological integrity on the refuge by removing and controlling invasive plants.
GOAL C. MANAGED WETLANDS AND AGRICULTURE: **Promote efforts to combine farming and the management of closely associated moist-soil units in order to provide essential habitat for migratory birds and other wetland-dependent species.**			
Objective C-1. Managed Wetlands:	Utilize existing water management infrastructure to continue supporting LMVJV habitat objectives.	Allow managed wetlands to reforest through natural succession.	Develop water management infrastructure and intense monitoring to accompany water management plan.
Objective C-2. Moist-soil Management:	Work within capabilities of current staffing level to create early successional habitats utilizing discing, herbicides, rotational small grain farming, and water management.	Seek partnerships and volunteers to create early successional habitats.	Create and/or maintain at least 400 acres of early successional habitats utilizing discing, herbicides, small grain farming and water management.
Objective C-3. Agricultural Lands:	Continue current cooperative farming of rice with one farmer on approximately 500 acres of the refuge.	Allow managed wetlands to reforest through natural succession.	Maintain current level or expand grain crop production through cooperative farming agreements to annually produce a minimum of 100–125 acres of unharvested rice and milo that can be flooded for wintering waterfowl.

Objectives	Alternative A Current Management (No Action Alternative)	Alternative B Minimize Management and Public Use	Alternative C Optimized Biological Program and Visitor Services
GOAL D. RESOURCE PROTECTION: **Identify and protect natural and cultural resources and acquire lands within the congressionally approved acquisition boundary through programs such as carbon sequestration partnerships, migratory bird programs, and other funding sources.**			
Objective D-1. Land Protection:	Continue under legislative mandate to expand the refuge up to 50,000 acres within the approved acquisition boundary. Work with landowners, and NGOs where appropriate, to acquire the largest inholding properties within the current refuge acquisition boundaries at each unit.	Same as Alternative A.	Continue under legislative mandate to expand the refuge up to 50,000 acres within the approved acquisition boundary and expand the approved acquisition boundary to incorporate 1,413 acres in the Spanish Lake Lowlands Unit (Figure 8), 87 acres in the Headquarters Unit (Figure 9), and 1,938 acres in the Lower Cane Unit (Figure 10). Work with land owners, and NGOs where appropriate, to acquire the largest inholding properties within the current refuge acquisition boundaries at each unit.

Objectives	Alternative A Current Management (No Action Alternative)	Alternative B Minimize Management and Public Use	Alternative C Optimized Biological Program and Visitor Services
Objective D-2. Private Lands:	Continue to opportunistically identify new and monitor current private lands restoration projects.	Do not pursue active private lands habitat initiatives.	Annually provide technical assistance and target up to 3 private land conservation programs (where appropriate) to develop partnerships with other federal and state agencies, universities, nongovernmental wildlife organizations and landowners within the Red River Alluvial Valley and West Gulf Coastal Plain, acquisition boundary and prioritized areas, to help achieve wildlife and habitat objectives.
Objective D-3. Contaminants:	Continue to foster communication with LDEQ and DNR as issues arise and information is requested.	Seek partnerships and volunteers to determine what, if any, contaminants exist on the refuge.	Determine what, if any, contaminants may exist on the refuge, what their impacts to the refuge are and how to mitigate the impacts.
Objective D-4. Cultural Resources:	Continue to comply with Section 106 of the National Historic Preservation Act.	Same as Alternative A.	Within 10 years of CCP approval, identify, evaluate the importance of, and seek the appropriate protective designation of cultural resources on the Refuge in accordance with existing legal requirements, regulations and professional standards.

Objectives	Alternative A Current Management (No Action Alternative)	Alternative B Minimize Management and Public Use	Alternative C Optimized Biological Program and Visitor Services
GOAL E. VISITOR SERVICES: **Utilize the urban proximity of the refuge's headquarters location to promote environmental education and interpretation opportunities and enhance wildlife-dependent public uses, including hunting, fishing, wildlife observation, and wildlife photography on the refuge.**			
Objective E-1. Visitor Center:	Develop and construct a visitor center on the Headquarters Unit. Continue to provide limited visitor services without a visitor services plan.	Develop and construct a visitor center on the Headquarters Unit. Provide visitor services at a reduced level.	Develop and construct a visitor center on the Headquarters Unit and improve visitor access, facilities, and program support to promote priority wildlife-dependent recreational uses.
Objective E-2. Hunting:	Continue to provide opportunities for deer (archery), waterfowl, and small game in limited areas following refuge-specific regulations and within framework of LDWF.	Decreased hunting will be allowed on the refuge in response to management concerns.	Provide safe, quality hunting opportunities in appropriate areas consistent with the refuge's established purposes and wildlife and habitat objectives for 1,000 visitors.
Objective E-3. Fishing:	Continue to provide opportunities for fishing in limited areas following Refuge-specific regulations and within framework of LDWF.	Continue to provide current low level of fishing opportunities on the refuge.	Provide quality fishing opportunities in the Spanish Lake Lowlands Unit and Bayou Pierre Unit for 2,500 visitors.
Objective E-4. Wildlife Observation and Photography:	Continue to allow wildlife observation and photography in limited areas without providing accommodations such as trails, photo blinds, etc.	Same as Alternative A.	Develop and provide opportunities and facilities for wildlife observation and photography on all units of the refuge with emphasis on the Headquarters Unit.

Objectives	Alternative A Current Management (No Action Alternative)	Alternative B Minimize Management and Public Use	Alternative C Optimized Biological Program and Visitor Services
Objective E-5. Environmental Education:	Continue to conduct limited outreach off-site, assisted by partners such as the Red River Refuge Alliance.	Same as Alternative A.	Develop a community-based environmental education program in coordination with area schools and other area educational organizations.
Objective E-6. Environmental Interpretation:	Provide limited opportunities for environmental interpretation.	Same as Alternative A.	Develop an interpretive program that will increase awareness of the habitat features, wildlife values, and management programs on the refuge.
Objective E-7. Refuge Support:	Provide current level of opportunites for the public using the one permanent staff member and equipment.	Provide opportunities for public use at a reduced level.	Within the next 10 years, complete steps to develop the refuge's infrastructure and operations to provide for quality, wildlife-dependent public use.
GOAL F. REFUGE ADMINISTRATION: **Secure and enhance staffing, funding, and facilities to maintain the long-term integrity of habitats and wildlife resources of the refuge in support of the achievement of the National Wildlife Refuge System's mission.**			
Objective F-1. Staffing:	Refuge continues to be staffed by one Refuge Manager and no support staff.	Same as Alternative 3, minus Assistant Refuge Manager and Outdoor Recreation Specialist.	Provide the refuge with adequate staffing to fulfill its Vision by adding an additional 7 FTEs.
Objective F-2. Facilities:	Maintain and repair existing facilities on an as needed basis.	Same as Alternative A.	Provide the refuge with the facilities necessary to fulfill its Vision.

Objectives	Alternative A Current Management (No Action Alternative)	Alternative B Minimize Management and Public Use	Alternative C Optimized Biological Program and Visitor Services
Objective F-3. Partnerships:	Maintain existing partnerships with Red River Refuge Alliance, federal, state, and local government agencies, NGOs, universities and private industry.	Same as Alternative A.	Expand and create new partnerships for the refuge that will help support its mission.
Objective F-4. Equipment:	Maintain existing inventory of equipment and vehicles.	Same as Alternative A.	Provide the refuge staff with vehicles and equipment appropriate to the work intended.

ALTERNATIVES CONSIDERED BUT ELIMINATED FROM FURTHER ANALYSIS

The alternative development process under NEPA and the Refuge Improvement Act is designed to allow consideration of the widest possible range of issues and potential management approaches. During the alternative development process, many different solutions were considered. The following alternative was considered but not selected for detailed study in this Draft CCP/EA for the reasons described.

MAXIMIZE PUBLIC USE ALTERNATIVE

Maximizing public use over other mandates deviates from Service policy. The fundamental mission of the National Wildlife Refuge System is wildlife conservation: wildlife must come first in the management of refuges. The Service will allow and provide for public use of a refuge—to the extent possible—as long as these uses are compatible with the Service's mission and the purposes for which the refuge was established. In the development of public use opportunities, appropriate, compatible wildlife-dependent recreational uses will be emphasized. However, public use must be at a level where wildlife populations and habitat are unharmed.

IV. Environmental Consequences

OVERVIEW

This chapter 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 environmental assessment. For each alternative, the expected outcomes are portrayed through the 15-year life of the CCP.

EFFECTS COMMON TO ALL ALTERNATIVES

A few potential effects will be the same under each alternative and are summarized under seven categories: environmental justice, climate change, regulatory effects, land acquisition, cultural resources, refuge revenue-sharing, and other effects.

ENVIRONMENTAL JUSTICE

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

None of the management alternatives described in this environmental assessment will disproportionately place any adverse environmental, economic, social, or health impacts on minority and low-income populations. Implementation of any action alternative that includes public use and environmental education is anticipated to provide a benefit to the residents residing in the surrounding communities.

CLIMATE CHANGE

The U.S. Department of the Interior issued an order in January 2001 requiring federal agencies with land management responsibilities under its direction to consider the potential impacts of climate change as part of long-range planning endeavors.

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.

Preserving natural habitat for wildlife is the heart of any long-range plan for national wildlife refuges. The actions proposed in this comprehensive conservation plan would preserve 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.

REGULATORY EFFECTS

As indicated in Appendix C, Relevant Legal Mandates and Executive Orders, the Service must comply with a number of federal laws, administrative orders, and policies in the development and implementation of its management actions and programs. Among these mandates are the Endangered Species Act of 1973, the Migratory Bird Treaty Act of 1918, and compliance with Executive Orders 11990 (Protection of Wetlands) and 11988 (Floodplain Management). The implementation of any of the three alternatives described in this environmental assessment would not lead to a violation of these or other mandates. All management activities that could affect the refuge's natural resources, including subsurface mineral reservations; utility lines and easements; soils; water and air; and historical and archaeological resources would be managed to comply with all laws and regulations. In particular, any existing and future oil and gas exploration, extraction, and transport operations on the refuge would be managed identically under each of the alternatives. Thus, the impacts would be the same.

LAND ACQUISITION

Funding for land acquisition from willing sellers within the approved acquisition boundary of Red River National Wildlife Refuge would come from the Land and Water Conservation Fund; the Migratory Bird Conservation Fund; Corps of Engineers mitigation programs; the Carbon Sequestration/Electric Utility Partnership; or donations from conservation and private organizations. Conservation easements and leases can be used to obtain the minimum interests necessary to satisfy refuge objectives if the refuge staff can adequately manage uses of the areas for the benefit of wildlife. The Service can negotiate management agreements with local, state and federal agencies, and accept conservation easements. Some tracts within the refuge's approved acquisition boundary may be owned by other public or private conservation organizations. The Service would work with interested organizations to identify additional areas needing protection and provide technical assistance if needed. The acquisition of private lands is entirely contingent on the landowners and their willingness to participate.

CULTURAL RESOURCES

All three 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 logging, 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 Louisiana 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 ongoing 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, historic, and archaeological resources in the public trust, and avoid any adverse effects wherever possible.

Land acquisition, within the current approved acquisition boundary, by the Service would provide some degree of protection to significant cultural and historic resources. If acquisition of private lands does not occur and these lands remain under private ownership, the landowner would be responsible for protecting and preserving cultural resources. Development of off-refuge lands has the potential to destroy archaeological artifacts and other historical resources, thereby decreasing opportunities for cultural resource interpretation and research.

REFUGE REVENUE-SHARING

Annual refuge revenue-sharing payments to Bossier, Caddo, DeSoto, Natchitoches, and Red River parishes would continue at similar rates under each alternative. If lands are acquired and added to the refuge, the payments would increase accordingly.

OTHER EFFECTS

Each of the alternatives would have similar effects or minimal to negligible effects on soils, water quality and quantity, noise, transportation, human health and safety, children, hazardous materials, waste management, aesthetics and visual resources, and utilities and public services.

SUMMARY OF EFFECTS BY ALTERNATIVE

This section describes the environmental consequences of adopting each refuge management alternative. The three alternatives share some similarities, with differences resulting from various types and levels of impacts. None of the proposed management alternatives would lead to a violation of federal, state, or local laws imposed for the protection of the environment.

SOILS

Silviculture is the main management technique that could influence the soils of the refuge. Accelerated erosion, soil compaction, and displacement are the primary concerns with the maintenance of long-term soil productivity. Activities that contribute to erosion, soil compaction, and displacement include construction, maintenance and use of temporary and permanent roads; forest management; recreation; and minerals management. Alternative B will have the least effect on soils from less use of roads, cooperative farming and forest management. However, Alternatives A and C will have some ground-disturbing activities associated with cooperative farming and forest management. Vegetative ground cover gets removed by farming and forest machinery, allowing soils to be removed from runoff. The extent of erosion depends on the soil type. The kinds and intensity of erosion control work on farm land and in timber sales will be adjusted to ground conditions and the need for controlling sediment. Refuge management will conduct erosion control measures in both alternatives to reduce the potential effects from proposed cooperative farming and forest management work.

Forest management and timber harvest will have a significant positive long-term effect on soil formation processes. In Alternative C, the increased retention of snags and woody debris will enhance soil organic material. Alternative B will also probably have an increase in snags and woody debris with natural succession.

Construction of the visitor center on the Headquarters Unit may impact soils by compaction and erosion. These effects will be minimal and short-term. Appropriate measures will be taken to decrease any loss or compaction of soils under all three alternatives. Maintenance or improvement of existing facilities (i.e., parking areas, roads, trails, and boat ramps) will cause minimal short-term impacts to localized soils and waters and may cause some minimal wildlife disturbances and damage to vegetation.

All three alternatives will have some effects to the soil resulting from use of roads by mineral producers travelling to gas wells and potential site effects from brine runoff from the wells. Oversight and monitoring will mitigate these effects with quick alerts to problems and coordination with the producer to resolve any problems.

Herbicides are used in all three alternatives. In each case, herbicides will be applied correctly and pose as minimal a risk as possible to soils. Herbicides, carefully applied according to the recommended application rate, should result in no detrimental effects to long-term soil productivity.

Recreational activities, in general, are less disruptive to soils than typical forest management activities; however, motorized vehicles in the forest have the potential to rut and compact soils. Alternative C proposes an increase in compatible wildlife-dependent uses and will have greater effects than the other two alternatives; however, it is anticipated to be minimal. All-terrain vehicles (ATVs) are limited to trails and access roads in all three alternatives. Permitted motor vehicles are allowed only on improved roads in all three alternatives.

HYDROLOGY

Impacts to the natural hydrology would have negligible effects. Fluctuating water levels is a priority factor in defining and constraining refuge resources and management. The Red River levels are out of refuge control and respond to the manipulation from the Red River Lock and Dams and to rainfall within the watershed. Water can be captured and released with water control structures for wintering waterfowl foraging and resting habitat in all three alternatives; however Alternative B encourages natural passive management of these resouces. In Alternative C only, water level fluctuations would be monitored to help define water availability for waterfowl foraging habitat.

WATER QUALITY

The refuge expects impacts to water quality to be minimal and only due to runoff. The effect of these refuge-related activities on overall water quality in the region is anticipated to be relatively negligible. Proposed refuge activities would likely only affect water quality by increasing the sediment load to the watershed to a slight degree. “Sediment increases can adversely affect fish productivity and diversity (Alexander and Hansen 1986), degrade drinking water, and affect recreational values. Changes in water nutrients or nutrient fluxes within streams as a result of management activities [silviculture practices] are minor…” (U.S. Forest Service 2005). Changes in water quality could occur as a result of road type, location, surface type, maintenance, and use. Existing state water quality criteria and use classifications are adequate to achieve desired on-refuge conditions; thus, implementation of any of the alternatives would not impact adjacent landowners or users beyond the constraints already implemented under existing state standards and laws.

Indirect effects of sedimentation degrading water quality could occur from vegetation manipulation from harvest or stand improvement with buffers in Alternatives A and C, but most likely these effects would not be significant.

All three alternatives have a degree of invasive plant control. Herbicides, however, are not applied directly to the water, so there would be an insignificant indirect effect.

AIR QUALITY

The refuge expects impacts to air quality to be minimal and only due to refuge visitors' automobile and off-road vehicle emissions. The effects of refuge-related management activities on overall air quality in the region are anticipated to be relatively negligible, especially compared to the contributions of industrial centers, power plants, and non-refuge vehicle traffic.

MIGRATORY BIRDS

Habitat management in the bottomland hardwood forest, as proposed in Alternative C, will serve the most diverse group of wildlife by increasing vertical structure, understory diversity, cover, and hard and soft mast species by creating an uneven-aged forest. Alternative C will include a mosaic of early to mid or immature forest, to late or mature forest. Older trees will be favored to promote den and cavity trees. Alternative A would include some of the same habitat management but to a lesser degree, resulting in only a few patches of early and immature forest with the majority lending toward a closed-canopy, mid-successional forest. Alternative B will have more mid-successional to late seral stage forest characterized by a closed canopy, lower species diversity, and less understory, cover, and nesting substrate as the forest naturally succeeds without intervening management.

Patches of early successional forest intermixed with mid-successional to mature forest provides nesting substrate for priority neotropical migratory birds. In years when the forest floods during spring, this vertical structure will provide excellent cover for spawning fish and their fry.

The mid or immature forest is sometimes viewed as the least beneficial to wildlife species. Its closed canopy prevents sunlight from reaching the forest floor, limiting the development of herbaceous ground cover and shrubby understory. This condition does provide some forage and cover for some species. For the majority of wildlife, this vertical structure condition provides lower quality habitat than early or late seral stages, although a few species can utilize mid-stage conditions, such as red-eyed vireos, yellow-billed cuckoos, and blue-gray gnatcatchers.

Late or mature forest conditions provide important habitat for high canopy nesting and roosting, suitable structure for cavity development and excavation, and relatively large volumes of hard mast and other seeds. Components of this type include snags, large and small hollow trees for dens, downed woody debris, and large trees near water that provide important habitat for many wildlife species. The snags provide an important component to cavity-nesting wildlife and provide enhanced organic material that is habitat for a diverse group of invertebrates, reptiles, and amphibians.

Wintering and migratory waterfowl, other than wood ducks, may be less abundant with Alternative B since the locally important open wetland units in Alternatives A and C will be restored to bottomland hardwood forest. However, wood duck foraging habitat will be increased in Alternative B. The reforestation of bottomland hardwood forest will increase the core acreage in Alternative B that could result in higher quality habitat for several migratory songbirds, potentially leading to an increase in nest success and population trends for the refuge. Alternatives A and C may have more edge species which can create cumulative effects on other species. For example, in edge habitats,

cowbirds may be more numerous and they parasitize other migratory songbird nests, leading to decreased nesting success. However, as bottomland hardwood forest habitat is restored in the Red River Valley, these edge effects will decrease, resulting in increased benefits to migratory birds.

Under Alternatives A and C, populations of grassland-dependent birds would likely increase over time as this habitat management increases.

Under C, the refuge's waterfowl populations would probably increase the most in response to the increases in moist-soil and cropland management. This would constitute an incremental contribution to NAWMP habitat and population objectives. Shorebird populations are also expected to increase somewhat with the active manipulation of water levels in the moist-soil units under Alternative C. Efforts would be made to increase the numbers and diversity of waterbirds (including marsh and colonial nesting birds) under all alternatives.

RESIDENT WILDLIFE

Under Alternative C, the desire for greater diversity in habitats on the refuge is higher than in the No Action alternative. Under Alternatives A and C, huntable populations of locally favored resident game species (deer, squirrel, rabbit, quail) will be maintained and increased in relation to habitat capability, where possible and when desirable, and where increases will not be in conflict with other species management. Disturbance to nonhunted wildlife would increase slightly. However, significant disturbance would be unlikely for the following reasons. Small mammals, including bats, are usually less active during the winter when hunting season occurs. These species are also nocturnal. Both of these qualities make hunter interactions with small mammals very rare. Nongame wildlife species such as early-successional neotropical migratory birds, woodpeckers, and reptiles and amphibians will benefit the most under Alternative C. Populations of feral hogs, beaver, nutria, raccoon, coyotes, and opossum would be decreased through hunting under this alternative. Depredation rates of songbirds, turkeys, turtles and their nests would decrease. Decreased wildlife-dependent public uses under Alternative B will create a corresponding decrease in disturbance.

Critical components of nongame and game species habitats such as snags, den trees, dead and down woody materials, and a variety of forest types and age classes will be provided and coordinated with all other resource management activities under Alternative C. Deer and other early forest-stage species will be favored by the abundant grassy/forb understory in all three alternatives, but to a greater extent with the mosaic of habitat types in Alternative C. Woodpeckers and other species associated with mature forests would be supported by the older trees in Alternatives B and C.

SPECIES OF CONCERN

All three alternatives provide habitat for the threatened interior least tern, species of special concern in the Red River Valley, and the recently delisted bald eagle. Alternative C combines biological integrity of the habitat and species management to a greater degree than Alternatives A and B. Alternative C proposes to work with partners to establish quality interior least tern nesting habitat on lands adjacent to the refuge in the Red River. Alternatives B and C also provide increased staff in order to monitor these species.

HABITATS

The area and habitat quality of bottomland hardwood forests would increase under each of the alternatives, including Alternative A. The Red River Valley in Louisiana is a highly degraded ecosystem. Virtually all of its historic bottomland hardwood forest has been removed for agriculture. All three

alternatives have provisions for reforestation and restoration of bottomland hardwood forest. In all three alternatives the bottomland forest is managed to enhance the forest condition or integrity, with the least amount in Alternative B. Many variables influence the size of an acorn crop and its availability for wildlife. Hard mast production is very unpredictable from year to year. Causes of this variability include climate, soil fertility, and the inherent capability of each tree. These causes are out of management's control; however, the refuge can influence long-term effects of acorn production by managing stand density and diversity, and monitoring and controlling disease and insect infestation.

Alternative B will have the most intensive baseline inventory to define current conditions but will only monitor natural succession. In that alternative, active management is limited to allowing the forest to grow and succeed under only natural processes. A database will track changes in the forest composition in response to deep overflow, beaver damage, and other ecological processes such as storms. Given the early seral stage of most of the bottomland hardwood forest, this alternative will result a later seral stage forest sooner and less diverse for species and vertical structure without proper management. Most of refuge forest management resources will involve inventorying and monitoring.

Alternative C will have a moderate baseline inventory to define current conditions with active management using mechanical thinning to maintain a variety of early, mid and late seral stages. Late seral stage components will be maintained at less basal area and canopy cover than Alternative B to open more patches in the forest for more shrub and midstory species that will increase hard and soft mast for wildlife and nesting structure for migratory birds. An increase of woody debris and snags will be retained in Alternative C. Alternatives A and C may see an increase in this rare old-growth forest type if the experimental aforestation plots are successful.

Under Alternative C, a decrease in canopy cover and basal area would increase midstory and understory resulting in increased mast for game species, increased foraging habitat for wood ducks, and increased nesting habitat for Swainson's , Kentucky, and hooded warblers. When backwater flooding occurs, there would be an increase in cover for spawning fish and their fry. Greater densities of snags and woody debris would increase nesting and foraging habitat for woodpeckers and bats under Alternative C. Vegetation effects will include a large increase in bottomland hardwood forest acreage over time with natural succession in Alternative B.

A habitat historically linked to bottomland hardwood forests in the Red River Valley is moist prairie. Alternatives A and C will continue to maintain more diverse vegetation coverage with a moist-soil unit, grassy field and patches of bottomland hardwood forest succession. Better management of water levels in moist-soil units will occur in Alternative C with an increase in resources and funding. The refuge would continue its current cooperative farming agreements under Alternatives A and C. These agreements provide benefits to wildlife on the refuge.

RESOURCE PROTECTION

Alternative A would maintain the current level of management effort to address certain resource threats. Opportunistic control of invasive species, particularly Chinese tallow trees, feral hogs and beaver will result in a continued problem throughout all the refuge units. Feral hogs will impact resident white-tailed deer populations and other native species due to their feeding habits. Beaver will pose a problem to bottomland hardwood forest restoration efforts.

Under Alternative B, feral hogs and beaver will continue to be a problem throughout all of the refuge units. The feral hogs will impact resident white-tailed deer populations and other native species due to their feeding habits. Beaver will pose a problem to bottomland hardwood forest restoration efforts. With regard to invasive species, Chinese tallow tree would continue to infest

portions of the refuge and Alternative B would provide little in the way of ongoing control efforts to prevent its expansion. Water hyacinth will continue to be a problem throughout the refuge units where slow-moving waters are present.

While Alternative C would intensify management of biological resources, including stepping up efforts to address certain resource threats, several of these would continue to be important issues over the life of the plan. This alternative proposes to more effectively control invasive plant and animal species. Partnerships will be increased under Alternative C to work with neighbors on invasive contro, and the potential for Partners for Fish and Wildlife projects will expand.

VISITOR SERVICES

Management activities outlined under Alternative C are designed to improve and expand some wildlife-dependent public use opportunities, while Alternative B reduces opportunities, and Alternative A maintains the current visitor program. Alternative C provides more interpretation, enhanced visitor access, and potential youth hunts. These activities will provide an indirect positive effect to fish and wildlife resources. The presence of the public can be detrimental to wildlife from disturbance to activities that are important to survival. However, timing of disturbance, the species involved, and activity can all vary in what degree the wildlife is affected. As public use levels expand across time, unanticipated conflicts between user groups may occur. Experience has proven that time and space 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. The key is for refuge managers to monitor the public use program and the wildlife population trends to determine if there is a significant change. Alternative C has an increased monitoring program for several wildlife species and public use programs, whereas Alternative B has a monitoring program for the deer population prior to the hunting program being allowed to occur.

Several research projects have examined the effects of hunting on waterfowl. Wolder (1993) found that waterfowl mortality, wounding, and disturbance from hunting caused the birds to shift their use of habitat. Heitmeyer and Raveling (1988) found that hunting and hunting disturbance limits waterfowl access to food resources. Such effects can result in cumulative impacts of reduced survival. However, the U.S. Fish and Wildlife Service monitors and manages waterfowl abundance and harvest at the flyway population level to ensure waterfowl resources are maintained. In addition, hunting programs on national wildlife refuges are designed to reduce disturbance to waterfowl and other wildlife overall for it to be designated compatible with the refuge purpose before it is allowed to occur. All three alternatives provide an important no hunting zone for waterfowl to rest and feed without disturbance. Alternative C provides a larger no hunting zone that may or may not provide added benefits. On the visitor use side, these no hunting areas can enhance the use of adjacent areas by holding more birds closer to a hunting area to allow greater opportunities for hunting.

Under Alternative C, deer herd health surveys would provide scientific evidence of herd characteristics and habitat carrying capacity that would promote a healthy deer population. This will result in an opportunity for deer hunting on the refuge. The public would be allowed to harvest a renewable resource, and the refuge would be promoting a wildlife-oriented recreational opportunity that is compatible with the purpose for which the refuge was established. The public would have an increased awareness of Red River NWR and the National Wildlife Refuge System under both Alternatives A and C. Under Alternative B, intensive deer surveys would monitor the deer population until the population reached a threshold to implement deer management for lowering the population. This alternative would limit opportunities for deer hunting to those times when the deer herd surpasses the target for habitat carrying capacity.

Alternative B will limit hunting opportunities with a target threshold to instigate deer hunting and a larger waterfowl sanctuary. Alternative C will expand the existing program for deer and waterfowl hunting. Alternative A will continue the existing visitor program that is limited to available funds. Efforts would also be made to provide limited and closely controlled youth or disabled hunts, for example, for small game, waterfowl, or deer are possibilities under Alternative C. There would also be an effort to allow tightly controlled hunts at the refuge headquarters. Close control is necessary here due to the close proximity of residences. Benefits of Alternative C could include improved management of wildlife populations, allowing the public to harvest a renewable resource; promoting wildlife-oriented recreational opportunities that are compatible with the purpose for which the refuge was established; increasing awareness of Red River NWR and the National Wildlife Refuge System; and meeting public demand.

Many studies have recommended designating confined fishing areas to reduce disturbance or temporal restrictions of fishing during critical waterfowl wintering and breeding periods (Johnson 1964; Braun et al. 1978). Many southern refuges prohibit fishing during winter to provide sanctuary for wintering waterfowl (Braun et al. 1978). Fishing can also influence the distribution, abundance, and productivity of waterbirds. Under Alternative A, some fishing from small watercraft (e.g., boats and canoes) would continue to take place in bayous and creeks under state jurisdiction. The refuge would not encourage or actively manage this fishing. Alternative C will provide increased fishing opportunities. However, these increased fishing opportunities would not occur in areas being actively managed for migratory birds, such as waterfowl. The construction of canoe/boat trails and access points (put-in locations) would be considered in order to increase fishing opportunities. The resulting increase in the numbers of anglers on the refuge would be a benefit from the public's perspective. Fishing opportunities would also be planned into the design and construction of the visitor center at the Headquarters Unit.

Public use visits for nonconsumptive uses such as willdlife observation, wildlife photography, and environmental education and interpretation are currently very low on the refuge. These uses, when they are conducted in an ethical manner, can have minimal to no impacts on wildlife. However, these uses can produce negative effects if public visitation levels increase; if the public pursues rare species; or if the public approaches wildlife too closely (Pease et al. 2005), and all these effects can differ depending upon which species are involved. Impacts can be mitigated by properly placing viewing areas and the use of trails. Gabrielson and Smith (1995) suggested that some species are disturbed to a greater degree with unpredictable movement compared to humans following a particular trail.

Under Alternative A, wildlife observation and photography would be maintained at their current levels, which include support by some volunteers and interns. Environmental education and interpretation at the refuge would continue at current low levels, constrained by limited staffing, conferring some educational and experiential benefits to the visiting public. In the public scoping comments, several citizens expressed a concern about the general lack of awareness and interest in the refuge on the part of most neighboring residents and communities. This apathy in turn leads to less visitation and support than if the local citizenry were more engaged. Under Alternative A, the current modest level of awareness and local visitation to the refuge would be anticipated to increase with the construction of a budgeted visitor center at the Headquarters Unit. Overall, the No Action alternative, even with the construction of the planned visitor center, would not realize the full potential of the refuge for engaging the attention, use, and support of the local public.

Under Alternative B, the refuge would have limited wildlife-dependent public use. Environmental education and interpretation at the refuge will increase with the addition of the headquarters visitor center. This will increase educational and experiential benefits to the visiting public. Wildlife observation and wildlife photography would be maintained at their current levels, which would include

support by a future refuge wildlife biologist as a collateral duty and the support of some volunteers and interns. In the public scoping comments, as noted above in the discussion on Alternative A, several citizens expressed concern about the general lack of awareness and interest in the refuge from most neighboring residents and communities. This situation in turn leads to less visitation and support than if the local citizenry were more engaged. Under Alternative B, the level of awareness and local visitation to the refuge would increase for nonconsumptive users but decrease in consumptive uses.

Under Alternative C, efforts would be made to expand nonconsumptive wildlife-dependent opportunities on the refuge. Environmental education and interpretation at the Red River Refuge would both be expanded through increased onsite and off-site activities, programs, and facilities, which would increase public awareness of the refuge's wildlife and resource values. Overall, this alternative is expected to more fully realize the potential of the refuge to engage the attention, use, and support of the local public.

Under Alternatives A and C, the refuge would work closely with state, federal, and private partners to minimize impacts to adjacent lands. Any newly opened areas under Alternative C would result in a net gain of public use opportunities, positively impacting the general public, nearby residents, and refuge visitors. Under all alternatives, with the addition of the visitor center, the refuge expects increased visitation and tourism to bring additional revenues to local communities.

REFUGE ADMINISTRATION

All three alternatives include staff expansion and/or filling of vacancies to some degree. Staff expansion or funding increases are directly related to supporting wildlife management and visitor services. Alternative C will increase biological, forestry, refuge management, maintenance, outdoor education, and law enforcement staff. Alternative B does not have as much of a staff increase, but it does include biological, forestry, maintenance and law enforcement staff. Alternative A will maintain the current staff and continue to see a decrease in refuge operations and maintenance. A funding increase is also included for Alternatives B and C to support increased staff.

Under all alternatives, a new headquarters/visitor center would be constructed. All other current facilities would be maintained. Under Alternative A, the refuge's partners, volunteers, interns, and its Friends Group would continue to assist the refuge; any increase in the number of partners and level of effort would occur as prospective partners approach the refuge. By not actively working to increase the number of partners and their level of commitment, the refuge would probably forego the administrative benefits of having a larger, more committed cadre of volunteers.

Alternative B envisions greater cooperation with partners and more extensive use of volunteers related to environmental education and interpretation. Volunteers with a wide variety of backgrounds can serve effectively in these two areas. With the Public Use Specialist position, the refuge could work harder to attract and maintain a dedicate corps of volunteers. The new headquarters/visitor center proposed under all the alternatives would increase both the refuge's administrative capacities and its ability to provide the visiting pubic with a satisfying and educational experience.

Alternative C envisions greater cooperation with partners and more extensive use of volunteers to help with intensified habitat and wildlife management, environmental education and interpretation. Volunteers with a wide variety of backgrounds can serve effectively in these two areas. The new headquarters/visitor center proposed under all the alternatives would increase both the refuge's administrative capacities and its ability to provide the visiting pubic with a satisfying and educational experience.

OTHER HUMAN DIMENSIONS

Under all alternatives, Red River National Wildlife Refuge would continue to generate modest beneficial social and economic impacts on the surrounding communities from the spending of visitors, the refuge and its employees, and from employee incomes, taxes, Refuge Revenue Sharing Act payments, and visitation/tourism. The growing interest of local stakeholders in emphasizing the presence of the refuge as a draw for tourists is likely to gradually attract more visitors and travelers to the area, who would generate additional positive effects in the economy. In comparison with other much larger sectors and segments of the local economy, these benefits would be negligible to minor, but they should not be overlooked.

By emphasizing both its biological and public use programs, and cooperating closely with local stakeholders, under Alternative C the refuge could both contribute to community economic development aspirations at the same time as it pursues its own goal of providing the public with quality wildlife-dependent recreation, environmental education and interpretation that lead to a greater understanding, appreciation and enjoyment of wildlife and their habitats.

Table 6 summarizes and addresses the likely environmental effects of each alternative, and is organized by broad issue categories.

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 nonfederal) or person undertakes such other actions (40 Code of Federal Regulations, 1508.7). The proposed actions would have both direct and indirect effects; however, the cumulative effects of these actions are not expected to be substantial.

BIOLOGICAL RESOURCES

All of the alternatives are intended to maintain or improve the refuge's biological resources in northwestern Louisiana. The biological integrity of the refuge would be protected under the proposed alternative, and the refuge's purposes would be achieved. The combination of Service management actions with those of other organizations could result in significant, beneficial cumulative effects by (1) increasing protection and management for federal- and state-listed threatened or endangered species; (2) protecting habitats that are regionally declining; and (3) reducing invasive exotic plants and animals.

The Service used Regional Bird Conservation plans, Partners in Flight plans, shorebird, waterbird and waterfowl plans, The Nature Conservancy ecoregion plans, the Louisiana Department of Wildlife and Fisheries Comprehensive Wildlife Conservation Strategy, and the Louisiana State wildlife and natural heritage program plans in determining the highest resource priorities for the refuge to protect and manage. That process allows the refuge to focus its conservation and management actions on those resources of concern that are internationally, nationally, regionally and locally important. The Service expects positive cumulative impacts on neotropical migratory birds, waterfowl, waterbirds, species of special concern, fish, and other resident wildlife and their habitats from refuge actions.

Table 6. Summary of environmental effects by alternative, Red River National Wildlife Refuge.

Issues	Alternative A Current Management (No Action Alternative)	Alternative B Minimize Management and Public Use Management	Alternative C Optimize Biological Program and Visitor Services (Proposed Alternative)
Manage bottomland hardwood forest habitat on the refuge.	▪ Opportunistically manage bottomland hardwood forest habitat. ▪ Some fragmentation of forest habitat would remain on the refuge. ▪ A mosaic of habitat types may emerge, providing a diversity of soft and hard mast for migrating waterfowl and increase foraging habitat for grassland birds and shorebirds. ▪ Deer foraging and cover habitat would increase as the young bottomland hardwood forest matured. ▪ The more open moist-soil units provide excellent opportunities to observe and photograph waterfowl, shorebirds and other water birds.	▪ Allowing a natural succession to forest habitat would eliminate reforestation costs to the refuge. ▪ Natural reforestation throughout the refuge would provide for a small increase in core acreage of bottomland hardwood forest but decrease foraging and nesting habitat for songbirds and wood ducks.	▪ Actively managed forests will provide greater vertical and structural diversity to bottomland hardwood forests. ▪ Complete a forest inventory and GIS database of refuge forest to generate baseline data for development of a Habitat Management Plan that will include a 10-year entry cycle, annual inventories by compartment, step-down prescriptions for desired conditions and monitoring protocols such as reforestation survival surveys. ▪ A mosaic of habitat types may emerge, providing a diversity of soft and hard mast for migrating waterfowl and increase foraging habitat for grassland birds and shorebirds.

Issues	Alternative A Current Management (No Action Alternative)	Alternative B Minimize Management and Public Use Management	Alternative C Optimize Biological Program and Visitor Services (Proposed Alternative)
How to deal with the invasive woody plants encroaching upon the native biological diversity.	▪ Work with partners, employ efforts to opportunistically control Chinese tallow as resources allow. Limited opportunistic monitoring and control efforts will result in a high possibility of new invasive species going undetected and more encroachment of existing natives. ▪ Limited control of woody invasives would likely increase potential for these plants to flourish at the expense of native plant diversity. ▪ The increased presence on invasives would reduce the wildlife carrying capacity and diversity of the refuge.	▪ Conduct refuge inventory and map invasive species location and density for baseline information. ▪ Allowing only natural succession of native forest combined with little to no control of invasives would allow these species to florish. ▪ No significant reductions in invasive plant species	▪ Inventory and map distribution of invasives to develop a pest management plan. Treat 15% annually on the refuge by chemical and mechanical means. ▪ An increase in control efforts in areas of forest management would increase native flora response, leading to increased chance of restoring the biological integrity of the forest. ▪ Increased efforts at Chinese tallow tree control on the refuge and (through education and partnerships) on neighboring lands would significantly reduce encroachment on refuge lands.

Issues	Alternative A Current Management (No Action Alternative)	Alternative B Minimize Management and Public Use Management	Alternative C Optimize Biological Program and Visitor Services (Proposed Alternative)
How to deal with nuisance wildlife.	▪ Opportunistic control will lead to loss of forest habitat and lower number of native species that these nuisance species compete with for food.	Same as Alternative A	▪ Control of beaver would manage their populations and promote forest health by reducing loss of timber from flooding. ▪ Control of feral hogs would benefit deer and turkey and other species that compete with the hogs for habitat.
Increase deer hunting or stop deer hunting.	▪ Deer herd health surveys would provide scientific evidence of herd characteristics and habitat carrying capacity that would promote a healthy deer population with a sound buck: doe ratio. ▪ Opportunities for deer hunting on the refuge would be provided.	▪ Intensive deer surveys would monitor the deer population until the population reached a threshold to implement deer management for lowering the herd size. ▪ Opportunities for deer hunting would be limited to when deer herd size surpasses a target for the habitat carrying capacity.	▪ Same as Alternative A plus: ▪ Efforts would be made to provide access to disabled hunters. ▪ Efforts would be made to provide for youth hunts.

Issues	Alternative A Current Management (No Action Alternative)	Alternative B Minimize Management and Public Use Management	Alternative C Optimize Biological Program and Visitor Services (Proposed Alternative)
The refuge should or should not provide more waterfowl sanctuary.	▪ The current 6300+acre waterfowl sanctuary would be maintained as a no-hunt zone to provide a moderate-sized area for wintering waterfowl to rest and forage. ▪ No hunting zones provide areas of rest for birds, yet helps entice birds into the area that can increase hunting opportunities.	▪ The current waterfowl sanctuary would be increased in size to provide a larger area for wintering waterfowl to rest and forage. ▪ A larger no-hunt zone would decrease the number of huntable acres within the refuge.	▪ Initially the same as Alternative A but the size of the sanctuary area would increase as new and appropriate lands were acquired.
Could fishing be improved on the refuge?	▪ Continue to provide opportunities for fishing in limited areas following refuge-specific regulations and within framework of LDWF.	Same as Alternative A	▪ As lands are acquired and access improved, fishing opportunities will be expanded as appropriate by increasing fishing facilities such as ramps and piers.
Could wildlife photography and observation be improved on the refuge?	▪ Continue to allow wildlife observation and photography in limited areas without providing accommodations such as trails, photo blinds, etc.	Same as Alternative A	▪ Improve opportunities for wildlife observation and photography by providing trails, observation platforms, photo blinds, and other facilities.
Could opportunities for environmental education and interpretation be improved on the refuge?	▪ Increase environmental education and interpretation program through construction of visitor center, assisted by partners such as the Red River Refuge Alliance.	Same as Alternative A	▪ Increase environmental education and interpretation program through construction of visitor center, as well as expansion of other refuge facilities.

Issues	Alternative A Current Management (No Action Alternative)	Alternative B Minimize Management and Public Use Management	Alternative C Optimize Biological Program and Visitor Services (Proposed Alternative)
Improve resource protection	▪ Continue under legislative mandate to expand up to 50,000 acres within the approved acquisition boundary. ▪ Continue to participate in the utility-funded land acquisition and reforestation program. ▪ Continue to comply with Section 106 of the National Historic Preservation Act. ▪ Continue to rely on Complex law enforcement officer and partner with LDWF but no dedicated law enforcement staff on refuge.	▪ Continue under legislative mandate to expand up to 50,000 acres within the approved acquisition boundary. ▪ Continue to comply with Section 106 of the National Historic Preservation Act. ▪ Expand law enforcement capability by hiring one full-time law enforcement officer and continue cooperative law enforcement efforts with the LDWF.	▪ Continue under legislative mandate to expand up to 50,000 acres in expanded acquisition boundary. ▪ Continue to participate in the utility-funded land acquisition and reforestation program. ▪ Identify, evaluate the importance of, and seek the appropriate protective designation of cultural resources on the refuge in accordance with existing legal requirements, regulations and professional standards. ▪ Expand law enforcement capability by hiring one full-time law enforcement officer and continue cooperative law enforcement efforts with the LDWF.

CULTURAL RESOURCES

None of the alternatives are expected to have significant adverse cumulative impacts on the cultural resources in Louisiana. Beneficial impacts would accrue at various levels, depending on the alternative, because of the proposed environmental education and interpretation programs and increased field surveys to identify and protect any sites discovered.

Under all of the alternatives, management practices on the refuge would consider potential historical resources. Projects requiring excavation are sampled using test pits in the affected area before work begins. The Service's regional archaeologist reviews annual management plans before they are implemented, and even then, the Service selects methods to avoid impacts on any resources.

HUMAN RESOURCES

None of the alternatives are expected to have significant adverse cumulative impacts on the economy of northwestern Louisiana. Although federal land acquisition reduces property tax revenue, it compensates affected parishes and towns with refuge revenue sharing payments, and should also reduce the costs of community services. The Service expects increased refuge visitation and increased tourism to bring additional revenues to the local communities, but does not predict a significant increase in overall revenue in any area.

Alternative C will increase opportunities for priority wildlife-dependent public uses, especially wildlife observation and photography, environmental education and interpretation, and hunting.

The Service defines facilities as: "Real property that serves a particular function(s) such as buildings, roads, utilities, water control structures, raceways, etc." Under the proposed action, those facilities most utilized by the public are roads, parking lots, trails, and boat launching ramps. Maintenance or improvement of existing facilities (i.e., parking areas, roads, trails, and boat ramps) will cause minimal short-term impacts to localized soils and waters and may cause some wildlife disturbances and damage to vegetation. The facility maintenance and improvement activities described are periodically conducted to accommodate daily refuge management operations and general public uses such as wildlife observation and photography. These activities will be conducted at times (seasonal and/or daily) to cause the least amount of disturbance to wildlife. Siltation barriers will be used to minimize soil erosion, and all disturbed sites will be restored to as natural a condition as possible. During times when roads are impassible due to flood events or other natural causes, those roads, parking lots, trails and boat ramps impacted by the event will be closed to vehicular use.

RELATIONSHIP BETWEEN SHORT-TERM USES AND LONG-TERM PRODUCTIVITY

This section evaluates the relationship between local, short-term uses of the human environment and maintaining long-term productivity of the environment. "Long-term" means the impact would extend beyond the 15-year planning horizon of this Draft CCP/EA. "Short-term" means less than 15 years.

All of the alternatives strive to maintain or enhance the long-term productivity and sustainability of the natural resources on the refuge. To varying degrees, they propose actions that promote watershed-wide or ecosystem-wide partnerships aimed at identifying and protecting important forested and wetland habitats. The alternatives strive to protect federal trust species and the habitats they depend on, evidenced by the limits on public access during certain seasons and in some locations. Environmental education and interpretation are priorities in each alternative, to encourage refuge visitors and neighbors to support and participate in environmental stewardship.

All of the alternatives propose stepped-up outreach and enforcement to prevent inappropriate and incompatible uses. Their purpose is to reduce impacts on wildlife and habitats and enhance the long-term productivity of those sites. Although the intent is the same, Alternative B would not provide the staffing or funding levels to ensure that those uses can be eliminated.

The construction of new refuge facilities, such as a visitor contact area, trail, observation platform, and kiosks, will result in both short- and long-term impacts on soils and vegetation. Those would be localized and confined to the immediate location of the construction sites. The new refuge facilities will provide greater environmental education and interpretation, leading to a more positive land ethic among visitors and surrounding communities. In summary, all of the alternatives are expected to contribute positively to maintaining or enhancing the long-term productivity of the environment of northwestern Louisiana.

UNAVOIDABLE ADVERSE IMPACTS

Under Alternative A (No Action), there are numerous unavoidable impacts, including law enforcement that is not adequate for protecting any significant visitor use; continued degradation of the biological functions of native plant communities and wildlife habitat due to the invasion of exotic plants and nuisance animals; and a continued decrease in biodiversity. Over time, if these issues are not addressed, they will continue to impact refuge resources.

Under Alternative B, additional unavoidable impacts added to those noted under Alternative A is the probable loss of a major funding source for land acquisition: the carbon sequestration/electric utility partnership. Loss of this funding source will dramatically reduce the ability of the refuge to expand and fulfill its purposes and mandate for this region.

Alternative C, the proposed alternative, also has some unavoidable impacts. These impacts are expected to be minor and/or short-term in duration. However, the refuge will attempt to minimize these impacts whenever possible. The following sections describe the measures the refuge will employ to mitigate and minimize the potential impacts that would result from implementation of the proposed alternative.

WATER QUALITY FROM SOIL DISTURBANCE AND USE OF HERBICIDES

If Alternative C is implemented, soil disturbance and siltation due to water management and cooperative farming activities; road and levee maintenance; and the construction of observation towers, boat ramps, and a headquarters and visitor center are expected to be minor and of short duration. To further reduce potential impacts, the refuge will use best management practices to minimize the erosion of soils into water bodies.

Foot traffic on new and extended foot trails is expected to have a negligible impact on soil erosion. To minimize the impacts from public use, the refuge will include informational signs that request trail users to remain on the trails, in order to avoid causing potential erosion problems.

Construction of the new visitor center would result in temporary soil disturbance but cumulative impacts associated with this are minimal.

Long-term herbicide use for exotic plant control could result in a slight decrease in water quality in areas prone to exotic plant infestation. Through the proper application of herbicides, however, this is expected to have a minor impact on the environment, with the benefit of reducing or eliminating exotic plant infestations.

WILDLIFE DISTURBANCE

Disturbance to wildlife is an unavoidable consequence of any public use program, regardless of the activity involved. While some activities such as wildlife observation may be less disturbing than others, all of the public use activities proposed under the proposed alternative will be planned to avoid unacceptable levels of impact.

The known and anticipated levels of disturbance from the proposed alternative are not considered to be significant. Nevertheless, the refuge will 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 will also be managed with restrictions that ensure minimal impact on other resources. General wildlife observation may result in minimal disturbance to wildlife. If the refuge determines that impacts from the expected additional visitor uses are above the levels that are anticipated, those uses will be discontinued, restricted, or rerouted to other less sensitive areas.

VEGETATION DISTURBANCE

Negative impacts could result from the creation, extension, and maintenance of trails that require the clearing of nonsensitive vegetation along their length. This is expected to be a minor short-term impact.

The construction of the visitor center will result in moderate vegetation disturbance; however care will be taken to ensure most habitat is left intact. Increased visitor use may increase the potential for the introduction of new exotic species into areas when visitors do not comply with boating regulations at the boat ramps and other access points, or with requests to stay on trails. The refuge will 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.

USER GROUP CONFLICTS

As public use increases, unanticipated conflicts between different user groups could occur. If this should happen, the refuge will adjust its programs, as needed, to eliminate or minimize any public use issues. The refuge will use methods that have proven to be effective in reducing or eliminating public use conflicts. These methods include establishing separate use areas, different use periods, and limits on the numbers of users in order to provide safe, quality, appropriate, and compatible wildlife-dependent recreational opportunities.

EFFECTS ON ADJACENT LANDOWNERS

Implementation of the proposed alternative is not expected to negatively affect the owners of private lands adjacent to the refuge. Positive impacts that would be expected include higher property values, less intrusion of invasive exotic plants, and increased opportunities for viewing more diverse wildlife.

However, some negative impacts that may occur include a higher frequency of trespass onto adjacent private lands and some noise associated with increased traffic. To minimize these potential impacts, the refuge will 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 native wildlife populations, and opened to wildlife-compatible public uses, where feasible.

Potential development of the refuge's buildings, trails, and other improvements could lead to minor short-term negative impacts on plants, soils, and some wildlife species. When building the observation towers, efforts would be made to use recycled products and environmentally sensitive treated lumber. The visitor center will be constructed to be aesthetically pleasing to the community and to avoid any additional impacts to native plant communities. 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.

POTENTIAL IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

Except perhaps in the extreme long-term or under unpredictable circumstances, irreversible commitments of resources cannot be reversed. One example is an action that contributes to the extinction of a species. Once extinct, it can never be replaced.

By comparison, irretrievable commitments of resources can be reversed, given sufficient time and resources; but they represent a loss in production or use for a period of time. One example is the maintenance of forest and shrubland as open field and grasslands. If for some reason grasslands no longer were an objective, they would gradually revert to shrub land and forest, or plantings could expedite that process.

The alternatives propose only a few actions that would irreversibly commit resources. One is committing land to the construction of the proposed new refuge headquarters and visitor contact station. All of the alternatives propose that action. Once a construction site is selected, a separate environmental assessment will be prepared to evaluate its site-specific impacts.

Another example is Service land acquisition. Alternatives A, B, and C all propose protection of inholding properties within the refuge's current approved acquisition boundaries. Once those lands become part of the refuge, their reversion to private ownership is unlikely. However, once placed in public ownership in the Refuge System, they will provide a new set of benefits to a much broader group of people. Those benefits include watershed protection, wildlife conservation, the preservation of rural character, and the expansion of wildlife-dependent recreational uses. The proposed management of the refuge will result in irretrievable and irreversible commitments of staffing and funding for the acquisition and stewardship of refuge lands.

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 still reasonably foreseeable.

The actions proposed for implementation under Alternative C include facility development, wildlife 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, and vehicular traffic.

Other indirect effects that may result from implementing the proposed alternative include minor impacts from siltation due to the disturbance of soils and vegetation while expanding the water control structures, as well as expanding or creating new foot trails; construction of the observation tower and visitor center; and providing greater visitor access through improvements to the boat ramps. These indirect effects are temporary and combined with the direct effects, only negligible impacts will be realized.

SHORT-TERM USES VERSUS LONG-TERM PRODUCTIVITY

The habitat protection and management actions proposed under Alternative C 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 construction of observation towers and a visitor center, or the creation of new trails. While these activities would cause short-term negative impacts, the educational values and associated public support gained from the improved visitor experience would produce long-term benefits for the refuge's entire ecosystem.

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 Alternative C have been carefully conceived to achieve that threshold. Therefore, implementing the proposed alternative (Alternative C) would lead to long-term benefits for wildlife protection and land conservation that far outweigh any short-term impacts.

V. Consultation and Coordination

OVERVIEW

This chapter summarizes the consultation and coordination that has occurred to date in identifying the issues, alternatives, and proposed action that 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 of the Draft CCP.

The Draft CCP/EA for Red River National Wildlife Refuge was written with the participation and assistance of refuge and Service staff; the Mangi Environmental Group, a Service contractor; and the Louisiana Department of Wildlife and Fisheries. The planning process itself began in January 2006 with the formation of a refuge planning team; a Notice of Intent to develop the plan had earlier been published in the *Federal Register.*

In December 2005, in preparation for the comprehensive planning process, a team of biologists conducted a comprehensive biological review for the refuge. Participants in the biological review were drawn from the refuge and the Service, including specialists from the Ecological Services, Realty, and Planning divisions; the U.S. Department of Agriculture's Natural Resources Conservation Service; Northwestern Louisiana University; Louisiana State University; Louisiana Department of Wildlife and Fisheries; Red River Waterway Commission; and Mangi Environmental Group.

Also in 2005, refuge and Service personnel met to conduct a visitor services review. The information and recommendations in both the biological and visitor services reports proved a valuable "point of departure" for the authors of this plan. Subsequently, the refuge hosted public scoping meetings on May 15 and 17, 2005, and began an outreach campaign through various media to collect ideas and concerns from all stakeholders. Please refer to Chapter III of the Draft CCP (Section A) for more information on the public scoping process and the overall consultation and coordination that were achieved during the development of the plan.

CORE PLANNING TEAM MEMBERS

The following individuals comprised the core planning team:

Brett Hunter, Refuge Manager, Red River NWR, U.S. Fish and Wildlife Service
Lindy Garner, Planning Biologist (former), U.S. Fish and Wildlife Service
Tina Chouinard, Natural Resouces Planner, U.S. Fish and Wildlife Service
George Chandler, Project Leader, U.S. Fish and Wildlife Service
Gypsy Hanks, Wildlife Biologist, U.S. Fish and Wildlife Service
Michael Renfrow, Private Lands Biologist, U.S. Fish and Wildlife Service
Gay Brantley, Visitor Services, U.S. Fish and Wildlife Service
Randy Williams, Consultant, Mangi Environmental Group (contractor)

INTERDISCIPLINARY PLANNING TEAM MEMBERS

Many individuals supported the planning process with participation on the biological review team, visitor services review team, and additional special topic discussions. Their information provided additional biological support for developing the objectives found in this plan. Some members are

internal to the Service and provided additional policy guidance and support for the objective development phase as well.

Biological Review Team

Steve Gabrey, Associate Professor, Northwestern State University
Jim Ingold, Professor, Louisiana State University-Shreveport
Lawrence Hardy, Director Emeritus, Louisiana State University-Shreveport
Jerry Daigle, State Soil Scientist, Natural Resources Conservation Service
Tom Edwards, WHM Biologist, Division of Migratory Bird Management, FWS
Paul Bruckwicki, Contaminants Biologist, Caddo Lake NWR, FWS
Jack Culpepper, Fish & Wildlife Biologist, Lafayette Ecological Services, FWS
Steve Smith, District Biologist, Louisiana Dept. of Wildlife and Fisheries
Michael Renfrow, Private Lands Biologist, North Louisiana Refuges, FWS
Jim Mangi, Environmental Consultant, Mangi Environmental Group, Inc.
John Pitre, District Biologist, Natural Resources Conservation Service, FWS
Steve Hebert, District Supervisor, Louisiana Dept. of Wildlife & Fisheries
Karen Kilpatrick, Project Leader, Natchitoches National Fish Hatchery, FWS
James Seales, Fisheries Biologist, Louisiana Dept. of Wildlife & Fisheries
Ed Trahan, Forester, Louisiana Dept. of Wildlife and Fisheries, FWS
John Simpson, Administrative Forester, Bayou Cocodrie NWR, FWS
Ken Guidry, Executive Director, Red River Waterway Commission
Bob Strader, Biologist, Migratory Bird Office, FWS
Ken Clough, Realty Specialist, Migratory Bird Realty Office, FWS
Randy Wilson, Biologist, Migratory Bird Office, Lower Mississippi Joint Venture, FWS
Joe Conti, Biologist, Natural Resources Conservation Service
Jan Dean, Fisheries Biologist, Natchitoches National Fish Hatchery, FWS
Gypsy Hanks, Wildlife Biologist, North Louisiana Refuges, FWS
Brett Hunter, Refuge Manager, Red River NWR, FWS
Lindy Garner, Natural Resource Planner (former), North Louisiana Refuges, FWS
George Chandler, Project Leader, North Louisiana Refuges, FWS

Visitor Services Review Team

Garry Tucker, Visitor Services and Outreach, FWS, Southeast Regional Office
Gay Brantley, Black Bayou Lake National Wildlife Refuge
Byron Fortier, FWS, Southeast Louisiana Refuges Complex

Cultural Resources Expertise and Support

Richard Kanaski, FWS Southeast Regional Archeologist, Savannah Refuges Complex

Other Contributors

In addition to the above-listed core and extended planning team members, a number of other individuals and groups contributed to the plan. These included local citizens and representatives from agencies, as well as those from nongovernmental organizations such as the local chapter of The Nature Conservancy and the Red River Refuge Alliance. These contributors participated in the scoping meetings or provided input at various stages of the planning process.

SECTION C. APPENDICES

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 management plan. Analysis of results help 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.

Approved Acquisition Boundary: A project boundary that the Director of the United States Fish and Wildlife Service approves upon completion of the detailed planning and environmental compliance process for establishment of a refuge.

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 (USFWS Manual 052 FW 1. 12B). The System's focus is on indigenous species, biotic communities, and ecological processes. Also referred to as Biodiversity.

Biological Integrity: Composition, structure, and function at the genetic, organism, and community levels consistent with natural conditions, and the biological processes that shape genomes, organisms, and communities.

Canopy: A layer of foliage, generally the upper-most layer, in a forest stand. It can be used to refer to mid or understory vegetation in multi-layered stands. Canopy closure is an estimate of the amount of overhead tree cover.

Carrying Capacity: The maximum population of a species able to be supported by a habitat or area.

Categorical Exclusion (CE,CX, CATEX, CATX):	A category of actions that do not individually or cumulatively have a significant effect on the human environment and have been found to have no such effect in procedures adopted by a federal agency pursuant to the National Environmental Policy Act (40 CFR 1508.4).
Community:	A distinct assemblage of plants that develops on sites characterized by particular climates and soils, and the species and populations of wild animals that depend on the plants for food, cover and/or nesting.
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 (CCP):	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 offices 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 United States Congress to be managed as part of the National Wilderness Preservation System (Draft Service Manual 610 FW 1.5).
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.
Ecotone:	Edge or transition zone between two or more adjacent but different plant communities, ecosystems, or biomes.
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)I 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.
Exotic:	A species that does not normally live and thrive in a particular ecosystem.
Extirpation:	The localized extinction of a species that is no longer found in a locality or country, but still exists elsewhere in the world.
Fauna:	All the vertebrate and invertebrate animals of an area.
Flora:	All the plants of an area.
Fragmentation:	The process of reducing the size and connectivity of habitat patches. The disruption of extensive habitats into isolated and small patches.
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).
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.

Herbicide: A chemical agent used to kill plants or inhibit plant growth.

Historic Conditions: Composition, structure, and functioning of ecosystems resulting from natural processes that we believe, based on sound professional judgment, were present prior to substantial human-related changes to the landscape.

Hydrology: The properties, distribution, and effects of water in the atmosphere, on the earth's surface and in soil and rocks. The movement of water and how it changes in depth, timing, flow, or location of surface water.

Kiosk: A small structure with one or more open sides that is used to display or provide information.

Improvement Act: The National Wildlife Refuge System Improvement Act of 1997.

Indicator Species: A species of plant or animals that is assumed to be sensitive to habitat changes and represents the needs of a larger group of species.

Informed Consent: The grudging willingness of opponents to "to go along" with a course of action that they actually oppose (Bleiker).

Invasive Species: A species of plant or animal that is non-native and whose establishment does, or is likely to, cause economic or environmental harm.

Inventory: A point-in-time measurement of the resource to determine location or condition.

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).
Littoral Zone:	The area from high water mark to low water mark or the intertidal zone.
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.
Monoculture:	When the plant life in an area comprises of only one species.
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 U.S. 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 NWRS (i.e., hunting, fishing, wildlife observation, photography, 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; games 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 System.
Native Species:	Species that normally live and thrive in a particular ecosystem.
Neo-tropical Song Birds:	A bird species that breeds north of the United States/Mexico border and winters primarily south of that border, which includes Mexico, West Indies, Central America and part of South America.
Notice of Intent (NOI):	A notice that an environmental impact statement will be prepared and considered (40 CFR 1508.22). Published in the *Federal Register*.
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 nonnative, new, or not common to the United States, according to the Federal Noxious Weed Act (PL 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 Untied States and to the public health.
Nuisance Species:	A plant or animal for economic or environmental reason causes problems. A native species can be a nuisance species.
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).

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 be from natural ignition or intentional ignition.

Priority Species: Fish and wildlife species that the Washington Department of Fish and Wildlife believe 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 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 and Secretary, 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.
Riparian:	Relating to the banks of a water body.
Scoping:	A process for determining the scope of issues to be addressed by a Comprehensive Conservation Plan and for identifying the significant issues. Involved in the scoping process are federal, tribal, state and local agencies; private organizations (businesses and non-profit); and individuals.
Songbirds: (Also Passerines)	A category of birds that are medium to small, perching landbirds. Most are territorial singers and migratory.

Species:	A distinctive kind of plant or animal having distinguishable characteristics, and that can interbreed and produce young. In taxonomy, a category of biological classification that refers to one or more populations of similar organisms that can reproduce with each other but is reproductively isolated from – that is, incapable of interbreeding with – all other kinds of organisms.
Species of Management Concern:	This is a category assigned to species for which information in the of the Service indicated that proposing to list as threatened or endangered was possibly appropriate, but for which sufficient data were not available to support proposed rules.
Step-down Management Plan:	A plan that provides specific guidance on management subjects (e.g., habitat, public use, fire, 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/EIS 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).

Watershed: The entire land area that collects and drains water into a stream or stream system.

Wetland: Areas such as lakes, marshes, bogs, and streams that are inundated by surface or ground water for a long enough period of time each year to support, and that do support under natural conditions, plants and animals that require saturated or seasonally saturated soils.

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
- 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.

Wildlife Corridor: A landscape feature that facilitates the biologically effective transport of animals between larger patches of habitat dedicated to conservation functions. Such corridors may facilitate several kinds of traffic, including frequent foraging movement, seasonal migration, or the once in a lifetime dispersal of juvenile animals. These are transitional habitats and need not contain all habitat elements required by migrants for long-term survival or reproduction.

Wildlife Dependent Recreational Use: A use (activity) on a refuge that involves hunting, fishing, wildlife observation and photography, or environmental education and interpretation, as identified in the National Wildlife Refuge System Improvement Act of 1997.

Wildlife Diversity: A measure of the number of wildlife species in an area and their relative abundance.

ACRONYMS AND ABBREVIATIONS

U.S. Fish and Wildlife Service

ACRONYM	DESCRIPTION
Ac	acre
ATV	All-terrain vehicle
BCC	Birds of Conservation Concern
BRT	Biological Review Team
CATX	Categorical Exclusion
CCP	Comprehensive Conservation Plan
CFR	Code of Federal Regulations
CRP	Conservation Reserve Program
CWCS	Comprehensive Wildlife Conservation Strategy
DNR	Department of Natural Resources
DOI	Department of the Interior
DED	Duck-energy days
EA	Environmental Assessment
EE	Environmental Education
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
FONSI	Finding of No Significant Impact
FR	Federal Register
FTE	full-time equivalent
FWS	Fish & Wildlife Service
FY	Fiscal Year
GIS	Global Information System
HQ	Headquarters
Lb	pounds
LDEQ	Louisiana Department of Environmental Quality
LDWF	Louisiana Department of Wildlife & Fisheries
LMVJV	Lower Mississippi Valley Joint Venture
MMS	Maintenance Management System

NAAQS	National Ambient Air Quality Standars
NABCI	North American Bird Conservation Initiative
NAWMP	North American Waterfowl Management Plan
NEPA	National Environmental Policy Act
NGO	Non-government organizations
NHPA	National Historic Preservation Act
NRCS	National Resources Conservation Service
NRHP	National Register of Historic Places
NWR	National Wildlife Refuge
NWRS	National Wildlife Refuge System
NWRSI	National Wildlife Refuge System Improvement Act
PFT	Permanent Full Time
PIF	Partner's In Flight
RHPO	Regional Historic Preservation Officer
ROD	Record of Decision
RONS	Refuge Operating Needs System
RRP	Refuge Roads Program
Service	U.S. Fish and Wildlife Service (also, FWS or USFWS)
SHPO	State Historic Preservation Officer
T&E	Threatened and Endangered Species
TFT	Temporary Full Time
USC	United States Code
USFWS	U.S. Fish and Wildlife Service
VC	Visitor Center
WGCP	West Gulf Coastal Plain
WRP	Wetlands Reserve Program

Appendix B. References and Literature Citations

Alexander, G.R. and E.A. Hansen. 1986. Sand bed load in a brook trout stream. *North American Journal of Fisheries Management* 6:9-23.

Bias, M.A., M.A. Wolder and P.E. Schmidt. 1997. *Disturbance as a Component of Waterfowl Habitat Quality.* Ducks Unlimited, Inc., Valley Habitats: a technical guidance series for private land managers in California's Central Valley. Number 17. 12 pp.

Braun, C.E., K.W. Harmon, J.A. Jackson and C.D. Littlefield. 1978. Management of national wildlife refuges in the United States: its impacts on birds. *Wilson Bulletin* 90:309-321.

Brauning, D. W., ed. 1992. *Atlas of Breeding Birds in Pennsylvania.* University of Pittsburgh Press, Pittsburgh, Pennsylvania. 484 pp.

Brush, T. 1991. Nesting ecology of prothonotary warblers in eastern Iowa: 1988-1991. Report submitted to the Iowa Department of Natural Resources. Unpublished.

Bushman, E. S. and G.D. Therres. 1988. *Habitat Management Guidelines for Forest Interior Breeding Birds of Coastal Maryland.* Maryland Department of Natural Resources, Wildlife Technical Publication 88-1. 50 pp.

Chambers, A., D.M. Kline, L. Vimmerstedt, A. Diem, D. Dismukes and D. Mesyanzhinov. 2005. *Comparison of Methods for Estimating the Nitros Oxide Emission Impacts of Energy Efficiency and Renewable Energy Projects: Shreveport, Louisiana Case Study.* National Renewable Energy Laboratory, Technical Report NREL/TP-710-37721. Revised July 2005.

Charlebois, P. 2002. *Non-native Aquatic and Wetland Plants in the United States.* National Invasive Aquatic Plant Outreach and Research Initiative, Sea Grant Program.

Conservation Commission of Missouri. 2002. *Managing Wetlands: Moist-Soil Management (Seasonally Flooded Impoundments).* Missouri Department of Conservation, February 2002. 2 pp.

Davis, J.B. 2001. *Survival, Recruitment, and Management of Box-nesting Wood Ducks in Mississippi and Alabama.* PhD Dissertation, Mississippi State University. 185 pp.

Fredrickson, L.H. 1996. Moist-soil management, 30 years of field experimentation. *International Waterfowl Symposium* 7:168-177.

Fredrickson, L.H. and T.S. Taylor. 1982. *Management of Seasonally Flooded Impoundments for Wildlife.* U.S. Fish and Wildlife Service Resource Publication 148, Washington, D.C. USA.

Gabrielson, G.W. and E.N. Smith. 1995. Physiological responses of wildlife to disturbance. Pages 95-107 in R.L. Knight and K.J. Gutzwiller, eds., *Wildlife and Recreationists: Coexistence through Management and Research.* Island Press, Washington, D.C. 372 pp.

Guillory, H. D. 1987. Cavity competition and suspected predation on prothonotary warblers by *Peromyscus* spp. *Journal of Field Ornithology* 58:425-7.

Gooding, G. and R. Langford. 2004. Characteristics of tree roosts of Rafinesque's big-eared bat and southeastern bat in Northeastern Louisiana. *Southwestern Naturalist* 49(1):61-67

Harvey, M.J. 1992. *Bats of the Eastern United States.* Arkansas Game and Fish Commission, Little Rock, Arkansas.

Harvey, M.J., J.S. Altenbach and T.L. Best. 1999. *Bats of the United States.* Arkansas Game and Fish Commission and U.S. Fish and Wildlife Service. 64 pp.

Heitmeyer, M.E. and D.G. Raveling. 1988. *Winter Resource Use by Three Species of Dabbling Ducks in California.* Department of Wildlife and Fisheries Biology, University of California at Davis. Final Report to Delta Waterfowl and Wetlands Research Center, Portage La Prairie, Manitoba, Canada. 200 pp.

Hunter, B.E. 2000. *Wood Duck Use Rates of Small versus Large Nest Boxes.* M.S. Thesis, Louisiana State University.

Johnson, R.E. 1964. Fish and fowl. Pages 453-458 in J.P. Linduska, ed., *Waterfowl Tomorrow.* U.S. Department of the Interior, Fish and Wildlife Service. U.S. Government Printing Office, Washington, D.C.

Kaminski, R. and B. Davis. 2002. *Wood Duck Broods in Dixie: Striving to Survive Early Life.* Research Advances, Vol. 7, No. 2, Mississippi State University, Forest and Wildlife Research Center, Mississippi State, Mississippi. 4 pp.

Keppie, D.M. and R.M. Whiting, Jr. 1994. American woodcock. *The Birds of North America* vol. 3, no. 100. American Orinithologists' Union, The Academy of Natural Sciences of Philadelphia.

Kilgore, K.J., E.D. Dibble and J.J. Hoover. 1993. *Relationships between Fish and Aquatic Plants: A Plan of Study.* Miscellaneous Paper A 93-1, U.S. Army Corps of Engineers, Waterways Experimental Station, Vicksburg, Mississippi.

Kross, J. 2006. Conservation of waste rice and estimates of moist-soil seed abundance for wintering waterfowl in the Mississippi Alluvial Valley. Thesis, Mississippi State University, Mississippi State, Mississippi. 56 pp.

Leberman, R.C. 1992. Prothonotary warbler. Pages 334-335 in D.W. Brauning, ed., *Atlas of Breeding Birds in Pennsylvania.* University of Pittsburgh Press, Pittsburgh, Pennsylvania.

Lester, Gary D., Stephen G. Sorensen, Patricia L. Faulkner, Christopher S. Reid and Ines E. Maxit. 2005. *Louisiana Comprehensive Wildlife Conservation Strategy.* Louisiana Department of Wildlife and Fisheries, Baton Rouge, Louisiana.

Loesch, C.R., K.J. Reinecke and C.K. Baxter. 1944. *Lower Mississippi Valley Joint Venture Evaluation Plan.* U.S. Fish and Wildlife Service, Lower Mississippi Valley Joint Venture, Vicksburg, Mississippi, USA.

Louisiana Department of Environmental Quality. 1998. *Water Quality Inventory, Section 305b Report.* Water Quality Management Division, Non-point Source Unit. Baton Rouge, Louisiana.

Louisiana Geologic Survey. 1990. Generalized geology of Louisiana. Information obtained from the website http://www.lgs.lsu.edu/lgs/gengeo.html.

Low, J.B. and F.C. Bellrose, Jr. 1944. The seed and vegetable yield of waterfowl food plants in the Illinois River Valley. *Journal of Wildlife Management* 8:7-22.

Mayer, J. L. and L. Brisbin, Jr. 1991. *Wild Pigs in the United States: Their History, Comparative Morphology, and Current Status.* The University of Georgia Press, Athens, Georgia. 314 pp.

McGilvrey, F.B. 1968. *A Guide to Wood Duck Production Habitat Requirements.* U.S. Fish and Wildlife Service, Research Publication 60. 32 pp.

Meyer, Kenneth D. 1995. American swallow-tailed kite. *The Birds of North America* vol. 4, no. 138. American Orinithologists' Union, The Academy of Natural Sciences of Philadelphia.

Oliarnyk, C.J. and R.J. Robertson. 1996. Breeding behaviour and reproductive success of cerulean warblers in southeastern Ontario. *Wilson Bulletin* 108(4):673-684.

Paulus, S.L. 1984. Activity budgets of nonbreeding gadwalls in Louisiana. *Journal of Wildlife Management* 48:371-380

Pease, M.L., R.K. Rose and M.J. Butler. 2005. Effects of human disturbances on the behavior of wintering ducks. *Wildlife Society Bulletin* 33(1):103-112.

Petit, L.J. 1991. Adaptive tolerance of cowbird parasitism by prothonotary warblers: a consequence of nest-site limitation? *Animal Behavior* 41:425-32.

Prosser, D.J. and R.P. Brooks. 1998. A verified habitat suitability index for the Louisiana waterthrush. *Journal of Field Ornithology* 69(2):288-298.

Reinecke, K.J. and C.K. Baxter. 1996. Waterfowl habitat management in the Mississippi Alluvial Valley. Pages 159-167 in J.T. Ratti, ed., *7th International Waterfowl Symposium.*

Reinecke, K.J. and C.R. Loesch. 1996. Integrating research and management to conserve wildfowl (Anatidae) and wetlands in the Mississippi Alluvial Valley, USA. *Gibier Faune Sauvage Game and Wildlife* 13:927-940.

Reinecke, K.J., R.M. Kaminski, D.J. Moorehead, J.D. Hodges and J.R. Nassar. 1989. Mississippi Alluvial Valley. Pages 203-247 in L.M. Smith, R.L. Pederson and R.M. Kaminski, eds., *Habitat Management for Migrating and Wintering Waterfowl in North America.* Texas Tech University Press. 506 pp.

Robbins, C.S., J.W. Fitzpatrick and P.B. Hamel. 1992. A warbler in trouble: Dendroica cerulea. Pages 549-562 in J.M. Hagan III and D.W. Johnson, eds., *Ecology and Conservation of Neotropical Migrant Landbirds.* Smithsonian Institution Press, Washington, D.C. xiii + 609 pp.

Robinson, S.K. 1993. Conservation problems of neotropical migrant land birds. *Transactions of the North American Wildlife and Natural Resources Conference* 58:379-389.

Shea D., C.S. Hofeltet, D.R. Luellen, A.Huysman, P.R. Lazaro, R. Zarzecki and J.R. Kelly. 2001. *Chemical contamination at National Wildlife Refuges in the Lower Mississippi River Ecosystem.* Report by North Carolina State University to the U.S. Fish and Wildlife Service, Atlanta, Georgia. 40 pp.

Stephens, S.E., R.M. Kaminski, B.D. Leopold and P.D. Gerard. 1998. Reproduction of wood ducks in large and small nest boxes. *Wildlife Society Bulletin* 26(1):159-167.

Strader, R.W. and P.H. Stinson. 2005. *Moist-Soil Guidelines for the U.S. Fish and Wildlife Service, Southeast Region.* Division of Migratory Birds, U.S. Fish and Wildlife Service, Jackson, Mississippi.

Trousdale, A.W. and D.C. Beckett. 2005. Characteristics of tree roosts of Rafinesque's big-eared bat (*Corynorthinus rafinesquii*) in Southeastern Mississippi. *American Midland Naturalist* 154: 442-449.

U.S. Department of Energy. 1999. *Carbon Sequestration Research and Development.* Office of Science, Office of Fossil Energy. Accessed at http://fossil.energy.gov/sequestration/publications/1999_rdreport/front_feb.pdf

U.S. Department of Interior, U.S. Fish and Wildlife Service and U.S. Department of Commerce, U.S. Census Bureau. 2003. *2001 National Survey of Fishing, Hunting, and Wildlife-associated Recreation – Louisiana.* Washington, D.C.

U.S. Fish and Wildlife Service. n.d. New Employee Handbook.

U.S. Fish and Wildlife Service. 1990. *American Woodcock Management Plan.* U.S. Fish and Wildlife Service, Office of Migratory Bird Managemen, Washington, D.C. 11 pp.

U.S. Fish and Wildlife Service. 1999. Species of Special Management Concern List, December, 1999.

U.S. Fish and Wildlife Service. 2005. Guidelines for Managing Bottomland Hardwood Forests.

Wolder, M. 1993. *Disturbance of Wintering Northern Pintails at Sacramento National Wildlife Refuge, California.* M.S. Thesis, Humbolt State University, Arcata, California. 62 pp.

Wood, G. W. and D.N. Roark. 1980. Food habits of feral hogs in coastal South Carolina. *Journal of Wildlife Management* 44(2): 506-511.

Yarrow, G. K. 1988. The potential for interspecific resource competition between white-tailed deer and feral hogs in the post oak savannah region of Texas. *Dissertation Abstracts International B Sciences and Engineering* 48(10): 2837.

Appendix C. Relevant Legal Mandates and Executive Orders

STATUE	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.

STATUE	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.

STATUE	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.

STATUE	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.

STATUE	DESCRIPTION
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.
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.

STATUE	DESCRIPTION
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.
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.

STATUE	DESCRIPTION
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.
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.

STATUE	DESCRIPTION
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.
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.

STATUE	DESCRIPTION
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.
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.

STATUE	DESCRIPTION
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.

EXECUTIVE ORDERS	DESCRIPTIONS
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.
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.

EXECUTIVE ORDERS	DESCRIPTIONS
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).
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

The following pages of this appendix contain the following:

- A copy of the cover letter that invited the public to participate in the planning process;
- A copy of the Public Comment Form submitted with the above letter and used at the public scoping meetings to solicit comments;
- A copy of the news release that was sent to local television, radio, and newspaper media in order to promote attendance at the public meetings; and
- A summary of the public comments that were received.

COVER LETTER

United States Department of the Interior

FISH AND WILDLIFE SERVICE

North Louisiana Refuges
11372 Hwy 143
Farmerville, Louisiana 71241
Telephone: 318/726-4222 Fax: 318/726-4667

April 17, 2006

Dear Interested Party:

The U.S. Fish and Wildlife Service is developing a Comprehensive Conservation Plan (CCP) for the Red River National Wildlife Refuge. This CCP is required by the National Wildlife Refuge System Improvement Act of 1997. The plan outlines the management practices and public uses that will occur on the Refuge for the next 10-15 years.

An important part of the planning process is gathering input from the public who use or are affected by the Refuge. The Service wants to know what the public would like to see implemented on the refuge, ideas for management, or concerns for wildlife. The public input received will be used to develop alternatives to current land uses and management practices. These alternatives are then evaluated for their impacts to the habitat and wildlife. The Service makes a decision on which alternative is preferred and this decision is then referred back to the public for further review.

Comments regarding management and visitor services on the Refuges will be accepted by phone, in writing, through email, and at public open house meetings. The first round of public open houses is listed below:

> Monday, May 15, 2006; Broadmoor Public Library, 1212 Captain Shreve Drive Shreveport, LA Drop in anytime between 3:00-7:00pm.
>
> Wednesday, May 17, 2006; President's Room in the Student Union at Northwestern State University, Natchitoches, LA Drop in anytime between 3:30-7:30pm.

At these open houses there will be handouts and poster materials for the public to review. Staff will be available to provide information and answer questions.

Enclosed are two items: a public input comment sheet that is provided to gather your comments about the refuges and a draft vision statement along with draft goals and objectives for the refuge, please feel free to provide comment on both. You can mail your comments back to the address listed above, drop it off at the open house, or provide comments in letter form through the mail or email. The Planning Team Leader may be contacted at 318-726-4222 x5 (phone), 318-726-4667 (fax), and email Lindy_Garner@fws.gov.

We look forward to hearing from you!

PUBLIC COMMENT FORM

Red River National Wildlife Refuge
Comprehensive Conservation Planning (CCP) Process
Open House and Public Scoping Meeting
Shreveport, LA (May 15, 2006)
Natchitoches, LA (May 17, 2006)

REFUGE OBJECTIVES:

- Provide for restoration and conservation of native plants and animal communities on suitable sites in the Red River Valley, including restoration of extirpated species.
- Provide habitat for migratory birds.
- Provide technical assistance to private landowners in the restoration of their lands for the benefit of fish and wildlife.

We welcome your comments and suggestions for the CCP in writing. You can use this form to write your comments on issues that should be addressed in the CCP and environmental assessment. Drop it off with us as you leave, or mail it. To be most useful, written comments should be sent by **July 1, 2006.** You may take extras for your friends and neighbors.

Please mail, fax, or email your comments to:

If you have any questions or comments concerning this meeting or the issues involved, please call Lindy Garner at 318/726-4222 ext. 5

Lindy Garner – Planning Biologist
North Louisiana Refuges Complex
11372 Highway 143
Farmerville, LA 71241
Fax: 318/726-4667
Email: lindy_garner@fws.gov

Please provide your contact information below:

Name _____

Mailing Address _____

_____

City, State, Zip Code

Important: Because the Comprehensive Conservation Plan/Environmental Assessment will be a public document, all of its associated records, including mailing lists and comments submitted by the public, may be subject to public review. We will only release names and addresses from our mailing list when we are required to do so by law (e.g. under the Freedom of Information-Act). If you wish to have your home address withheld in such a case, please indicate so below. We will not sell or otherwise distribute mailing lists for commercial purposes. If we do not hear from you by **July 1, 2006**, we will remove your name from the mailing list.

- ❑ **Keep me on your mailing list**
- ❑ **Keep me on your mailing list, but do not release my home address**
- ❑ **Remove me from your mailing list**

Signature: _____

Date: _____

Please Provide Comments on Reverse Side

What do you think are the most important refuge management issues facing Red River National Wildlife Refuge?

How do you think the above issues should be addressed?

How would you like to see the refuge habitats and wildlife be managed on Red River NWR?

Are the types of public use and visitation that are permitted and encouraged on the Refuge appropriate?

Out of the six wildlife-dependent priority uses (wildlife observation, photography, hunting, fishing, environmental education, and interpretation), which ones are you most interested in seeing promoted on the Red River NWR?

Please provide any other comments or suggestions for how you would like to see the Red River NWR managed over the next 10-15 years.

NEWS RELEASE

FOR IMMEDIATE RELEASE FOR INFORMATION CONTACT: Lindy Garner 318/726-4222x5

Red River National Wildlife Refuge Seeks Public Input on Future Management at Open House

Monday, May 15, 2006; Broadmoor Public Library, 1212 Captain Shreve Drive
Shreveport, LA Anytime between 3:00-7:00pm.

Wednesday, May 17, 2006; President's Room in the Student Union on the NSU campus
Natchitoches, LA Anytime between 3:30-7:30pm.

The U.S. Fish and Wildlife Service (Service) will be hosting an open house to request input from the public in developing a Comprehensive Conservation Plan (CCP) for the Red River National Wildlife Refuge. The Refuge is comprised of five units spaced along a 120-mile stretch of the Red River from the Louisiana/Arkansas state line to just below Natchitoches, LA. The CCP will set wildlife, habitat, and public use priorities and guide management decisions on the Refuge for the next 15 years. The open house will provide an opportunity for interested members of the public, tribes, agencies, neighbors, public interest groups, and local governments to participate in the Refuge planning process from the very beginning. The purpose of these meetings is to find out what the public's ideas are on management of the Refuge so they can be addressed in the planning process. Refuge staff and maps and exhibits will be present as well as a representative of the Mangi Environmental Group, a consulting firm that is assisting the Service in preparing the CCP and its associated Environmental Assessment (EA).

The Service needs public input to questions like these:

1. How would you like to see the refuge habitats and wildlife managed on the Red River NWR?
2. Are the types of public use and visitation that are allowed and encouraged on the Refuge appropriate?
3. Out of the six wildlife-dependent priority uses (wildlife observation, photography, hunting, fishing, environmental education, and interpretation), which ones are you interested in seeing promoted on the Red River NWR?
4. What do you think are the most important refuge management issues facing the Red River NWR?

If anyone cannot attend the open house but would like to provide input, they can mail, fax, or email their comments to:

Lindy Garner, Planning Biologist
North Louisiana Refuges Complex
11372 Hwy 143
Farmerville, LA 71241
Fax: 318/726-4667
eMail: lindy_garner@fws.gov

SUMMARY OF PUBLIC SCOPING COMMENTS

In response to the question, "What issues and concerns do you think need to be addressed in the CCP and what suggestions and ideas do you have for refuge management over the coming 15 years?," the following comments were received:

- Public use is the most important issue at the refuge units.
- You should consider lottery hunts on the refuge.
- Field tours of the refuge should be offered.
- There needs to be more hunting, fishing, and environmental education.
- Waterfowl hunting on the refuge should end at 2:00pm.
- Refuge hunt areas should be rotated each season so ducks and geese don't develop the "Refuge Attitude".
- Allow for dove and teal hunting in September.
- Establish fields to enhance dove hunting and habitat.
- Disabled hunter areas should be offered at two prime locations (at a minimun) to hunt waterfowl, deer, and doves.
- Offer, by lottery, fixed blind locations which would only be hunted on Saturdays.
- Grow crops on the refuge which help to hold waterfowl and doves.
- Implement a resident Canade Goose program with needed nesting stuctures and predator deterrent devices.
- The refuge units should be managed the same as Louisiana Wildlife Management Areas
- Camping on the refuge should be allowed.
- One of the most important issues facing the refuge is political interference.
- Fishing should be allowed on all navigable waters of the Red River and its tributaries with the same rules and regulations as published by the LDWF.
- No fishing with nets should be allowed and no commercial fishing.
- Fishing from boats with trolling motors only should be allowed.
- Fishing piers should be constructed and be handicap accessible.
- Oxbows of the Red River should not be considered a part of the Refuge.

- Bird watching should be by permit only and the birder must have a migratory type Feferal stamp.

- Eagle nesting towers or tall cypress tree nesting platforms should be constructed and new eagles introduced to the area.

- Safety courses for youth should be provided at the headquarters/visitor center with a focus on hunting, boating, camping, bird watching, and hiking.

- Access to the into the proposed Education Center should not be through a neighborhood, it should be accessed through the extension of the Arthur Ray Teague Parkway.

- There should be no hunting at the refuge Headquarters Unit; it should be used primarily for environmental education and fishing

The following comments were received concerning what should be included in the CCP:

- A clear statement of the desired future conditions when the refuge purposes and goals are accomplished.

- Refuge neighbors and visitors should be provided with a clear understanding of the reasons for management actions on the refuge.

- Assurance that the management of the refuge reflects the policies and goals of the National Wildlife Refuge System.

- Assurance that refuge management is consistent with federal, state, and parish plans.

- Provision for long-term continuity in refuge management.

- A basis for operation, maintenance, and capital improvement budget requests.

The following comments were made on what specific management goals should be included in the CCP/EA:

- Expand scientifically based monitoring and research to support management decisions regarding wildlife habitat and populations.

- Restore, conserve, and enhance the natural diversity, abundance, and ecological function of refuge habitat, with an emphasis on managing habitat to benefit threatened and endangered species and species of concern in the State of Louisiana.

- Protect the natural and cultural resources of the refuge to ensure their integrity and to fulfill the mission of the National Wildlife Refuge System.

- Provide opportunities for environmental education and interpretation and wildlife dependent recreation in accordance with the National Wildlife Refuge System Improvement Act of 1997.

- Promote interagency and private landowner cooperation and partnerships for the management and protection of natural and cultural resources within Red River Valley of Louisiana to benefit wildlife, water quality and quantity, and the American people.

The following comments were made on what specific impacts and issues need to be addressed in the EA:

- Impacts to the refuge and its wildlife from water pollution and what is being done to eliminate, minimize, or mitigate these impacts.
- Impacts to the refuge and its wildlife from air pollution and what is being done to eliminate, minimize, or mitigate these impacts.
- Impacts to the refuge and its wildlife from habitat fragmentation and what is being done to eliminate, minimize, or mitigate these impacts.
- Impacts to the refuge's endangered and threatened species and what is being done to eliminate, minimize, or mitigate these impacts.
- Impacts to the refuge and its wildlife from past agricultural activities.
- Impacts to the refuge from the 1994 Red River Waterway Project.
- Impacts to the refuge from the USDA's Wetlands Reserve Program and Conservation Reserve Program.
- Impacts to the refuge and its native wildlife from invasive plant and animal species, including the black carp.
- Impacts to the refuge from Hurricanes Katrina and Rita and what is being done to mitigate these impacts.
- Population trends of the refuge's wildlife and how conservation efforts have worked of not worked in the past and what possible alternative changes or additions to conservation efforts need to be made.
- The present condition of the refuge's bottomland hardwoods and what can be done to enhance those resources, if anything.
- The present condition of the refuge's cypress sloughs and what can be done to enhance those resources, if anything.
- The present condition of the refuge's shrub swamps and what can be done to enhance those resources, if anything.
- What opportunities exist for bird watching and what can be done to enhance bird watching activities there?
- What opportunities exist for fishing and hunting and what can be done to enhance fishing and hunting activities there?
- What efforts are being made and are needed for the refuge to play an educational role in teaching the public about the values of refuge lands and the wildlife there?

- Provide for an effective, scientifically sound monitoring program to ensure that management adapts to changes in the needs of the refuge's ecosystems.

- A discussion of the Service's planned forest management practices and the impacts these practices may have on the refuge's wildlife and plant communities.

- A discussion of the Service's planned fire management practices and the impacts these practices may have on the refuge's resources.

- A detailed discussion of the Service's land acquisition strategy. This discussion should include a timeline as well as detailed maps depicting the five focus units and the specific areas that will be acquired by the Service.

- What potential for additional land acquisitions exists in order to enlarge the refuge (beyond the originally approved 50,000 acres)?

Appendix E. Appropriate Use Determinations

RED RIVER 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 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 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: _____Red River NWR_____

Use: _____Farming_____

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: _____Red River NWR_____

Use: _____All-terrain 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_____ **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: _____Red River NWR_____

Use: _____Hiking, Jogging, and Walking_____

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: _____Red River NWR_____

Use: _____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_____ **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: _____Red River NWR_____

Use: _____Berry/fruit picking_____

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: _____Red River NWR_____

Use: _____Boating_____

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.

Appendix F. Compatibility Determinations

RED RIVER NATIONAL WILDLIFE REFUGE COMPATIBILITY DETERMINATIONS

Introduction: The Fish and Wildlife Service reviewed several uses for compatibility during the comprehensive conservation planning process for Red River National Wildlife Refuge. The descriptions and anticipated impacts of each of these uses are addressed separately. However, the Uses through National Wildlife Refuge System Mission sections, and the Approval of Compatibility Determinations section, apply to each use. If one of these uses is considered outside of the Comprehensive Conservation Plan for Red River National Wildlife Refuge, then those sections become part of that compatibility determination.

Uses: Several uses were evaluated to determine their compatibility with the Refuge System and the mission and purposes of the refuge: (1) wildlife observation and photography; (2) environmental education and interpretation; (3) big game hunting; (4) small game hunting; (5) migratory bird hunting; (6) fishing; (7) hiking, jogging, and walking; (8) boating; (9) all-terrain vehicles; (10) berry/fruit picking; (11) bicycling; and (12) cooperative farming.

Refuge Name: Red River National Wildlife Refuge

Parishes: Bossier, Caddo, DeSoto, Natchitoches, and Red River Parishes, Louisiana

Establishing and Acquisition Authority: Fish and Wildlife Coordination Act

Refuge Purpose(s): "The purposes of the refuge are the following: (1) To provide for the restoration and conservation of native plants and animal communities on suitable sites in the Red River basin, including restoration of extirpated species. (2) To provide habitat for migratory birds. (3) To provide technical assistance to private landowners in the restoration of their lands for the benefit of fish and wildlife." (114 Stat. 1056, dated Oct. 13, 2000)

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

Description of Use: *Wildlife Observation and Photography*

Wildlife observation and photography have been identified in the National Wildlife Refuge System Improvement Act of 1997 as priority wildlife-dependent recreational uses provided they are compatible with the purpose for which the refuge was established.

Wildlife photography, including other image-capturing activities such as videography, has occurred on the refuge since its inception. Wildlife observation and photography could occur anywhere on the refuge throughout the year. These activities can be accomplished while driving, boating, or walking on the refuge according to refuge regulations.

Availability of Resources:

Resources involved in the administration and management of the use: Minor amounts of personnel time associated with administration, management, and law enforcement

Special equipment, facilities, or improvements necessary to support the use: Observation tower, observation deck, access roads, kiosks, and brochures

Maintenance costs: $15,000/year

Monitoring costs: $3,000/year

Offsetting revenues: None

Anticipated Impacts of the Use:

Short-term impacts:

Impacts from the construction of a photo blind, observation deck and tower will include permanent removal of vegetation and disturbance to wildlife during actual construction. These impacts should be short lived and minimal. The footprints of the tower, deck and blind will be small. Most of the deck will be built over water necessitating few trees or bushes having to be removed. Construction will be a one-time event that should be short in duration.

The refuge provides habitat for resident and migratory wildlife. Visitors participating in observation or photography may disturb individual animals by varying degrees. Examples of potential disturbance include flushing of birds from feeding, resting, or nesting areas and trampling of plants from observers and photographers. Disturbance to trust species are expected to be minimal. Short-term impacts to facilities, such as roads and trails, can be avoided by special closures due to unsafe conditions.

Long-term impacts:

Other refuges within the complex that Red River NWR is administered under have offered wildlife observation and photography for over 20 years without long-term impacts. Thus, long-term impacts at Red River NWR are not expected.

Cumulative impacts:

No cumulative impacts are anticipated.

Public Review and Comment:

This compatibility determination was part of the Draft Red River National Wildlife Refuge Comprehensive Conservation Plan and Environmental Assessment, which was announced in the *Federal Register* and made available for public comment for 30 days. Specific dates will be listed here after they occur and this document is submitted for Fish and Wildlife Service approval.

Determination (check one below):

_____ Use is Not Compatible

__X__ Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility:

Visitors are required to abide by all refuge regulations that limit impacts on plant and wildlife populations.

Justification:

Visitors have the opportunity to view and photograph many species of wildlife with relative ease at many places on the refuge. Opportunities exist for these activities by boat, by walking, or by driving the public roads. Wildlife observation and photography are a wildlife-dependent recreation that is a priority public use.

Mandatory 15-Year Re-evaluation Date:

Description of Use: *Environmental Education and Interpretation*

Environmental education and interpretation activities include traditional environmental education, such as teacher or staff-led on-site field trips, off-site programs in classrooms, and interpretation of wildlife resources on the refuge. Interpretative panels are usually placed along trails or on observation decks to help the public interpret the environment they are viewing.

Environmental education and interpretation have been identified in the National Wildlife Refuge System Improvement Act of 1997 as priority public uses provided they are compatible with the purpose for which the refuge was established.

Environmental education and interpretation could occur throughout the refuge year-round as requested by the public. Although the activities do not require special use permits, they are most often closely coordinated with and led by the refuge manager.

Availability of Resources:

Resources involved in the administration and management of the use: Minor amounts of personnel time

Special equipment, facilities, or improvements necessary to support the use: Kiosks, observation tower, brochures, and environmental education materials

Maintenance costs: $2,000/year

Monitoring costs: None

Offsetting revenues: None

Anticipated Impacts of the Use:

Short-term impacts:

The use of on-site, hands-on, action-oriented activities by groups of teachers/students to accomplish environmental education objectives may impose a low-level impact on the sites used for these activities. Impacts may include trampling of vegetation and temporary disturbance to wildlife species in the immediate vicinity during the activities. Since most activities would take place on existing roads, trails, and other facilities, impacts would be minimal.

Long-term impacts:

Current utilization of these uses is incidental to overall refuge programs and no long-term adverse impacts have been experienced on other refuges in the Complex. Long-term beneficial impacts include the furthering of the refuge mission through the education of the general public.

Cumulative impacts:

No cumulative impacts are anticipated.

Public Review and Comment:

This compatibility determination was part of the Draft Red River National Wildlife Refuge Comprehensive Conservation Plan and Environmental Assessment, which was announced in the Federal Register and made available for public comment for 30 days. Specific dates will be listed here after they occur and this document is submitted for Fish and Wildlife Service approval.

Determination (check one below):

_____ Use is Not Compatible

__X__ Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility:

On-site activities should be held where minimal impact would occur. Evaluations of sites and programs should be conducted periodically to assess if objectives are being met and to ensure that the natural resources are not being degraded. If evidence of unacceptable adverse impacts begins to appear, it may be necessary to change the location of the outdoor activities.

Justification:

Environmental education and interpretation are used to encourage understanding in citizens of all ages in order to act responsibly in protecting a healthy ecosystem. They are tools to use in building land ethic, developing public support, and decreasing wildlife violations. They constitute one method of increasing visibility in the community and improving the image of the Service.

Mandatory 15-Year Re-evaluation Date:

Description of Use: *Big Game Hunting*

Big game hunting on Red River Refuge consists of white-tailed deer and feral hogs. Hunting activities are permitted with a valid refuge hunt permit and appropriate state licenses. The refuge hunt program is an excellent wildlife management and public relations tool, which provides quality recreational opportunities for the public while regulating specific animal populations at desired levels. The refuge hunt plan was developed to ensure that associated public recreation and wildlife management objectives are met in a responsible and consistent manner.

Hunting, a wildlife-dependent recreation, has been identified in the National Wildlife Refuge System Improvement Act of 1997 as a priority public use provided it is compatible with the purpose for which the refuge was established.

Archery deer hunting and hog hunting occur on 2,545 acres split between the Bayou Pierre and Spanish Lake Lowlands Units. All hunting seasons are established annually through coordination with the Louisiana Department of Wildlife and Fisheries. One either-sex deer may be harvested each day of the season. All regulations and annual changes are published in the Code of Federal Regulations (50 CFR).

Hunters access the refuge on open roads, by boat, by foot, and all-terrain vehicles limited to designated trails.

Public hunting opportunities are limited in north Louisiana. Hunting opportunities on private land are virtually non-existent unless a person is willing and able to purchase hunting rights through hunting leases.

Availability of Resources:

Resources involved in the administration and management of the use: Personnel time associated with administration and law enforcement

Special equipment, facilities, or improvements necessary to support the use: Access roads, gates, boat ramps, brochures, kiosks, and law enforcement equipment

Maintenance costs: $15,000/year

Monitoring costs: $5,000/year

Offsetting revenues: None

Anticipated Impacts of the Use:

Short-term impacts:

National wildlife refuges administered by the North Louisiana Refuges Complex have been open to hunting since 1975, with no documented disturbance to refuge habitats. Deer populations have always remained healthier on refuges with a hunt program in place; likewise, the populations have never been jeopardized by hunting. Feral hogs are non-native, invasive and extremely detrimental to the biological integrity of a refuge. Therefore, any decrease in hog numbers is beneficial to the refuge.

Long-term impacts:

To date, there is no indication of adverse biological impacts associated with the Complex's deer hunting program. However, should it become necessary, the refuge has the latitude to adjust hunting seasons and bag limits annually, or to close the refuge entirely if there are safety issues or other concerns that merit closure. This latitude, coupled with monitoring of wildlife populations and habitat conditions by the Service and the Louisiana Department of Wildlife and Fisheries, will ensure that long-term negative impacts to either wildlife populations and/or habitats on the refuge are unlikely.

Should hunting pressure increase on the refuge, alternatives such as quota hunts, a reduction in the number of days of hunting, or restrictions on that part of the refuge open to hunting can be utilized to limit impacts.

Cumulative impacts:

The timing and duration of the refuge's hunting program does not coincide with most other uses of the refuge and would not result in cumulative impacts to refuge resources.

Public Review and Comment:

This compatibility determination was part of the Draft Red River National Wildlife Refuge Comprehensive Conservation Plan and Environmental Assessment, which was announced in the Federal Register and made available for public comment for 30 days. Specific dates will be listed here after they occur and this document is submitted for Fish and Wildlife Service approval.

Determination (check one below):

_____ Use is Not Compatible

__X__ Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility:

Hunting seasons and bag limits are established annually as agreed upon during the annual hunt coordination meeting with state personnel. These generally fall within the state framework. The refuge can, and has, established more restrictive seasons and bag limits to prevent over-harvest of individual species or disturbance to trust species. All hunters are required to possess a refuge hunting permit while participating in refuge hunts. This permit, which augments the state hunting regulations, explains both the general hunt regulations and the refuge-specific regulations. Law enforcement patrols are frequently conducted throughout the hunting season to ensure compliance with refuge laws and regulations. The refuge has included a Refuge Operating Needs System project for a full-time officer to ensure compatibility over the long term.

Justification:

White-tailed deer hunting is necessary to keep deer populations at or below the habitat's carrying capacity. Overpopulation of deer causes an increase in disease and starvation. Deer herds that are overpopulated will significantly alter habitats. Feral hogs are invasive exotics that destroy native plant habitats and compete for food with other native species such as deer, turkey, squirrel, and waterfowl. Reduction of the hog population by hunting is beneficial to the biological integrity of the Refuge.

Mandatory 15-Year Re-evaluation Date:

Description of Use: *Small Game Hunting*

Small game hunting consists of squirrels, rabbits, raccoons, opossum, coyotes, beaver, and quail. Hunting activities are permitted with a valid refuge hunt permit and appropriate state licenses. The refuge hunt program is an excellent public relations tool, which provides quality recreational opportunities for the public while promoting national wildlife refuges. The refuge hunt plan was developed to ensure that associated public recreation and wildlife management objectives are met in a responsible and consistent manner.

Hunting, a wildlife-dependent recreation, has been identified in the National Wildlife Refuge System Improvement Act of 1997 as a priority public use provided it is compatible with the purpose for which the refuge was established.

Hunting occurs on 2,545 acres split between the Bayou Pierre and Spanish Lake Lowlands Units. Small game hunting seasons on the refuge follow the state regulated seasons, which usually are from October through February. All hunting seasons are established annually through coordination with the Louisiana Department of Wildlife and Fisheries. All regulations and annual changes are published in the Code of Federal Regulations (50 CFR).

Hunters access the refuge on open roads, by boat, by foot, and by all-terrain vehicles limited to designated trails.

Public hunting opportunities are limited in north Louisiana. Hunting opportunities on private land are virtually non-existent unless a person is willing and able to purchase hunting rights through hunting leases.

Availability of Resources:

Resources involved in the administration and management of the use: Personnel time associated with administration and law enforcement

Special equipment, facilities, or improvements necessary to support the use: Access roads, gates, boat ramps, brochures, kiosks, and law enforcement equipment

Maintenance costs: $10,000/year

Monitoring costs: $5,000/year

Offsetting revenues: None

Anticipated Impacts of the Use:

Short-term impacts:

National wildlife refuges administered by the North Louisiana Refuges Complex have been open to hunting since 1975, with no documented disturbance to refuge habitats and no noticeable impact on the abundance of species hunted or other associated wildlife. While managed hunting opportunities may result in localized disruption of individual animals' daily routines, no noticeable adverse effect on populations has been documented.

Long-term impacts:

To date, there is no indication of adverse biological impacts associated with the Complex's hunting program. However, should it become necessary, the refuge has the latitude to adjust hunting seasons and bag limits annually, or to close the refuge entirely if there are safety issues or other concerns that merit closure. This latitude, coupled with monitoring of wildlife populations and habitat conditions by the Service and the Louisiana Department of Wildlife and Fisheries, will ensure that long-term negative impacts to either wildlife populations and/or habitats on the refuge are unlikely.

Should hunting pressure increase on the refuge, alternatives such as quota hunts, a reduction in the number of days of hunting, or restrictions on that part of the refuge open to hunting can be utilized to limit impacts.

Cumulative impacts:

The timing and duration of the refuge's hunting program does not coincide with most other uses of the refuge and would not result in cumulative impacts to refuge resources.

Public Review and Comment:

This compatibility determination was part of the Red River National Wildlife Refuge Comprehensive Conservation Plan and Environmental Assessment, which was announced in the Federal Register and made available for public comment for 30 days. Specific dates will be listed here after they occur and this document is submitted for Fish and Wildlife Service approval.

Determination (check one below):

_____ Use is Not Compatible

__X__ Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility:

Hunting seasons and bag limits are established annually as agreed upon during the annual hunt coordination meeting with state personnel. These generally fall within the state framework. The refuge can, and has, established more restrictive seasons and bag limits to prevent over-harvest of individual species or disturbance to trust species. All hunters are required to possess a refuge hunting permit while participating in refuge hunts. This permit, which augments the state hunting regulations, explains both the general hunt regulations and the refuge-specific regulations. Law enforcement patrols are frequently conducted throughout the hunting season to ensure compliance with refuge laws and regulations. The refuge has included a Refuge Operating Needs System project for a full-time officer to ensure compatibility over the long term.

Justification:

Regulated hunting does not have an adverse impact on populations of small game. Hunting is a priority public use and offers the public an inexpensive wildlife-dependent recreational opportunity.

Mandatory 15-Year Re-evaluation Date:

Description of Use: *Migratory Bird Hunting*

Migratory bird hunting on Red River Refuge consists of ducks, woodcock, coots, and geese. Hunting activities are permitted with a valid refuge hunt permit and appropriate state licenses. The refuge hunt program is an excellent public relations tool, which provides quality recreational opportunities for the public while promoting national wildlife refuges. The refuge hunt plan was developed to ensure that associated public recreation and wildlife management objectives were being met in a responsible and consistent manner.

Hunting, a wildlife-dependent recreation, has been identified in the National Wildlife Refuge System Improvement Act of 1997 as a priority public use provided it is compatible with the purpose for which the refuge was established.

Hunting occurs on 2,545 acres split between the Bayou Pierre and Spanish Lake Lowlands Units. Migratory bird hunting seasons on the refuge follow the state regulated seasons. All hunting seasons are established annually through coordination with the Louisiana Department of Wildlife and Fisheries. All regulations and annual changes are published in the Code of Federal Regulations (50 CFR). Waterfowl, though, can only be hunted until noon each day on the refuge.

Hunters access the refuge on open roads, by boat, by foot, and by all-terrain vehicles limited to designated trails.

Public hunting opportunities are limited in north Louisiana. Hunting opportunities on private land are virtually non-existent unless a person is willing and able to purchase hunting rights through hunting leases.

Availability of Resources:

Resources involved in the administration and management of the use: Personnel time associated with administration and law enforcement

Special equipment, facilities, or improvements necessary to support the use: Access roads, gates, boat ramps, brochures, kiosks, and law enforcement equipment

Maintenance costs: $15,000/year

Monitoring costs: $5,000/year

Offsetting revenues: None

Anticipated Impacts of the Use:

Short-term impacts:

National wildlife refuges administered by the North Louisiana Refuges Complex have been open to hunting since 1975, with no documented disturbance to refuge habitats and no noticeable impact on the abundance of species hunted or other associated wildlife. While managed hunting opportunities may result in localized disruption of individual animals' daily routines, no noticeable adverse effect on populations has been documented.

Long-term impacts:

To date, there is no indication of adverse biological impacts associated with the Complex's hunting program. However, should it become necessary, the refuge has the latitude to adjust hunting seasons and bag limits annually, or to close the refuge entirely if there are safety issues or other concerns that merit closure. This latitude, coupled with monitoring of wildlife populations and habitat conditions by the Service and the Louisiana Department of Wildlife and Fisheries, will ensure that long-term negative impacts to either wildlife populations and/or habitats on the refuge are unlikely.

Should hunting pressure increase on the refuge, alternatives such as quota hunts, a reduction in the number of days of hunting, or restrictions on that part of the refuge open to hunting can be utilized to limit impacts.

Cumulative impacts:

The timing and duration of the refuge's hunting program does not coincide with most other uses of the refuge and would not result in cumulative impacts to refuge resources.

Public Review and Comment:

This compatibility determination was part of the Draft Red River National Wildlife Refuge Comprehensive Conservation Plan and Environmental Assessment, which was announced in the Federal Register and made available for public comment for 30 days. Specific dates will be listed here after they occur and this document is submitted for Fish and Wildlife Service approval.

Determination (check one below):

_____ Use is Not Compatible

__X__ Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility:

Hunting seasons and bag limits are established annually as agreed upon during the annual hunt coordination meeting with state personnel. These generally fall within the state framework. The refuge can, and has, established more restrictive seasons and bag limits to prevent over-harvest of individual species or disturbance to trust species. All hunters are required to possess a refuge hunting permit while participating in refuge hunts. This permit, which augments the state hunting regulations, explains both the general hunt regulations and the refuge-specific regulations. Law enforcement patrols are frequently conducted throughout the hunting season to ensure compliance with refuge laws and regulations. The refuge has included a Refuge Operating Needs System project for a full-time officer to ensure compatibility over the long term.

Justification:

Regulated hunting does not have an adverse impact on populations of migratory birds. Hunting is a priority public use and offers the public an inexpensive wildlife-dependent recreational opportunity.

Mandatory 15-Year Re-evaluation Date:

Description of Use: *Fishing*

Fishing was a traditional recreational use of the area that is now Red River Refuge prior to its inclusion into the National Wildlife Refuge System and continues to be a recreational pursuit with the public. It is one of the more popular wildlife-dependent uses on the refuge. Fish populations currently support a sustainable harvest under a regulated fishing program.

Fishing, a wildlife-dependent recreation, has been identified in the National Wildlife Refuge System Improvement Act of 1997 as a priority public use, provided it is compatible with the purpose for which the refuge was established.

Fishing would be permitted on portions of the Bayou Pierre, Spanish Lake Lowlands, and Headquarters Units. The use is conducted year-round. Fishing is conducted subject to regulations established by the Louisiana Department of Wildlife and Fisheries. Fishing is further restricted on the refuge by regulations which prohibit commercial fishing on the refuge and prohibit the use of certain fishing methods.

Availability of Resources:

Resources involved in the administration and management of the use: Personnel time associated with administration and law enforcement

Special equipment, facilities, or improvements necessary to support the use: Boat ramps, kiosks, brochures, law enforcement equipment, and access roads

Maintenance costs: $10,000/year

Monitoring costs: $5,000/year

Offsetting revenues: None

Anticipated Impacts of the Use:

Short-term impacts:

Minor impacts, such as litter and gasoline contamination, could occur but not at a level that would cause serious concern. There is some erosion from outboard wakes.

Long-term impacts:

Fishing, as regulated, should not have any long-term negative impacts on the refuge.

Cumulative impacts:

No cumulative impacts are known to occur.

Public Review and Comment:

This compatibility determination was part of the Draft Red River National Wildlife Refuge Comprehensive Conservation Plan and Environmental Assessment, which was announced in the Federal Register and made available for public comment for 30 days. Specific dates will be listed here after they occur and this document is submitted for Fish and Wildlife Service approval.

Determination (check one below):

_____ Use is Not Compatible

__X__ Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility:

Commercial fishing is prohibited. No trotlines, yo-yos, stump lines or traps are permitted.

Justification:

Fishing is probably one of the most popular forms of outdoor recreation in the state, and the refuge has the opportunity to provide quality fishing to the public, which is a priority public use. Current state and refuge regulations limit impacts to fish and wildlife populations on the refuge, while providing a safe and rewarding experience for the refuge visitor.

Mandatory 15-Year Re-evaluation Date:

Description of Use: *Hiking, Jogging, and Walking*

Hiking, jogging and walking facilitates travel and access for the priority public uses. Priority public uses as defined in the National Wildlife Refuge Improvement Act of 1997 include hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation.

The primary areas of these uses occur along refuge roads and trails which are maintained for refuge administrative and other management activities. At times, individuals will walk along rights-of-way or across country throughout the refuge scouting for hunting areas. Access for walking, hiking, or jogging may not be allowed at times if deemed by the refuge manager that there are safety issues or wildlife disturbance issues.

Individuals assessing the refuge for hunting will need to possess a valid hunting permit and follow all refuge regulations. Access to the refuge is open every day during daylight hours, but only in areas specifically open to walking, hiking and jogging. Entry on all or portions of individual areas may be temporarily suspended by posting upon occasions of unusual or critical conditions affecting land, water, vegetation, wildlife populations, or public safety.

Walking or jogging can facilitate non-consumptive priority public uses by allowing observation of the natural landscape and for wildlife viewing. Individuals stop to observe associated animals and plant communities. The use mainly occurs in very small groups or by individuals. Regarding consumptive uses, anglers and hunters can access refuge lands by walking anywhere on the refuge.

Access to the refuge is necessary for desirable use and management of the refuge. Foot traffic on the refuge provides increased access and opportunities to participate in priority public uses as hunting, fishing, wildlife observation and photography. Hiking, jogging, and walking can also be a form of exercise while enjoying the outdoors that coincides with former Secretary Norton's 2004 America's Public Lands get Fit with US initiative; this initiative is part of a larger partnership initiated by President Bush to promote trails and refuges for health and recreation. The Get Fit with US initiative is a direct result of President George W. Bush's Executive Order, which was issued for the purpose of improving the health of all Americans. It is designed to promote a healthy lifestyle alliance between public health and recreation.

Availability of Resources:

Resources involved in the administration and management of the use: Personnel time associated with administration and law enforcement

Special equipment, facilities, or improvements necessary to support the use: None

Maintenance costs: Maintenance costs are not directly attributable to these incidental uses on the refuge.

Monitoring costs: Minimal costs are associated with these uses to monitor consequences of public having access to the refuge, such as degree of littering and vandalism. Plants and wildlife will be monitored to determine any impacts as a result of public use.

Offsetting revenues: None

Anticipated Impacts of the Use:

Hiking, jogging, and walking access is typically by single individuals or small groups on improved refuge roads or trails. Damage to habitat is negligible. Use is sporadic and dispersed for minimal disturbance.

There is some temporary disturbance to wildlife due to human activity on the land, as with any level of public use. Use is sporadic though and limited so not creating significant impacts. Winter disturbance to resident wildlife is temporary and minor but would be monitored at this important time during fat deposition and when energy conservation is important. Spatial and season closures will be used when needed to protect wintering waterfowl. Any unreasonable harassment would be grounds for the manager to close the area to these uses or restrict the uses to minimize harm.

Disturbance to trust species are minimal due to the locations of the designated gravel roads and unimproved roads. Short-term impacts to facilities, such as roads and trails, are not expected.

No long-term or cumulative impacts are anticipated; however, the program can be modified in the future to mitigate unforeseen impacts.

Public Review and Comment:

This compatibility determination was part of the Draft Red River National Wildlife Refuge Comprehensive Conservation Plan and Environmental Assessment, which was announced in the Federal Register and made available for public comment for 30 days. Specific dates will be listed here after they occur and this document is submitted for Fish and Wildlife Service approval.

Determination (check one below):

_____ Use is Not Compatible

__X__ Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility:

Camping and fires are prohibited, and personal belongings may not be left on the refuge overnight. Harassment of wildlife is prohibited as well as the taking of any plant, animal or artifact from the refuge.

If any adverse impacts occur from any aspect of the limited public access, then further restrictions may be imposed to protect the plant and animal resources of the refuge. Any group associated with a commercial operator (eg. Birding tour) will need to request permission from the refuge manager.

Individuals walking or hiking to support hunting opportunities will follow all refuge regulations and possess a valid hunting permit. Road races/fun runs are generally not allowed if off-refuge sites are available, but permission may be requested from the refuge manager through the Special Use Permit process.

Justification:

Hiking, walking and jogging, as identified in this determination, are not expected to materially interfere with or detract from the mission of the National Wildlife Refuge System or from the purposes for which the refuge was established. The associated disturbance to wildlife and habitat is temporary and minor. Monitoring would be conducted to ensure that these uses remain compatible. If uses increase and impacts are suspected, a re-evaluation will be conducted and corrective actions taken to protect refuge resources. These uses provide opportunities to participate in wildlife observation and photography. Outdoor recreational activities provide individuals with quality wildlife-oriented experiences, educational opportunities, and allow them to utilize a natural environment. This activity also supports the federal government's initiative to promote physical fitness opportunities on public lands.

Mandatory 10-Year Re-evaluation Date:

Description of Use: *Boating – Motorized and Human-powered*

There is a 75-acre lake on the Headquarters Unit of the refuge that would be open to boating. Boating would facilitate fishing and wildlife observation and photography. Access to the lake is from a boat ramp located on the refuge. The refuge is open during daylight hours from March 15 through September 30. Entry on all or portions of the lake may be temporarily suspended by posting upon occasions of unusual or critical conditions affecting land, water, vegetation, wildlife populations, or public safety.

Providing the public with wildlife-oriented recreation is a priority use of the refuge. Boating provides access to fishing, a priority public use. Since fish and wildlife observation is an integral part of the boating experience, it is considered a wildlife-oriented activity.

Availability of Resources:

Resources involved in the administration and management of the use: Personnel time associated with administration and law enforcement

Special equipment, facilities, or improvements necessary to support the use: None

Maintenance costs: Every 3-5 years the annual maintenance costs may increase in order to provide gravel for parking lots and roads and replace signs.

Monitoring costs: Minimal costs are associated with monitoring the consequences of the public having access to the refuge, such as degree of littering and vandalism. Plants and wildlife will be monitored to determine any impacts as a result of public use.

Offsetting revenues: None

Anticipated Impacts of the Use:

Boating is restricted to the lake. The lake is not connected to any other water body or tributary. Disturbance by boats may affect wildlife, but it is expected to be minimal, especially since boating will not be permitted during winter when waterfowl use is high. No rookeries exist on the lake; nor are there any eagle nests in the vicinity. Continued monitoring for significant disturbance to wildlife, in particular birds will allow the refuge to determine if additional regulations are needed if use increases. Any unreasonable harassment would be grounds for the manager to close the area to boating or restrict the use to minimize harm

Public Review and Comment:

This compatibility determination was part of the Draft Red River National Wildlife Refuge Comprehensive Conservation Plan and Environmental Assessment, which was announced in the Federal Register and made available for public comment for 30 days. Specific dates will be listed here after they occur and this document is submitted for Fish and Wildlife Service approval.

Determination (check one below):

_____ Use is Not Compatible

__X__ Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility:

Motorized land vehicles are required to remain on designated roads only. Boats and other personal belongings are not allowed to be left on the refuge overnight. Harassment of wildlife is prohibited. If any adverse impacts occur from any aspect of boating, then further restrictions may be imposed to protect the plant and animal resources of the refuge.

Justification:

Outdoor recreational activities provide individuals with quality wildlife-oriented experiences, educational opportunities, and allow them to utilize a natural environment. Motorized and human-powered boating for fishing and wildlife observation is a low impact and low cost activity on Red River NWR. Boating provides access to fishing, a priority pubic use. Since fish and wildlife observation is an integral part of the boating experience, it is considered a wildlife-oriented activity and therefore does not materially detract or interfere with the purposes of the refuge or mission of the National Wildlife Refuge System.

Mandatory 15-Year Re-evaluation Date:

Description of Use: *All-terrain Vehicles*

All-terrain vehicles are generally defined as three, four, or six-wheeled vehicles that are equipped with low pressure tires designed primarily for off-road use. The use of all-terrain vehicles (ATVs) is strictly in support of priority public uses; hunting and fishing. The refuge has a very limited system of roads and only one ATV trail on the Bayou Pierre Unit which runs along the levee of the Red River. All ATV use is restricted to a designated, marked trail. ATVs are prohibited from one hour after legal shooting hours end until 4:00 am. Trails are marked with signs and are closed from March 1 through August 31. ATV access is by the general public for access to hunting and fishing areas. ATV tires are restricted to those no larger than 25x12 with a maximum 1" lug height and a maximum allowable tire pressure of 7lbs. psi as indicated on the tire by the manufacturer. ATVs are usually trailored to a parking lot and ridden on the trail to access remote areas within the refuge prior to walking to hunting or fishing areas. ATVs are not permitted off the designated trails. ATV trails support priority public uses such as hunting and fishing. The existing designated trail system is close to optimum for the public use program. Minor additions/deletions, re-routing or seasonal opening date changes may be implemented from time to time to address needs as they occur. No major changes/modifications are foreseen.

Availability of Resources:

Based on a review of the refuge's budget allocated for this activity, there is adequate funding to ensure compatibility and to administer the use at its current level.

Anticipated Impacts of the Use:

Use of ATVs does result in some minor disturbance to wildlife as with any use. Restricting use to designated trails routed to avoid sensitive areas such as major stream crossings or archaeological areas and opening trails only to seasonal use minimizes overall potential impacts. The primary compatibility issues of concern are with disturbance to migratory waterfowl, endangered species, and habitat conservation.

Migratory waterfowl and endangered species are not significantly impacted by ATV use. The ATVs trails are limited to areas where migratory birds do not congregate and would not interact with any endangered species or their habitats. The trails are located along the levee system of the Red River which is accessed by the levee board for maintenance; therefore, no natural habitats are being degraded or ridden on.

Public Review and Comment: This compatibility determination was part of the Draft Red River National Wildlife Refuge Comprehensive Conservation Plan and Environmental Assessment, which was announced in the Federal Register and made available for public comment for 30 days. Specific dates will be listed here after they occur and this document is submitted for Fish and Wildlife Service approval.

Determination (check one below):

_____ Use is Not Compatible

__X__ Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility:

ATVs may be used only to reach areas open to wildlife-dependent activities such as hunting, fishing, wildlife observation and photography. Trails are open only from September 1 through February 28.

Restrictions apply to tire size and ATVs can only be used on designated trails. ATVs and other personal belongings are not allowed to be left on the refuge overnight. Harassment of wildlife is not prohibited. If any adverse impacts occur from any aspect of this limited public access, then further restrictions may be imposed to protect the plant and animal resources of the refuge.

Justification:

Use of ATVs is an access concession strictly in support of the priority public uses of hunting and fishing. ATVs cause much less damage to trails than do conventional and four-wheel drive vehicles. Use of ATVs help distribute hunters, thereby facilitating a balanced harvest and reducing hunter crowding. This access enhances the pursuit of wildlife-dependant recreation (hunting, fishing, wildlife observation, and photography) in this resource-rich area. Providing such recreation is a refuge objective, and demand for this access is high among users.

Mandatory 10-Year Re-evaluation Date:

Description of Use: *Berry/Fruit Picking*

Berry picking is not one of the six priority public wildlife-dependant uses of the National Wildlife Refuge System but it is a historical use of the land before the refuge was established. The collection of native fruit is for personal (non-commercial) use on the refuge without a Special Use Permit required.

Mayhaw fruit ripens in late April-May with collection being very time consuming and quite difficult, with further complications by some years having the refuge flooded. No more than a few individuals even make an effort to gather mayhaws resulting in very little quantity of fruit actually removed, and therefore no restriction is made on the number of individuals allowed for this use.

Seldom has the refuge received a request for acorn collection. These will be evaluated on a case-by-case basis to determine if the cause is for reforestation and whether productivity of the tree species is available. Stipulations for area and methods of collection will be issued with a Special Use Permit. No commercial operations will be allowed.

Berry-picking and acorn collection would be allowed on the entire refuge. Mayhaws occur in the bottomland hardwoods, and blackberries/dewberries are in most any of the areas on the refuge. Picking would most likely occur in the mornings of late spring for Mayhaws and late summer for blackberries/dewberries. No extensive, or commercial equipment would be used. Mayhaw pickers may use cherry picking ladders to get in the tops of trees but would have to carry the ladder in and out on each trip. Mayhaws would primarily be picked in areas adjacent to roads or in water by boat.

This was an existing use prior to refuge establishment, and the general public still requests access for the activity as it is a traditional use. The demand for this use is very light, but the refuge wants the public to feel free to pick a handful of blackberries or mayhaws to eat while walking the refuge.

Availability of Resources:

Resources involved in the administration and management of the use: Staff will not be involved in the collection of berries. Acorn collection proposals will be evaluated on a case-by-case basis within existing resources.

Special equipment, facilities, or improvements necessary to support the use: None

Maintenance costs: None

Monitoring costs: Monitoring and compliance would be handled within existing resources, programs and staff time.

Offsetting revenues: None

Anticipated Impacts of the Use:

Short-term Impacts:

Collection of fruits and berries for personal use will have a negligible impact on forest and wildlife resources. Some habitat trampling or disturbance may occur with foot-traffic to berry-picking areas, but no more than other uses such as wildlife observation while hiking. Short-term impacts are minimal and not significant due to the current, small number of users.

There is no significant increase in the magnitude of this use expected over the next 10 years. In fact, we would expect a decrease based on the change in demographics. If for some unanticipated reason this level of use increases a significant degree, a new compatibility determination would be required and regulating measures (eg. SUP and quantity restrictions) could be evaluated with subsequent public comment.

Long-term Impacts:

Direct impact is a small amount of plant resources taken from individual trees or shrubs, but is extremely insignificant on the scale of habitat acres available over the long-term for mayhaw and blackberry/dewberry seeding. There is no concern for removing important food resources for wildlife since the amount is insignificant and it has been noted by Martin et al. (1961) that “the small apple-like fruits are not used by wildlife to nearly so great an extent as might be anticipated”.

Cumulative Impacts:

No cumulative impacts with other uses are expected to affect the refuge in any detrimental manner. No conflict of users occurs since berry-picking occurs outside of the hunting season.

Public Review and Comment: This compatibility determination was part of the Draft Red River National Wildlife Refuge Comprehensive Conservation Plan and Environmental Assessment, which was announced in the Federal Register and made available for public comment for 30 days. Specific dates will be listed here after they occur and this document is submitted for Fish and Wildlife Service approval.

Determination (check one below):

_____ Use is Not Compatible

__X__ Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility:

Berry pickers may not sell berries or otherwise engage in commercial activities associated with berry picking. Cherry picking ladders can be used but must be carried in and out on each trip. No personal belongings may be left on the refuge overnight. All refuge regulations are applicable, including vehicle use.

Justification:

Picking wild berries for personal consumption is not an economic use and does not materially interfere with or detract from the fulfillment of the National Wildlife Refuge System mission or the purpose of the refuge. There is no significant wildlife or habitat disturbance from the light demand, and that accessibility is limited to roads and trails. No refuge support is needed for implementation of this use. Picking wild berries fosters wildlife observation on the refuge and illustrates the advantage of certain plants and a healthy environment to the public.

Martin, Zim and Nelson. 1961. "American Wildlife & Plants—A Guide to Wildlife Food Habits"

Mandatory 10-Year Re-evaluation Date:

Description of Use: *Bicycling*

Bicycling facilitates travel and access for the priority public uses on Red River NWR. Priority public uses as defined in the National Wildlife Refuge Improvement Act of 1997 include hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation.

Bicycles are considered legal modes of transportation on most State and Parish roads. Therefore, in most cases where refuge roads are open to vehicles, they are open to bicycles. Bicycles will not be allowed if there are safety issues or wildlife disturbance issues. Secondary roads that are closed to vehicles are open to bicycles since they support the wildlife dependent recreational activities. Bicycle races or other organized, group events are not allowed.

The refuge is open during daylight areas. Bicycling will only be allowed in areas open to the public. Cyclists accessing the refuge for hunting will need to possess a valid hunting permit and follow all refuge regulations. Access to the refuge is open every day. Entry on all or portions of individual areas may be temporarily suspended by posting upon occasions of unusual or critical conditions affecting land, water, vegetation, wildlife populations, or public safety.

Bicycling to facilitate non-consumptive priority public uses involves observing the natural landscape from a bicycle. Riders stop to observe associated animals and plant communities. The use mainly occurs by individual users rather than groups.

Bicycle travel is conducted in accordance with stipulations necessary to ensure compatibility. Access to the refuge is necessary for desirable use and mangement of the refuge. Bicycle travel on the refuge provides increased access and opportunities to participate in priority public uses such as hunting, fishing, wildlife observation and photography. It is an alternative means of travel to view the refuge's diverse biological assets and can be less physically demanding than pedestrian travel for some users. It can also be a form of exercise while enjoying the outdoors that coincides with the Federal government's initiative, "America's Public Lands Get Fit with US" to promote physical fitness activities on public lands.

Availability of Resources:

Resources involved in the administration and management of the use: Personnel time associated with administration and law enforcement

Special equipment, facilities, or improvements necessary to support the use: None

Maintenance costs: None

Monitoring costs: Monitoring and compliance would be handled within existing resources, programs and staff time.

Offsetting revenues: None

Anticipated Impacts of the Use:

Bicycle access is typically by single individuals on improved refuge roads. Damage to habitat is negligible. Access by bicycle during the hunting season is often used to retrieve game or to access remote areas of the refuge to hunt. Use is sporadic and dispersed from minimal disturbance.

There is some temporary disturbance to wildlife due to human activity on the land, but no more so than any other use, and actually probably less. Disturbance to wildlife is temporary and minor but would be monitored. Any unreasonable harassment would be grounds for the manager to close the area to bicycling or restrict the use to minimize harm.

No long-term or cumulative impacts are anticipated; however, the program can be modified in the future to mitigate unforeseen impacts.

Public Review and Comment: This compatibility determination was part of the Draft Red River National Wildlife Refuge Comprehensive Conservation Plan and Environmental Assessment, which was announced in the Federal Register and made available for public comment for 30 days. Specific dates will be listed here after they occur and this document is submitted for Fish and Wildlife Service approval.

Determination (check one below):

_____ Use is Not Compatible

__X__ Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility:

No equipment may be left on the refuge overnight. Harassment of wildlife is prohibited. If any adverse impacts occur from any aspect of this use, then further restrictions may be imposed to protect the plant and animal resources on the refuge. Individuals using bicycles to support hunting will follow all refuge regulations and will posses a valid hunting permit.

Justification:

Bicycle use, as identified in this determination is not expected to materially interfere with or detract from the mission of the National Wildlife Refuge System or from the purposes for which the refuge was established. The associated disturbance to wildlife and habitat is temporary and minor. Monitoring will be conducted to ensure that this use remains compatible. If use increases and impacts are suspected, a re-evaluation will be conducted and corrective actions taken to protect refuge resources. Bicycles are used to facilitate priority public uses as a reasonable mode of access. Outdoor recreational activities provide individuals with quality wildlife-oriented experiences, educational opportunities, and allow them to utilize a natural environment. This activity also supports the Federal government's initiative to promote physical fitness on public lands.

Mandatory 10-Year Re-evaluation Date:

Description of Use: *Cooperative Farming*

Cooperative farming is utilized on the refuge to manage and maintain approximately 1,000 acres of waterfowl impoundment habitats that provide seasonally flooded crops and moist-soil units necessary to meet the refuge's waterfowl habitat objectives. This farming program is a critical component of the refuge's habitat management program. The refuge's cooperative farmers enter into annual cooperative farming agreements specifying what crops will be grown in specific fields for both the refuge and cooperative farmer's share. The cooperative farmer receives 80 percent of planted acres, while the refuge receives 20 percent of the planted acres. The refuge's crop share is strategically located in areas that can be flooded in the winter to provide waterfowl foraging habitat in support of North American Waterfowl Management Plan objectives for the Mississippi Alluvial Valley. At the present time, the refuge does not have the staff or equipment necessary to manage and maintain the acreage needed to meet its waterfowl foraging objectives without the assistance of the cooperative farming program. Refuge cooperative farming operations will continue under carefully regulated conditions.

Availability of Resources: Based on a review of the refuge's budget allocated for this activity, there is adequate funding to ensure compatibility and to administer the use at its current level.

Anticipated Impacts of the Use: Cooperative farmers grow rice on the refuge under an annually updated cooperative farming agreement. Refuge crop shares are left standing in the field to provide high energy grain and forage primarily for wintering waterfowl. The cooperative farmers' harvested fields are also used extensively by snipe, shorebirds, geese, ducks, deer, and other wildlife. The majority of all cooperative farming takes place in the refuge's core waterfowl sanctuary area.

Cooperative farming results in some degree of soil erosion due to disking and planting operations. The impact of soil erosion on adjacent wetlands and water bodies is minimal because of maintained grass buffer strips around each field and the extensive use of flash board risers to retain and slowly release sediment-laden water. Cooperative farmers are allowed to use approved pesticides under a

closely monitored pesticide use proposal system. Refuge-approved pesticides have low toxicity and fast biodegradation rates compared to other commonly used agricultural pesticides. Under approved label application rates and methods, approved pesticides should have minimal effect on the biological environment. However, the potential exists for misapplication or accidental spills of approved pesticides. During the past 10 years there have been no known pesticide accidents or pesticide-related wildlife mortality reported on the refuge. Careful monitoring of cooperative farmer pesticide use should further reduce any potential impacts from pesticide use on the refuge.

Public Review and Comment: This compatibility determination was part of the Draft Red River National Wildlife Refuge Comprehensive Conservation Plan and Environmental Assessment, which was announced in the Federal Register and made available for public comment for 30 days. Specific dates will be listed here after they occur and this document is submitted for Fish and Wildlife Service approval.

Determination (check one below):

_____ Use is Not Compatible

__X__ Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility:

The cooperative farming program is regulated through annual cooperative farming agreements that specify the field crops to be grown, acceptable farming practices, and approved pesticide use procedures. Special conditions contained in each cooperative farming agreement provide the following requirements: no fall disking allowed, vegetative filter strips are maintained around all fields and water bodies, crops must be harvested by November 15 and no drainage of seasonally flooded habitat is allowed until after March 1. Refuge crops will be planted in designated fields and not be manipulated in any way after maturity and only approved pesticides will be used when the level of pest occurrence is at the economic threshold level as indicated by crop scouting. Under these carefully controlled conditions, the cooperative farming program has been and is expected to continue to be compatible with the refuge's purposes.

Justification:

The cooperative farming actions as set forth in the Cropland Management Plan for Red River National Wildlife Refuge are in accordance with Service guidelines for the protection, management, and enhancement of habitats for wildlife populations on the refuge. Adherence to the Cropland Management Plan promotes the enhancement of habitats for migratory birds, threatened and endangered species, and resident wildlife.

Mandatory 10-Year Re-evaluation Date:

APPROVAL OF COMPATIBILITY DETERMINATIONS

The signature of approval is for all compatibility determinations considered within the comprehensive conservation plan. 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

REGION 4
INTRA-SERVICE BIOLOGICAL EVALUATION FORM

Originating Person: Brett Hunter, Refuge Manager, Red River National Wildlife Refuge

Telephone Number: 318-726-4222 **E-Mail:** _brett_hunter@fws.gov

Date: June 4, 2007

PROJECT NAME (Grant Title/Number): Comprehensive Conservation Plan for Red River NWR

I. Service Program:
___ Ecological Services
___ Federal Aid
___ Clean Vessel Act
___ Coastal Wetlands
___ Endangered Species Section 6
___ Partners for Fish and Wildlife
___ Sport Fish Restoration
___ Wildlife Restoration
___ Fisheries
_X_ Refuges/Wildlife

II. State/Agency: Louisiana/USFWS

III. Station Name: Red River NWR

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

Implement the Comprehensive Conservation Plan for Red River NWR by adopting the proposed alternative. This plan directs the management of the refuge for the next 15 years.

V. Pertinent Species and Habitat:

A. Include species/habitat occurrence map:

See Figure 1. River frontage is owned within the Headquarters, Bayou Pierre, and Lower Cane River Units. If land were acquired in the Wardview Unit, river frontage might be owned there. Records of nesting least terns are known for sandbars adjacent to the Headquarters Unit and near the Bayou Pierre Unit prior to refuge establishment. Since 2000, neither colony has been present due to sandbars being colonized by willow trees. The Wardview Unit has an active colony across the river from what could one day be refuge lands. No nesting records occur anywhere near the Lower Cane River Unit.

B. Complete the following table:

SPECIES/CRITICAL HABITAT	STATUS[1]
Pallid Sturgeon	E
Interior Least Tern	E

STATUS: E=endangered, T=threatened, PE=proposed endangered, PT=proposed threatened, CH=critical habitat, PCH=proposed critical habitat, C=candidate species

VI. Location (attach map):

A. Ecoregion Number and Name: West Gulf Coastal Plain

B. County and State: Red River, Bossier, and Natchitoches Parishes, Louisiana

C. Section, township, and range (or latitude and longitude): See Figure 1.

D. Distance (miles) and direction to nearest town: The Bayou Pierre Unit is approximately 15 miles north of Coushatta, LA. The Spanish Lake Lowlands Unit is 10 miles north of Natchitoches, LA. The Headquarters Unit is located in Bossier City, LA.

E. Species/habitat occurrence:

Interior Least Tern (*Sterna antillarum anthalassos*) – known to occur in Caddo, Bossier and Red River Parishes. Breeds on sand or gravel bars of the Upper Red River.

Pallid Sturgeon (*Scaphirhynchus albus*) – possibly occurs in Natchitoches Parish. It inhabits large rivers in central U.S. In Louisiana, it was formerly thought to be restricted to the main channel of the Mississippi River. However, recent data indicate that the species also exists in the Atchafalaya River.

VII. Determination of Effects:

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

SPECIES/ CRITICAL HABITAT	IMPACTS TO SPECIES/CRITICAL HABITAT
Pallid Sturgeon	Beneficial impacts from best management practices of riverside habitat, erosion control, etc.
Interior Least Tern	Beneficial impacts from working with Interior Least Tern Working Group and potentially assisting state of Louisiana in protecting and restoring interior least tern nesting habitat in the future.

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

SPECIES/ CRITICAL HABITAT	ACTIONS TO MINIMIZE IMPACTS
Pallid Sturgeon	See below
Interior Least Tern	See below

Proposed actions in the CCP/EA would likely have no impact, beneficial or adverse, to pallid sturgeon. The only minor impacts that may occur would be beneficial due to adjacent riverine lands being managed according to Best Management Practices. Forested batture lands would not be clear-cut causing erosion and increased sedimentation of the river.

Interior least terns are found in Caddo, Bossier, and Red River Parishes on the upper portions of the Red River. Red River frontage occurs within the Headquarters, Bayou Pierre and Lower Cane River Units; however, the refuge does not currently own any suitable sandbars for nesting terns. However, if in the future any sandbars are developed within the refuge boundary, then they will be monitored for least tern activity and any necessary posting or closures will be conducted. No construction of piers, observation towers, boat ramps, etc., will be conducted on sandbars. Hunting will not coincide with the breeding season of interior least terns. The refuge will participate in the Interior Least Tern Working Group and will partner with the State of Louisiana to protect and restore interior least tern nesting habitat off of refuge lands.

VIII. Effect Determination and Response Requested:

SPECIES/ CRITICAL HABITAT	DETERMINATION[1]			RESPONSE[1] REQUESTED
	NE	NA	AA	
Pallid Sturgeon		X		Concurrence
Interior Least Tern		X		Concurrence

[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 AConcurrence@ 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 AConcurrence@.

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

Brett E Hunter

Signature (originating station)

11/29/07
Date

Refuge Manager
Title

If the project description changes or incidental take exceeds that which has been exempted under section 9 of the Act, then the Ecological Services Field Office must be contacted.

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

Appendix H. Wilderness Review

The Wilderness Act of 1964 defines a wilderness area as an area of federal land that retains its primeval character and influence, without permanent improvements or human inhabitation, and is managed so as to preserve its natural conditions and which:

1. generally appears to have been influenced primarily by the forces of nature, with the imprint of man's work substantially unnoticeable;

2. has outstanding opportunities for solitude or primitive and unconfined types of recreation;

3. has at least 5,000 contiguous roadless acres or is of sufficient size to make practicable its preservation and use in an unimpeded condition; or is a roadless island, regardless of size;

4. does not substantially exhibit the effects of logging, farming, grazing, or other extensive development or alteration of the landscape, or its wilderness character could be restored through appropriate management at the time of review; and

5. may contain ecological, geological, or other features of scientific, educational, scenic, or historic value.

The lands within Red River National Wildlife Refuge were reviewed for their suitability in meeting the criteria for wilderness, as defined by the Wilderness Act of 1964. No lands in the refuge were found to meet these criteria. Therefore, the suitability of refuge lands for wilderness designation is not further analyzed in this plan.

Appendix I. Refuge Biota

Red River National Wildlife Refuge
Bird List

This list contains those species of birds thought to occur on lands owned by the Red River NWR according to various literature sources, surveys, and observations.

Grebes
- Pied-billed Grebe (*Podilymbus podiceps*)
- Horned Grebe (*Podiceps auritus*)

Pelicans, Cormorants, and Darters
- American White Pelican (*Pelecanus erythrorhynchos*)
- Double-crested Cormorant (*Phalacrocorax auritus*)
- Anhinga (*Anhinga anhinga*)

Bitterns, Herons, and Egrets
- American Bittern (*Botaurus lentiginosus*)
- Least Bittern (*Ixobrychus exilis*)
- Great Blue Heron (*Ardea herodias*)
- Green Heron (*Butoroides virescens*)
- Little Blue Heron (*Efretta caerulea*)
- Tricolored Heron (*Efretta tricolor*)
- Black-crowned Night-heron (*Nycticorax nycticorax*)
- Yellow-crowned Night-heron (*Nyctanassa violacea*)
- Cattle Egret (*Bubulcus ibis*)
- Great Egret (*Ardea alba*)
- Snowy Egret (*Egretta thula*)

Ibises, Spoonbills, Storks, and New World Vultures
- White Ibis (*Eudocimis albus*)
- Roseate Spoonbill (*Ajaia ajaia*)
- Wood Stork (*Mycteria americana*)
- Black Vulture (*Coragyps atratus*)
- Turkey Vulture (*Cathartes aura*)

Waterfowl
- Greater White-fronted Goose (*Anser albifrons*)
- Snow Goose (*Chen caerulescens*)
- Ross's Goose (*Chen rossi*)
- Canada Goose (*Branta canadensis*)
- Wood Duck (*Aix sponsa*)
- Gadwall (*Anus strepera*)
- American Wigeon (*Anus americana*)
- American Black Duck (*Anus rubripes*)
- Mallard (*Anus platyrhynchos*)
- Mottled Duck (*Anys fulvigula*)
- Blue-winged Teal (*Anus discors*)
- Northern Shoveler (*Anus clypeata*)

Waterfowl (continued)

Northern Pintail (*Anus acuta*)
Green-winged Teal (*Anus crecca*)
Canvasback (*Aythya valisineria*)
Redhead (*Aythya americana*)
Ring-necked Duck (*Aythya collaris*)
Greater Scaup (*Aythya marila*)
Lesser Scaup (*Aythya affinis*)
Bufflehead (*Bucephala albeola*)
Hooded Merganser (*Lophodytes cucullatus*)
Common Merganser (*Mergus merganser*)
Red-breasted Merganser (*Mergus serrator*)
Ruddy Duck (*Oxyura jamaicensis*)

Hawks, Eagles, and Kites

Broad-winged Hawk (*Buteo platypterus*)
Cooper's Hawk (*Accipiter cooperii*)
Red-shouldered Hawk (*Buteo lineatus*)
Red-tailed Hawk (*Buteo jamaicensis*)
Sharp-shinned Hawk (*Accipiter striatus*)
Northern Harrier (*Circus cyaneus*)
Bald Eagle (*Haliaeetus leucocephalus*)
Golden Eagle (*Aquila chrysaetos*)
Osprey (*Pandion haliaetus*)
Mississippi Kite (*Ictinia mississippiensis*)

True Falcons

American Kestrel (*Falco sparverius*)
Merlin (*Falco columbarius*)
Peregrine Falcon (*Falco peregrinus*)

Gallineaceous Birds (Quail, Turkey, and Allies)

Northern Bobwhite (*Colinus virginianus*)
Wild Turley (*Meleagris gallopava*)

Rails, Gallinules, Coots, and Cranes

King Rail (*Rallus elegans*)
Virginia Rail (*Rallus limicola*)
Sora Rail (*Porzana carolina*)
Purple Gallinule (*Porphyrula martinica*)
American Coot (*Fulica americana*)
Common Moorhen (*Gallinula chloropus*)

Plovers

American Golden-Plover (*Pluvialis dominica*)
Black-bellied Plover (*Pluvialis squatarola*)
Semipalmated Plover (*Charadrius semipalmatus*)
Snowy Plover (*Charadrius alexandrinus*)
Killdeer (*Charadrius vociferous*)

Avocets and Sandpipers

American Avocet (*Recurvirostra americana*)
Black-necked Stilt (*Himantopus mexicanus*)
Greater Yellowlegs (*Tringa melanoleuca*)
Lesser Yellowlegs (*Tringa flavipes*)
Solitary Sandpiper (*Tringa solitaria*)
Spotted Sandpiper (*Actitis macularia*)
Upland Sandpiper (*Bartramia longicauda*)
Semipalmated Sandpiper (*Caladris pusilla*)
Western Sandpiper (*Caladris mauri*)
Least Sandpiper (*Caladris minutilla*)
Pectoral Sandpiper (*Caladris melanotos*)
Stilt Sandpiper (*Calidris himantopus*)
Whimbrel (*Numenius phaeopus*)
Willet (*Catoptrophorus semipalmatus*)
Dunlin (*Caladris alpine*)
Wilson's Phalarope (*Phalaropus tricolor*)
Short-billed Dowitcher (*Limnodromus griseus*)
Long-billed Dowitcher (*Limnodromus scolopaceus*)
Wilson's Snipe (*Gallinago gallinago*)
American Woodcock (*Scolopax minor*)

Gulls, Terns, and Skimmers

Bonaparte's Gull (*Larus philadelphia*)
Ring-billed Gull (*Larus delawarensis*)
Herring Gull (*Larus argentatus*)
Caspian Tern (*Sterna caspia*)
Forster's Tern (*Sterna forsteri*)
Least Tern (*Sterna antillarum*)
Black Tern (*Chlidonias niger*)

Pigeons and Doves

Rock Dove (*Columbia livia*)
Mourning Dove (*Zenaida macroura*)
Common Ground Dove (*Columbina passerine*)
Eurasian Collared Dove (*Streptopelia decaocto*)

Cuckoos

Black-billed Cuckoo (*Coccyzus erthropthalmus*)
Yellow-billed Cuckoo (*Coccyzus americanus*)
Greater Roadrunner (*Geococcyx californianus*)

Owls

Barn Owl (*Tyto alba*)
Eastern Screech-Owl (*Otus asio*)
Great Horned Owl (*Bubo virginianus*)
Barred Owl (*Strix varia*)
Short-eared Owl (*Asio flammeus*)

Swifts and Hummingbirds

Chimney Swift (*Chaeura pelagica*)
Ruby-throated hummingbird (*Archilochus colubris*)

Nightjars

Common Nighthawk (*Chordeiles minor*)
Chuck-will's-widow (*Caprimulgus carolinensis*)
Whip-poor-will (*Caprimulgus vociferous*)

Kingfishers

Belted Kingfisher (*Ceryle alcyon*)

Woodpeckers

Downy Woodpecker (*Picoides pubescens*)
Hairy Woodpecker (*Picoides villosus*)
Pileated Woodpecker (*Dryocopus pileatus*)
Red-headed Woodpecker (*Melanerpes erthrocephalus*)
Red-bellied Woodpecker (*Melanerpes carolinus*)
Yellow-bellied Sapsucker (*Sphyrapicus varius*)
Northern Flicker (*Colaptes auratus*)

Shrikes

Loggerhead Shrike (*Lanius ludovicianus*)

Vireos

White-eyed Vireo (*Vireo griseus*)
Yellow-throated Vireo (*Vireo flavifrons*)
Blue-headed Vireo (*Vireo solitarius*)
Warbling Vireo (*Vireo gilvus*)
Philadelphia Vireo (*Vireo phidelphicus*)
Red-eyed Vireo (*Vireo olivaceus*)

Jays and Crows

Blue Jay (*Cyanocitta cristata*)
American Crow (*Corvus brachyrhynchos*)
Fish Crow (*Corvus ossigragus*)

Larks

Horned Lark (*Eremophila alpestris*)

Martins and Swallows

Purple Martin (*Progne subis*)
Bank Swallow (*Riparia riparia*)
Barn Swallow (*Hirundia rustica*)
Northern Rough-winged Swallow (*Stelgidopteryx serripennis*)
Tree Swallow (*Tachycineta bicolor*)

Chickadees and Titmice

Carolina Chickadee (*Poecile carolinensis*)
Tufted Titmouse (*Baeolophus bicolor*)

Nuthatches

Red-breasted Nuthatch (*Sitta canadensis*)
White-breasted Nuthatch (*Sita carolinensis*)
Brown-headed Nuthatch (*Sitta pusilla*)

Creepers

Brown Creeper (*Certhia americana*)

Wrens

Bewick's Wren (*Thryomanes bewickii*)
Carolina Wren (*Thryothorus ludovicianus*)
House Wren (*Troglodytes aedon*)
Sedge Wren (*Cistothorus platensis*)
Winter Wren (*Troglodytes troglodytes*)

Kinglets and Gnatcatchers

Golden-crowned Kinglet (*Regulus satrapa*)
Ruby-crowned Kinglet (*Regulus calendula*)
Blue-gray Gnatcatcher (*Polioptila caerulea*)

Thrushes

Gray-cheeked Thrush (*Catharus minimus*)
Swainson's Thrush (*Catharus ustulatus*)
Hermit Thrush (*Catharus guttatus*)
Wood Thrush (*Hylocichia mustelina*)
American Robin (*Turdus migratorius*)
Eastern Bluebird (*Sialia sialis*)
Veery (*Catharus fuscescens*)

Mockingbirds and Thrashers

Northern Mockingbird (*Minus polyglottos*)
Gray Catbird (*Dumetella carolinensis*)
Brown Thrasher (*Toxostoma rufum*)

Starlings

European Starling (*Sturnus vulgaris*)

Pipits

American Pipit (*Anthus rubescens*)

Waxwings

Cedar Waxwing (*Bombycilla garrulous*)

Tanagers

Summer Tanager (*Piranga rubra*)
Scarlet Tanager (*Piranga olivacea*)

Blackbirds

Baltimore Oriole (*Icterus galbula*)
Brown-headed Cowbird (*Molothrus ater*)
Brewer's Blackbird (*Euphagus cyanocephalus*)

Blackbirds (continued)

Common Grackle (*Quiscalus quiscula*)
Eastern Meadowlark (*Sturnella magnus*)
Orchard Oriole (*Icterus spurious*)
Red-winged Blackbird (*Agelaius phoeniceus*)
Rusty Blackbird (*Euphagus carolinus*)

Wood Warblers

Blue-winged Warbler (*Vermivora pinus*)
Golden-winged Warbler (*Vermivora chrysoptera*)
Orange crowned Warbler (*Vermivora celata*)
Nashville Warbler (*Vermivora ruficapilla*)
Tennessee Warbler (*Vermivora peregrine*)
Bay-breasted Warbler (*Dendroica castanea*)
Blackburnian Warbler (*Dendroica fusca*)
Blackpoll Warbler (*Dendroica striata*)
Black-throated Blue Warbler (*Dendroica caerulescens*)
Black-throated Green Warbler (*Dendroica virens*)
Cerulean Warbler (*Dendroica cerulean*)
Chestnut-sided Warbler (*Dendroica pensylvanica*)
Magnolia Warbler (*Dendroica magnolia*)
Palm Warbler (*Dendroica palmarum*)
Pine Warbler (*Dendroica pinus*)
Prairie Warbler (*Dendroica discolor*)
Yellow-rumped Warbler (*Dendroica coronata*)
Yellow-throated Warbler (*Dendroica dominica*)
Yellow Warbler (*Dendroica petechia*)
Black-and White Warbler (*Mniotilta varia*)
American Redstart (*Setophaga ruticilla*)
Prothonotory Warbler (*Protonotaria citrea*)
Worm-eating Warbler(*Helmitheros vermivorus*)
Swainson's Warbler (*Limnothlypis swainsonii*)
Louisiana Waterthrush (*Seiurus motacilla*)
Northern Waterthrush (*Seiurus noveboracensis*)
Ovenbird (*Seiurus aurocapillus*)
Kentucky Warbler (*Oporornis formosus*)
Mourning Warbler (*Oporomis philadelphia*)
Common Yellowthroat (*Geothlypis trichas*)
Canada Warbler (*Wilsonia canadensis*)
Hooded Warbler (*Wilsonia citrine*)
Wilson's Warbler (*Wilsonia pusilla*)
Northern Parula (*Parula americana*)
Yellow-breasted Chat (*Icteria virens*)

New World Finches

Northern Cardinal (*Cardinalis cardinalis*)
Rose-breasted Grosbeak (*Pheuticus ludovicianus*)
Blue Grosbeak (*Passerina caerulea*)
Indigo Bunting (*Passerina cyanea*)
Painted Bunting (*Passerina ciris*)
Dickcissel (*Spiza americana*)

Old World Finches

Purple Finch (*Carpodacus purpureus*)
American Goldfinch (*Carduelis tristis*)
Pine Siskin (*Carduelis pinus*)
Evening Grosbeak (*Coccothraustes vespertinus*)

Sparrows

Eastern Towhee (*Pipilo erthrophthalmus*)
Bachman's Sparrow (*Aimophila aestivalis*)
Chipping Sparrow (*Spizella passerine*)
Field Sparrow (*Spizella pusilla*)
Vesper Sparrow (*Pooecetes gramineus*)
Savannah Sparrow (*Passerculus sandwichensis*)
Grasshopper Sparrow (*Ammodramus savannarum*)
Henslow's Sparrow (*Ammodramus henslowii*)
Le Conte's Sparrow (*Ammodramus leconteii*)
Fox Sparrow (*Passerella iliaca*)
Lincoln's Sparrow (*Melospiza lincolnii*)
Song Sparrow (*Melospiza melodia*)
Swamp Sparrow (*Melospiza georgiana*)
White-crowned Sparrow (*Zonotrichia leucophrys*)
White-throated Sparrow (*Zonotrichia albicollis*)
Dark-eyed Junco (*Junco hyemalis*)
Lapland Longspur (*Calcarius lapponicus*)

Mammal List

This list contains those species of mammals thought to occur on lands owned by the Red River NWR according to various literature sources, surveys, and observations.

Didelphiidae (Opossums)
- Opossum (*Dedelphis marsupialis*)

Soricidae (Shrews)
- Least Shrew (*Cryptotis parva*)
- Short-tailed Shrew (*Blarina brevicauda*)

Talpidae (Moles)
- Eastern Mole (*Scalopus aquaticus*)

Chiroptera (Bats)
- Hoary Bat (*Lasiurus cinereus*)
- Red Bat (*Lasiurus borealis*)
- Seminole Bat (*Lasiurus seminolus*)
- Big Brown Bat (*Eptesicus fuscus*)
- Brazilian Free-tailed Bat (*Tadarida brasiliensis*)
- Southern Myotis (*Myotis austroriparius*)
- Eastern Pipistrel (*Pipistrellus subflavus*)
- Evening Bat (*Nycticeius humeralis*)
- Rafinesque's Bat (*Coryrhincus reainesquii*)

Dasypodidae (Armadillos)
- Nine-banded Armadillo (*Dasypus novemcinctus*)

Leporidae (Rabbits)
- Eastern Cottontail (*Sylvilagus floridanus*)
- Swamp Rabbit (*Sylvilagus aquaticus*)

Sciuridae (Squirrels)
- Eastern Gray Squirrel (*Sciurus carolinensis*)
- Fox Squirrel (*Sciurus niger*)
- Southern Flying Squirrel (*Glaucomys volans*)

Geomydae (Pocket Gophers)
- Plains Pocket Gopher (*Geomys bursarius*)

Castoridae (Beaver)
- Beaver (*Castor canadensis*)

Muridae (Old World Rats and Mice)
- Roof Rat (*Rattus rattus*)
- Norway Rat (*Rattus norvegicus*)
- House Mouse (*Mus musculus*)

Cricetidae (Mice, Rats, Voles)

Cotton Mouse (*Peromyscus gossypinus*)
Fulvous harvest Mouse (*Reithrodontomys fulvescens*)
Golden Mouse (*Peromyscus nuttalli*)
Hispid Cotton Mouse (*Sigmodon hispidus*)
White-footed Mouse (*Peromyscus luecopus*)
Eastern Woodrat (*Neotoma floridana*)
Marsh Rice Rat (*Oryzomys palustris*)
Muskrat (*Ondatra zibethica*)
Pine Vole (*Pitymys pinetorum*)

Capromyidae (Nutria)

Nutria (*Myocactor coypus*)

Canidae (Coyotes, Wolves, Foxes)

Coyote (*Canis latrans*)
Gray Fox (*Urocyon cinereoargenteus*)
Red Fox (*Vulpes fluva*)

Ursidae (Bears)

Black Bear (*Ursus americanus*)

Procyonidae (Raccoons)

Raccoon (*Procyon lotor*)

Mustelidae (Weasels, Skunks)

Long-tailed Weasel (*Mustela frenata*)
Mink (*Mustela vison*)
River Otter (*Lutra canadensis*)
Striped Skunk (*Mephitis mephitis*)

Felidae (Cats)

Bobcat (*Lynx rufus*)

Suidae (Hogs)

Feral Hog (*Sus scrofa*)

Cervidae (Deer)

White-tailed Deer (*Odocoileus virginianus*)

Red River National Wildlife Refuge

Herptile List

This list contains those species of reptiles and amphibians thought to occur on lands owned by the Red River NWR according to various literature sources, surveys, and observations.

Alligatoridae (Alligators)
American Alligator (*Alligator mississippiensis*)

Chelydridae (Snapping Turtles)
Alligator Snapping Turtle (*Macroclemys temminckii*)
Common Snapping Turtle (*Chelydra serpentina*)

Kinosternidae (Musk and Mud Turtles)
Common Musk Turtle (*Sternotherus odoratus*)
Razorback Musk Turtle (*Sternotherus carinatus*)
Mississippi Mud Turtle (*Kinosternon subrubrum hippocrepis*)

Emydidae (Box and Water Turtles)
Three-toed Box Turtle (*Terrapene carolina triunguis*)
Mississippi Map Turtle (*Graptemys pseudogeographica kohnii*)
Ouachita Map Turtle (*Graptemys ouachitensis*)
Southern Painted Turtle (*Chrysemys picta dorsalis*)
Western Chicken Turtle (*Deirochelys reticularia miaria*)
Red-eared Slider (*Trachemys scripta elegans*)
River Cooter (*Pseudemys concinna*)

Trionychidae (Softshell Turtles)
Smooth Softshell (*Apalone mutica*)
Spiny Softshell (*Apalone spinifera*)

Iguanidae (Anoles and Fence Lizards)
Green Anole (*Anolis carolinensis*)
Northern Fence Lizard (*Sceloporus undulates hyacinthinus*)

Teiidae (Racerunners)
Six-lined Racerunner (*Cnemidophorus sexlineatus sexlineatus*)

Scincidae (Skinks)
Ground Skink (*Scincella lateralis*)
Broadhead Skink (*Eumeces laticeps*)
Five-lined Skink (*Eumeces fasciatus*)
Southern Coal Skink (*Eumeces anthracinus pluvialis*)

Anguidae (Glass Lizards)
Western Slender Glass Lizard (*Ophisaurus attenuatus attenuatus*)

Elapidae (Coral Snakes)
Texas Coral Snake (*Micrurus fulvius tener*)

Colubridae (Snakes)

Broadbanded Water Snake (*Nerodia fasciata confluens*)
Diamondback Water Snake (*Nerodia rhombifer rhombifer*)
Mississippi Green Water Snake (*Nerodia cyclopion*)
Yellowbelly Water Snake (*Nerodia erythrogaster flavigaster*)
Graham's Crayfish Snake (*Regina grahamii*)
Gulf Glossy Crayfish Snake (*Regina rigida sinicola*)
Florida Redbelly Snake (*Storeria occipitomaculata obscura*)
Midland Brown Snake (*Storeria dekayi wrightorum*)
Eastern Garter Snake (*Thamnophis sirtalis sirtalis*)
Western Ribbon Snake (*Thamnophis proximus proximus*)
Rough Earth Snake (*Virginia striatula*)
Western Smooth Earth Snake (*Virginia valeriae elegans*)
Black Rat Snake (*Elaphe obsolete obsoleta*)
Corn Snake (*Elaphe guttata guttata*)
Louisiana Milksnake (*Lampropeltis triangulum amaura*)
Prairie King Snake (*Lampropeltis calligaster calligaster*)
Speckled King Snake (*Lampropeltis getula holbrooki*)
Eastern Hognose Snake (*Heterodon platirhinos*)
Eastern Coachwhip (*Masticophis flagellum flagellum*)
Flathead Snake (*Tantilla gracilis*)
Mississippi Ringneck Snake (*Diadophis punctatus stictogenys*)
Northern Scarlet Snake (*Cemophora coccinea copei*)
Racer (*Coluber constrictor anthicus*)
Rough Green Snake (*Opheodrys aestivus*)
Western Worm Snake (*Carphophis vermis*)
Western Mud Snake (*Farancia abacura reinwardtii*)

Viperidae (Vipers)

Southern Copperhead (*Agkistrodon controtrix contortrix*)
Western Cottonmouth (*Agkistrodon piscivorus leucostoma*)
Timber Rattlesnake (*Crotalus horridis*)
Western Pygmy Rattlesnake (*Sistrurus miliarius streckeri*)

Proteidae (Mudpuppies)

Red River Mudpuppy (*Necturus maculosus louisianensis*)

Amphiumidae (Amphiumas)

Three-toed Amphiuma (*Amphiuma tridactlyum*)

Sirenidae (Sirens)

Western Lesser Siren (*Siren intermedia nettingi*)

Ambystomatidae (Salamanders)

Marbled Salamander (*Ambystoma opacum*)
Mole Salamander (*Ambystoma talpoideum*)
Smallmouth Salamander (*Ambystoma texanum*)
Spotted Salamander (*Ambystoma maculatum*)

Salamandridae (Newts)

Central Newt (*Notophthalmus viridescens*)

Plethodontidae (Lungless Salamanders)

Dusky Salamander (*Desmognathus fuscus complex*)
Dwarf Salamander (*Eurycea quadridigittata*)

Bufonidae (Toads)

Fowler's Toad (*Bufo fowleri*)
Gulf Coast Toad (*Bufo valliceps valliceps*)

Hylidae (Treefrogs and Peepers)

Bird-voiced Treefrog (*Hyla avivoca*)
Cope's Gray Treefrog (*Hyla chrysoscelis*)
Gray Treefrog (*Hyla versicolor*)
Green Treefrog (*Hyla cinerea*)
Squirrel Treefrog (*Hyla squirella*)
Northern Spring Peeper (*Pseudacris crucifer*)
Upland Chorus Frog (*Pseudacris feriarum*)
Northern Cricket Frog (*Acris crepitans crepitans*)

Microhylidae (Narrowmouth Toads)

Eastern Narrowmouth Toad (*Gastrophryne carolinensis*)

Ranidae (True Frogs)

Bullfrog (*Rana catesbeiana*)
Bronze Frog (*Rana clamitans clamitans*)
Pickerel Frog (*Rana palustris*)
Southern Leopard Frog (*Rana sphenocephala*)

Fish List

This list contains those species of reptiles and amphibians thought to occur in waters administered by the Red River NWR according to various literature sources, surveys, and observations.

Petromyzontidae (Lampreys)
- Chestnut Lamprey (*Ichthyomyzon castaneus*)
- Southern Brook Lamprey (*Ichthyomyzon gagei*)

Polydontidea (Paddlefish)
- Paddlefish (*Polydon spatula*)

Lepisosteidae (Gars)
- Alligator Gar (*Lepisosteus spatula*)
- Longnose Gar (*Lepisosteus osseus*)
- Shortnose Gar (*Lepisosteus platostomus*)
- Spotted Gar (*Lepisosteus oculatus*)

Amiidae (Bowfin)
- Bowfin (*Amia calva*)

Anguillladae (Eels)
- American eel (*Anguilla rostrata*)

Clupeidae (Shads and Herrings)
- Gizzard Shad (*Dorosoma cepedianum*)
- Threadfin Shad (*Dorosoma petenense*)
- Skipjack Herring (*Alosa chrysochloris*)

Hiodontidae (Mooneyes)
- Goldeye (*Hiodon alosoides*)
- Mooneye (*Hiodon tergisus*)

Esocidae (Pikes)
- Chain Pickeral (*Esox niger*)
- Grass Pickeral (*Esox americanus*)

Sctostomidae (Suckers)
- Black Buffalo (*Ictiobus niger*)
- Bigmouth Buffalo (*Ictiobus cyprinellus*)
- Smallmouth Buffalo (*Ictiobus bubalus*)
- Creek Chubsucker (*Erimyzon oblongus*)
- Lake Chubsucker (*Erimyzon sucetta*)
- River Carpsucker (*Carpiodes carpio*)
- Spotted Sucker (*Minytrema melanops*)
- River Redhorse (*Moxostoma carinatum*)
- Blacktail Redhorse (*Moxostoma poecilurum*)

Aphredoderidae Pirate Perch
- Pirate Perch (*Aphredoderus sayanus*)

Cyprinidae (Minnows, Chubs, Shiners, and Carp)

Bullhead Minnow (*Pimephales vigilax*)
Bluntnose Minnow (*Pimephales notatus*)
Flathead Minnow (*Pimephales promelas*)
Cypress Minnow (*Hybognathus hayi*)
Silvery Minnow (*Hybognathus nuchalis*)
Pugnose Minnow (*Opsopoeodus emiliae*)
Cheek Chub (*Semotilus atromaculatus*)
Silver Chub (*Hybopsis storeriana*)
Speckled Chub (*Hybopsis aestivalis*)
Bigeyed Shiner (*Notropis boops*)
Bluehead Shiner (*Notropis hubbsi*)
Emerald Shiner (*Notropis atherinoides*)
Ghost Shiner (*Notropis buchanani*)
Ironcolor Shiner (*Notropis chalybaeus*)
Mimic Shiner (*Notropis volucellus*)
Pallid Shiner (*Notropis amnis*)
Ribbon Shiner (*Notropis fumeus*)
Steelcolor Shiner (*Notropis whipplei*)
Taillight Shiner (*Notropis maculatus*)
Weed Shiner (*Notropis texanus*)
Blackfin Shiner (*Cyprinella venusta*)
Golden Shiner (*Notemigonus crysoleucas*)
Redfin Shiner (*Lythrurus umbratilis*)
Striped Shiner (*Luxilus chrysocephalus*)
Goldfish (*Carassius auratus*)
Common Carp (*Cyprinus carpio*)

Ictaluridae (Catfish, Bullheads, and Madtoms)

Blue Catfish (*Ictalurus furcatus*)
Channel Catfish (*Ictalurus punctatus*)
Flathead Catfish (*Pylodictis olivaris*)
Black Bullhead (*Ameiurus melas*)
Brown Bullhead (*Ameiurus nebulosus*)
Yellow Bullhead (*Ameiurus natalis*)
Brindled Madtom (*Noturus miurus*)
Brown Madtom (*Noturus phaeus*)
Freckled Madtom (*Noturus nocturnus*)
Tadpole Madtom (*Noturus gyrinus*)

Cyrinodontidae (Topminnows)

Blackspotted Topminnow (*Fundulus olivaceus*)
Blackstripe Topminnow (*Fundulus notatus*)
Golden Topminnow (*Fundulus chrysotus*)
Starhead Topminnow (*Fundulus notti*)

Peociliidae (Livebearers)

Mosquitofish (*Gambusia affinis*)

Atherinidae (Silversides)
Brook Silverside (*Labidesthes sicculus*)

Percicthyidae (Temperate Basses)
Striped Bass (*Morone saxatilis*)
White Bass (*Morone chrysops*)
Yellow Bass (*Morone mississippiensis*)

Centrarchidae (Sunfish, Bass, Crappie, and Allies)
Largemouth Bass (*Micropterus samloides*)
Spotted Bass (*Micropterus punctulatus*)
Bantum Sunfish (*Lepomis symmetricus*)
Bluegill (*Lepomis macrochirus*)
Dollar Sunfish (*Lepomis marginatus*)
Green Sunfish (*Lepomis cyanellus*)
Longear Sunfish (*Lepomis megalotis*)
Orangespotted Sunfish (*Lepomis humilis*)
Redear Sunfish (*Lepomis microlophus*)
Spotted Sunfish (*Lepomis punctatus*)
Warmouth (*Lepomis gulosus*)
White Crappie (*Pomoxis annularis*)
Black Crappie (*Pomoxis nigromaculatus*)
Flier (*Centrarchus macropterus*)

Elassomatidae (Pigmy Sunfish)
Banded Pigmy Sunfish (*Elassoma zonatum*)

Percidae (Darters and Allies)
Scaly Sand Darter (*Ammocrypta vivax*)
Western Scaly Darter (*Ammocrypta clara*)
Bluntnose Darter (*Etheostoma chlorosomum*)
Creole Darter (*Etheostoma collettei*)
Cypress Darter (*Etheostoma proeliare*)
Goldstripe Darter (*Etheostoma parvipinne*)
Harlequin Darter (*Etheostoma histrio*)
Mud Darter (*Etheostoma asprigene*)
Redfin Darter (*Etheostoma whipplei*)
Slough Darter (*Etheostoma gracile*)
Speckled Darter (*Etheostoma stigmaeum*)
Swamp Darter (*Etheostoma fusiforme*)
Blackside Darter (*Percina maculata*)
Channel Darter (*Percina copelandi*)
Dusky Darter (*Percina sciera*)
Logperch (*Percina caprodes*)
Ouachita Darter (*Percina ouachitae*)
River Darter (*Percina shumardi*)
Sauger (*Stizostedion canadense*)
Walleye (*Stizostedion vitreum*)

Sciaenidae (Drums)
Freshwater Drum (*Aplodinotus grunniens*)

Red River National Wildlife Refuge
Woody Plant List

This list contains those species of woody plants thought to occur on lands owned by the Red River NWR according to various literature sources, surveys, and observations.

Aceraceae (Maples and Elders)
- Red Maple (*Acer rubrum*)
- Boxelder (*Acer negundo*)

Agavaceae (Yuccas)
- Adam's Needle (*Yucca filamentosa*)

Anacardiaceae (Sumac, Poison Ivy, and Allies)
- Shiny Sumac (*Rhus copallinum*)
- Smooth Sumac (*Rhus glabra*)
- Poison Ivy (*Toxicodendron redicans*)
- Chittimwood (*Sideroxylon lanuginosum*)

Annonaceae (Pawpaws)
- Dwarf Pawpaw (*Asimina parviflora*)
- Pawpaw (*Asimina triloba*)

Araliaceae (Arelias)
- Devil's Walkingstick (*Arelia spinosa*)

Arecaceae (Palmettos)
- Palmetto (*Sabal minor*)

Aristolochiaceae (Pipevine)
- Dutchman's Pipevine (*Aristolochia tomentosa*)

Asteraceae (Saltbush and Allies)
- Saltbush (*Baccharis halimifolia*)
- New Jersey Tea (*Ceanothus americanus*)

Aquifoliaceae (Holly and Allies)
- American Holly (*Ilex opaca*)
- Carolina Holly (*Ilex ambigua*)
- Deciduous Holly (*Ilex deciduas*)
- Youpan (*Ilex vomitoria*)

Betulaceae (Alder, Birch, and Allies)
- Smooth Alder (*Alnus serrulata*)
- River Birch (*Betula nigra*)
- Blue Beech (*Fagus grandifolia*)
- Ironwood (*Carpinus caroliniana*)

Bignoniaceae (Trumpet Creeper and Allies)
Trumpet Creeper (*Campsis radicans*)
Cross Vine (*Bignonia capreolata*)
Southern Catalpa (*Catalpa bignonioides*)

Caprifoliaceae (Honeysuckle, Arrowwood and Allies)
Coral Honeysuckle (*Lonicera sempervirens*)
Japanese Holeysuckle (*Lonicera japonica*)
Arrowwood (*Viburnum dentatum*)
Rusty Blackhaw (*Viburnum rufidulum*)
Buttonbush (*Cephalanthus occidentalis*)
Elderberry (*Sambucus canadensis*)

Celastraceae (Strawberrybush)
Strawberrybush (*Evonymus americana*)

Clusiaceae (St. Andrew's Cross and Broombush)
St. Andrew's Cross (*Hypericum hypericoides*)
Broombush (*Hypericum prolificum*)

Cornaceae (Dogwoods)
Flowering Dogwood (*Cornus florida*)
Rough-leaf Dogwood (*Cornus drummondii*)
Swamp Dogwood (*Cornus foemina*)

Cuppressaceae (Red-cedar)
Eastern Red-cedar (*Juniperus virginiana*)

Ebonaceae (Persimmon)
Persimmon (*Diospyrus virginiana*)

Ericaceae (Blueberrys)
Elliot's Blueberry (*Vaccinium elliotti*)
Large Cluster Blueberry (*Vaccinium virgatum*)
Deerberry (*Vaccinium stamineum*)
Sparkleberry (*Vaccinium arboretum*)

Euphorbiaceae (Tallow Trees)
Chinese Tallow Tree (*Triadica sebiferum*)

Fabaceae (Locust, Redbud, and Allies)
Black Locust (*Robinia pseudoacacia*)
Honey Locust (*Gleditsia triacanthos*)
Water Locust (*Gleditsia aquatica*)
Eastern Redbud (*Cercis canadensis*)
American Wisteria (*Wisteria frutescens*)
Coralbean (*Erythrina herbacea*)
False Indigo (*Amorpha* spp.)
Mimosa (*Albizia julibrissin*)

Fagaceae (Oaks and Allies)
- Black Oak (*Quercus velutina*)
- Blackjack Oak (*Quercus marilandica*)
- Cherrybark Oak (*Quercus pagodafolia*)
- Delta Post Oak (*Quercus similes*)
- Laurel Oak (*Quercus laurifolia*)
- Nuttall Oak (*Quercus texana*)
- Overcup Oak (*Quercus lyrata*)
- Post Oak (*Quercus stellata*)
- Shumard Oak (*Quercus shumardii*)
- Southern Red Oak (*Quercus falcata*)
- Swamp Chestnut Oak (*Quercus michauxii*)
- Water Oak (*Quercus migra*)
- White Oak (*Quercus alba*)
- Willow Oak (*Quercus phellos*)
- Allegheny Chinquapin (*Castanea pumilla*)
- American Beech (*Fagus grandifolia*)

Grossulariaceae (Sweetspire)
- Sweetspire (*Itea virginica*)

Hamamelidaceae (Sweetgum and Witch Hazel)
- Sweetgum (*Liquidambar styraciflua*)
- Witch Hazel (*Hamamelis virginiana*)

Hippocastanaceae (Buckeyes and Azeleas)
- Red Buckeye (*Aesculus pavia*)
- Hoary Azalea (*Rhododendron canescens*)

Juglandaceae (Walnut, Hickory, and Pecan)
- Mockernut Hickory (*Carya alba*)
- Bitter Pecan (*Carya aquatica*)
- Bitternut Hickory (*Carya cordiformis*)
- Pignut Hickory (*Carya glabra*)
- Sweet Pecan (*Carya illinoiensis*)
- Black Hickory (*Carya texana*)
- Black Walnut (*Juglans nigra*)

Lauraceae (Sassafras and Spicebush)
- Sassafras (*Sassafras albidium*)
- Spicebush (*Lindera benzoin*)

Loganiaceae (Jessemine)
- Carolina Jessemine (*Gelsemium sempervirens*)

Magnoliaceae (Magnolia)
- Sweetbay Magnolia (*Magnolia virginiana*)

Meliaceae (Chinaberry Tree)
- Chinaberry (*Melia azedarach*)

Moraceae (Mulberry and Allies)
Red Mulberry (*Morus rubra*)
Osage-orange (*Maclura pumifera*)

Myricaceae (Waxmyrtle)
Waxmyrtle (*Myrica cerifica*)

Nyssaceae (Blackgum and Tupelo)
Blackgum (*Nyssa sylvatica*)
Water Tupelo (*Nyssa aquatica*)

Oleaceae (Ash and Allies)
Green Ash (*Fraxinus pennsylvanica*)
White Ash (*Fraxinus americana*)
Chinese Privet (*Ligustrum sinense*)
Fringetree (*Chioanthus virginicus*)
Swamp Privet (*Forestiera acuminata*)

Pinaceae (Pines)
Loblolly Pine (*Pinus echinata*)
Shortleaf Pine (*Pinus taeda*)

Platanaceae (Sycamore)
American Sycamore (*Platanus occidentalis*)

Polygonaceae (Eardrop Vine)
Lady's Eardrop Vine (*Brunnichia ovata*)

Rhamnaceae (Buckthorn)
Carolina Buckthorn (*Frangula caroliniana*)
Rattan Vine (*Berchemia scandens*)

Rosaceae (Plum, Hawthorn, and Allies)
Black Cherry (*Prunus serotina*)
Chickasaw Plum (*Prunus angustifolia*)
Mexican Plum (*Prunus mexicana*)
Cockspur Hawthorn (*Cretageous crus-galli*)
Green Hawthorn (*Cretageous viridis*)
Mayhaw (*Cretageous opaca*)
Parsleyhaw (*Cretageous marshallii*)
Blackberry (*Rubus argutus*)
Serviceberry (*Amelanchier arborea*)

Rubiaceae (Buttonbush)
Buttonbush (*Cephalanthus occidentalis*)

Rutaceae (Toothache Tree)
Toothache Tree (*Zanthoxylum clava-hercules*)
Trifoliate-orange (*Poncirus trifoliate*)

Salicaceae (Willow and Cottonwood)
Black Willow (*Salix nigra*)
Eastern Cottonwood (*Populus deltoides*)

Sapotaceae (Bumelia)
Gum Bumelia (*Bumelia langinose*)

Schizaeaceae (Climbing Fern)
Japanese Climbingfern (*Lygodium japonicum*)

Scrophulariaceae (Princesstree)
Princesstree (*Paulownia tomentosa*)

Simarubaceae (Tree-of-Heaven)
Tree-of-Heaven (*Ailanthus altissima*)

Smilacaceae (Green briar and Allies)
Fiddleleaf Greenbriar (*Smilax bona-nox*)
Sawbriar (*Smilax glauca*)
Common Greengriar (*Smilax rotundifolia*)
Upland Bamboo Vine (*Smilax smallii*)
Red Berry Greenbriar (*Smilax walterii*)

Stracaceae (Snowbells)
Large Snowbell (*Styrax americanum*)
Small Snowbell (*Styrax grandifolius*)
Two-winged Silverbell (*Halesia diptera*)

Symplocaceae (Sweetleaf)
Sweetleaf (*Symplocos tinctoria)*

Taxodiaceae (Cypress)
Baldcypress (*Taxosium distichum*)

Ulmaceae (Elm and Hackberry)
American Elm (*Ulmus americana*)
Cedar Elm (*Ulmus crassifolia*)
Slippery Elm (*Ulmus rubra*)
Winged Elm (*Ulmus alata*)
Water Elm (*Planer aquatica*)
Southern Hackberry (*Celtis laevigata*)

Verbenaceae (Beautyberry)
American Beautyberry (*Callicarpa americana*)

Vitaceae (Wild Grapes and Allies)
Peppervine (*Ampeopsis arborea*)
Heart-leaf Peppervine (*Ampeopsis cordata*)
Virginia Creeper (*Parthenocissus quinquefolia*)
Summer Grape (*Vitis aestivalis*)
Gray Grape (*Vitis cinerea*)
Muscadine Grapes (*Vitis rotundifolia*)