

**Comprehensive
Conservation Plan**

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Black bear and cubs
*by Don Anderson
USFWS Photo*

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Bear Cub
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Guiding Principals of the National Wildlife Refuge System

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

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

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

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

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

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

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

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





USFWS Photo

I. BACKGROUND

INTRODUCTION

This Comprehensive Conservation Plan for Bayou Cocodrie National Wildlife Refuge was prepared to guide management actions and direction for the refuge over the next 15 years. 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 met the goals and objectives of the refuge and that could be implemented within the 15-year period. A draft comprehensive conservation plan/environmental assessment describing the Services proposed alternative, as well as the other alternatives considered and their effects on the environment, was made available to state and federal government agencies, conservation partners, and the general public for review and comment. Comments from each entity were considered in the development of this plan.

PURPOSE AND NEED FOR PLAN

The purpose of the plan is to identify the role the refuge will play in support of the mission of the National Wildlife Refuge System and to provide guidance in refuge management activities.

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 Service management actions, including land protection and recreation/education programs are consistent with the mandates of the National Wildlife Refuge System;
- Ensure that the management of the refuge is consistent with federal, state, and county plans; and
- Provide a basis for the development of budget requests for operations, maintenance, and capital improvement needs.

Perhaps the greatest need of the Service is communication with the public and the public's participation in carrying out the mission of the National Wildlife Refuge System. Many agencies, organizations, institutions, and businesses have developed relationships with the Service to advance the mission of national wildlife refuges. This comprehensive conservation plan supports the Partners-in-Flight Initiative; the Lower Mississippi Valley Migratory Bird Wetland Conservation Initiative; the North American Waterfowl Management Plan; the Western Hemisphere Shorebird Reserve Network; the

American Woodcock Management Plan; and the National Wetlands Priority Conservation Plan. For further information regarding migratory birds, see website <http://birds.fws.gov>.

FISH AND WILDLIFE SERVICE

Mission

As part of its mission, the Service manages more than 540 national wildlife refuges covering more than 95 million acres. These areas comprise the National Wildlife Refuge System, the world's largest collection of lands, with 77 million acres in Alaska and the remaining acres spread across the other 49 states and several island territories.

Description

The Fish and Wildlife Service is the primary federal agency responsible for conserving, protecting, and enhancing the Nation's fish and wildlife populations and their habitats. The Service shares some conservation responsibilities with other federal, state, tribal, local, and private entities. The Service also has specific trustee responsibilities for migratory birds, threatened and endangered species, anadromous fish, and certain marine mammals, as well as for lands and waters administered by the Service to manage and protect these resources.

NATIONAL WILDLIFE REFUGE SYSTEM

Mission

The mission of the National Wildlife Refuge System, as defined by the National Wildlife Refuge System Improvement Act of 1997 is:

"...to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife and plant resources and their habitats within the United States for the benefit of present and future generations of Americans."

Description

The National Wildlife Refuge System Improvement Act of 1997 established, for the first time, a clear legislative mission of wildlife conservation for the National Wildlife Refuge System. Activities were initiated in 1997 to complement the direction of this new legislation, including the preparation of comprehensive conservation plans for all refuges. These plans, which are developed with full public involvement, guide the management of refuges by establishing natural resource and recreation/education programs. The Act states that each refuge shall be managed to:

- Fulfill the mission of the National Wildlife Refuge System;
- Fulfill the individual purpose of each refuge;
- Consider the needs of wildlife first;

- Fulfill requirements of comprehensive conservation plans that are prepared for each unit of the refuge system;
- Maintain the biological integrity, diversity, and environmental health of the refuge system;
- Recognize that wildlife-dependent recreation activities including hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation are legitimate and priority public uses; and allow refuge managers authority to determine compatible public uses.

Approximately 37.5 million people visited national wildlife refuges in 1998, most to observe wildlife in their natural habitats. As visitation grows, there are significant economic benefits to local communities. Economists have discovered that refuge visitors contribute more than \$400 million annually to local economies. Nearly 40 percent of the country's adults spent \$101 billion on wildlife-related pursuits in 1996, according to the National Survey of Fishing, Hunting, and Wildlife-Associated Recreation (Fish and Wildlife Service 1996).

Volunteers continue to be a major contributor to the success of the refuge system. In 1998, volunteers contributed more than 1.5 million hours on refuges nationwide, a service valued at more than \$20.6 million.

The wildlife and habitat vision for national wildlife refuges stresses that wildlife come first; that ecosystems, 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.

LEGAL POLICY CONTEXT

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. Refer to Appendix C for a complete listing of relevant legal mandates.

Lands within the National Wildlife Refuge System are closed to public use unless specifically and legally opened. All programs and uses must be evaluated based on mandates set forth in the National Wildlife Refuge System Improvement Act. 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 (these uses include hunting, fishing,



Wallace Lake
USFWS Photo

- wildlife observation, wildlife photography, and environmental education and interpretation); and
- Ensure that visitor activities are compatible with refuge purposes.

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 federal agencies and state fish and wildlife agencies during the course of acquiring and managing refuges. State wildlife management areas and national wildlife refuges provide the foundation for 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 (<http://www.wlf.state.la.us>) is a state-partnering agency with the Service, charged with enforcement responsibilities relating to migratory birds and endangered species, as well as managing state natural resources and approximately 1.4 million acres of coastal marshes and wildlife management areas. The Department coordinates the state wildlife conservation program and provides public recreation opportunities including an extensive hunting and fishing program on state wildlife management areas, such as the 36,000-acre Red River Wildlife Management Area in Concordia Parish (Figure 1). The state's participation and contribution throughout this comprehensive conservation planning process provide for ongoing opportunities and open dialogue to improve the ecological sustainment of fish and wildlife in Louisiana. An integral part of the comprehensive conservation planning process is integrating common mission objectives, where appropriate.

ECOSYSTEM CONTEXT

Overview

Sustainable communities and species conservation and recovery require the joint efforts of private landowners and local communities, as well as state and federal governments. The Fish and Wildlife Service is initiating cooperative partnerships in an effort to reduce the declining trend of fish and wildlife populations and biological diversity within the Lower Mississippi Valley Ecosystem (Figure 2).

The Lower Mississippi Valley once supported a vast bottomland hardwood forest complex that extended along the Mississippi River from Illinois to Louisiana. Today, less than 20 percent of this bottomland hardwood forest remains and most is fragmented or remains in scattered patches throughout the region (Figure 3). Floodwaters once recharged wildlife habitats and created rich, dynamic systems that supported a diverse abundance of fish and wildlife species. Today, the Lower Mississippi Valley is bisected by levees and flows are restricted by flood control projects and agricultural diversion. Water quality is significantly impacted by agricultural and industrial runoff. Rivers

Figure 1. Conservation management focus areas Bayou Cocodrie Refuge

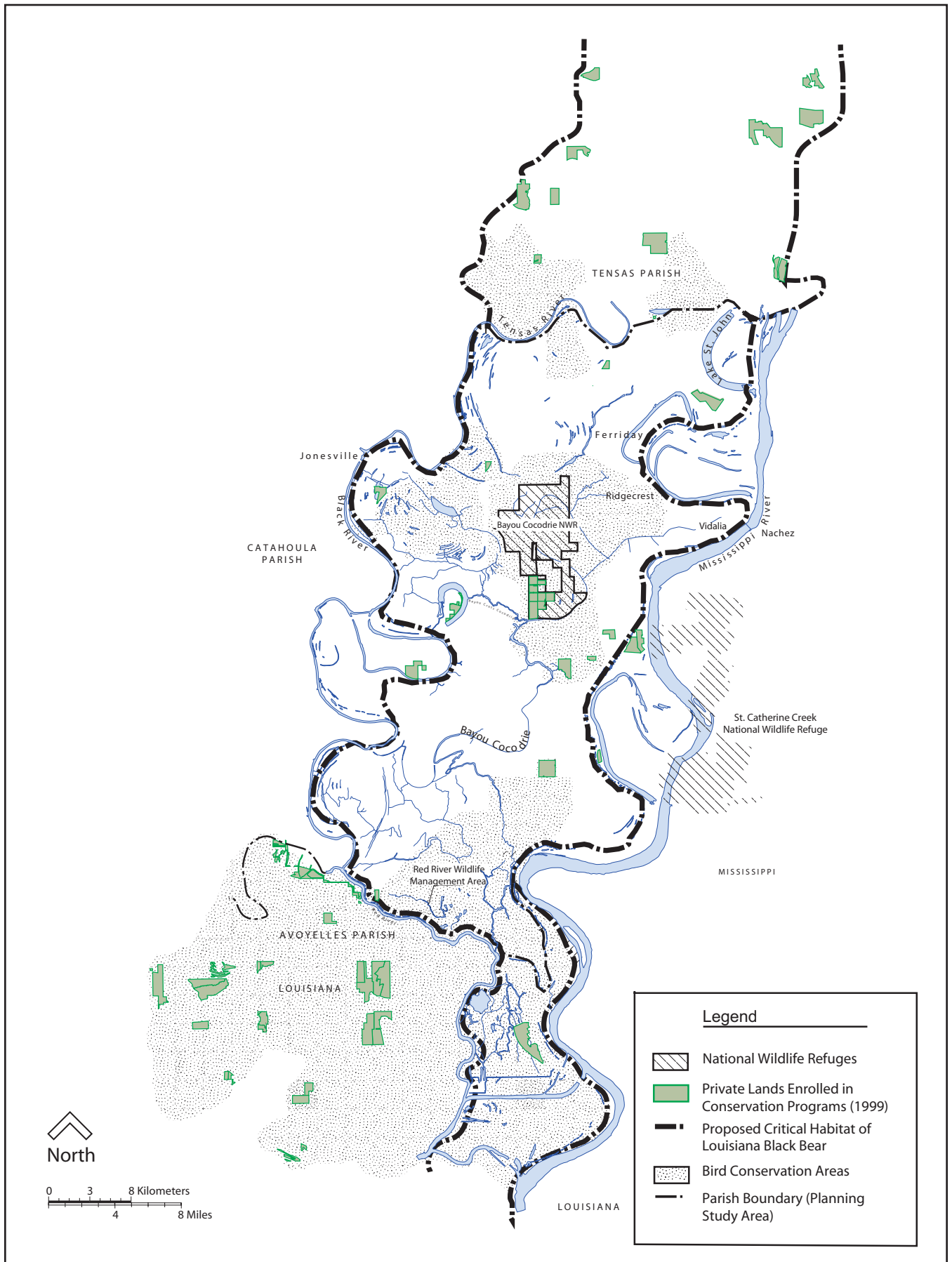


Figure 2. Lower Mississippi Valley Ecosystem

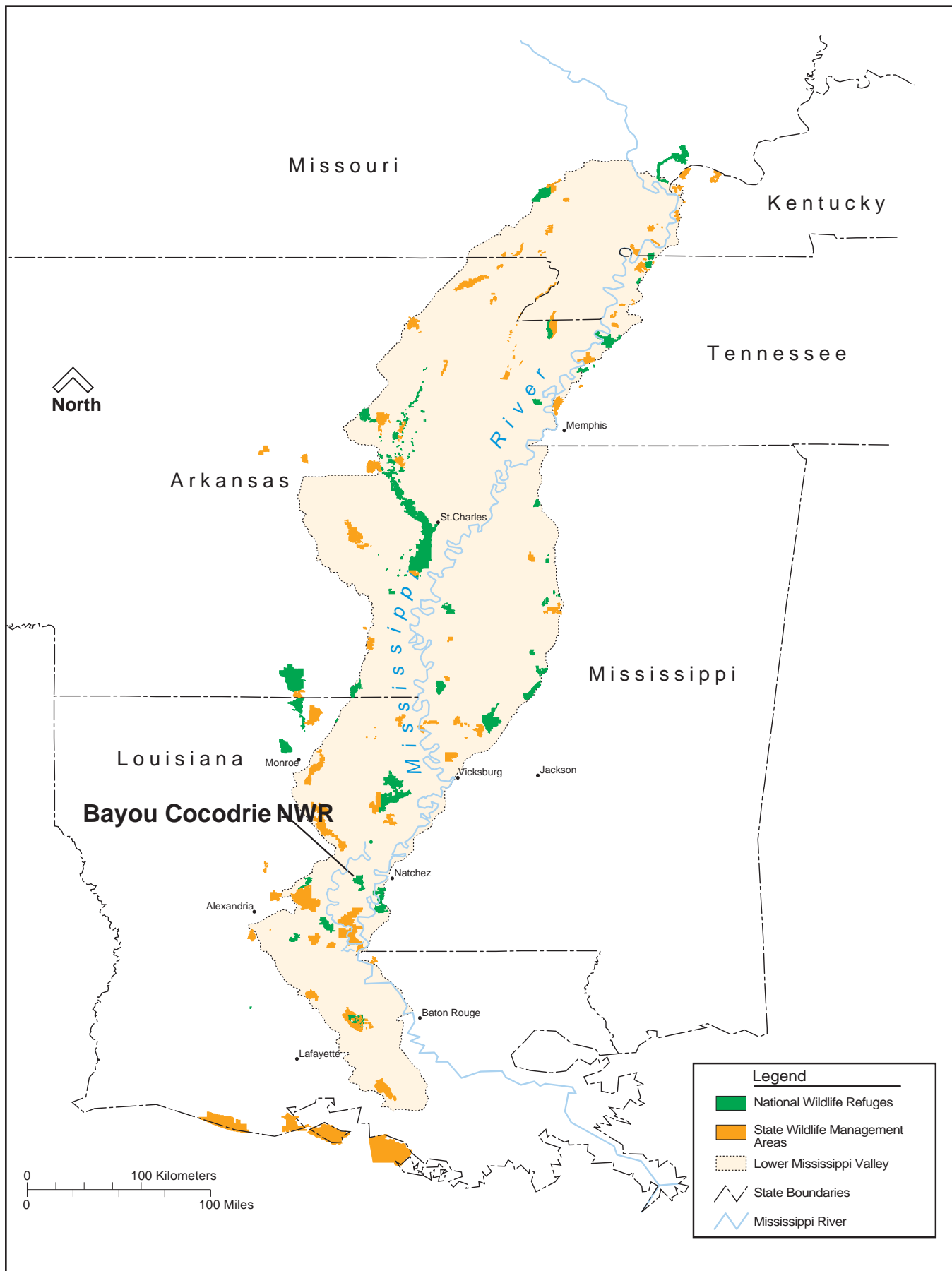
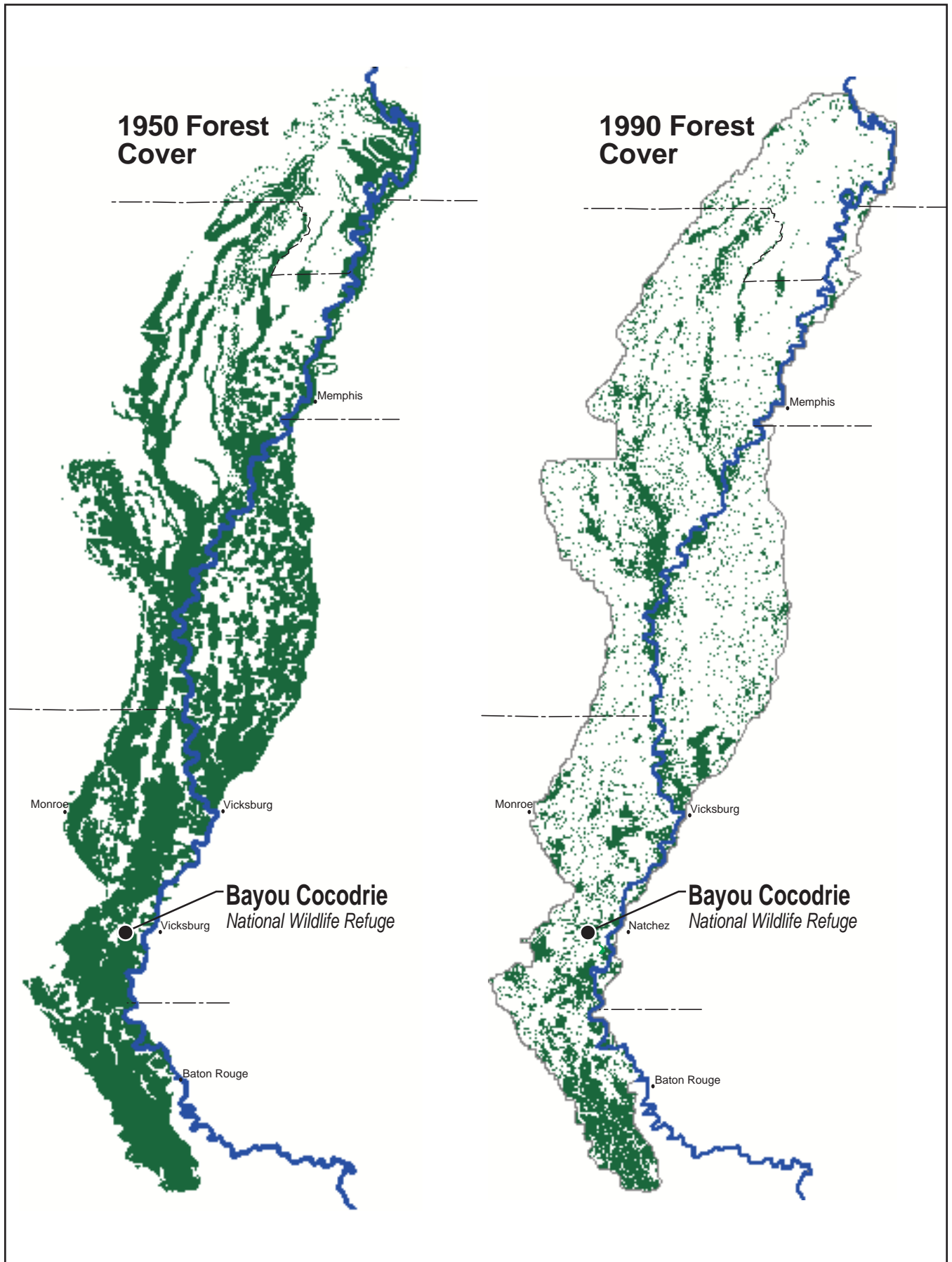


Figure 3. Forest cover changes in the Mississippi Valley



and water bodies throughout are highly turbid, laden with pesticides, and support a small fraction of the once abundant aquatic resources. These declines prompted the Service to designate bottomland hardwood forests found in this ecosystem as areas of special concern.

The Service is focusing efforts to adopt collaborative resource partnerships within and outside the agency to reduce the declining trend of fish and wildlife populations and biological diversity, to establish conservation priorities, to clarify goals, and to solve common threats and problems associated with fish and wildlife resources. Biological objectives in the Lower Mississippi Valley, for species groups targeted in this plan, reflect the Partners-in-Flight Plan, North American Waterfowl Management Plan, Western Hemisphere Shorebird Reserve Network, and the recovery of the Louisiana sub-population of black bears (Figure 4).

Ecological Threats and Problems

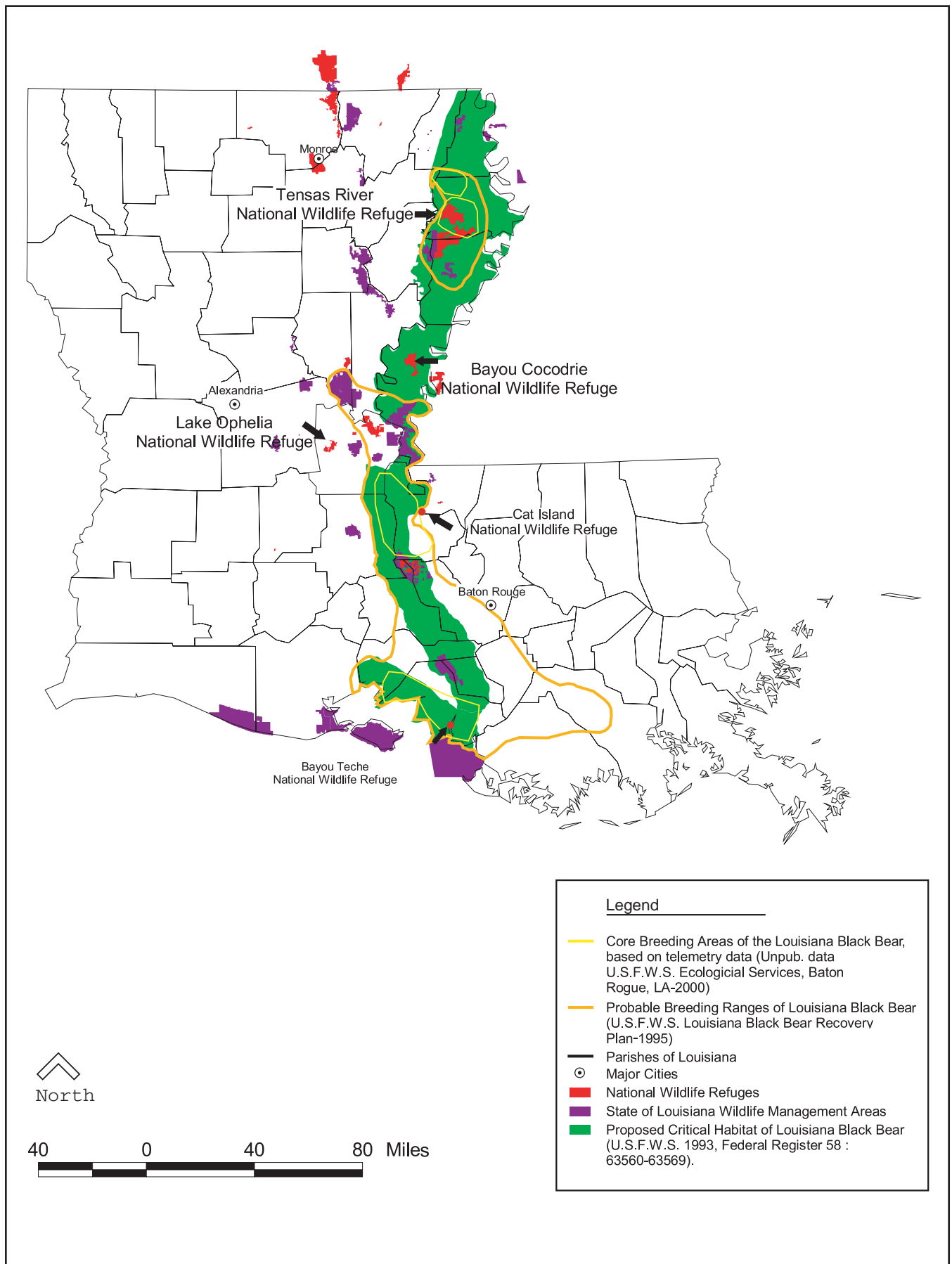
National wildlife refuges in the Lower Mississippi Valley serve as part of the last safety net to support biological diversity--the greatest challenge facing the Service. Impacts and underlying causes and threats to biological diversity within the Lower Mississippi Valley include:

- The loss of sustainable communities, including the loss of 20 million acres of bottomland hardwood forests;
- The loss of connectivity between bottomland hardwood forest sites; e.g., forest fragmentation;
- The effects of constructing navigation and water diversion projects;
- The effects of agricultural and timber harvesting practices;
- The simplification of the remaining wildlife habitats within the ecosystem and gene pools; and
- The cumulative habitat effects of land and water resource development activities.

As a result of these causes and threats, many species endemic to the Lower Mississippi Valley have become threatened, endangered, or extinct. The Louisiana black bear is listed as threatened under the Endangered Species Act. The endangered red wolf and Florida panther are no longer found in the Lower Mississippi Valley; and the ivory-billed woodpecker and Bachman's warbler, once known to occur in the area, are considered endangered, if not extinct.

Elimination of forest habitats and forest fragmentation has decimated wildlife species throughout the Lower Mississippi Valley (Figure 3). Species most adversely affected by fragmentation are species that are area sensitive or dependent on special habitat requirements such as large, mature blocks of forest that offer secure nesting habitat and a particular food source. Forest fragmentation affects migratory songbirds mostly through high rates of nesting failure due to predation and cowbird parasitism--both are recognized by the Service as serious threats to wildlife in Louisiana. More than 70 species of breeding migratory songbirds are found in this region.

Figure 4. Breeding ranges and proposed critical habitat for the Louisiana black bear



Some of these species including the Swainson's warbler, prothonotary warbler, wood thrush, and cerulean warbler have declined significantly, and need the benefits of large forest blocks to recover and sustain their existence (pers. comm. Hunter, Fish and Wildlife Service).

Modifications to the historic flood plains have caused major declines in fisheries and aquatic resources productivity. The reduction of ecological functions from non-point source runoff of sediments, excess nutrients, and pesticides/herbicides is a continual threat to the remaining fisheries resources. The Service's Draft Fisheries and Aquatic Resources Strategic Management Plan for the Lower Mississippi River Ecosystem identifies 67 fish species as endangered, and 39 species as threatened. In addition, 16 other species are species of concern or proposed for listing. Only two threatened/endangered fish species occur in Louisiana.

The lack of bottomland hardwood forests and the impacts associated with fragmented forests pose a serious threat to migratory bird populations, black bear, and other resident species.

CONSERVATION PRIORITIES AND INITIATIVES

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

Bottomland hardwood forests are ranked as the highest conservation priority of the Fish and Wildlife Service and other agencies on which to focus management efforts. For example, the U.S. Department of Agriculture is working with the Service and landowners to restore forests on private lands to contribute to the recovery of the Louisiana black bear. The Lower Mississippi River Joint Venture (a consortium of public and private conservation groups) initiated cooperative efforts to restore lands that provide maximum benefits to migratory songbirds, and has identified conservation areas on which to focus future land protection and restoration efforts. The long-term goal is to provide forest islands called forest Source Population Objectives in the Lower Mississippi Valley ranging in size from 10,000 to more than 100,000 acres. The forest Source Population Objectives are priority areas for forest restoration and will someday serve as important anchors for biological diversity.

The Lower Mississippi Valley serves as the primary wintering habitat for mid-continent waterfowl populations, as well as breeding and migration habitat for migratory songbirds returning from Central and South America.

*Bayou Cocodrie
National Wildlife Refuge*

**Comprehensive
Conservation Plan**

Background



Black bear
USFWS Photo

The recovery of the Louisiana black bear involves a major conservation endeavor between federal, state, and private participants including the Service, Natural Resources Conservation Service, state agencies, universities, private conservation organizations, and the Black Bear Conservation Committee. The Service's recovery plan is to establish viable populations, promote various land protection methods that will establish migration corridors, and protect habitat. The Black Bear Conservation Committee is made up of public and private partners in Mississippi, Louisiana, and east Texas, and uses education and outreach as tools to promote the recovery of the black bear. The committee adheres to the Service's recovery plan. The overall goal of both the committee and the Service is to restore and protect a series of large forest blocks connected by corridors; to facilitate recovery of the bear in Louisiana; to identify protection areas in Louisiana as special focus areas; and to support black bear populations and provide movement corridors that serve as conduits of genetic exchange within the Lower Mississippi Valley. These forest blocks overlay the forest Source Population Objectives identified by the Service for this refuge. Forest Source Population Objectives are also identified for Tensas River National Wildlife Refuge in Madison and Tensas parishes, Louisiana, the Red River/Three Rivers Wildlife Management Area Complex in Concordia Parish, and the Atchafalaya Basin.

Conservation management on private lands is extremely important to fish and wildlife resources. The synergy of all federal, state, tribal, and private organizations working together will ensure that the Service not only protects the more important areas, but also reduces redundancy and overlap.

*Bayou Cocodrie
National Wildlife Refuge*

**Comprehensive
Conservation Plan**

Background

II. Refuge Description

**Comprehensive
Conservation Plan**

Refuge Description



Refuge sign
USFWS Photo

INTRODUCTION

Bayou Cocodrie National Wildlife Refuge is located in east central Louisiana, 13 miles west of the Mississippi River and Natchez, Concordia Parish, Mississippi (Figure 5). The city of Ferriday, located about 4 miles northeast of the refuge, is the nearest community. Although the refuge was established in 1990, to date, only 13,168 acres have been acquired within the 22,269-acre acquisition boundary (Figure 6). In addition to this acquisition boundary, areas outside the boundary are being studied for inclusion in the refuge system and/or partnership planning efforts. It also includes portions of the Lower Mississippi Valley watershed that affect the planning study area (Figure 7).

The potential wildlife habitat values of old growth bottomland hardwoods and adjacent forests provided the impetus to purchase the property from its original owners. In 1988, The Nature Conservancy purchased 11,230 acres from the Fisher Lumber Company, a subsidiary of General Motors, for resale to the Service.

Management efforts since 1990 have emphasized acquiring land, securing staff to operate the new facility, and initiating conservation programs that benefit resident wildlife species. However, Service acquisition of key properties, such as inholdings and bottomland hardwood forest habitats, may not be realized within the 15 year planning period due to budget constraints and landowner preferences. The 13,168-acre refuge boundary has a significant edge which contributes to predation of nesting forest birds. Edge effect is the tendency of a transitional zone between communities to contain a greater variety of species and more dense populations of species than any surrounding community. Such is the case between wildlife communities that occupy dense bottomland hardwood forests and wildlife found in open, cultivated agricultural lands.

Conservation management projects include:

- Conducting comprehensive assessments of existing fish and wildlife resources;
- Recruiting and training staff and improving existing facilities;
- Defining refuge objectives that will contribute to maintaining biological diversity within the Lower Mississippi Valley;
- Managing habitats to reduce threats and problems (i.e., forest fragmentation, loss of old growth forests) associated with species of concern;
- Assisting in black bear recovery efforts; and
- Defining research within the old growth area and involving partners to accomplish the research.

Figure 5. Refuge location

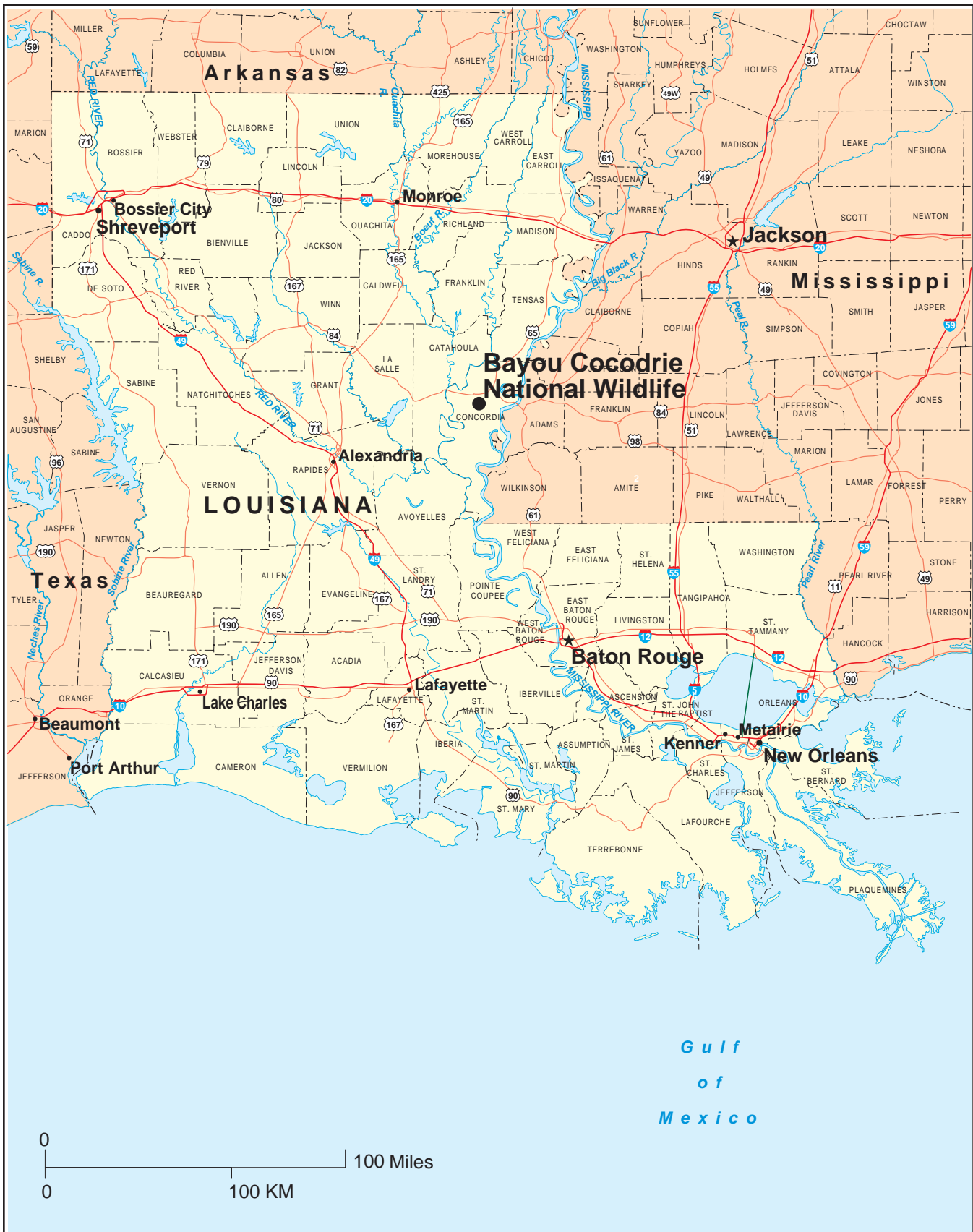


Figure 6. Approved aquisition target areas

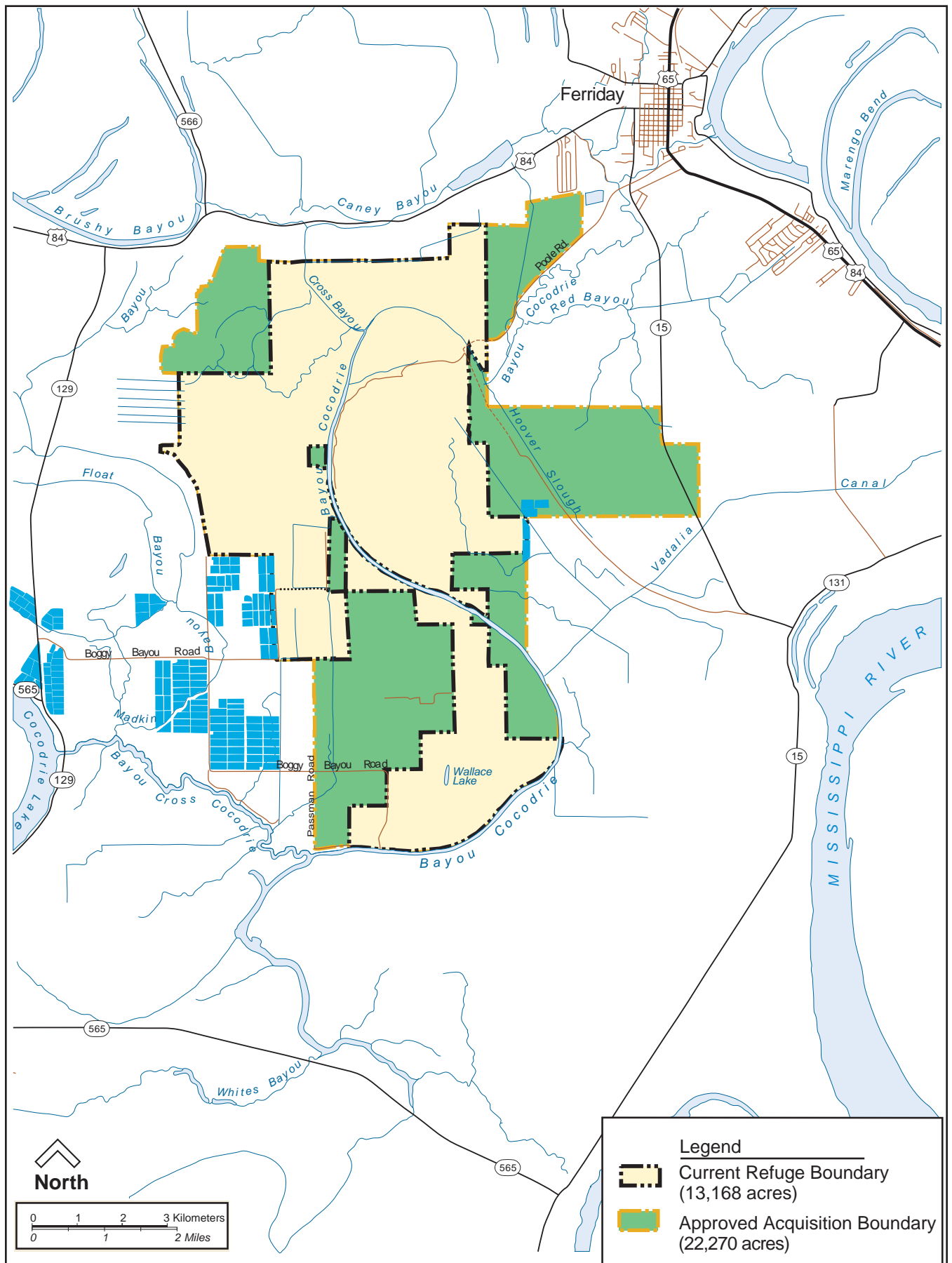
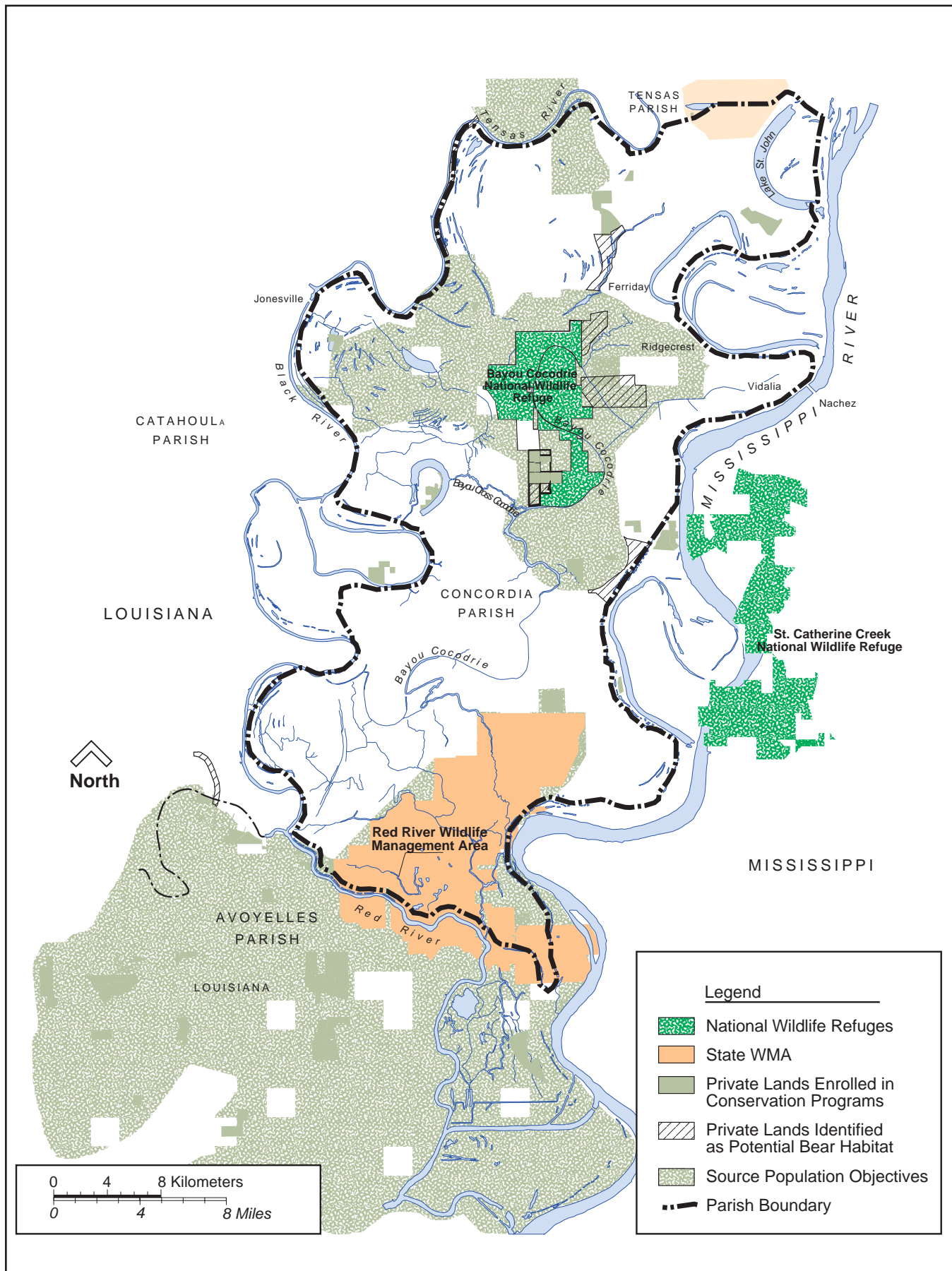


Figure 7. Planning study area



PURPOSE

Congress authorized the establishment of Bayou Cocodrie National Wildlife Refuge on November 16, 1990, through Public Law 101 593 (Section 108, House Report 3338), to protect some of the last remaining, least disturbed bottomland hardwoods in the Lower Mississippi Valley. Congress stated the refuge purpose as follows:

"The Bayou Cocodrie National Wildlife Refuge is established and shall be managed for the purposes of (1) conservation and enhancement of wetlands; (2) general wildlife management as a unit of the National Wildlife Refuge System, including management of migratory birds; and (3) fish and wildlife-oriented recreational activities."

In establishing the refuge, Congress recognized the significance of this area in its findings:

"The Bayou Cocodrie area is a bottomland hardwood swamp which borders (supports or harbors) more than one hundred and fifty species of birds and many other types of wildlife, including several species threatened with extinction, such as the Louisiana population of black bears. The Bayou Cocodrie area includes some of the least disturbed bottomland hardwood forests in the southeast and significantly contributes to the biological diversity in the region."

In managing the refuge, the Secretary of the Interior shall manage:

"...an amount of refuge woodlands as a contiguous forest sufficient to benefit the species of passerine birds that occupy this type of habitat. The Secretary shall give special consideration to accomplishing this objective through the use of current authority, including his authority to establish Research Natural Areas within the Refuge."

Expanding on the primary purpose, objectives were defined in the June 1992 Environmental Assessment and Land Protection Plan prepared by the Service. The management objectives include:

- Providing wintering habitat for migratory waterfowl;
- Establishing habitat for a natural diversity of wildlife;
- Providing habitat for non-game migratory birds (neotropicals);
- Establishing a Research Natural Area; and
- Providing opportunities for environmental education, research, interpretation, and other wildlife-dependent recreation.

BIOLOGICAL ENVIRONMENT

Fish, Wildlife, and Plant Populations

The refuge serves as a critical repository of gene pools, species, and communities that must contribute to the overall health of the Lower Mississippi Valley Ecosystem. Named after the native alligator



Yellow-throated warbler
USFWS Photo

(crocodile) and the bayou that runs through it, the refuge provides an important ecological niche for fish, wildlife, and plant species. The Service manages refuge resources and, where possible, coordinates with neighboring land managers and agencies to conserve biological diversity. The high quality forests, long growing season, abundant rainfall, and geographical proximity to the Mississippi River provide habitat for a diversity of resident species, including migratory songbirds and black bear. The refuge is home to a wide variety of amphibians, reptiles, mammals, and birds and is well known locally for its wildlife habitat. Songbirds, white tailed deer, waterfowl, shorebirds, raptors, reptiles, amphibians, woodcock, furbearers, and other mammals utilize this area. A list of wildlife species known or predicted to inhabit the refuge is included in Appendix D.

A thorough documentation of the population status of wildlife other than neotropical songbirds has not been conducted. Excellent documentation of neotropical bird use of portions of the refuge has been accomplished under Service sponsorship by the Louisiana State University Avian Laboratory.

Threatened Species and Species of Management Concern

Infrequently, the refuge staff observes footprints of the transient Louisiana black bear, which is listed as threatened under the Endangered Species Act. The threatened bald eagle has been observed on the refuge. Initial and unpublished studies have indicated that the refuge's old growth trees are important roosting sites for the Rafinesque's big-eared bat, a species of management concern (unpub. reports, Cochran and Fish and Wildlife Service 1999). The Florida panther and the red wolf were former residents of the area, but none have been documented in the last 40 years.

The refuge location and habitat features are significant for the future conservation of the Louisiana black bear. Restoration efforts proposed by the Black Bear Conservation Committee include proposed bear management units that would protect lands outside the current refuge acquisition boundary. The Service, the Louisiana Department of Wildlife and Fisheries, and members of the Black Bear committee are planning to eventually move females onto the refuge, and other public lands near the refuge, in an effort to reestablish breeding populations. The committee also has identified private lands that could be used as corridors between breeding bear populations. A combination of protected and managed public and private lands would provide the necessary forested blocks and corridors for bears to move about with minimal disturbance. The Natural Resources Conservation Service plays a major role in black bear recovery efforts by implementing land protection programs that provide an economic incentive for farmers to restore farmlands and place them in conservation easements.

Avian Species

Avian species are extremely important wildlife resources identified on the refuge with more than 186 species recorded within the refuge

border (unpub. data, Ouchley). The bottomland hardwood forests serve as important habitat for breeding birds and migratory birds in the spring and fall. Surveys and studies indicate that this refuge may contain the most diverse assemblage of migratory bird species remaining in the Lower Mississippi Valley.

For migratory forest breeding songbirds and shorebirds, the ecological and biological significance is transcontinental, providing breeding and migration habitat for gulf migrants returning from their wintering grounds in Central and South America. Songbird studies have been conducted in the Brooks Brake Unit, which contains a 750-acre old growth forest stand. Additional surveys and monitoring would confirm breeding songbird survey information, nest success, and other key measurements. Such species as warblers, vireos, tanagers, flycatchers, and indigo buntings are common residents.

The refuge and the Lower Mississippi Valley serve as the primary wintering ground for mid-continent waterfowl populations breeding in the prairies and parklands of Canada and the United States. Excellent historic conditions, typical of refuge habitats, once supported migratory waterfowl. Management efforts to improve wintering waterfowl habitat on refuge lands are underway and will increase as additional lands are purchased. Typical winter residents include mallards, teal, and wood ducks. Waterfowl species known to nest in this area include wood ducks and hooded mergansers. Restoration and management of wetlands on the refuge would create additional resources for dabbling ducks.

Waterfowl population objectives are tied to supporting the North American Waterfowl Management Plan. A 440-acre moist-soil impoundment is managed adjacent to a recently reforested area and cropland. The refuge impoundments, in conjunction with naturally flooded forest habitat, will eventually support about 480,000 duck-use-days. The refuge population objective will average between 5,000-10,000 ducks for 110 days (unpub. report, Bayou Cocodrie National Wildlife Refuge 1998). This population objective is supported by the moist-soil unit, flooded sloughs, Wallace Lake and Little Wallace Lake, as well as brakes subject to flooding. Managers focus work on the moist-soil units, selected sloughs in the Brooks Brake Unit, and construction of wood duck boxes. The only breeders utilizing the bottomland hardwood forests are wood ducks and hooded mergansers.

Wading birds are abundant in the small lakes and numerous sloughs. The backwater bays, sloughs, and depressions provide habitat for shorebirds such as yellowlegs, sandpipers, plovers, gulls, and terns that can be found using wetland mudflats and bayous during their spring and fall migrations. Herons and egrets are plentiful.

Mammals

Mammals are numerous and observed throughout the refuge. No comprehensive list of mammalian species exists for the refuge, although it is known which mammals occur in this area (St. Amant 1951 and Lowery 1981). The refuge area contains seven orders of

mammals including pouched mammals (opossums); insect-eaters (shrews and moles); bats; flesh-eaters (long-tailed weasel); gnawing mammals (southern flying squirrel); rabbits; and even-toed hoofed mammals (white-tailed deer).

The bottomland hardwood communities are very productive for a wide array of wildlife species, including game animals. Game species include white-tailed deer, grey and fox squirrels, and swamp and cotton-tailed rabbits. Furbearers include beaver, nutria, otter, striped skunk, coyote, grey and red fox, mink, and bobcat. The deer hunt program is designed to maintain herd levels at or slightly below carrying capacity. Population levels have improved dramatically since Service acquisition, as have herd health indicators. Average body weights are improving and mature bucks may weigh in excess of 250 pounds live weight. Future deer populations will be a reflection of both forest management and deer harvest.

Raccoon populations are monitored to ensure compatible levels with other species. Negative impacts from excessive population numbers include depredation on turkey, neotropical birds, and wading bird nests.

Feral hogs compete with resident wildlife for food and can cause crop damage to neighboring farms. Hunting and removal programs should bring these animals under control.

Reptiles and Amphibians

Although frequently observed, much is still unknown about reptile and amphibian population levels on the refuge. At least thirty species of reptiles and amphibians and a variety of native and non-native aquatic species are known to occur on the refuge. The diverse group of amphibians including salamanders, toads, and frogs is well adapted to the aquatic and terrestrial environments, and moisture is typically important for the group's survival. Reptiles including turtles, alligators, lizards, skinks, and snakes are common.

Aquatic Species

These species are most commonly observed along the main stem of the Bayou Cocodrie. Although limited, the refuge does provide an important fishery resource for local fishermen. Most of the aquatic habitat consists of beaver ponds, oxbow lakes such as Wallace and Little Wallace, and Cross Bayou streams that support commercial fishing for catfish, buffalo, alligator gar, and freshwater drum. Sport fishing populations of crappie, bass, and bream are also found in these lakes, although the populations are low due to periodic water quality problems, particularly high turbidity. Access to the lakes is very limited.

Mussels

A comprehensive mussel survey has not been completed for the refuge; however, a survey was conducted at St. Catherine Creek National Wildlife Refuge, which is located 20 miles to the southeast. This survey indicated the possibility of the following mussels occurring on the refuge: fat pocketbook, mapleleaf, flat floater, paper

pondshell, giant floater, Texas liliput, pond, yellow sandshell, paper-shell, pink papershell, and southern mapleleaf.

Old Growth

Old growth, an extremely important, if not one of the greatest ecological assets of the refuge, is a vanishing native habitat in the Lower Mississippi Valley. This rare hardwood plant community has outstanding ecological value, especially for forest interior breeding songbirds. While there is no formal initiative in place that outlines a specific technical approach for managing the old growth area, the Service will monitor the quality and condition of this site and propose it for Research Natural Area designation. Due to its significance, it will be afforded special protection and will be used as a model for study on which to base management direction of the refuge.

Invasive Species

Also known as exotic or non-native species, invasive species are becoming an increasing concern of refuge staff. Feral hogs and Chinese tallow pose threats to the biological diversity of the refuge. Feral hogs degrade wildlife habitat, and being omnivores, prey on young livestock, as well as fawns and ground nesting birds. Feral hog habitat preferences include moist bottomlands and dense vegetation along rivers and streams. Upland habitats where oak mast is found also attract these scavengers. Feral hogs are prolific reproducers. Control methods commonly used on the refuge to reduce the populations include hunting and trapping. Chinese tallow (*Sapium sebiferum*) is a small- to medium-sized tree that is reported in small numbers on the refuge. The plant is highly invasive and could quickly out-compete native plant species if left unattended.

Habitats

The habitat communities of ridge and swale topography are important for the long term survival of many plant and wildlife species (Figure 8). About 10,600 acres of these forests are within the refuge boundary. The forests, however, exhibit poor canopy, midstory, and understory structures to support populations of priority bird species, including the swallow-tailed kite, Cerulean warbler, Swainson's warbler, and American woodcock. The swallow-tailed kite and Cerulean warbler are extirpated from the refuge, but historical records suggest that the refuge was once included in their breeding range (Cooke 1904, Beyer 1900, Oberholser 1938). Managing to exhibit the features, functions, and processes characteristic of old growth communities may yield the highest benefit for priority bird species.

The refuge was established to protect the exemplary 750-acre old growth forest noted for its outstanding wildlife habitat value. This area supports a variety of sensitive species, including nesting songbirds. Natural communities include bottomland hardwood forests, marsh or herbaceous wetlands, swamps, streams, and lakes/deep-water habitats typical of the ridge and swale topography associated with bottomland hardwood forests in this area (Figure 9).

Figure 8. Habitat communities of ridge and swale topography

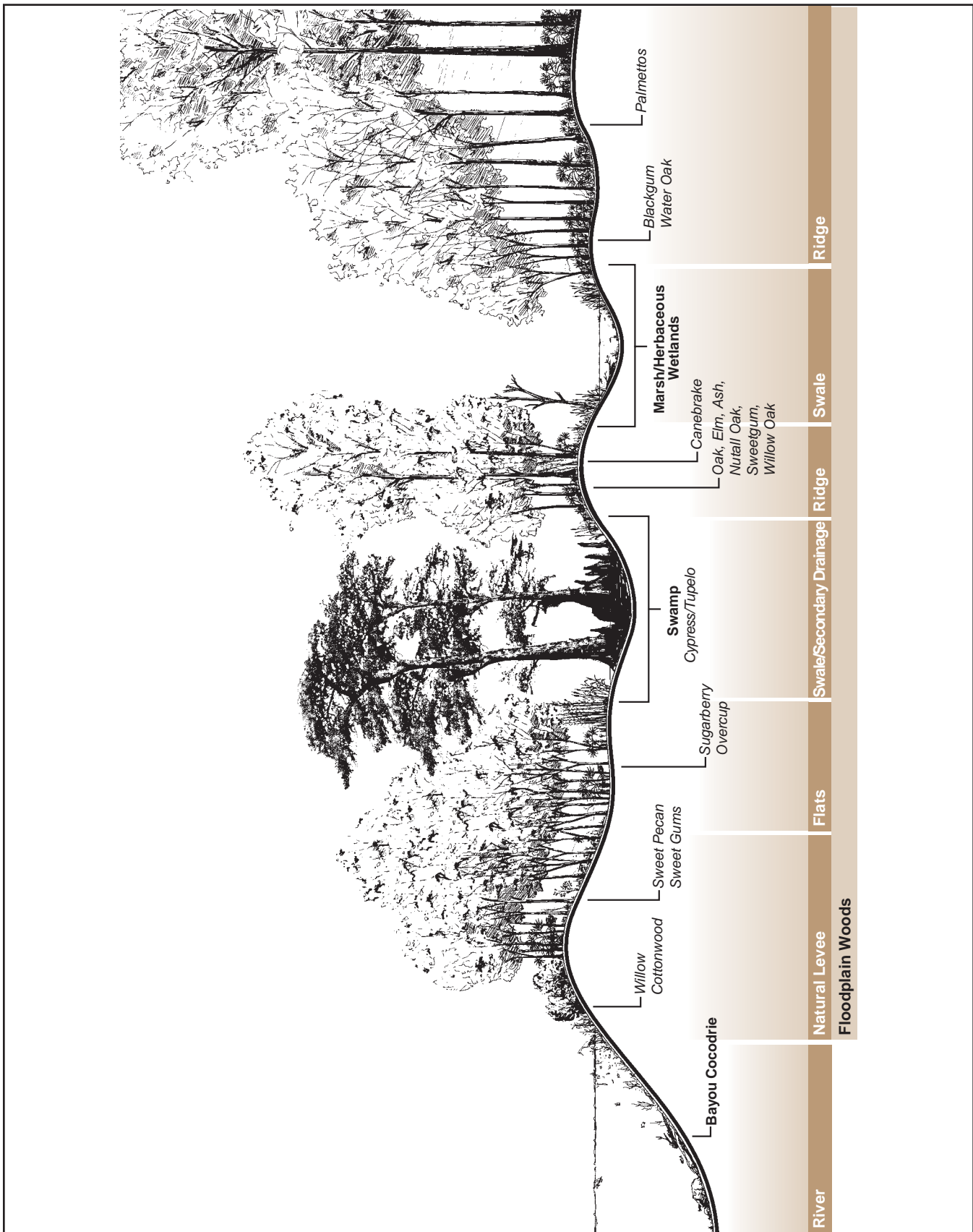
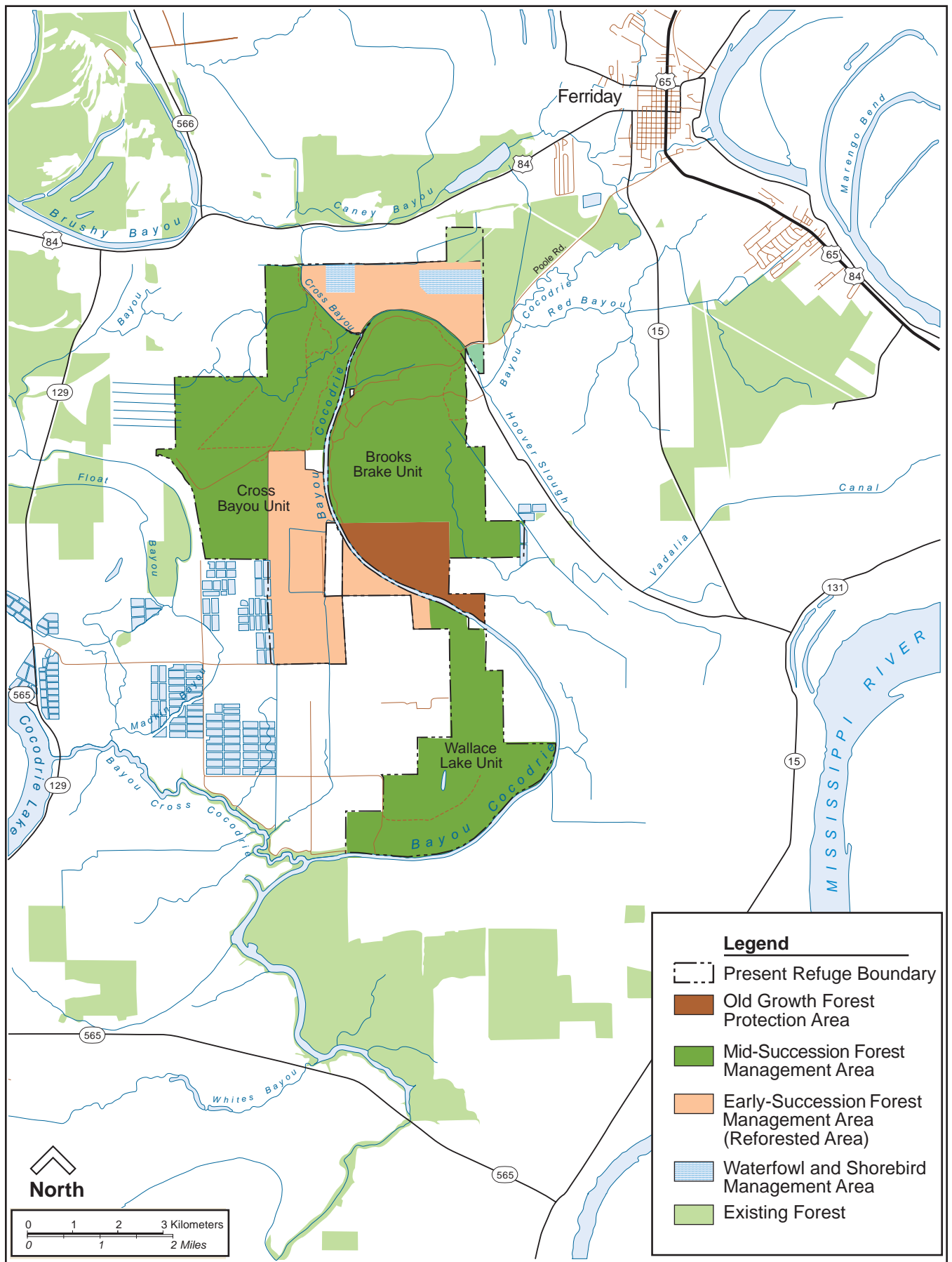


Figure 9. Existing habitat management





Lofton water control structure
USFWS Photo

Due to the refuge's location, soils, and annual rainfall, which exceeds 60 inches, much of the vegetation consists of bottomland hardwood communities, with the exception of the recently reforested agricultural portions where weeds and grasses predominate.

Forest plant communities differ with slight elevation changes and the understory is reflective of sunlight conditions caused by the canopy closure. Quick to recover from disturbances, soils are fertile with a high site index and fast tree growth. Forest age ranges from very young to relatively old, depending on the site. Trees range in type from red gum, red oak, and sweet pecan on the ridges, to overcup oak, hackberry, and green ash in the flats, to cypress and bitter pecan in the lowest areas. Examples of dominant vegetation include cypress, cottonwood, black willow, sweet pecan, overcup oak, Nuttall oak, winged elm, and Tupelo gum. Sub-dominant plants include palmetto, switchcane, hawthorns, honey locust, and box elder. Other understory plants include smilax, honeysuckle, blackberry, dewberry, and a host of vines including rattan, muscadine, and poison ivy. Wet site vegetation includes pickerel-weed, day flower, water hyacinth, various sedges, and marsh mallow.

The refuge's aquatic habitat includes bayous, creeks, lakes, beaver ponds, and permanent and seasonal swamps. Bayou Cocodrie is a tributary of the Red River, located west of the Mississippi River in east-central Louisiana. Wetlands and deepwater habitat include small lakes, swamps, ponds, and perennial and intermittent streams. Wallace Lake has permanent water. Seasonal floodwater remains in the shallow swales for several months, and in recent years, many of swales in both the Brooks Brake and Wallace Lake units have held water year-round.

Bayou Cocodrie begins at Concordia Lake. This secondary waterway is sluggish due to the flat terrain and management of the downstream weir on Wild Cow Bayou. The backwater flooding is virtually gone because of downstream pumping, resulting in the loss of seasonal flood waters. About 6 miles of this 30-mile river lie within the refuge boundary, and are flanked by natural levees that result in some of the highest ground on the refuge. As it exits the refuge, the bayou flows southward for a distance of 12 miles. Fish habitat diversity is only fair due to the sluggish nature of the stream and the impacts of land use in the watershed.

Old fields where former landowners actively clear-cut and then farmed are scattered along the refuge. Since 1996, managers have been replanting these areas in mixed hardwood seedlings. About 1,100 acres were managed under lease agreements between the refuge and local landowners to produce millet, buckwheat, and perennial grasses for foraging of wintering waterfowl, but these lease agreements have been discontinued. The lands are scheduled for reforestation over the next two planting seasons.

Reforestation efforts will increase the present forest block size and provide direct benefits to many nesting migratory birds and black bear, as well as many other indigenous species.

EDUCATION AND VISITOR SERVICES

Activities oriented toward interaction with and appreciation of wildlife and native habitats are a high priority of the refuge. Wildlife-dependent recreation includes wildlife observation (by hiking and canoeing), hunting, fishing, and photography. Hunting and wildlife observation have been the mainstay of this refuge. Currently, there are no interpretive facilities on the refuge.

Since the passage of National Wildlife Refuge System Improvement Act of 1997, the refuge has adopted hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation as the six priority general public uses. These uses, as such, are management's primary focuses and over time programs will be developed to increase visitor awareness and appreciation of fish and wildlife resources.

The public has yet to discover the natural beauty and wildlife of this refuge. It is largely undeveloped and in 1999 received about 5,500 visitors. The refuge offers hunting and wildlife observation as the primary recreation activities because of lack of facilities and staff to support other programs. Recreation data is limited. The refuge is open during the hunting season with some fishing access allowed at the south end. Public access to the interior of the refuge is limited to a 13-mile trail system located in the Brooks Brake Unit. This area offers the best access from public roads. About 4 miles of trail are open to use by all terrain vehicles for access during the hunting season. A 0.5-mile trail is managed for wheelchair access.

The refuge serves as a location for wildlife dependent recreation uses by keeping valuable wildlife habitats in the public trust. Trails are maintained for hunting access, wildlife observation, photography, and hiking. The staff contributes time to local schools and civic groups when requested, and periodically conducts specialized environmental education programs. Forest tracts on private lands throughout Concordia Parish have added value for hunting although much of the land is leased as hunting clubs.

There are other public lands within commuting distance that offer wildlife dependent recreation experiences. Five national wildlife refuges - Tensas River, Catahoula, Grand Cote, and Lake Ophelia in Louisiana, and St. Catherine Creek south of Natchez, Mississippi - are within a 2-hour drive of Bayou Cocodrie National Wildlife Refuge. Tensas River National Wildlife Refuge offers an ever-expanding interpretive and environmental education program. Catahoula National Wildlife Refuge provides wildlife observation and photography opportunities with its wildlife drive, observation sites, and trails around Catahoula Lake, one of the most popular over-wintering waterfowl sites in the area. Waterfowl hunting and big, small,

and upland game hunting, using various forms of weaponry, are offered on each refuge.

In Concordia Parish, the Red River/Three Rivers State Wildlife Management Area Complex offers hunting and fishing activities. The Bayou Cocodrie is a state designated scenic river (Louisiana Department of Wildlife and Fisheries 1998). In 1998, the state offered a total of 3 days of modern gun deer hunting--2 days were managed for take of either doe or buck, and 1 day was managed for buck only. The state allows for the use of both modern and primitive weapons. In addition to deer hunting, the Red River Wildlife Management Area is also open to waterfowl and small game hunting.

The Louisiana Department of Wildlife and Fisheries and the Army Corps of Engineers manage more than 60,000 acres of public lands in Concordia Parish to support hunting and fishing. Other fishing opportunities are available at nearby national wildlife refuges. Facilities found at these refuges include fishing piers, boat ramps, and bank fishing areas. Some refuges offer universally accessible fishing areas.

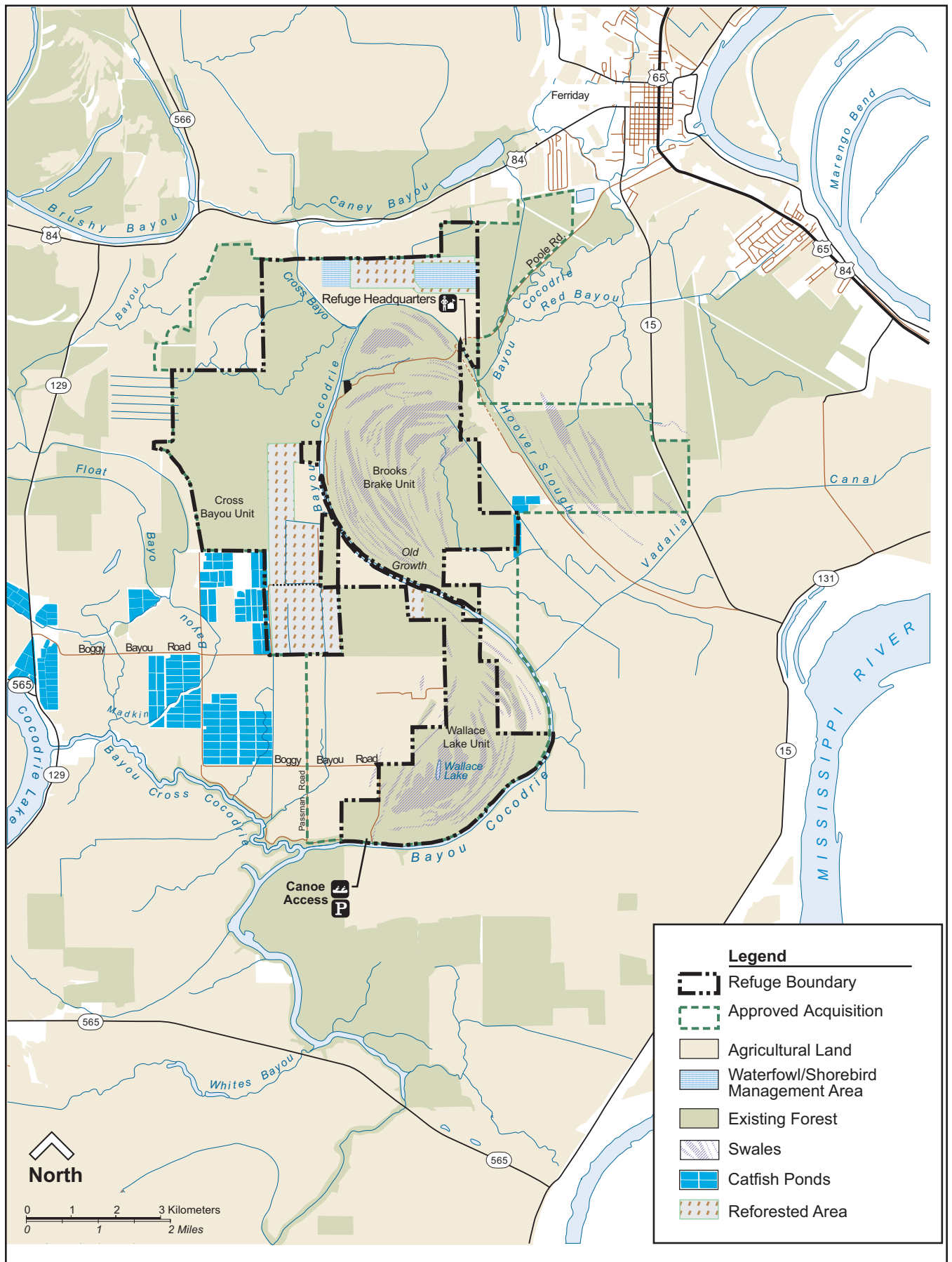
REFUGE ADMINISTRATION

Refuge administration refers to the operation and maintenance of refuge programs and facilities including new construction. The refuge staff consists of six permanent employees. Until 1997, the refuge had two employees and was managed on a custodial basis. The staff coordinates extensively with landowners, conservation organizations, local agencies, and civic groups. The Service is concentrating efforts with the Natural Resources Conservation Service to coordinate land conservation projects on private lands. Of particular interest to the Service is the protection of forested tracts near the refuge boundary that will assist in the long term recovery of the Louisiana black bear.

The staff is focusing efforts on protecting needed lands and developing a systematic approach to manage biological resources. The staff maintains one administrative site, the main headquarters located on Poole Road. The administrative site contains an office, a connecting maintenance shop, and a storage shed for vehicles. The facility has limited space for present staff and lacks a safe fuel storage building. Also lacking are informational/interpretive displays.

Three management units, Cross Bayou, Brooks Brake, and Wallace Lake (Figure 10), are entirely accessed by external roads maintained by the parish and the state. At times, refuge trails are impassable due to localized flooding. Maintenance access is via the same trail system used by visitors. Poole Road, which serves as the main access to the refuge, is primarily gravel and once served as the underlying bed for railroad transport. At times, railroad spikes surface and pose problems for motor vehicle traffic. Boggy Bayou Road is located at the southern terminus of the refuge and terminates next to Bayou Cocodrie. Small boats are launched at the terminus of this road and

Figure 10. Refuge land use features





Brooks Brake unit
USFWS Photo

school buses utilize it for a turnaround. This site is noted as an excellent location to develop a trailhead for boat/canoe launch purposes. Access to the south end of the Brooks Brake Unit is limited and requires permission from the landowner.

The roads and private lands adjoining the refuge have a direct influence on wildlife as they remove habitat in proportion to the areas they occupy. In addition, access provided to wildlife areas has resulted in increased disturbance and poaching in some locations. Several species, including nesting songbirds, avoid roads, trails, and roadside areas thereby reducing availability of habitat (pers. comm., Hunter). Refuge trails are maintained biannually to help provide habitat for birds and other wildlife that utilize edges.

The Federal Highway Administration is planning improvements for Highway 84, the major road to the north of the refuge. The refuge is coordinating the development of these improvements as part of the overall environmental compliance requirements.

RESEARCH NATURAL AREA

Research Natural Areas are designated by federal land management agencies to preserve plant and animal communities in a natural state for research purposes. These areas protect and manage vanishing native habitats that exhibit outstanding ecological value by preventing unnatural encroachments and activities that directly or indirectly modify ecological processes.

House Report 3338-4 describes the need for designating a Research Natural Area as: "In managing the refuge, the Secretary shall manage an amount of refuge woodlands as a contiguous mature forest sufficient to benefit the species of passerine birds that occupy this type of habitat. The Secretary shall give special consideration to accomplishing this objective through the use of his current authority, including his authority to establish Research Natural Areas within the refuge."

A major feature associated with the refuge is the unique old growth site in the south Brooks Brake Unit. When Congress established the refuge in 1990, it directed the Service to protect the old growth area and evaluate it to be managed as a Research Natural Area. This designation is important because the site will serve as a comparison model for scientists to learn more about land management, and to utilize techniques on other sites of the refuge and within the Lower Mississippi Valley. Biologists will gain first-hand knowledge of the values of old growth and coordinate new management approaches to solving habitat issues related to old growth functions.

LAND PROTECTION AND CONSERVATION

Of the total refuge acquisition boundary of 22,269 acres, the Service has acquired 13,168 acres thus far, leaving a balance of 9,101 acres in

private ownership. The acquisition boundary includes a 5,000-acre expansion based on recommendations contained in the Louisiana Black Bear Habitat Protection Plan approved on September 28, 1999.

The refuge staff is focusing on land acquisition within the refuge acquisition boundary by coordinating priorities identified by the Lower Mississippi River Ecosystem Team. Land protection goals set for the refuge will support strategic growth in areas where there is greatest concern, namely lands identified for migratory songbirds and black bears.

The Federal Government does not pay property taxes, but payments are made to local communities to offset taxes on those properties removed from the tax rolls. The refuge is exempt from land-based tax rolls but contributes to the local parish through the use of the Refuge Revenue Sharing Act of 1964. The local government is provided with a share of revenues from refuge receipts in lieu of taxes it normally receives from properties in private ownership. In 1999, Concordia Parish received \$49,813 as its share of these funds.

Private lands in Concordia Parish enrolled in conservation programs contribute significantly to wildlife conservation. The Service has an active partnership with several agencies and organizations to enroll private lands in these programs. Approximately 1,600 acres adjacent to the refuge are enrolled in the Wetlands Reserve Program administered by the Natural Resources Conservation Service. Private land enrollment in conservation programs will continue to be encouraged to augment Service program and mission requirements. Concordia Parish topography is 5 percent lakes, rivers, and bayous; 63 percent cultivated croplands; and 32 percent forests. The topography is characterized by undulating lands or lands locally referred to as ridges and swales. The swales are old river scars. The average ridge elevation fluctuates to about 3 feet in grade and ridge width varies between 120 to 350 feet. The swales or depressions vary from 50 to 300 feet wide. Surface gradient is 1 to 2 percent and drainage is localized. Natural levees along present waterways generally range from 3 to 5 feet.

CONTAMINANTS

Contaminants are not well studied on the refuge. The Service completed site contaminant inspections (Level 1) on properties prior to purchase from 1993 through 1995. A preliminary Environmental Site Assessment of the refuge, prior to Service acquisition, reported that the potential for environmental contamination was low. Beginning in October 1997, the Department of Toxicology of North Carolina State University initiated a study to assess potential biological impacts and hazards resulting from contaminant exposure and the importance of this exposure relative to other biological impacts, such as habitat alteration. The final report is pending. An integrated pest management plan is scheduled to be developed in 2004.

CULTURAL RESOURCES

No detailed archaeological or historical site investigations have been documented for the refuge. The majority of past cultural resource investigations focused along sites at Brushy Bayou, Cross Bayou, and Cocodrie Lake (Ford 1936; Keller and Campbell 1983; Servello 1976; Lower Mississippi Valley Survey 1964; Cusick and McMakin 1994; Cusick et al., 1995; and State of Louisiana Site Files). Many of these investigations focused on the archaeological manifestations of early Native American groups, (i.e., Marksville, Natchez, and Tunica) which have resulted in the identification of several major single mounds and mound groups (16Co9, 16Co14, 16Co15, 16Co80, 16Co92, 16Co99, and 16Co102). Occupations of these sites date from Poverty Point through the Coles Creek Periods [ca. 2000 B.C. 1250 A.D.] (Neuman 1984; Jeter et al., 1989). Cusick and McMakin 1994, and Cusick et al., 1995, recorded several late 19th and early 20th century tenant farm sites and the early 20th century sharecropper community of Frogmore (16Co159). The latter is located on Brushy Bayou just north of the refuge. Frogmore centered around a cotton gin, a store, and a post office. Levee and road construction and agricultural activities have adversely impacted the archaeological deposits associated with many of these sites. However, oral history interviews and documentary research could provide a wealth of information regarding the refuge and the parish

PHYSICAL ENVIRONMENT

The refuge geology is underlain with Pleistocene deposits of the Mississippi River which extend and dip toward the coast. A Pleistocene-age eroded subsurface exists at 50 to 150 feet below the surface, with Tertiary age sedimentary deposits beneath this subsurface (Saucier 1994). Faulting is commonly related to sediment loading and deep-seated salt movement and may provide conduits for potential cross-formation groundwater flow.

Virtually all of the soils are Alligator-Tensas-Dundee-Sharkey-Tunica, and Sharkey-Alligator-Tensas. These soils are clay or loam and have clay or loam subsoils. The soils are fine textured and poorly drained with low permeability. Standing water is common during rainy periods of the year. These soil types are highly restrictive for urban and agricultural uses because of their high shrink-swell characteristics and low-bearing strength.

Hydrology and water management influences the function of habitats on the refuge. Bayou Cocodrie is a meandering tributary of the Red River. Historically, when the Red River reached flood stage, backwater flooding was common within the watershed. Since the development of flood control structures, Bayou Cocodrie's natural overflow is restricted to large flood events. The natural sediment supplies at the refuge are threatened by flood control and agricultural operations, including the operation of the Wild Cow Bayou weir which prevents the natural back flow of floodwaters.

*Bayou Cocodrie
National Wildlife Refuge*

**Comprehensive
Conservation Plan**

Refuge Description



Muzzle loader deer hunter
USFWS Photo

Nearby levees, irrigation channels, and pumps have influenced the change of riparian systems to water development projects in support of agriculture. Natural flooding assists in maintaining healthy bottomland hardwood forest habitat by recharging the forest with sediment and nutrients.

The refuge is within the 582-square-mile Tensas-Concordia Levee area. The levee system borders the Red, Black, and Tensas rivers and was built for flood protection. For the most part, the historic backwater flooding is impeded because of the ring levee and pump systems operated on the Wild Cow Bayou in western Concordia Parish. Bayou Cocodrie functions more like a lake than a free flowing stream due to the weir on Wild Cow Bayou (Corps of Engineers 1990, Soil Conservation Service 1968).

The subtropical climate is characterized by high humidity, an absence of extreme temperatures, and abundant rainfall distributed evenly throughout the year. The climate is controlled by warm, moist air from the Gulf of Mexico, and cooler, drier air from the central plains. Extended hot, sultry summers and moderately cool winters are normal. The summers have about 85 days with highs greater than 90 degrees Fahrenheit. The winters are marked by brief cool periods with average winter highs in the mid-50s. Annual rainfall is 55 inches and the growing season is approximately 220 days in duration. The average annual runoff occurs from December to April. Evaporation exceeds precipitation in the summer.

SOCIAL AND ECONOMIC ENVIRONMENT

The rural character and sparse population are characteristic of east-central Louisiana. Census data from 1990 indicate that the parish had a population of 20,828 people, which is a decline of 9 percent since the 1980 census. The parish seat, Vidalia, had a decline in population from 6,000 in 1980, to some 4,953 in 1990. Ferriday had a 1980 population of 5,500, and a 1990 population of 4,111. Population shifts in Concordia Parish, as a whole, are largely attributable to a decline in the farming, oil, and gas sectors of the economy since the early 1980s.

Per-capita income recorded for Louisiana in 1998 was \$22,206 (USDA, ERS 1998). Overall, Louisiana ranks among the one of the poorest states in the country. Oil and gas production and agriculture have long been the main economic base in Concordia Parish and surrounding areas. Some of the major private employers in Concordia Parish include Wal-Mart, Aluminum Company of America, D&D Petroleum, Rogers Lumber International, Inc., and Ferriday Market. Other major employers include the Concordia Parish Schools, Riverland Medical Center, and Concordia Electric Cooperative (Fish and Wildlife Service et al., 1998 Appraisal Report).

Lands adjacent to the refuge are privately owned and managed for farmland, catfish, and timber. Concordia Parish consists of about 479,000 acres, of which 63 percent is cultivated cropland, and 32 percent is woodland. The surrounding farmland primarily is farmed for

soybean, cotton, corn, and catfish. Scattered forests surrounding the refuge are valued as private hunting clubs. There are approximately 1,050 farms (averaging in size of 586 acres) in Concordia Parish with more than 700 receiving some form of payment from the U.S.

Department of Agriculture. Farm commodity prices, in general, have decreased since the mid-1980s and more dramatically since the passage of the 1996 Farm Bill. Poor farm production, drought, and low commodity prices in the last three seasons have encouraged many producers to sell their farms and/or enroll them in some type of conservation program. Income derived from land sales and enrollment in conservation programs (including restoration for waterfowl and black bear habitat) is very important to the local economies (pers. comm., Natural Resources Conservation Service 1999). Due to poor yields in 1998, Concordia Parish claimed the largest conservation reserve program enrollment in the state. In 1999, the Wetlands Reserve Program reported that more than 8,000 acres were enrolled with a total of more than \$5 million invested in Concordia Parish. Within the refuge boundaries, most of the commercially owned timberlands were partially or totally harvested from the 1920s to the 1940s, with final sales recorded in the 1970s and 1980s.

REFUGE RELATED PROBLEMS AND ISSUES

In 1990, Congress established the refuge to protect and restore bottomland hardwood forests for a diversity of wildlife with special emphasis on migratory birds and the Louisiana black bear. To date, 13,168 acres, which make up the refuge, are considered a significant shortfall and insufficient to fully implement the purposes legislated by Congress.

The key biological value of the refuge is the bottomland hardwood forest communities, particularly the rare old growth plant community. Many migratory land birds depend upon these forest habitats for a portion of their life cycle. Of the 186 species of birds and a host of other mammals, reptiles, amphibians, and fish that utilize the refuge, 4 species have been federally listed as either threatened or as species of management concern. The Louisiana black bear has long been a focus of management efforts at Bayou Cocodrie Refuge.

Road development, forest fragmentation, loss of older-aged forests, recreational use, and rural development on lands surrounding the refuge represent the land status trends in Concordia Parish. The surrounding development has led to declining wildlife populations, habitat degradation, wildlife/people conflicts, pesticide accumulation in the water, pest management problems, and a need for increased law enforcement to administer hunting programs.

Many of the refuge's significant resource problems and management challenges are reflected on a larger scale within the Lower Mississippi Valley. These problems, both individually and cumulatively, play a significant role in determining future conditions on the refuge. These problems and challenges are briefly summarized in the following paragraphs.

Forest Fragmentation

The greatest challenge to meeting refuge objectives is forest fragmentation within a landscape scale. Although the refuge is mostly forested, it is considered fragmented because it is within a mostly agricultural landscape. The present configuration and size of the refuge is not sufficient to support or contribute to populations of area sensitive, mature forest birds such as the Swainson's warbler. The refuge must secure and restore additional lands within the current acquisition boundary to form a contiguous forest of sufficient size to meet refuge objectives.

Forest Conditions

Present forest conditions found on the refuge (with the notable exception of the proposed Research Natural Area) are marginal in quality as they relate to being able to support mature forest bird species. Forest stands on the refuge, with the exception noted above, are mid successional and exhibit classic mid-successional forest characteristics such as heavy stocking, closed canopies, and little vertical structure. In order to provide conditions suitable for many mature forest species, the refuge must manage its mid-successional forest stands to provide more structure.

Lack of Inventory Information

The development of baseline data is a task expected to take years for present staff to accomplish. National Wildlife Refuge System policy requires inventories of plants, fish, wildlife, and habitats. Monitoring of critical parameters and trends of selected species and species groups, and the subsequent basing of management on sound data, continue to be a problem due to staffing constraints. No standard inventory and monitoring method has been established. Fish, reptile, and amphibian conservation is overlooked because of the lack of information and funding to manage these resources.

Low Operation and Maintenance Funds

The refuge is faced with the challenge of contributing substantially to off refuge ecosystem objectives, such as migratory bird and game species management. These ever increasing responsibilities, coupled with the current low levels of funding, make it difficult to meet the demand for biological services on and off the refuge. The refuge staff is also facing the challenge of managing an active and increasing visitor services program. The Red River and Three Rivers Wildlife Management Areas, managed by the Louisiana Department of Wildlife and Fisheries, are the only other public hunting and fishing areas in Concordia Parish. The refuge provides hunting opportunities and those opportunities will be expanded as the refuge grows and as additional staff become available. Other recreational opportunities will be provided and expanded as facilities, staff, and funding become available. Access to the refuge, however, is very limited due to terrain conditions and lack of roads and trails.

REFUGE CONSERVATION PRIORITIES

Priorities identified for Bayou Cocodrie National Wildlife Refuge include a stronger management emphasis on migratory songbirds. Focal species are managed according to refuge size and location which contributes to the overall health of the ecosystem. Identified migratory bird and black bear protection areas typically overlay public and private lands. The public land portions of these conservation zones may not contain sufficient amounts or the kind of wildlife habitat (e.g., mature stand structure) to support high priority species. As a result, the Service and partners work collectively with landowners to achieve common goals and form conservation partnerships. One such conservation partnership involves the Natural Resources Conservation Service. Landowner participation in its Wetlands Reserve Program may assist the Fish and Wildlife Service in meeting wildlife objectives through the acquisition and restoration of 1,400 acres directly adjacent to the refuge.

A forest Source Population Objective of roughly 20,000 acres for the refuge and 30,000 acres in nearby private lands is identified to support declining songbird populations that once were abundant in this area. Also, reforestation to remove carbon from the atmosphere on refuges and other lands in the Lower Mississippi Valley is a long-term goal.

The following land birds either currently breed, or have historically bred, on the refuge and are ranked by priority on which to focus management efforts: extremely high priority--swallow tailed kite, Cerulean warbler, and Swainson's warbler; high priority--red headed woodpecker, northern parula, yellow-billed cuckoo, wood thrush, prothonotary warbler, white-eyed vireo, American woodcock, and wood thrush. These species are focal species that are assumed to be sensitive to habitat changes and represent the needs of a larger group of migratory species.

The recovery of the Louisiana black bear includes 5,000 acres of land for an expansion as identified in the Louisiana Black Bear Habitat Protection Plan. These lands are now within the approved acquisition boundary. Additionally, bear corridors have been identified to connect habitat patches and will be targeted for reforestation by the private lands program.

Long-term goals for the Louisiana black bear will be accomplished when there are at least two viable bear populations that have genetic interchange (joining Atchafalaya population with Tensas River population). The black bear protection areas overlay the forest Source Population Objectives from the Tensas River National Wildlife Refuge in Madison and Tensas parishes, Louisiana, to the Bayou Cocodrie National Wildlife Refuge and the Red River Wildlife Management/Three Rivers areas in Concordia Parish, and the Atchafalaya Basin.

III. Plan Development

OVERVIEW

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



USFWS Photo

SCOPING OF ISSUES AND CONCERNS

Issue identification is a major factor in determining management goals and objectives. To ensure that management of the refuge is reflective of the issues and concerns, a series of meetings and interviews were conducted to guide the planning effort. The planning process was coordinated with federal, state, and local agencies, as well as organizations and surrounding communities. This coordination is essential to ensure support for the plan and projects identified for the refuge.

Issues and concerns were generated based upon contact with citizens and public agencies, and on resource needs identified by staff. A Service planning team was assembled to evaluate and identify steps to rectify these issues and resource needs, and to measure the impact of plan implementation. Afterwards, the team developed a list of goals, objectives, and strategies to shape the management of the refuge for the next 15 years.

Issue identification provided the basis for initiating the development of management objectives and strategies. These issues play a role in determining future conditions of the refuge. The issues and concerns described in the following pages were generated by the public and Service staff.

Fish and Wildlife Populations

- Migratory songbird diversity and populations are significantly declining.
- Neighbors expressed a concern that Service management activities on the refuge could attract birds that may feed on fish in nearby catfish ponds.
- Some wildlife species including deer, beaver, feral hog, and raccoon are damaging or altering forest conditions to the detriment of other wildlife species and habitat (e.g., songbirds).
- There is a lack of information about Service plans for management of the Louisiana black bear. Sightings are rare. Refuge neighbors are concerned about the effects that bears might have on people and property, when and if they do return to the refuge.
- There is no management emphasis on certain wildlife species, including fish, bats, shorebirds, reptiles, and amphibians.

Habitats

- The refuge forest boundaries are heavily fragmented forest and conditions and proportions are of poor habitat value to breeding birds.
- There are too few surveys and studies conducted on the refuge.
- There is a concern that the remaining old growth trees might be harvested or overly managed by the Service.
- The existing forests have received little management attention by the Service.

Education and Visitor Services

- Access to the refuge headquarters and throughout the refuge is difficult for both staff and visitors. Service employees and visitors must rely on parish road conditions, while the conditions of internal trails dictate use.
- The refuge offers limited opportunities to view and photograph wildlife. The trails are impassable during high rainfall and prolonged flooding.
- There are limited hunting and fishing opportunities on the refuge.
- There are no educational/interpretive facilities or programs available to local and regional schools, conservation clubs, and communities at large.
- There is a lack of information about the purpose of the refuge and available visitor opportunities.

Refuge Administration

- The lack of staff to manage refuge biological programs and forestry management is a fundamental issue.
- The refuge entrance road (Poole Road) is at times unsafe because of surface conditions.
- The refuge office has inadequate space to support existing staff, volunteers, and the visiting public.
- There are few parking facilities and signs. There was a concern that providing additional access or improved access might impact forest habitats and fish and wildlife populations.
- Since most of the refuge boundary has not been surveyed, it is difficult to enforce game violations and protect wildlife and habitat near refuge boundaries.

Land Protection and Conservation

- There is a concern about sedimentation, erosion, and turbidity resulting from land use activities off the refuge and the effects within the watershed.



USFWS Photo

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 is for the Service to maintain the ecological health, diversity, and integrity of refuges. The refuge is a vital link in the overall function of the ecosystem. Refuges in the Lower Mississippi Valley include managed bottomland hardwood forests and moist-soil areas. To offset the historic and continuing loss of these habitats within the ecosystem, the refuge and other public lands provide the biological safety-net for migratory non-game birds and waterfowl, threatened and endangered species, and resident species.

VISION

The refuge's abundant wildlife and biological communities form the basis for future management of the refuge. The vision of land conservation for the refuge describes the desired future conditions and management standards developed collaboratively by the public and refuge staff. The planning team, in conjunction with information gathered from the public, formulated the following vision as a guide by which to manage the refuge:

Bayou Cocodrie National Wildlife Refuge will be transformed into one of the finest examples of bottomland hardwood forest complexes, striving to protect the habitats of fish and wildlife, and creating new opportunities for visitors to enjoy its unique biological resources.

GOALS, OBJECTIVES, AND STRATEGIES

The goals, objectives, and strategies addressed below are the Service's response to the issues, concerns, and needs expressed by the planning team, refuge staff, and public. These goals, objectives, and strategies reflect the Service's commitment to achieve the mandates of the National Wildlife Refuge System Improvement Act of 1997, the mission of the National Wildlife Refuge System, the North American Waterfowl Management Plan, and the purpose and vision of Bayou Cocodrie National Wildlife Refuge. Depending upon the availability of funds and staff, the Service intends to accomplish these goals, objectives, and strategies during the next 15 years.

Goal A: Fish and Wildlife Populations

Contribute to the wildlife population goals and objectives established in nationally and internationally significant management plans, including Partners-in-Flight Plan; Louisiana Black Bear Protection

Plan; North American Waterfowl Management Plan; American Woodcock Management Plan, and other plans for the Lower Mississippi Valley.

Objective A.1: Songbirds

Support healthy populations of forest dwelling migratory songbirds, specifically 500 pairs of Swainson's warblers, and provide suitable habitat for the reestablishment of Cerulean warbler and swallow-tailed kite populations.

Discussion: A wide-range goal for the Lower Mississippi Valley is to establish self-sustaining populations of all forest breeding bird species. This objective supports Source Population Objectives established for this area. A minimum of 13,000 acres of core forest (20,000 acres of forest habitat that is ≥ 1 km from agriculture or other non-forested land use) is needed to support 500 breeding pairs of Swainson's warblers. This would also allow for recolonization of the area by Cerulean warblers and swallow-tailed kites (pers. comm., Hunter).

Present refuge data suggest densities for the Swainson's warbler are now about 6 pairs per 100 acres, in optimal habitat, and indicate this figure is lower than that found at Tensas River and Atchafalaya National Wildlife Refuges in comparable habitat (Ouchley unpub. data, per observations). The Service adopted a minimum effective population of 500 breeding pairs per 20,000-acre forest patch (pers. comm., Hunter).

Restoration of migratory songbird populations is a high priority of the Partners-In-Flight Plan, a national and regional planning effort developed to emphasize land bird species as a priority for conservation. Habitat loss, land bird population trends, and vulnerability of species and habitats to threats are all factors used in the priority ranking of species (Bonney 1999). Further, biologists are identifying focal species for each habitat type from which population and habitat objectives and conservation actions can be determined. This list of focal species, objectives, and conservation actions will aid migratory bird management on the refuge (Figure 11 and Appendix D).

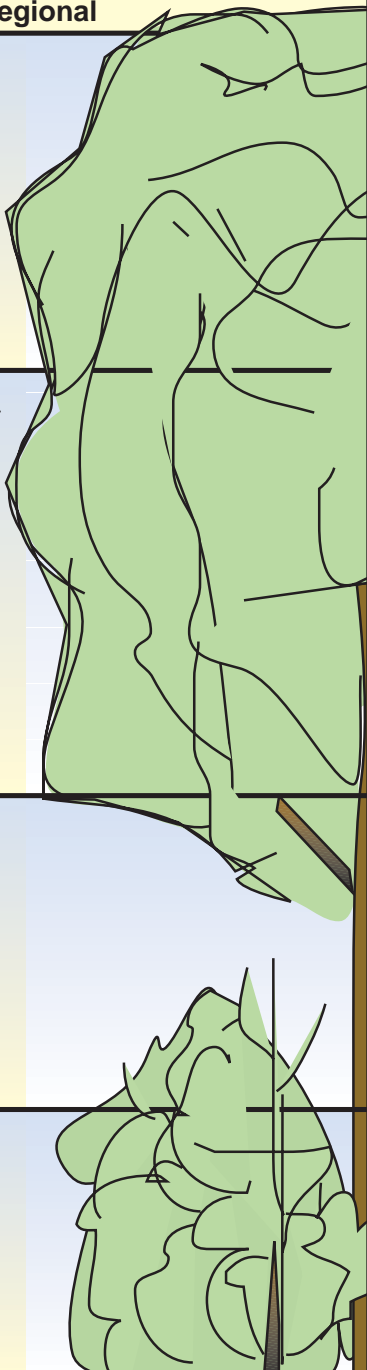
Strategies:

- Survey the refuge and determine baseline populations for forest-breeding non-game birds.
- Establish point count stations to determine population size changes over time.
- Conduct nest productivity studies, including predator disturbance during the nesting season, both in existing forests and in areas undergoing reforestation to determine actual population health for as many species as possible. If population objectives are not met, then reevaluate management actions and other possible causes and assess findings to determine appropriate corrective measures.

Figure 11. Priority bird species associated with the refuge bottomland hardwood forest

*Shows present species status and desired density expressed in pairs per 100 acres
(from Hamel 1992)*

Priority Level :				
	Extremely High	High	Moderate	Low or Regional
Canopy	Swallow-tailed Kite (Extirpated) Cerulean Warbler (Extirpated)	Red-headed Woodpecker 2-3/100 acres Northern Parula 11-16/100 acres	Blue-gray Gnatcatcher 9-11/100 acres Rusty Blackbird (winter) 1-3/100 acres	Chimney Swift 1/100 acres Yellow-throated Warbler 4-6/100 acres Summer Tanager 5-7/100 acres
Midstory		Yellow-billed Cuckoo 5-7/100 acres Wood Thrush (nest) 13-15/100 acres Prothonotary Warbler 11-19/100	Ruby-throated Hummingbird 3-4/100 acres Eastern Wood-Pewee 7-8/100 acres Carolina Chickadee 9-10/100 acres	Acadian Flycatcher 13-16/100 acres
Understory	Swainson's Warbler (nest) 6-11/100 acres	White-eyed Vireo 9-12/100 acres Prothonotary Warbler		Hooded Warbler 14-18/100 acres
Ground	Swainson's Warbler (forage)	American Woodcock (winter) 7-11/100 acres Wood Thrush (forage)		



- Manage beaver, muskrat, raccoon, and feral hog populations to protect and target forest-breeding bird species, including the use of such techniques as trapping.

Objective A.2: Black Bear

Assist in maintaining viable populations of those species of fish, wildlife, and plants endemic to bottomland hardwoods of the area, including the threatened Louisiana black bear.

Discussion: The Louisiana black bear is listed as a threatened species under the Endangered Species Act. The Service and partnering agencies and organizations have identified two viable sub-populations in need of recovery. These separated populations, one each in the Atchafalaya and Tensas river basins, have potential open space to support immigration and emigration corridors between them. The refuge is located between the Red River/Three Rivers Wildlife Management Area Complex and the Tensas River National Wildlife Refuge, making it ideally situated to help link these two sub populations. Management of the Louisiana black bear is dependent upon providing sufficient habitat, including forested sites on both public and private lands. Biologists are studying the present landscape, land uses, and black bear behavior to determine how well bears adapt to the present landscape and move from one management area to the next.

The Service is monitoring bear movement to determine if the refuge might serve as a site for bear reintroduction. Adding forest areas aligned along the identified corridor and adjacent to state and federal wildlife areas, as well as enrolling private lands in conservation programs, will be essential to the recovery of the black bear. The addition of a wildlife movement corridor will result in connecting forest blocks where numerous forest interior species, including black bear, move between the large forest areas of natural vegetation. Meeting this goal is considered sufficient to support viable populations of black bear for long-term survival.

Strategies:

- Coordinate with neighbors, the Black Bear Conservation Committee, Louisiana Department of Wildlife and Fisheries, and other agencies/organizations in Concordia Parish to facilitate bear conservation and research programs.
- Conduct outreach efforts involving neighbors, local residents, schools, and businesses on bear biology and conservation, and the effect bears will have on activities of neighboring landowners.
- Encourage refuge visitors, as well as surrounding landowners, to report bear sightings or suspected bear activity.
- Assist others with all phases of black bear management and nuisance control in Concordia Parish.
- Provide habitat that supports the recovery of the Louisiana black bear.



Shorebirds
USFWS Photo

Objective A.3: Waterfowl and Shorebirds

Provide habitat to support approximately 10,000 migrating waterfowl, 12,000 migrating shorebirds, and other important associated migratory bird populations, including woodcock.

Discussion: Since food is a limiting factor for southbound migrating shorebirds and wintering waterfowl, adequate shallow water foraging habitat must be available to meet shorebird requirements during their southward migrations. The refuge should support about 12,000 southbound migrating shorebirds.

For transient shorebirds, typically mudflat foraging habitat is abundant in the Lower Mississippi Valley during the spring northward migration. In early spring, agricultural fields are bare and winter flood water is receding; in late spring, rice fields are flooded. During southward migration in late summer and fall, fields of maturing crops are dry. Therefore, the period from July 15 to September 30 is the period when foraging habitat for shorebirds is least available. Food is also a limiting factor for wintering waterfowl populations. About 300 acres of foraging habitat are needed on the refuge to support the wintering waterfowl population goals within the Lower Mississippi Valley.

Strategies:

- Conduct shorebird and other water bird counts using International Shorebird Survey protocol on 10-day intervals during migration and wintering periods. Conduct mid winter waterfowl surveys.
- Assess food quality and quantity on the refuge during peak periods of shorebird movement.
- Assess food quality and quantity on and off the refuge during peak periods of waterfowl use.
- Develop impoundment units with a moist-soil component to support waterfowl and shorebird use.
- Assess wintering and foraging habitat on and off refuge during peak periods of woodcock use.

Objective A. 4: Resident and Other Species

Manage to maintain healthy, viable resident populations, including white-tailed deer (average harvest range 250-300 deer), turkey, and other resident species.

Discussion: The refuge will be managed to ensure healthy, viable resident populations consistent with sound biological principles and other objectives of this plan.

White-tailed deer have the potential to adversely affect habitats unless their numbers are kept at a level that is at or slightly below carrying capacity. The refuge hunt program is designed to maintain the herd at this level while offering quality hunting opportunities to the public. Current harvest data indicate an annual harvest of 250-300 deer or approximately 1 deer harvested per 54 acres of hunted

area. The harvest (per acre) will occasionally fluctuate due to weather and habitat conditions. Population level indicators will include browse surveys, harvest data, and periodic health checks.

Raccoons may also have an adverse impact on other species in the event of over-population. Nest predation on turkeys, wood ducks, and songbirds may become so great as to limit the reproductive success of those species. Over-populations may also facilitate the spread of canine distemper, a common close contact type disease, to other species such as foxes, coyotes, and domestic canids. In an effort to prevent raccoon over-populations, the species is considered an incidental harvest species and may be taken during any open hunting season.

Wild turkey populations are currently low on the refuge. This species will benefit from increased management emphasis. Additional hunting opportunities may become available as the turkey population reaches a point where it can support such activities.

Reptiles and amphibians are abundant on the refuge and are key species by which biologists evaluate the environmental health of the ecosystem. Knowledge of which species occur on the refuge is fundamental to understanding the biological diversity of the area.

Strategies:

- Monitor the population status of key indicator species, white-tailed deer, and turkey.
- Manage white-tailed deer population at current levels (average harvest range is between 250-300/10,000 acres).
- Integrate population objectives for resident species into habitat management plans.
- Establish hunting regulations for resident wildlife to maintain population health and stability and habitat relationships. Coordinate with neighbors.
- Identify thresholds of disturbance and develop associated standards and mitigation techniques that can be applied, where appropriate, to reduce conflicts and achieve balance between the public and wildlife.
- Designate raccoons as an incidental take species.
- Prepare and conduct biological/monitoring plan which includes establishing baseline information on reptile/amphibian occurrence and habitat utilization.
- Develop population estimates for the American alligator and monitor effects on other trust species.

Objective A.5: Integrated Pest Management

Reduce and/or eliminate invasive, exotic, and pest plant and animal populations to minimize negative effects on native flora and fauna.

Discussion: Water hyacinth and hydrilla are two exotic species found in refuge lakes and sloughs. These plants form dense mats that impede water flow and recreational use and retard the growth of desirable submerged aquatic plants. Also found in recently reforested

management units and moist-soil management areas are pest plants such as Johnsongrass, alligatorweed, cocklebur, and coffeebean. Where they occur, these plants often form thick monotypic stands that crowd out other desirable plants. Control of these weeds can be achieved by timing water draw downs, disking, burning, flooding, and/or herbicide application.

Feral hogs are major non-native animal pests found throughout the refuge and on adjoining properties. Feral hogs have an adverse effect on habitat and productivity of most native wildlife. Since they are omnivores, feral hogs use virtually every component of the habitat, resulting in direct competition with native wildlife, reductions in carrying capacities, and adverse impacts to reproduction and recruitment. In addition, feral hogs serve as a source for many diseases that affect wildlife as well as domestic livestock.

Strategies:

- Inventory and map the distribution of invasive and exotic plant species, and develop an Integrated Pest Management Plan consistent with a Nuisance Animal Control Plan.
- Use integrated pest management techniques to reduce water hyacinth and hydrilla infestations to levels that do not negatively affect trust resources or impede recreational use of water bodies.
- Inventory feral hog numbers and monitor effects on natural habitats and crop depredations.
- Provide hunter take provisions for feral hogs by including them as a miscellaneous species during any established refuge hunt.
- Use refuge staff and contracted animal damage control experts to maintain feral hogs at acceptable population levels in closed areas and other parts of the refuge, as needed.
- Coordinate with the Aquatic Plants Division of the Louisiana Department of Wildlife and Fisheries to implement control programs.
- Coordinate results of information concerning success/failure of control treatments within and outside the agency, especially in regard to hydrilla.

Goal B: Habitats

Conserve, manage, and restore the values and functions of the refuge's bottomland hardwoods to sustain the biological diversity characteristic of the ridge and swale topography of the Lower Mississippi Valley.

Objective B.1: Contiguous Forest

Assemble, at a minimum, 13,000 acres of core forest habitat consisting of mixed-age bottomland hardwood forests for a diversity of species, with special emphasis on migratory breeding songbirds and the threatened Louisiana black bear. (Refer to Objective A.1: Songbirds.)



USFWS Photo

Discussion: Certain migratory forest songbirds, including forest-breeding birds such as the Swainson's warbler, are in significant decline due to the loss of bottomland hardwood forests. Priority species associated with habitats that support forest songbirds are vulnerable. Additional forested tracts that would form a contiguous block size, containing a minimum of 13,000 acres of core forest, would also support prothonotary warbler populations.

One of the purposes of this refuge is to provide, to the extent possible, habitat for those fish, wildlife, and plants characteristic of mature bottomland hardwood forests of the Lower Mississippi Valley. Most of the current refuge is a mosaic of 0- to-70 year timber age classes, intermixed with seasonal swales, beaver ponds, and former agricultural lands.

Strategies:

- Develop and implement a forest habitat management plan designed to maintain a diversity of forest cover types, tree species compositions, and tree age class distributions.
- Restore hydrology where needed and where practical.
- Develop clear biological goals and objectives for management of resident wildlife and ensure that management reflects the contribution of these goals to native biological diversity.
- Inventory and establish deer, raccoon, beaver, and feral hog population parameters and baseline indices.
- Conduct monitoring surveys.
- Develop and maintain geographic information system databases to monitor forest stand management results.
- Limit access through measures such as gating roads and minimizing all terrain vehicle trails.
- Incorporate timber management practices that enhance bear habitat such as protection of potential den trees, allowing light to penetrate the forest floor for soft mast production, and managing for hard mast trees.
- Incorporate the enhancement/widening of forest corridors that link forested tracts through incentive programs, easements, and/or purchases.
- Minimize logging and construction activities during periods of bear denning.

Objective B.2: Old Growth Forest Protection

Protect the existing 750 acres of old growth forest to support interior forest breeding songbirds and manage this area as a Research Natural Area.

Discussion: The avian and old growth habitat relationships exhibit relatively self-sustaining and preferred habitat characteristics that support priority songbird species found in the Lower Mississippi Valley. Old growth habitat supports priority songbird species such as the Cerulean warbler.

A 750-acre remnant patch of old growth timber is located in the south section of the Brooks Break Unit. The structure and conditions of this site are unlike any other forested site found in the Lower Mississippi Valley in that they exhibit a complex canopy layer with super emergent trees. The super-emergent trees, such as willow oak and pecan, exceed 120 years of age. Another tree canopy layer contains tree classes of at least 70 years of age. This complex canopy layer is considered optimum habitat for certain area specific songbirds, including the Cerulean warbler. The Swainson's warbler is associated with very dense understory and bare ground which may develop from either a large tree fall gap or from a regeneration clear cut. The former is characteristic of old growth stands, where species such as the Cerulean warbler may also occur. The latter results in even-aged management that will not support Cerulean warblers and other canopy dependent species in the same stands (pers. comm., Hunter, Boykin).

Strategies:

- Establish baseline monitoring.
- Propose designation of the 750 acres as a Research Natural Area.
- Develop a monitoring plan that will standardize data collection, analysis, and reporting.
- Monitor migratory breeding bird habitat conditions and manage for the priority species identified for this refuge.
- Contact landowners about providing limited and/or seasonal public access to the site and, if possible, provide a gated and improved road over private lands to old growth site.
- Coordinate research efforts with scientists and the research community.
- Prohibit logging in 750 acres designated as a Research Natural Area and manage partnerships to monitor migratory songbird populations.
- Restore hydrology where needed and where practical.

Objective B.3: Forest Management

Manage and enhance approximately 3,200 acres of the Brooks Brake Unit (outside the protected old growth area) to move toward old growth conditions for interior breeding forest songbird populations.

Discussion: The Brooks Brake Unit is composed of 3,200 acres of even aged mature forest and the 750-acre old growth forest. Its present condition in the mature, even-aged stands supports marginal habitat for priority forest breeding bird species. Managing to exhibit the features, functions, and processes characteristic of old growth communities may yield the highest benefit for these songbirds. Forest management approaches that result in the maintenance and development to support songbirds of stand components will be emphasized. The area outside the existing old growth site in the Brooks Brake Unit will be managed to mimic or mirror conditions of old growth, and should be monitored to determine management success.

The nesting habitat on the Brooks Brake Unit can support an important source population that adds large numbers of potential breeders to

the Lower Mississippi Valley population, especially in years when other nesting areas fail due to the effects of forest loss, degradation, and fragmentation. The development and maintenance of a super-emergent canopy will create optimum conditions for area sensitive songbirds.

Strategies:

- Evaluate forest survey requirements needed to plan forest management on this unit.
- Develop a habitat restoration plan that will specify desirable stand conditions.
- Utilize habitat management techniques that will mimic old growth structure and function while allowing the forest to become self-sustaining old growth.
- Inventory and establish deer, raccoon, beaver, and feral hog population parameters and baseline indices.
- Conduct monitoring surveys.
- Develop and maintain a geographic information system.
- Limit access by gating roads and minimizing vehicle/trail access.
- Incorporate timber management practices that enhance bear habitat such as protection of potential den trees, allowing light to penetrate forest floor for soft mast production, and managing for hard mast trees.

Objective B.4: Other Forest Management

Manage, at a minimum, 10,000 acres of existing mid-succession forests in the Wallace Lake and Cross Bayou Management units to support migratory songbirds and resident species.

Discussion: To support bird nesting success, improvements in stand conditions in the Wallace Lake and Cross Bayou Management units should be undertaken. These units comprise approximately 10,000 acres of forest. Managing these units with special emphasis on improving forest structure conditions is critical to bird nesting success. Refuge forests have excellent potential to offer high quality breeding habitat for priority songbirds. About 10,000 acres of stand improvements are needed in or next to the Cross Bayou and Wallace Lake units to offset the present marginal conditions.

Strategies:

- Develop and implement forest and water management programs to provide needed nesting, foraging, and resting habitat.
- Implement forest management approaches that result in the development and maintenance of under-story, mid-story, and over-story stand components (i.e., complex forest stand structure) to meet the needs of forest-dwelling non-game birds. This may be accomplished by commercial operators or with existing staff.
- Where appropriate, manage habitat functions and values to improve conditions altered by beaver activities within the Brooks Brake and Wallace Lake units.

- Develop a habitat management plan that will specify desirable future stand conditions.
- Evaluate forest survey requirements necessary to plan forest management on the refuge.
- Develop an Integrated Pest Management Plan.

Objective B.5: Reforestation

Reforest, at a minimum, 7,000 acres of open areas and manage forest conditions to achieve structurally complex, mid succession forest conditions and decrease effects of fragmentation. Reforestation efforts via partnerships and interagency coordination will target identified high priority areas to maximize increases in core habitat.

Discussion: In addition to the 2,000 acres reforested in 1996, reforesting 5,000 acres would contribute to the 13,000 acre core forest block objective. This, in turn, would assist in supporting the conditions for area sensitive species that need large forest tracts. All potential sites for reforestation activities are outside the current refuge boundary, and would have to be acquired or placed in a land protection program.

Strategies:

- Reforest all refuge lands except those areas identified for waterfowl management, using species appropriate to the site.
- Develop and utilize forest management techniques to establish and maintain vertical and horizontal complexity.
- Seek funding opportunities and partners to assist in reforesting refuge lands and target identified high priority areas for reforestation via partnerships and interagency coordination.

Objective B.6: Wetlands

Restore and enhance 440 acres of seasonal wetlands to provide high-quality migration and foraging habitat for waterfowl and shorebirds.

Discussion: Waterfowl objectives established as part of the North American Waterfowl Management Plan would support foraging and resting habitat. Shorebird objectives, as identified by Service biologists, include 120 acres of the refuge's 360-acre moist-soil site which will be managed for fall migrants and used by wintering waterfowl.

The refuge contains a 440-acre site that has been managed specifically for waterfowl and shorebirds. Its agricultural state and hydrological features make water management viable.

Other wetlands in the form of beaver sloughs or dead timber areas will be seasonally managed for roosts, brood habitat, and winter habitat. These areas will require beaver dam removal in late spring. Permanent woodland lakes provide additional habitat, which require minimal management.

Strategies:

- Manage existing impoundments for waterfowl and shorebirds.
- Monitor waterfowl utilization patterns and waterfowl populations.
- Develop and implement a Moist-Soil Management Plan.

Goal C: Education and Visitor Services

Develop a balanced wildlife dependent recreation program that will benefit refuge visitors and be consistent with the National Wildlife Refuge System Improvement Act of 1997.

Discussion: Consistent with provisions outlined in the Act, the Service will provide wildlife-dependent recreation opportunities that provide educational awareness and an appreciation of the unique qualities and features offered on national wildlife refuges. The refuge is contributing to the National Wildlife Refuge System mission by providing several wildlife-dependent recreation programs. These programs provide the public with an opportunity to learn about, enjoy, and appreciate natural resources. These activities will increase visitor use over time, but not at the expense of the natural environment. In order to implement a comprehensive visitor service program, additional staff will be needed, including a law enforcement officer and an outdoor recreation planner. In order to provide environmental education opportunities, new facilities will need to be located at primary access points.

As identified in the National Wildlife Refuge System Improvement Act, the six priority wildlife-dependent recreation activities allowed on national wildlife refuges are hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation. These priority uses and any other uses must be considered appropriate and compatible with the refuge purpose and the mission of the National Wildlife Refuge System. Fundamental and supreme to the provision of these uses are viable and diverse fish and wildlife populations and the habitats upon which they depend.

Objective C.1: Hunting

Where appropriate, increase white-tailed deer hunting opportunities and manage deer populations at or slightly below carrying capacity and provide small game and waterfowl hunting opportunities.

Discussion: Currently, an annual harvest average of 1 deer per 50-55 acres hunted will meet this objective. This average may be adjusted as habitat conditions improve and carrying capacities increase. The Service manages hunt programs in pursuit of wildlife and habitat management goals and objectives and to provide a high quality experience for each hunter. A quota hunting system on a broad land base usually yields a higher success rate for the visiting hunter. Research has shown that hunting, under carefully regulated conditions, will not significantly affect populations; will enable land managers to control

population levels; will make use of a renewable resource; and will provide opportunities for high quality, wildlife-dependent recreation.

The refuge supports a wide variety of resident game species such as white-tailed deer, turkey, squirrel, raccoon, and waterfowl.

Management of these species remains a collaborative effort with the Louisiana Department of Wildlife and Fisheries. Achievement of habitat and population management objectives is primary in establishing hunting opportunities. In 1994, the Service adopted a hunt plan to assist in population management of white tailed deer and small game. This plan is modified annually and when lands are acquired and additional staff becomes available. The Endangered Species Act requires that hunting activities be managed to protect the threatened Louisiana black bear.

Flooded sloughs and backwater areas of the Brooks Brake Unit provide an excellent opportunity to allow limited waterfowl hunting. By allowing limited hunting, there should be no disturbance to waterfowl using the refuge's moist-soil management units located in the Cross Bayou Unit, where hunting is not allowed. These moist-soil units are designed strictly as resting/breeding areas for waterfowl. Waterfowl hunting in the Brooks Brake Unit will be limited to 3 days per week until noon and expanded when deemed appropriate and compatible.

Strategies:

- Monitor deer populations via browse surveys, harvest data, and periodic health checks.
- Manage hunt program to achieve population management and wildlife habitat objectives.
- Increase hunting area to include reforested habitat for small and big game hunting as land is acquired and managers become available to manage additional hunters.
- Expand hunting program to include a quota modern gun hunt for white-tailed deer, and to provide waterfowl hunting opportunities.
- Improve refuge access by extending trails and providing additional entry/check points.
- Revise the 1994 Hunt Plan in coordination with Louisiana Department of Wildlife and Fisheries to assist in achieving balanced and healthy game populations.
- Evaluate potential impacts of hunting on other refuge activities and programs.
- Develop additional trails and parking areas as appropriate and compatible.

Objective C.2: Fishing

Improve areas for limited parking, canoe/small skiff launching, and bank fishing at two existing locations near Bayou Cocodrie.

Discussion: The refuge must first assess the fishery resource to assure that the ecological integrity of native fish populations supports sport fishery opportunities. Additionally, the most accessible section of the Bayou Cocodrie River is located on the Cross Bayou channel

west of the refuge headquarters (referred to as the cut through). This section can only be reached from Poole Road, which is maintained by the parish.

Fish conservation has not been a primary objective of this refuge. Game fish such as catfish, crappie, bass, and bream are known to occur in Wallace and Little Wallace lakes. Where the Bayou Cocodrie River meanders next to the refuge, it is known to offer moderate quality fishing opportunities. Some interest exists to provide access for fishing on refuge lands.

Strategies:

- Inventory and evaluate fishery resource potential using Service's Fisheries Division.
- In consultation with county, state, and federal partners, develop and implement a Sport Fishing Management Plan to provide a quality fishing experience.
- Evaluate the costs, logistics, and safety considerations in creating suitable sites for fishing.
- Coordinate development of parking facility, structures, and activities with the Louisiana Department of Wildlife and Fisheries and other appropriate entities (permits regarding Scenic River status).
- Develop bank fishing access on existing properties including Bayou Cocodrie, Cross Bayou, and Wallace Lake.

Objective C.3: Wildlife Observation and Photography

Improve access and opportunities for wildlife observation and photography refuge-wide with emphasis on improvements in the Brooks Brake Unit.

Discussion: The Red River/Three Rivers Wildlife Management Area Complex provides for wildlife viewing in Concordia Parish. Louisiana's Wildlife Worth Watching guide to viewing wildlife lists the Sand Levee Trail on Three Rivers Wildlife Management Area for vehicle parking, hiking, and primitive camping, and the Yakey Waterfowl Impoundment on the Red River Wildlife Management Area for vehicle parking and viewing of wildlife. Public facilities, regionally, are limited and many of these are often closed to protect nesting habitat. There is an excellent potential for viewing and studying bottomland hardwood communities by developing canoe trails, hiking trails, and observation/photo blinds, where appropriate and compatible.

Bayou Cocodrie offers significant wildlife viewing opportunities within an expansive mature bottomland hardwood forest setting. Many opportunities exist for the establishment of hiking trails (both primitive and improved). Canoe access would provide the public with opportunities to utilize this resource with minimal disturbance. Additional canoe access would allow the public to utilize several tributaries and lakes for wildlife observation and photography.



USFWS Photo

Strategies:

- Develop an Education and Visitor Services Management Plan.
- Evaluate the potential and the impacts of siting a trailhead for canoe access from the Brooks Brake Unit.
- Develop canoe access areas, trailhead parking, and foot trail to old growth area along with interpretive panels for wildlife viewing and photography.
- Develop a boardwalk trail loop and parking area near the refuge headquarters. Design interpretive panels and accessible trails.
- Maintain a seasonal trail to Wallace Lake.
- Where appropriate, develop wildlife viewing sites.
- Encourage the development of volunteer services to support recreational programs.
- Monitor and survey recreational programs.
- Develop a wildlife auto tour with interpretive panels designed to highlight refuge management and unique features of the refuge.

Objective C.4: Environmental Education

Initiate and develop a community based environmental education program with area schools and local conservation groups to increase awareness of the refuge and management activities.

Discussion: Emphasis will be placed on the unique features of the refuge, the bottomland hardwood forest ecosystem, and the effects of human activities on the environment. Programs and opportunities will be offered to enhance public awareness and understanding of the refuge environment, and hopefully solicit a greater appreciation of, and participation in, environmental stewardship.

Interpretive opportunities will set apart the unique management features and strengthen the connection between wildlife management and people. Environmental education programs will instill an appreciation of a healthy environment while demonstrating to landowners that human activities and wildlife can successfully co-exist. The refuge can provide quality interpretive and educational programs in an outdoor classroom setting.

Because the refuge is relatively new, the area schools and communities may be unaware of its unique features, values, and management activities. Currently, there is little opportunity to interpret the benefits of these values and management in the surrounding communities.

Current staffing at the refuge is extremely limited with no public use staff. A strong volunteer program will be essential to successfully implement an education and visitor use program. Volunteers will be recruited and trained to assist staff in developing and implementing environmental education and interpretive programs.

Strategies:

- Develop a volunteer based Instructor Corps Program to provide for environmental education and interpretive programs, and for facilities development.

- Develop teaching materials and host annual teacher workshops to promote environmental education based curriculum in local schools.
- Encourage the development of a refuge friends group as well as a volunteer program to support environmental education programs.
- Monitor and survey recreation and education uses throughout the refuge as an ongoing program.
- Develop a visitor education center and an outdoor classroom along Poole Road.
- Increase involvement in and update local public (i.e., Police Jury, School Board, Chamber of Commerce) on refuge activities.

Objective C.5: Interpretation

Develop an interpretive program that will increase awareness of the refuge and its unique features and values, as well as wildlife associated with bottomland hardwood forest communities (i.e., values related to mature forests, migratory birds, and the Louisiana black bear).

Discussion: Ecotourism opportunities may be developed depending on market response to Service initiatives. For instance, the Service could offer opportunities for special tours to observe waterfowl at St. Catherine Creek National Wildlife Refuge in the winter, and songbirds at Bayou Cocodrie National Wildlife Refuge in the fall and spring. Using the Natchez Visitor Center as a central meeting location, special tours could be arranged for both refuges. Education and interpretation often play key roles in assisting refuge management to integrate conservation into the overall mission and purposes of the refuge. Research can be incorporated into educational programs that will allow the Service to build constituencies within the conservation and local communities.

Many opportunities exist for special events and volunteer guided programs, such as night hikes, bird tours, etc. Opportunities to discuss and demonstrate sustainable land use practices exist, as do opportunities to teach about and promote water quality improvement practices, community involvement, and environmental stewardship.

Occasionally, the refuge staff and volunteers will conduct guided tours on the refuge. There is an excellent potential to provide outdoor classroom opportunities and take advantage of the unique resources, such as interpretation of the old growth conditions and songbird relationships.

Strategies:

- Coordinate with staff of St. Catherine Creek National Wildlife Refuge to develop an interpretive display at the Louisiana Hydroelectric Visitor Center.
- Develop a series of interpretive programs and events that incorporate management and research activities. Programs and events will be staged so as not to disrupt nesting birds or when research activities could be disrupted by human disturbance.

- Increase local awareness of the Lower Mississippi River ecosystem and the importance of bottomland hardwood forests.
- Offer educational classes on wildlife observation opportunities and unique features of the refuge to local community and events coordinators.
- Promote ecotourism opportunities in conjunction with local partnerships, businesses, and civic groups. Such opportunities may include birding tours, festivals, and other special events.
- In conjunction with St. Catherine Creek National Wildlife Refuge, promote opportunities and partnerships with local civic groups such as the Natchez Visitor Center.
- Develop an exhibit for the Natchez Visitor Center featuring both Bayou Cocodrie and St. Catherine Creek Refuges.

Objective C.6: Recreation Facilities

Develop and improve existing visitor facilities throughout the refuge that promote year round wildlife-dependent recreation, education, interpretation, and viewing opportunities.

Discussion: Facilities and structures will enhance opportunities for the public and accommodate a range of interests and abilities. Presently, the refuge has 13 miles of existing trails. There are two, all terrain vehicle trails currently in use on the refuge primarily to provide hunting access. Trails, parking areas, observation decks, signs, and kiosks will provide controlled access to the refuge. Presently, all existing trails leading to water bodies, or that provide access to interior sections of management units, are minimally maintained and can only be used by the public on a limited basis or by permit. New trails may be provided where appropriate and compatible.

Support facilities and access are needed to disperse visitors and protect ecologically sensitive areas. Recreational fishing is extremely popular within the watershed. The refuge has the potential to offer excellent wildlife and nature viewing but has limited parking facilities. Access to the Bayou Cocodrie River is limited due to the lack of public boat launching facilities and due to land use and ownership patterns. Nearly the entire river corridor is privately owned except on the refuge. Programs will focus on refuge management, bottomland hardwood forests, migratory songbirds, and black bear recovery efforts.

Strategies:

- Prepare an Education and Visitor Services Management Plan.
- Develop and implement a Sign Plan.
- Develop gated parking facilities with interpretation/information signs.
- Maintain the existing Wallace Lake trail for foot access.
- Develop a headquarters/visitor center facility.
- Develop a refuge friends/support group.
- Institute a refuge volunteer program.

Goal D. Refuge Administration

Develop and implement a comprehensive refuge facility program responsive to management and fish and wildlife needs.

Objective D.1: Staff and New Facilities

Add five additional staff positions, develop new facilities, and improve existing facilities to support a comprehensive refuge management program.

Discussion: Cooperative partnerships with local government entities to upgrade some of the parish maintained roads are vital to refuge operations. In order to support biological programs and a growing staff, additional facilities and equipment will be needed to expand and accommodate new offices and maintenance areas. In addition, signs (i.e., direction, safety, and information) are needed to support refuge management activities.

The refuge employs six full-time staff members who primarily focus management activities on tree planting and maintenance, coordinating with landowners and other Service biologists to promote the recovery of the Louisiana black bear, and providing a quality hunting program.

The refuge lacks the staff and facilities to fully respond to the development of refuge programs, such as forest management to improve the conditions for forest breeding birds, and management of a comprehensive biological, recreational, and environmental education program.

Strategies:

- Expand refuge office and maintenance facilities near the present facilities, off Poole Road, to support biological program objectives and comply with safety standards.
- Increase professional staff positions to include a law enforcement officer, forestry technician, biologist, biology technician, and outdoor recreation planner.
- Increase refuge funding to support additional operation and maintenance activities, including the purchase of computer equipment and software, inventorying and monitoring equipment (geographic information system), and heavy equipment.
- Promote partnerships and seek challenge cost-share grants for construction of recreation facilities.
- Develop secured storage for petroleum and chemical products.
- Develop a radio communication system responsive to law enforcement and other field operations.

Objective D.2: Operations and Maintenance

Improve current operations and maintenance capability to support long-term wildlife, habitat, and visitor service objectives.

Strategies:

- Seek support of parish and state transportation officials to fund, develop, and maintain Poole Road, the entrance to refuge visitor service facilities, and other roads used for refuge access.
- Add additional equipment to support habitat and wildlife management activities.
- Promote partnerships and seek challenge cost-share grants and other funding sources for maintenance of recreation facilities.

Goal E. Cultural Resources

Protect refuge cultural resources in accordance with federal and state historic preservation legislation and regulations.

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

Objective E.1: Survey/Investigation

By 2005, conduct a refuge-wide archaeological survey.

Strategies:

- Secure funding to conduct a comprehensive archaeological survey and geomorphic investigation.
- Develop databases for the refuge's archaeologic and historic sites.
- Procure pertinent scientific reports and articles and produce an annotated bibliography to document the region's history, geomorphology, and the utility of scientific methodology.

Objective E.2: Archaeological Resources

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

Strategy:

- Pertinent staff and law enforcement officers will attend Archaeological Resources Protection Act training course and Section 106/Cultural Resources for Managers course.

Objective E.3: Cooperative Management

Assist in organizing partnerships to manage cultural resources with pertinent federal and state agencies consistent with the Louisiana Comprehensive Archaeological Plan (1983).



USFWS Photo

Strategies:

- Coordinate agreements with appropriate agencies to enhance law enforcement and facilitate investigations in keeping with the Archaeological Resources Protection Act.
- If appropriate, coordinate with Louisiana State University or other entities for the permanent curation of archaeological collections and associated documentation.

Objective E.4: Visitor Awareness

Develop and implement an educational program that will provide an understanding of and appreciation for the refuge's ecology and the human influence on ecosystems of the Lower Mississippi Valley.

Strategy:

- Work with local Native American and African American communities to develop an education program.

Goal F: Land Protection and Conservation

Protect and improve conditions for biological and other natural resource values through the use of current land protection programs.

Objective F.1: Land Acquisition

Seek to acquire and/or protect additional acres to achieve the forest habitat requirements in support of species including Swainson's warbler, swallow-tailed kite, Louisiana black bear, and white-tailed deer.

Discussion: The permanently protected block of bottomland hardwood forest can be achieved through a combination of fee title and conservation easements/cooperative agreements within identified focus areas.

The protection of these lands is subject to how the lands contribute to the biological needs of the refuge and meet funding priorities nationwide. Land acquisition within the approved acquisition boundary is subject to its contribution to the overall forest configuration, its contribution to wildlife populations and habitat objectives, and whether landowners are interested in selling their lands. Expanding refuge ownership of lands within the approved acquisition boundary, coupled with intensive partnering with both public and private entities to protect privately owned lands in the identified priority areas, will assist in overall efforts to establish Source Population Objectives of migratory songbirds and black bear, as well as provide additional wildlife-dependent recreation and environmental education benefits.

Strategies:

- Achieve protection and conservation through acquisition of lands within the current refuge acquisition boundary and through

- conservation partnerships with landowners on lands within the identified priority areas.
- Ensure that lands are purchased or cooperatively protected based on the greatest habitat value to species life cycle needs and ecosystem representation. Establish acquisition priority based upon habitat values and/or possible threats to existing resources.
- Initiate and continue contact with all landowners within the acquisition boundary in order to determine landowner interest and participation.
- Develop a coordinated approach with partners to appropriately locate areas of greatest conservation concern.
- Seek additional partnerships with conservation organizations and others to complete acquisitions.

Objective F.2: Private Lands Technical Assistance

Provide technical assistance (i.e., information) utilizing private lands conservation programs to develop partnerships with landowners to achieve wildlife and habitat objectives.

Discussion: A vast majority of lands within the Lower Mississippi Valley are privately owned but play an integral role in the management of migratory bird and other wildlife populations. Through the Partners for Fish and Wildlife Program, the Service provides technical and financial assistance to private landowners interested in managing for waterfowl or other federal trust resources, and in restoring bottom-land hardwood forests or riparian habitats. The Service can also provide land protection and conservation assistance in concert with other private, state, or federal agencies. Providing management assistance to private landowners is critical to the Service's accomplishment of landscape habitat initiatives in the Lower Mississippi Valley.

Strategies:

- Coordinate land conservation activities with private, local, state, and federal organizations that participate in conservation incentive programs for local landowners, with special emphasis on identified priority areas.
- Conduct an annual seminar for local land managers (private and public) on habitat management, current research and monitoring, and watershed issues.
- Develop and distribute a newsletter describing conservation programs that are available to private landowners.
- Communicate with adjacent and key landowners and other community organizations and participate in local Chamber of Commerce to promote outreach and cooperation in managing the refuge.
- Develop and employ outreach strategies to enroll private landowners in the most appropriate conservation program.
- Where appropriate, protect the remaining private lands within the refuge acquisition boundary.

Objective F.3: Private Land Enrollment in Conservation Programs

Seek to enroll about 12,000 acres of appropriate habitat in private land conservation programs outside the approved acquisition boundary to establish migration corridors between the Three Rivers/Red River Wildlife Management Areas and Tensas National Wildlife Refuge.

Discussion: The Service is working with the Natural Resources Conservation Service, the Louisiana Department of Wildlife and Fisheries, Black Bear Conservation Committee, and universities to develop a series of forest blocks and connecting forested corridors from Tensas River National Wildlife Refuge to the Atchafalaya Basin. The Bayou Cocodrie area, including the refuge, has been designated as an integral forest block in that planning effort. To facilitate movement north and south, it is critical that the refuge and adjacent forested lands be connected to other nearby forest blocks at the Red River/Three Rivers Wildlife Management Areas via forested corridors.

The Service considers restoring and protecting Louisiana black bear habitat a high priority in the Bayou Cocodrie planning area. The Service coordinates efforts with the Black Bear Conservation Committee, the Louisiana Department of Wildlife and Fisheries, the Natural Resources Conservation Service, and many others to achieve bear conservation goals in Louisiana.

Strategies:

- Coordinate Louisiana black bear recovery activities with other Fish and Wildlife Service offices, state agencies, Black Bear Conservation Committee, and local landowners.
- In conjunction with state and federal agencies, develop and implement education programs within local communities.
- Identify and prioritize potential private lands for enrollment in private lands conservation programs that are in partnership with the Service.
- Inform landowners of available private lands conservation programs.
- Enroll private lands in incentive programs.

V. Plan Implementation

**Comprehensive
Conservation Plan**

Plan Implementation



Air photo over I-20
USFWS Photo

BACKGROUND

Refuge lands are managed as defined under the National Wildlife Refuge System Improvement Act of 1997, Fish and Wildlife Manual, sound biological principles, and up-to-date research. Congress has distinguished a clear legislative mission of wildlife conservation for all national wildlife refuges, which unlike other public lands, are dedicated to the conservation of the Nation's fish and wildlife resources. Recreational values are accommodated where appropriate and compatible, while still meeting the Congressional mandates of wildlife first. Priority projects emphasize the protection and enhancement of fish and wildlife species first and foremost, but consideration is given to balancing the needs and demands for recreation and environmental education.

REFUGE PROJECTS

The projects described in the following pages reflect the basic needs identified by Service staff, the public, and planning team members for the management of fish and wildlife populations, habitats, visitor services, general administration, and land protection and conservation. Among these projects is a list of step-down plans, individual and specific in nature, to be developed or revised. Step-down plans are prepared in conjunction with the provisions set forth in the National Environmental Policy Act of 1969, and outline specific management actions. The refuge operates under a number of these plans.

General cost estimates for the projects are provided in Figure 16. These figures will be updated and adjusted annually. There are no estimates of potential land purchases as land values are subject to time of sale and market value at time of purchase. There are no assurances that these projects will be either fully or partially funded. However, with the assistance and cooperation of conservation partners, the Service will use this plan to focus attention on funding the operation and maintenance needs of the refuge.

For the purpose of achieving the goals and objectives developed for the refuge, the plan has grouped management strategies into specific projects. This plan describes a total of 41 projects including the need for additional personnel to implement the projects. Private lands have been identified for possible enrollment in land protection programs offered by the Service or other partnering agencies.

Fish and Wildlife Populations

(1) Fish and Wildlife Management Plan

With the addition of a wildlife biologist, a fish and wildlife management plan will be developed to describe specific wildlife inventory activities and techniques to monitor fish and wildlife populations. The plan will address nuisance animal management, game harvest

needs, comprehensive inventory methods, and reporting requirements. It will describe inventory and water management activities (e.g., stream culverts that block fish movement), as well as identify wetlands and stream restoration projects that will improve habitat conditions for native fish and other aquatic species on the refuge. Monitoring parameters, trends of selected species and groups, and an approach consistent with other refuges in the area will be described.

The existing hunt plan will be revised as appropriate and integrated into the Fish and Wildlife Management Plan. It will define species to be hunted, season structures, hunting methods, and applicable refuge-specific hunting regulations.

(2) Investigations

Investigations will be conducted to assess invasive species including zebra mussel, beaver, feral hog, Chinese tallow, and water hyacinth to determine population status and biological parameters. Exploratory investigations will be conducted for the Rafinesque's big-eared bat and the fat pocketbook mussel.

(3) Surveys and Assessments

The refuge will complete a comprehensive survey of vertebrates and species diversity. Surveys will include assessing the status of land bird populations and providing baseline data to evaluate the effectiveness of forest management and restoration efforts. This information is critical to implementing programs, formulating habitat management, and correcting deficiencies. White-tailed deer health check surveys and browse surveys will be conducted every 3 years. Annual waterfowl surveys will yield pertinent information to assist in determining how effectively the refuge moist-soil management program is supporting at least 10,000 migrating waterfowl and 12,000 shorebirds.

(4) Geographic Information System

Wildlife use and habitat type will be digitized and used for future analysis and monitoring. Data will be stored and maintained in a geographic information system. Additional data will be acquired from partners, while other databases will be developed. Hardware, digitizing equipment, field survey equipment, and aerial surveys and data will be purchased along with a computer, printer, and plotter.

(5) Nest Boxes

Artificial nest box programs will be established to support the needs of prothonotary warblers and wood ducks.

(6) Black Bear Monitoring

Monitoring will include bear movements, activities, and capture and radio collaring, as well as assessing and evaluating sites for release. As Highway 84 is improved, the Service, along with appropriate agencies, will consider the effects of wildlife movement across the road expanse that may involve enlarging drainage culvert(s) for wildlife movement under the highway.

(7) Avian Monitoring

Scheduled monitoring of non-game birds, including small land birds, shorebirds, raptors, colonial nesting birds, and waterfowl will be ongoing. The refuge will participate in regional and national avian monitoring programs. Refuge-specific assessments of forest songbird communities will include songbird use, abundance, and diversity. By 2006, implementation of detailed monitoring will begin in the old growth stand component. Cerulean and Swainson's warbler nest surveys will be conducted to monitor nesting success, predator disturbance, and nesting parasitism.

Habitats

(8) Forest Habitat Management Plan

The Forest Habitat Management Plan will describe specifics of the forest management program. An inventory and mapping of refuge habitats will be part of this planning effort. Forest management will be described to maintain and improve forest age, species, and structural class components to benefit forest breeding birds, Louisiana black bear, and indigenous species. The plan will establish schedules for reforesting open areas and preparation of forest management prescriptions for existing stands. Objectives will be stated in clear and measurable terms and provide an overall framework on which to base plant and wildlife monitoring.

(9) Weeds/Invasive Species

An Integrated Pest Management Plan will be developed in 2008. The refuge may seek assistance from entities including local universities, conservation organizations, and the U.S. Department of Agriculture.

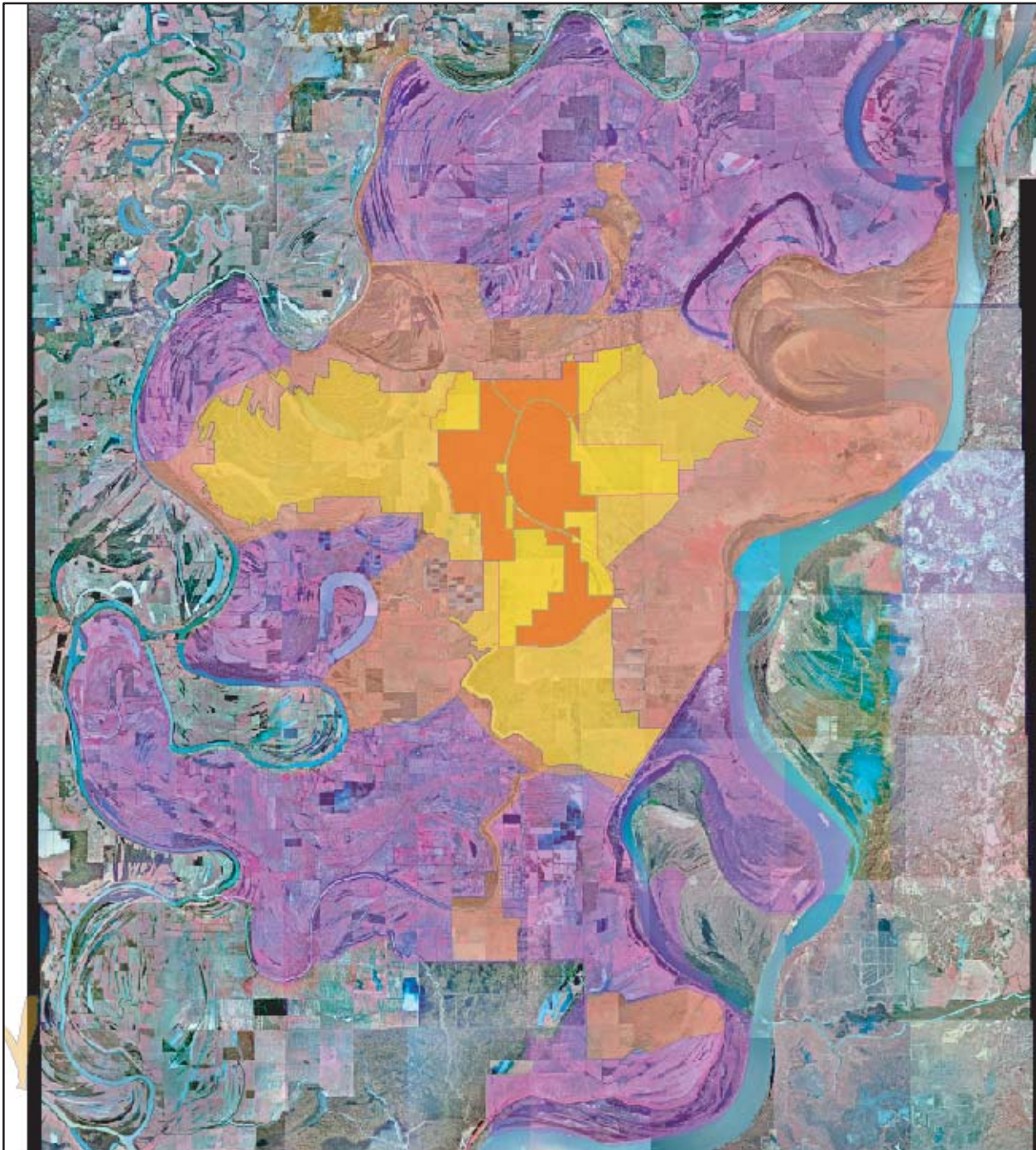
(10) Reforestation

Reforestation with a mix of native hardwoods on most open, heavily fragmented areas within the identified priority areas is a long-term goal (Figure 12). All new lands acquired in excess of waterfowl needs will be reforested. Concerted efforts will be made to develop and/or expand partnerships with public and private entities to achieve reforestation goals within identified priority areas to establish travel corridors between existing forest blocks to aid in the recovery of the Louisiana black bear. Replanted sites will also provide migratory songbird habitat and increase natural diversity of wildlife. High priority sites first considered for reforestation include refuge lands (former marginal agricultural sites) and neighboring private lands enrolled in Partners for Wildlife or Wetland Reserve programs.






(11) Research Natural Area

The 750-acre old growth area will be proposed as a Research Natural Area with several primary objectives. These are (a) to remain as the best example of old growth bottomland hardwoods remaining in the Lower Mississippi Valley, which continues to provide for those species dependent on habitat conditions found in old growth bottomland hardwoods; (b) to provide a standard by which to measure management activities within the Brooks Break Unit; (c) to provide research

Figure 12. Land protection priority areas



Legend

-  BCNWR BOUNDARY
-  BCNWR ACQUISITION BOUNDARY
-  BCNWR PRIVATE LANDS PRIORITY I
-  BCNWR PRIVATE LANDS PRIORITY II
-  BCNWR PRIVATE LANDS PRIORITY III

1:305,000



opportunities focused on old growth functions within bottomland hardwood ecosystems; and (d) to provide other research opportunities compatible with the first three objectives. The forest will generally be left undisturbed, except for research projects as stated in the objectives. Species occurrences, species habitat relationships, and avian surveys are currently being studied in the old growth area and will continue to be studied. The protected old growth will be used as a standard to manage existing forest stands with objectives of providing old growth functions (Figures 13 and 14).

(12) Forest Management-Brooks Brake Unit

Management of this unit will focus on providing habitat for forest interior birds that are dependent on habitat characteristics displayed by old growth bottomland hardwoods. Although management will primarily include thinning and small group selection cutting, other silviculture practices may apply as determined through habitat surveys and the prescription process necessary for this unit to meet its habitat objectives. Management techniques will be designed to (a) provide old growth characteristics/functions; and (b) allow this unit to become self-sustaining old growth. The proposed Research Natural Area located within this unit will be the standard by which all management within this unit is based. Management applications on target species will be monitored on a continuing basis and subject to change as effects are determined (Figures 13 and 14).

(13) Forest Management-Wallace Lake and Cross Bayou Units

A forest stand components' evaluation will be completed for the Wallace Lake and Cross Bayou units as well as acquired forest lands to determine appropriate management prescriptions needed to meet songbird and black bear objectives. Management applications will be described in the Forest Habitat Management Plan. Initially, forest management may involve thinning and group selection cutting to increase natural diversity and restore forest habitats to a healthier and more natural distribution of stages, and to encourage a diverse understory of native grasses, shrubs, and hardwoods (Figures 13 and 14).

(14) First Order Vegetative Monitoring

Pre- and post-treatment habitat monitoring in the Brooks Brake Unit will be conducted. Annual evaluations will be made wherever there is a forest stand management activity to assess the health of forest songbird communities, restore natural diversity to emphasize mature forests, and measure management application success.

(15) Wetland Restoration

Currently, moist-soil units have been partially developed by the refuge staff to restore habitat for waterfowl, shorebirds, other water birds and raptors. Phased development of these moist-soil units, including initial levee construction of two water impoundments, was completed in 1999. Additional water management improvements requiring funding include irrigation wells, pumping units, irrigation pipes, and stoplog structures.

Figure 13. Habitat management (short-term projection)

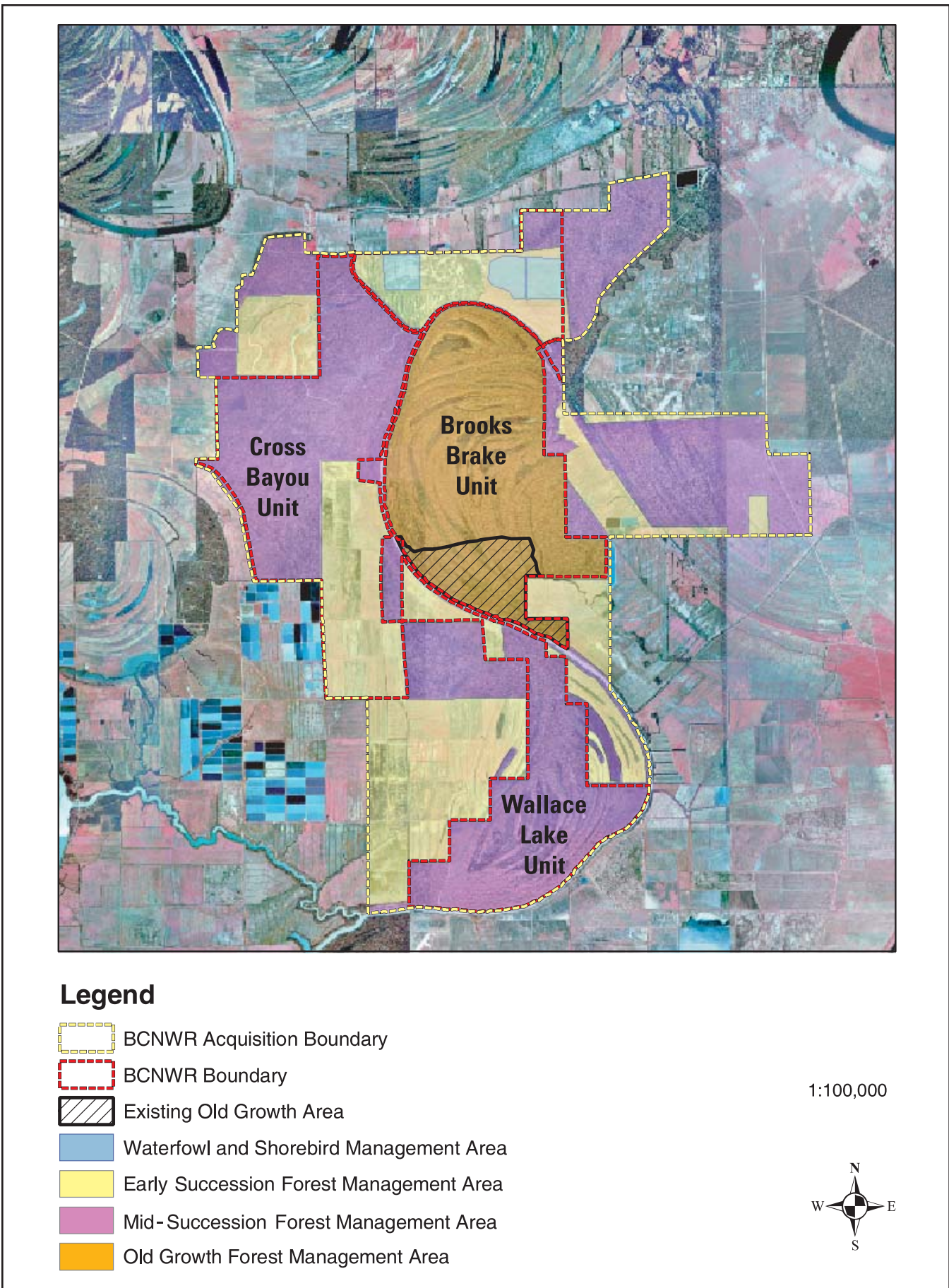
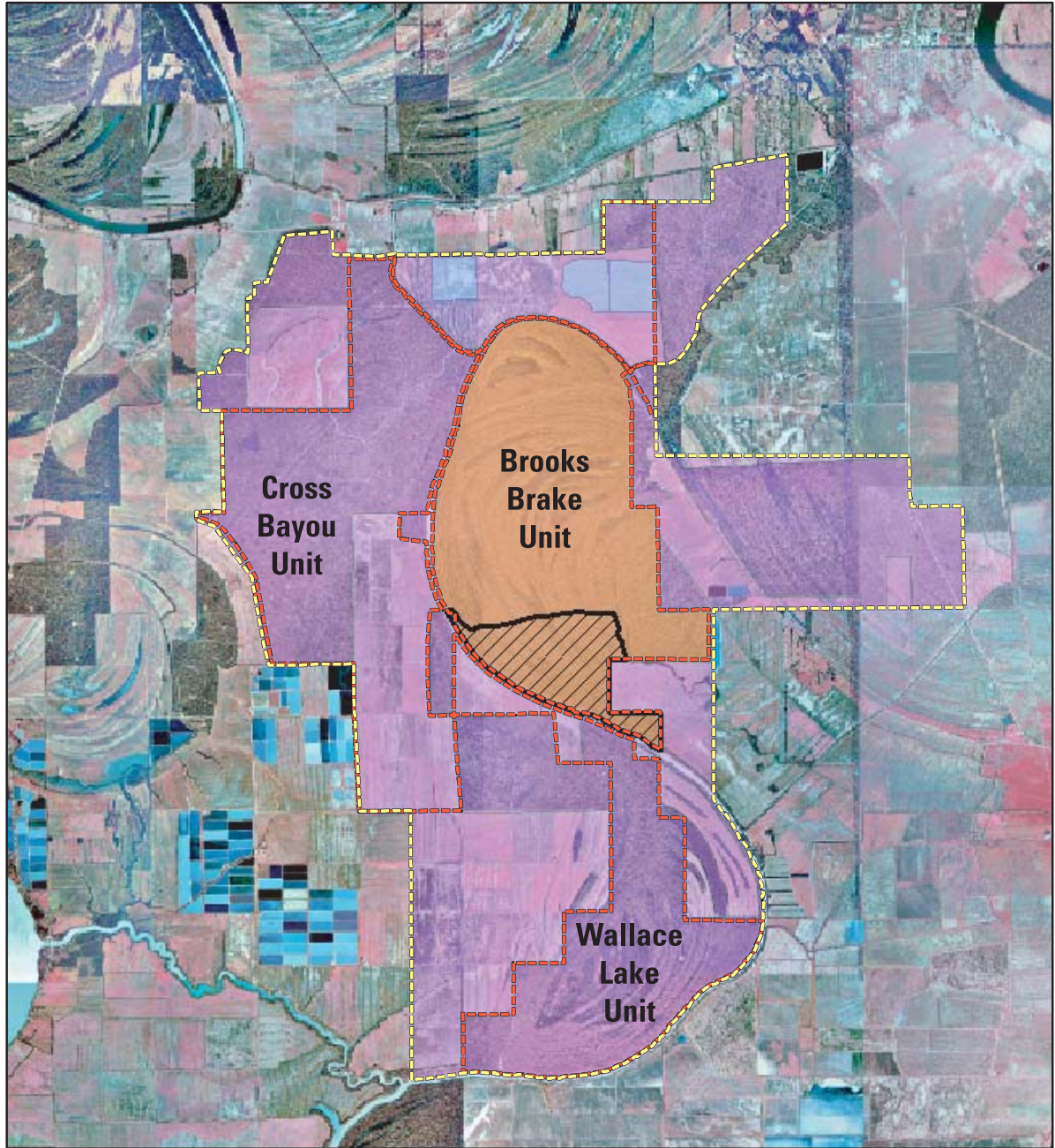


Figure 14. Habitat management (long-term projection)



Legend

-  BCNWR Acquisition Boundary
-  BCNWR Boundary
-  Waterfowl and Shorebird Management Area
-  Existing Old Growth Area
-  Old Growth Forest Management Area
-  Mid-Succession Forest Management Area

1:100,000



Education and Visitor Services

(16) Visitor Services Plan

Descriptions of specific materials, displays, and themes to promote the six priority public uses adopted by the Service will be addressed in this plan. Specific visitor use activities including facility requirements, site design, conceptual themes, and accessibility for the disabled will also be addressed.

This plan will also address the specific services (e.g., ecotourism opportunities such as guided tours) the refuge could provide local communities, as well as the cooperative partnerships to increase awareness of fish and wildlife resources and systematically improve visitor use within the area.

(17) Hunting

Hunting opportunities will be expanded as lands are acquired and initially will include a lottery, modern-day gun hunt for white-tailed deer, and a limited waterfowl hunt in the Brooks Brake Unit. The addition of a permanent law enforcement officer and radio communication system will improve emergency response and the safety of officers in the field. Additional hunter check stations, hunter safety classes, and annual hunt brochures will be provided.

(18) Sport Fishing

To improve sport fishing opportunities, additional access for both boat and bank fishing will be developed on the Cross Bayou, which is the most suitable site for access (Figure 15). A road, boat ramp, and parking area will be developed. Bank fishing will be universally accessible.

(19) Wildlife Observation and Photography

Wildlife observation and photography near the refuge headquarters will include the construction of an observation platform at the waterfowl/shorebird area, the addition of a 10-car parking area, informational kiosk, and two vault toilets. In addition, informational panels will illustrate waterfowl and shorebird management (Figure 15).

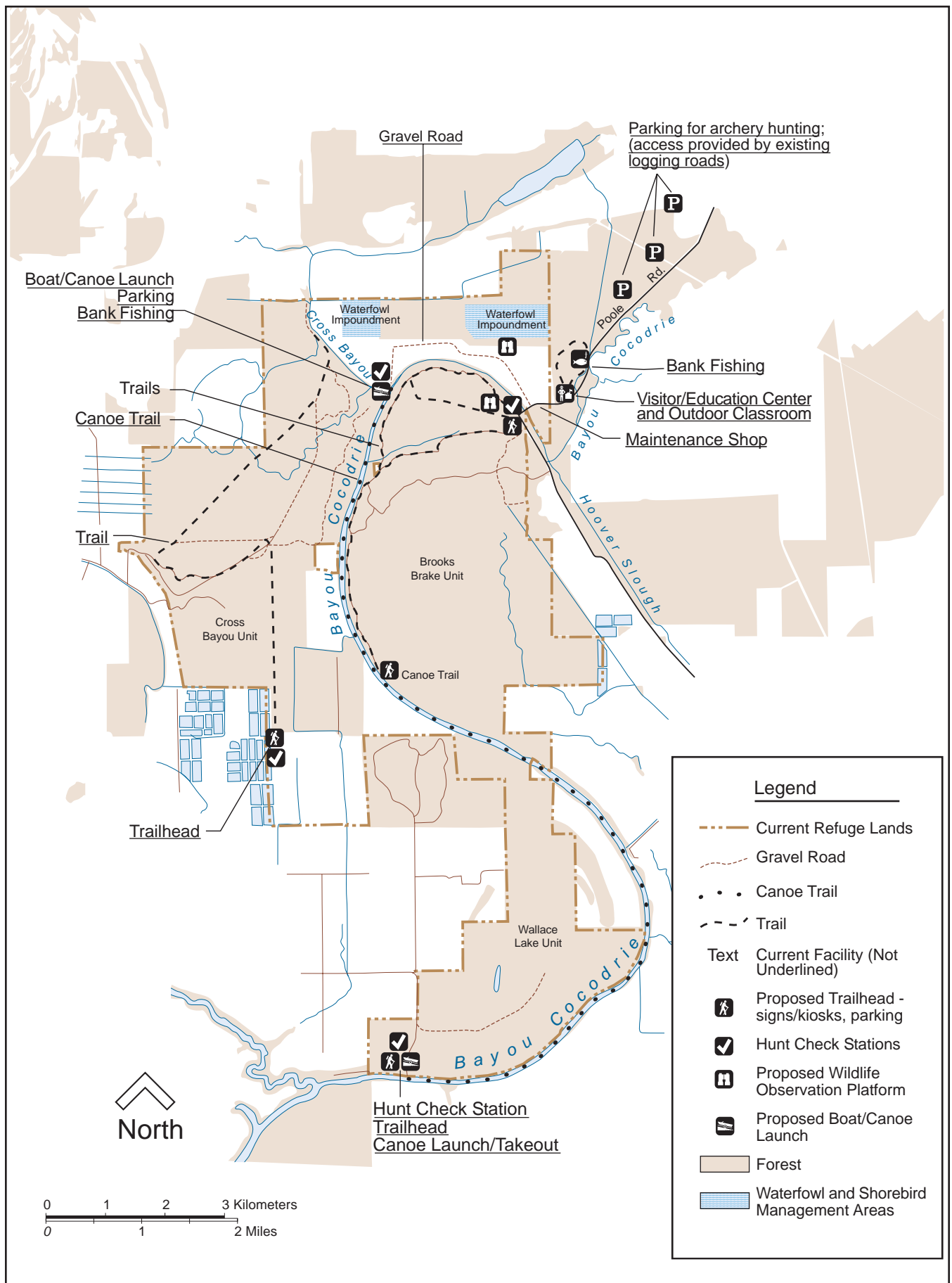
(20) Boardwalk to Old Growth Area

A 3/4-mile boardwalk will be constructed leading to the edge of the old growth/research natural areas and will be open year-round except for the nesting season (Figure 14).

(21) Canoe Trail

Bayou Cocodrie is designated as a Scenic River by the State of Louisiana. It flows through the oldest remaining bottomland hardwood forest stands in the area. There is limited access along its length, since much of it flows through private lands. The refuge offers one of the few opportunities for public canoe access. A parking area and canoe launching area will be developed near the refuge headquarters and Poole Road bridge at Cross Bayou, and off Boggy Bayou Road. The canoe trail will also offer 2 - 3 designated stops along its route for visitors to walk a short distance into the forest (Figure 15).

Figure 15. Current and proposed visitor facilities





GIS mapping
USFWS Photo

(22) Parking/Trailhead Development

This area supports the 13-mile trail system located throughout the Brooks Brake Unit. Trails provide access for hunting and wildlife observation and photography. The Brooks Brake Unit is the primary location for recreation opportunities on the refuge, providing access deep into the bottomland hardwood forest community. All trails leading into the Brooks Brake Unit begin from a central parking area. The area is in need of improvements, trailhead development, and signs. Portions of the trail system will be upgraded to include photo/observation blinds at selected sites (Figure 15).

(23) Visitor Center/Headquarters Complex

Key to the success of providing additional visitor services is having office space for additional staff and an indoor area to conduct environmental education activities. A dual administrative and visitor services facility, to be located along Poole Road, will provide much needed office space for the expanded staff, as well as a central point for visitors to obtain information about the refuge. In addition to offices, it will include an exhibit area, an auditorium for interpretive and education programming, and a classroom space for school field trips. Besides working with local schools, the refuge staff will be available to offer educational programs to visitors and local residents (Figure 15).

(24) Kiosks

A 3-panel kiosk with basic information regarding the Service, the refuge, and recreation opportunities will be developed and located at all parking areas and trailheads. There will be from four to six of these located throughout the refuge (Figure 15).

(25) Environmental Education

There are a number of elements required for successful administration of a new interpretive/environmental education program. Many of these elements have annual operating expenses related to materials for program participants. The addition of one permanent Outdoor Recreation Planner will provide services at the refuge, as well as at Lake Ophelia and St. Catherine Creek National Wildlife Refuges. Other costs associated with program development will include brochures, teacher activity guides, curriculum development, education program equipment (e.g., microscopes, dip nets, sampling kits), projection equipment, and various guides/manuals.

(26) Outreach

Outreach to local constituencies and beyond is becoming a valuable tool for refuge managers. Communication with the public regarding the refuge's role in management and protection of natural resources results in direct support of refuge programs. Making use of other local facilities and developing an ecotourism program, portable exhibits, and special issue fact sheets are just a few of the items that can be useful outreach tools. Outreach programs are supported with the use of reference materials, portable exhibits, and off site permanent exhibits.

Refuge Administration

(27) Base Operations and Existing Staff

The refuge is currently managed with six full-time staff members. In its current operation, with minimal staff and low funding, the refuge conducts only essential activities such as law enforcement and outreach. Adequate funding and staffing of the refuge is necessary to attain the wildlife goals and objectives identified in this plan (Figures 16 and 17).

(28) Wildlife Enforcement Officer

Protecting refuge resources and the safety of visitors is a fundamental responsibility of refuge management. Game is commonly taken out of season and night poaching is a continual enforcement problem. The illegal sale of white perch from the Bayou Cocodrie River has resulted in prosecution. With the proposed increase in public hunting opportunities, a full time law enforcement officer is required (Figure 17).

(29) Forestry Technician

Proposed forest management work will require the addition of a forestry technician to assist the forester. The addition of this position will allow technical assistance to be provided to nearby refuges, as well as to private landowners enrolled in conservation programs that involve forest improvements or forest restoration projects.

(30) Wildlife Biologist and Biologist Technician

One full-time wildlife biologist and a full-time biologist technician are needed to develop plans, baseline studies, and biological assessments; monitor and evaluate management programs; manage black bear; and develop, with aid of the forester, a forest management program (Figure 17).

(31) Park Ranger/Public Use Specialist

As the refuge staff becomes increasingly involved in community partnerships and in providing recreation and environmental education to local schools, civic organizations, and on the refuge, it will be necessary to add a full-time position to serve these needs. The park ranger/public use specialist will also contribute to building recreation and environmental education programs at St. Catherine Creek and Lake Ophelia National Wildlife Refuges. The recreational and environmental education opportunities developed by the refuge will provide an economic benefit to the local community. Local merchants who sell outdoor recreation equipment, and businesses that provide food, lodging, and other commercial services to visitors and tourists, will benefit from this outreach program (Figure 17).

(32) Equipment Shed Construction

Currently, 75 percent of refuge equipment is unprotected and exposed to heat and moisture throughout the year. Because of this, routine replacement is expensive and constant exposure to the elements is causing deterioration to hydraulic lines, tires, and other soft coverings. This deterioration could also become a safety factor as an unexpected rupture of hydraulic lines could lead to serious burns. The addition of an equipment shed will reduce maintenance costs and extend the longevity of the equipment.

(33) Oil Storage Facility

Currently, the refuge lacks a storage facility for small engine tools, antifreeze, fuels, petroleum products, and paints. As a result, items are purchased on an as needed basis that is disruptive to management activities. The installation of a prefabricated oil storage facility is an immediate need.

(34) Radio Communication System

The staff is provided with cellular telephones for communication in the field. These phones operate well in open areas, but are ineffective over most of the refuge due to operating limitations under a thick forest canopy. As a result, communication is often interrupted and could place staff at serious risk. With the addition of a radio communication system, services will be shared with local police enforcement, as well as with St. Catherine Creek National Wildlife Refuge.

(35) Vehicle and Heavy Equipment Fleet

Equipment replacement needs include: one 4-wheeled backhoe, two tractors, one pressure washer, one motor grader, one bat wing mower, and two pickup trucks. The purchase of heavy equipment for erosion control is an important need. A priority whenever agricultural land is acquired is to eliminate topsoil runoff. Another priority is to restore 700 acres of interior forest damaged by beaver activity. A 4-wheeled backhoe will be used for multiple purposes including beaver dam removal and installation of pipe drops in the agricultural field bordering the Bayou Cocodrie River. The pipes will help prevent soil erosion. A motor-grader and bat-wing mower will be used to maintain refuge facilities and properties including impoundment levees, refuge access roads, trails, and parking areas.

(36) Entrance Road Rehabilitation

There is a need to rehabilitate approximately 3.5 miles of Poole Road from the refuge boundary, east to Highway 15. Poole Road is the only access to the refuge headquarters and will serve as the only access to planned visitor and education facilities. Boggy Bayou Road provides the only access to the south end of the refuge and is in need of major repairs. Because both are parish roads, partnerships will be developed with the Concordia Parish Police Jury and funding sought from the Federal Highway Administration.

(37) Refuge Road Improvements

An existing dirt road will be overlain with gravel, culverts, and drains to provide access for maintenance of waterfowl impoundments and for use by the public, as new facilities are constructed.

(38) Survey and Boundary Signs

Thirty-one miles of mostly remote property boundary are not posted. As a result, repeated game violations occur near refuge borders. Posting Service boundary signs will aid the refuge in prosecuting game violators and provide clear delineation of refuge lands where fish and wildlife are fully protected.

Cultural Resources

(39) Archaeological and Historic Resource Investigations

A comprehensive inventory and procurement of information on historic sites, as well as site eligibility for the National Register of Historic Places, will occur as appropriate. The refuge will procure pertinent scientific reports and articles and produce an annotated bibliography to document the region's history, geomorphology, and the utility of the scientific methodology. Native American and African American communities will be consulted to address how management activities might impact archaeological sites deemed important to those groups.

Land Protection and Conservation

(40) Land Acquisition

Implementation of this comprehensive conservation plan will result in the acquisition of up to 9,101 acres of wildlife habitat within the approved acquisition boundary for the Bayou Cocodrie National Wildlife Refuge. Additionally, private lands within identified priority areas will be targeted for various conservation programs and partnerships. The Service believes these are the minimum interests necessary to preserve and protect the fish and wildlife resources and meet conservation objectives.

The success of meeting wildlife and habitat management objectives identified in this plan is closely tied to the Service having management and/or protection interest on current refuge lands, additional lands within the current acquisition boundary, and identified priority areas.

The private property has been prioritized for protection using the following criteria:

- Biological significance;
- Existing and potential threats;
- Significance of the area to refuge management and administration; and
- Existing commitments to purchase or protect land.

Three categories of land protection have been established, with the highest priority being the Priority I lands. A description of the lands within each of the three priority groups is given below. Figure 12 shows the locations of the project areas and their respective priority groups.

Priority Group I: All lands within approved acquisition boundary and lands outside the acquisition boundary that, if reforested and protected, would significantly expand the core forest area and protect key habitats for the Louisiana black bear.

Priority Group II: Lands included within identified priority bird areas or bear corridors.

Priority Group III: Lands that, if reforested and protected, would serve to join existing blocks of forests (defragmentation), establish travel corridors between habitat blocks, or expand core forest areas within existing forest patches, but that are not included in identified priority bird areas or bear corridors.

*(41) Private Lands Coordination and Enrollment in
Conservation Programs*

In order for the refuge to restore and connect forests to serve as wildlife corridors, the staff must coordinate with landowners and agencies within Concordia, Tensas, and Catahoula parishes. The Service will accelerate joint planning at the watershed, landscape, and eco-region level with the U.S. Department of Agriculture and Louisiana Department of Wildlife and Fisheries. Further, the Service will coordinate with other agencies and organizations the enrollment of up to 12,000 acres of private lands in other private lands conservation programs. The Natural Resources Conservation Service and Farm Service Agency have been instrumental in implementing conservation measures to improve conditions for black bear by enrolling lands in the Wetlands Reserve Program and the Conservation Reserve Program. The Service will continue to provide technical assistance and support to enroll farmlands in these programs.

Black bear recovery success will depend upon landowner participation in various conservation programs coordinated with private, local, state, and federal organizations. Priority lands evaluated for enrollment will consider black bear movement and administrative access for monitoring.

Figure 16. Project/staff cost summary for 2001-2016

CCP Project Description No. Project	RONS/MMS Project No.	Estimated Cost (1999)	
		Initial	Recurring
<i>Fish and Wildlife Populations</i>			
1. Fish and Wildlife Management Plan	RONs 00004, 00005	*	
2. Investigations	RONs 00004, 00007	100,000	10,000
3. Surveys and Assessments	RONs 00004,00007	237,000	
4. Geographic Information System	Proposed	10,000	3,000
5. Nest Boxes	Proposed	5,000	2,500
6. Black bear Monitoring	RONs 00004	*	90,000
7. Avian Monitoring	RONs 00007, 00005	*	
<i>Habitats</i>			
8. Forest Habitat Management Plan	RONs 00002	54,500	
9. Weeds/Invasive Species	00007	110,000	10,000 ©
10. Reforestation	RONs 00002	7,500 ©	
11. Research Natural Area	RONs 00004,00007,00002	*	
12. Forest Management - Brooks Brake Unit	RONs 00002, 00004	*	
13. Forest Management - Wallace Lake and Cross Bayou Units	RONs 00002. 00004, 00023	*	
14. First Order Vegetative Monitoring	RONs 00004,00002	*	
15. Wetland Restoration	RONs 00023	45,000	5,000
<i>Education and Visitor Services</i>			
16. Visitor Services Plan	Proposed	*	
17. Hunting	RONs 00019	28,000	7,000
18. Sport Fishing	RONs 00019	20,000	5,000
19. Wildlife Observation and Photography Platform	MMS 00009	90,000	5,000
20. Boardwalk to Old Growth Area	MMS 00010	20,000	5,000
21. Canoe Trail	MMS 00010	10,000	5,000
22. Parking/Trailhead Development	MMS 04001, 04002, 04003, 04004	50,000	5,000
23. Visitor Center Headquarters/Complex	MMS 00001	2,163,000	50,000
24. Kiosks	Proposed	40,000	10,000
25. Environmental Education	Proposed	25,000	20,000
26. Outreach	Proposed	25,000	10,000
<i>Refuge Administration</i>			
27. Base Operations and Existing Staff	NA	NA	421,500 (FY04)
<i>Salary/Benefits</i>			
28. Wildlife Enforcement Officer	RONs 00019	100,000	100,000
29. Forestry Technician	RONs 00002	80,000	80,000
30. Wildlife Biologist and Bio Tech	RONs 00005	130,000	130,000
31. Outdoor Recreation Planner/Public Use Specialist	Proposed	80,000	
32. Equipment Shed Construction	MMS 00015	150,000	5,000
33. Oil Storage Facility	MMS 00017	53,000	3,000
34. Radio Communication System	RONs 00013	23,000	5,000
35. Vehicle and Heavy Equipment Fleet	RONs 00016, 11 MMS Projects	250,000	5,000
36. Entrance Road Rehabilitation (Poole Road)	MMS 00003, 00004	945,000**	20,000
37. Refuge Road Improvements	MMS 00003, 00004	234,500	
38. Survey and Boundary Signs	RONs 00018	150,000	5,000
Total		5,235,500	1,017,000
39. Archaeological and Historic Resource Investigations***			
40. Land Acquisition***			
41. Private Lands Coordination and Enrollment in Conservation Programs***			

Key:

RONs - Refuge Operation Needs (RONs) projects identified in this plan describe new projects in the first year, one-time expenses, and recurring annual costs.

MMS - Maintenance Management System (MMS) projects identified in this plan describe deferred maintenance or the backlog of maintenance and equipment needs that exist.

Both RONs and MMS projects are in addition to the base operating budget of the refuge.

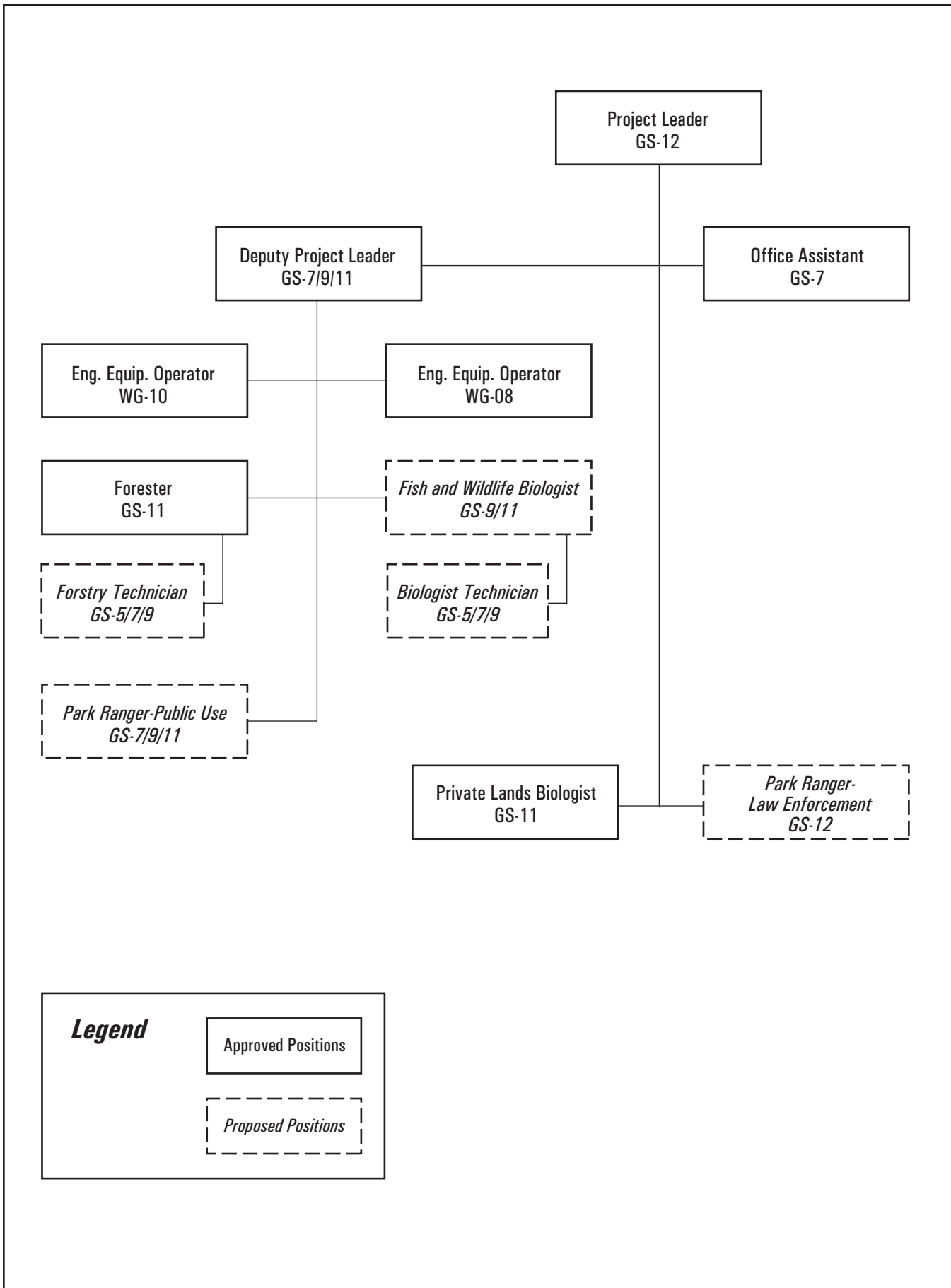
* Project cost is part of proposed staff cost

** Project cost primarily supported by partners

*** Project cost is undetermined

© Project primarily completed by Contracted Services

Figure 17. Current and proposed organizational structure





Canoe launch
USFWS Photo

STEP-DOWN MANAGEMENT PLANS

Refuge policy (Refuge Manual, Part 4, Chapter 3) requires that specific management plans be developed for each refuge. Some plans require annual revisions and others are on a 5- or 10-year revision schedule (Figure 18). The hunting and fishing plans are currently being revised.

Figure 18. Step-down plans

Plans Required	Completion Date Fiscal Year
Forest Management Plan	2005
Sign Plan	2006
Public Use Plan	2006
Water Management Plan	2006
Wildlife Inventory Plan	2007
Predator Control Plan	2007
Fire Management Plan	2008
Law Enforcement Plan	2008
Integrated Pest Management Plan	2008
Education and Visitor Services Management Plan	2009

PLAN PERFORMANCE

Specific survey, inventory, and monitoring protocols will be adopted for the refuge. Before doing so, a detailed biological assessment will be conducted. A geographic information system will be used to store and analyze information.

The National Wildlife Refuge System Improvement Act requires that the Service monitor fish, wildlife, and plants on refuges in order to establish status and trends of both resident and migratory wildlife. Monitoring is an essential component of this plan, and specific strategies have been integrated into the goals and objectives. All habitat management activities will be monitored to assess whether the desired effect on wildlife and habitat components has been achieved. Monitoring the number of breeding pairs and the reproductive parameters of the priority suite of songbird species will follow established statewide protocols, at a minimum. Baseline surveys will be established for other species of wildlife for which existing or historical numbers are not well known. It also will be important to begin studies to monitor the response of wildlife to increased visitor use.

Management of projects is dependent on monitoring and evaluation to sustain the function and dynamics of forests, maintaining biological diversity, protecting target species, and providing a variety of wildlife-dependent recreation and education experiences of value to visitors. Information derived from monitoring and evaluation will enable managers to adjust and test the management objectives outlined in this plan.

This plan will be reviewed annually to determine the need for revision and to adjust and set priorities. A revision will occur if significant information becomes available, such as a change in ecological conditions, a major refuge expansion, or if new step-down plans are developed. The plan will be augmented by detailed step-down plans to address completion of specific strategies in support of refuge goals and objectives. Revisions to the plan will be subject to National Environmental Policy Act review, as well as public review. Management performance is documented in annual narratives. A new plan is required after 15 years.

PARTNERSHIP OPPORTUNITIES

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

Many biologists and private citizens, as well as environmental organizations, scientific organizations and other agencies, have expressed a great interest in the management of the refuge. Maintaining and developing partnerships will enable the refuge to achieve its goals and objectives, minimize costs, share funding, and bridge relationships with others. To maintain and enhance wildlife outside of the refuge, the Service will focus its efforts on continuing to develop partnerships with landowners, the Louisiana Department of Wildlife and Fisheries, The Nature Conservancy, the Natural Resources Conservation Service and the Farm Service Agency. Although the Service does not have management responsibilities for those lands outside the refuge, it is important to articulate the wildlife resource needs area wide. Collaboration with colleges and universities and with conservation organizations will enable the refuge to carry on its extensive plans for research, monitoring, and education. To create awareness and expand environmental education efforts in the community, partnerships will be established with organizations and school systems.

MONITORING AND EVALUATION

Wildlife population monitoring, primarily of breeding birds, black bear, white-tailed deer, and invasive species, as well as habitat monitoring, will be emphasized. Wildlife monitoring will include surveys during the hunting and breeding seasons, brood surveys, collar observations, species richness measurements, and relative abundance figures. Habitat monitoring will primarily involve the amount and distribution of forested wetland habitats, vegetation and water quality surveys, community composition and structure, and representative components and habitat parameters addressed in plan objectives.

Adaptive management is a process in which projects are implemented within a framework of scientifically driven experiments to test predictions and assumptions as outlined in this plan. The biological programs are systematically evaluated to determine management

effects on wildlife populations. This information is used to refine approaches and to determine how effectively goals and objectives are being accomplished. Evaluations will be conducted on a regular basis to provide feedback to stakeholders and partners. If monitoring and evaluation yield undesirable effects for target and non-target species and/or communities, management projects will be altered and the comprehensive conservation plan will be revised.

*Bayou Cocodrie
National Wildlife Refuge*

**Comprehensive
Conservation Plan**

Plan Implementation

APPENDIX A. GLOSSARY

<i>Adaptive management</i>	A process in which projects are implemented within a framework of scientifically driven experiments to test predictions and assumptions outlined within the comprehensive conservation plan. The analysis of the outcome of project implementation helps managers determine whether current management should continue as is or whether it should be modified to achieve desired conditions.
<i>Alternative</i>	Alternatives are different means of accomplishing refuge purposes, goals, and objectives, and contributing to the National Wildlife Refuge System. A reasonable way to fix the identified problem or satisfy the stated need.
<i>Approved Acquisition Boundary</i>	A project boundary which the Director of the Fish and Wildlife Service approves upon completion of a detailed planning and environmental compliance process.
<i>Bayou</i>	A minor river or secondary watercourse, usually sluggish or back flooding water flow.
<i>Biological Diversity</i>	The variety of life and its processes, including the variety of living organisms, the genetic differences among them, and the communities and ecosystems in which they occur. The National Wildlife Refuge System focus is on indigenous species, biotic communities, and ecological processes.
<i>Canebrake</i>	Cane stand (<i>Arundinaria gigantea</i>) that, under present-day conditions, grows in disturbed areas and frequently persists in small closed-canopy patches at Bayou Cocodrie National Wildlife Refuge. Historically, cane was in large disturbed areas under open canopies. Habitat is unique and valued for the Swainson's warbler.
<i>Canopy</i>	A layer of foliage; generally the upper-most layer, in a forest stand. It can be used to refer to mid- or under-story vegetation in multi-layered stands. Canopy closure is an estimate of the amount of overhead tree cover (also canopy cover).
<i>Categorical Exclusion</i>	A category of actions that do not individually or cumulatively have a significant effect on the human environment and have been found to have no such effect in procedures adopted by a federal agency pursuant to the National Environmental Policy Act.
<i>CFR</i>	Code of Federal Regulations.
<i>Compatible Use</i>	A wildlife-dependent recreational use or any other use of a refuge that, in the sound professional judgment of the Refuge Manager, will not materially interfere with, or detract from, the fulfillment of the mission or the purposes of the refuge. A compatibility determination supports the selection of compatible uses and identifies stipulations or limits necessary to ensure compatibility.

<i>Comprehensive Conservation Plan</i>	A document that describes the desired future conditions of the refuge; provides long-range guidance and management direction for the Refuge Manager to accomplish the purposes, goals, and objectives of the refuge; and contributes to the mission of the National Wildlife Refuge System, and to meet relevant mandates.
<i>Conservation Easement</i>	A legal document that provides specific land-use rights to a secondary party. A perpetual conservation easement usually grants conservation and management rights to a party in perpetuity.
<i>Cooperative Agreement</i>	A simple habitat protection action in which no property rights are acquired. An agreement is usually long-term and can be modified by either party. Lands under a cooperative agreement do not necessarily become part of the National Wildlife Refuge System.
<i>Corridor</i>	A route that allows movement of individuals from one region or place to another.
<i>Cover Type</i>	The present vegetation of an area.
<i>Cultural Resources</i>	The remains of sites, structures, or objects used by people of the past.
<i>Cypress and Tupelo Swamp</i>	Found in low-lying areas - swales and open ponds - that hold water several months, if not all of the year. Large hollow trees are used as bear den sites.
<i>Deciduous</i>	Pertaining to perennial plants that are leafless for some time during the year.
<i>Ecological Succession</i>	The orderly progression of an area from one vegetative community to another through time in the absence of disturbance.
<i>Ecosystem</i>	A dynamic and interrelating complex of plant and animal communities and their associated non-living environment.
<i>Ecosystem Management</i>	Management of natural resources using system-wide concepts to ensure that all plants and animals in ecosystems are maintained at viable levels in native habitats and basic ecosystem processes are perpetuated indefinitely.
<i>Even aged Forests</i>	Forests that are composed of trees with a time span of less than 20 years between oldest and youngest individuals.
<i>Emergent Growth/Revegetation</i>	Farmland or logged timber that has been reforested (early succession) or may be naturally revegetated.
<i>Endangered Species</i>	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.
<i>Endemic Species</i>	Plants or animals that occur naturally in a certain region and whose distribution is relatively limited to a particular locality.

<i>Environmental Assessment</i>	A concise document prepared in compliance with the National Environmental Policy Act, that briefly discusses the purpose and need for an action, alternatives to such action, and provides sufficient evidence and analysis of impacts to determine whether to prepare an environmental impact statement or a finding of no significant impact.
<i>Fauna</i>	All the vertebrate or invertebrate animals of an area.
<i>Federal Trust Species</i>	All species where the Federal Government has primary jurisdiction including federally threatened or endangered species, migratory birds, anadromous fish, and certain marine mammals.
<i>Fee Title</i>	The acquisition of most or all of the rights to a tract of land. There is a total transfer of property rights with the formal conveyance of a title. While a fee title acquisition involves most rights to a property, certain rights may be reserved or not purchased, including water rights, mineral rights, or use reservation (the ability to continue using the land for a specified time period, or the remainder of the owner's life).
<i>Finding of No Significant Impact</i>	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.
<i>Flood Plain Woods/Bottomland Hardwood Forests</i>	Forests consisting of hardwood species adapted to heavy clay soils and frequent/seasonal inundation. Such forests occur naturally in the alluvial flood plains of rivers and streams in the southeastern United States but millions of acres (up to 90%) have been cleared primarily for agriculture in the Mississippi River Alluvial Valley.
<i>Fragmentation</i>	The process of reducing the size and connectivity of habitat patches. The disruption of extensive habitats into isolated and small patches.
<i>Goal</i>	Descriptive, open-ended, and often broad statements of desired future conditions that convey a purpose but do not define measurable units.
<i>Geographic Information System</i>	A computer system capable of storing and manipulating spatial data.
<i>Ground Story (flora)</i>	Vascular plants less than one meter in height, excluding tree seedlings.
<i>Herbaceous Wetland</i>	Annually or seasonally inundated with vegetation consisting primarily of grasses, sedges, rushes, and cattail.
<i>Habitat</i>	The place where an organism lives. The existing environmental conditions required by an organism for survival and reproduction.
<i>Indicator Species</i>	A species of plant or animals that is assumed to be sensitive to habitat changes and represents the needs of a larger group of species.
<i>In holding</i>	Privately owned land inside the boundary of a national wildlife refuge.
<i>Issue</i>	Any unsettled matter that requires a management decision.

<i>Mid-succession Forest</i>	A forest generally characterized by even aged structure resulting from human disturbance such as timber harvest. Mid-successional forests may contain mature trees but as a whole do not exhibit functional or structural characteristics associated with old growth conditions.
<i>Migratory</i>	The seasonal movement from one area to another and back.
<i>Monitoring</i>	The process of collecting information to track changes of selected parameters over time.
<i>National Environmental Policy Act</i>	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 this Act with other planning requirements, and prepare appropriate policy documents to facilitate better environmental decision making.
<i>National Wildlife Refuge</i>	A designated area of land, water, or an interest in land or water within the National Wildlife Refuge System.
<i>National Wildlife Refuge System</i>	Various categories of areas administered by the Secretary of the Interior for the conservation of fish and wildlife, including species threatened with extinction, all lands, waters, and interests therein administered by the Secretary as wildlife refuges, wildlife ranges, game ranges, wildlife management areas, or waterfowl production areas.
<i>Native Species</i>	Species that normally live and thrive in a particular ecosystem.
<i>Neotropical Migratory Bird</i>	A bird species that breeds north of the United States/Mexican border and winters primarily south of that border, which includes Mexico, West Indies, Central America and part of South America.
<i>Natural Levee</i>	Natural embankment created by soil deposited as a stream over-tops its banks. Located adjacent to a stream, a natural levee is often the highest ground in a bottomland or swamp type area.
<i>Objective</i>	An objective is a concise quantitative (where possible) target statement of what will be achieved. Objectives are derived from goals and provide the basis for determining management strategies. Objectives should be attainable and time-specific.
<i>Old Growth Forest</i>	Forested areas lacking frequent disturbance to vegetation, usually characterized by dominant species entered into a late successional stage; usually associated with high diversity of species, specialization, and structural complexity.
<i>Planning Area</i>	A planning area may include lands outside existing refuge planning unit boundaries that are being studied for inclusion in the unit and/or partnership planning efforts. It may also include watersheds or ecosystems that affect the planning area.

<i>Planning Team</i>	A planning team prepares the comprehensive conservation plan. Planning teams are interdisciplinary in membership and function. A team generally consists of a planning team leader; refuge manager and staff biologists; staff specialists or other representatives of Service programs, ecosystems or regional offices; and state partnering wildlife agencies as appropriate.
<i>Preferred Alternative</i>	This is the alternative determined by the decision maker to best achieve the refuge purpose, vision, and goals, to contribute to the refuge system mission, address the significant issues, and is consistent with principles of sound fish and wildlife management.
<i>Refuge Boundary</i>	Lands acquired by the Fish and Wildlife Service within the current approved acquisition boundary.
<i>Refuge Operating Needs System</i>	This is a national database that contains the unfunded operational needs of each refuge. Projects included are those required to implement approved plans and meet goals, objectives, and legal mandates.
<i>Refuge Purposes</i>	The purposes specified in or derived from the law, proclamation, executive order, agreement, public land order, donation document, or administrative memorandum establishing, authorizing or expanding a refuge, refuge unit, or refuge subunit.
<i>Seral Forest</i>	A forest in the mature stage of development, usually dominated by large, old trees.
<i>Sink</i>	A habitat in which local mortality exceeds local reproductive success for a given species.
<i>Sink Population</i>	A population in a low quality habitat in which birth rate is generally less than the death rate and population density is maintained by immigrants from source populations.
<i>Source</i>	A habitat in which local reproductive success exceeds local mortality for a given species.
<i>Source Population</i>	A population in a high-quality habitat in which birth rate greatly exceeds death rate and the excess individuals leave as migrants.
<i>Step down Management Plans</i>	Step-down management plans provide the details necessary to implement management strategies and projects identified in the comprehensive conservation plan.
<i>Strategy</i>	A specific action, tool, or technique or combination of actions, tools, and techniques used to meet unit objectives.
<i>Threatened Species</i>	Species listed under the Endangered Species Act that are likely to become endangered within the foreseeable future throughout all or a significant portion of their range.
<i>Understory</i>	Any vegetation with canopy below or closer to the ground than canopies of other plants.

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 transition habitats and need not contain all of the habitat elements required by migratory species for long-term survival or reproduction.

Wildlife-dependent Recreation

A use of a refuge involving hunting, fishing, wildlife observation, wildlife photography and environmental education and interpretation. The National Wildlife Refuge System Improvement Act of 1997 specifies that these are the six priority general public uses of the system.



Coot
USFWS Photo

APPENDIX B. REFERENCES

- Bonney, Rick, David N. Pashley, Robert J. Cooper, and Larry Niles, editors. 1999. *Strategies for Bird Conservation: The Partners in Flight Planning Process*. Cornell Lab of Ornithology. Cornell University, New York.
- Burdge, Rabel J. 1995. *A Community Guide to Social Impact Assessment*. Social Ecology Press. Middleton, Wisconsin.
- Cochran, Shawn M., 1999. *Draft Roosting and Habitat Use of Bats in Southern Bottomland Hardwood Forests*. Arkansas State University, State University, Arkansas.
- Department of Wildlife and Fisheries, State of Louisiana. 1998. *Scenic Rivers Management Plan for Bayou Cocodrie, Concordia Parish*. Baton Rouge, Louisiana.
- Eyre, F.H., Editor. 1980. *Forest Cover Types of the United States and Canada*. Society of American Foresters, Washington, D.C.
- Finch, Deborah M. 1991. *Population Ecology, Habitat Requirements, and Conservation of Neotropical Migratory Birds*. General Technical Report RM 205, U.S. Forest Service, Fort Collins, Colorado.
- Finch, Deborah M. 1992. *Status and Management of Neotropical Migratory Birds. Management Implications of Cowbird Parasitism on Neotropical Migrant Songbirds*. General Technical Report RM 229, U.S. Forest Service, Flagstaff, Arizona.
- Fredrickson, Leigh H., and Donald L Bateman. 1990. *Greentree Reservoir Management Handbook*. Gaylord Memorial Laboratory, University of Missouri, Columbia, Missouri.
- Hamel, Paul B. 1992. *The Land Managers Guide to the Birds of the South*. The Nature Conservancy and the USDA Forest Service. Atlanta, Georgia.
- Heard, L. Pete. Conference Co Chairman, Director. 1996. *The Delta Connecting Points of View for Sustainable Natural Resources*. Wildlife Habitat Management Institute, USDA, Natural Resources Conservation Service, Madison, Mississippi.
- Jeter, Marvin D. 1989. *Archaeology and Bioarchaeology of the Lower Mississippi Valley and Trans Mississippi South in Arkansas and Louisiana*. Prepared by the Arkansas Archaeological Survey. Report for the U.S. Army Corps of Engineers. 1989.
- Kaufman, Kenn. 1996. *Lives of North American Birds*. Houghton Mifflin Company, Boston, Massachusetts.
- Louisiana Commission on Intergovernmental Relations. 1975. *The Concordia Parish Plan*. Department of Housing and Urban Development, New Orleans, Louisiana.
- Martin, Paul G. 1980. *Soil Survey of Concordia Parish, Louisiana*. U.S. Soil Conservation Service and Louisiana Soil and Water Conservation Committee.
- Morrison, Merrie. 1998. *Bird Conservation Taking Flight, How Partners in Flight is Lifting Bird Conservation to New Heights*. American Bird Conservancy. Washington, D.C.

- Ouchley, Keith. 1997. Bird Species List. Unpublished list on file at refuge, Ferriday, Louisiana.
- Putnam, John A., George M. Furnival, and J.S. Mcknight. 1960. Management and Inventory of Southern Hardwoods. U.S. Forest Service. Washington, D.C.
- Saucier, Robert T., 1994. Geomorphology and Quaternary Geologic History of the Lower Mississippi Valley. Mississippi River Commission. Vicksburg, Mississippi.
- Smith, Loren M., Roger L. Pederson, and Richard M. Kaminski. 1989. Habitat Management for Migrating and Wintering Waterfowl in North America. Texas Tech University Press, Lubbock, Texas.
- The Nature Conservancy. 1990. Report of Preliminary Environmental Site Assessment, The Fisher Tract. Concordia Parish, Louisiana.
- The Nature Conservancy. 1991. Timber Inventory of the Fisher/Nature Conservancy Tract. Concordia Parish, Louisiana.
- Twedt, Daniel J. and William B. Uihlein, 1999. Landscape Level Reforestation Priorities for Forest Breeding Landbirds in the Mississippi Alluvial Valley. USGS Patuxent Wildlife Research Center and U.S. Fish and Wildlife Service, Vicksburg, Mississippi.
- U.S. Congress. November 16, 1990. Public Law 101 593, Section 108, House Report 3338.
- USDA Forest Service. General Technical Report SO 114. 1994. Smith, Winston Paul and David N. Pashley, A Workshop to Resolve Conflicts in the Conservation of Migratory Landbirds in Bottomland Hardwood Forests. Tensas National Wildlife Refuge, Tallulah, Louisiana.
- USDA Economic Research Service. 2000. Website: <http://www.ers.usda.gov/>
- USDA Soil Conservation Service. 1968. Work Plan for Watershed Protection, Flood Prevention, Drainage, and Fish and Wildlife Improvement, North Concordia Watershed. Fort Worth, Texas.
- U.S. Army Corps of Engineers. 1990. Water Control Plan for the Tensas Concordia Pumping Plant and Related Facilities. Tensas Basin. Red River Backwater Areas. Vicksburg, Mississippi.
- USDI Fish and Wildlife Service. 1999. Bayou Cocodrie National Wildlife Refuge. Unpublished report, Ferriday, Louisiana.
- USDI, Fish and Wildlife Service and USDC, Bureau of the Census. 1996. The 1996 National Survey of Fishing, Hunting, and Wildlife Associated Recreation. Washington, D.C.
- USDI Fish and Wildlife Service. 1992. Environmental Assessment and Land Protection.
- USDI Fish and Wildlife Service Leaflet 13.3.14. 1992. Management of Habitat for breeding and Migrating Shorebirds in the Midwest.
- USDI Fish and Wildlife Service Leaflet 13. 1988. University of Missouri, Columbia, Missouri. Considerations of Community Characteristics for Sampling Vegetation.
- USDI Fish and Wildlife Service. 1990. Hunter, William C. Handbook for Nongame Bird Management and Monitoring in the Southeast Region. Atlanta, Georgia.

- USDI Fish and Wildlife Service. 1991. Timber Inventory of the Fisher/Nature Conservancy Property. Concordia Parish, Louisiana.
- USDI Fish and Wildlife Service. 1998. Appraisal of 935 acres of Hardwood Bottomland. Concordia Parish, Louisiana.
- USDI Fish and Wildlife Service. 1990. Project Development Planning Report, Establishment of Bayou Cocodrie National Wildlife Refuge, Concordia Parish, Louisiana.
- USDI Fish and Wildlife Service. 1991. An Appraisal of Certain Properties for the Bayou Cocodrie National Wildlife Refuge.
- USDI Fish and Wildlife Service. 1988. Three Rivers Waterfowl Habitat Conservation Plan East Central Louisiana.
- USDI Fish and Wildlife Service. 1978. Bottomland Hardwood Preservation Program, Lower Mississippi River Delta.
- USDI Fish and Wildlife Service. 1999. Mississippi Alluvial Valley Migratory Bird Wetland Conservation Initiative.
- USDI Fish and Wildlife Service. 1999. Louisiana Black Bear Habitat Protection Project, Final Environmental Assessment and Land Protection Plan.
- USDI Fish and Wildlife Service. 1996. National Survey of Fishing, Hunting, and Wildlife Associated Recreation.
- USDI Fish and Wildlife Service. 1999. Fulfilling the Promise. Visions for Wildlife, Habitat, People, and Leadership.
- USDI Fish and Wildlife Service. 1993. Refuges 2003, Draft Environmental Impact Statement.
- USDI Fish and Wildlife Service. 1998. Update to the North American Waterfowl Management Plan, Expanding the Vision. Report on file, Bayou Cocodrie National Wildlife Refuge, Ferriday, Louisiana.

APPENDIX C. RELEVANT LEGAL MANDATES

NATIONAL WILDLIFE REFUGE SYSTEM AUTHORITIES

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

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

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

KEY LEGISLATION/POLICIES FOR PLAN IMPLEMENTATION

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

Antiquities Act (1906): Authorizes the scientific investigation of antiquities on federal land and provides penalties for unauthorized removal of objects taken or collected without a permit.

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

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

Migratory Bird Hunting and Conservation Stamp Act (1934): Authorized the opening of part of a refuge to waterfowl hunting.

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

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

Refuge Recreation Act (1962): Allows the use of refuges for recreation when such uses are compatible with the refuge's primary purposes and when sufficient funds are available to manage the uses.

Land and Water Conservation Fund Act (1965): Uses the receipts from the sale of surplus federal land, outer continental shelf oil and gas sales, and other sources for land acquisition under several authorities. National Wildlife Refuge System Administration Act of 1966, as amended by the National Wildlife Refuge System Improvement Act of 1997, 16 U.S.C. 668dd 668ee. (Refuge Administration Act): Defines the National Wildlife Refuge System and authorizes the Secretary of the Interior to permit any use of a refuge provided such use is compatible with the major purposes for which the refuge was established. The Refuge Improvement Act clearly defines a unifying mission for the refuge system; establishes the legitimacy and appropriateness of the six priority public uses (hunting, fishing, wildlife observation, wildlife photography and environmental education and interpretation); establishes a formal process for determining compatibility; established the responsibilities of the Secretary of the Interior for managing and protecting the System; and requires a comprehensive conservation plan for each refuge by the year 2012. This Act amended portions of the Refuge Recreation Act and National Wildlife Refuge System Administration Act of 1966.

Architectural Barriers Act (1968): Requires federally owned, leased, or funded buildings and facilities to be accessible to persons with disabilities.

National Environmental Policy Act (1969): Requires the disclosure of the environmental impacts of any major federal action significantly affecting the quality of the human environment.

Endangered Species Act (1973): Requires all federal agencies to carry out programs for the conservation of threatened and endangered species.

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

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

Emergency Wetlands Resources Act (1986): The purpose of the Act is "To promote the conservation of migratory waterfowl and to offset or prevent the serious loss of wetlands by the acquisition of wetlands and other essential habitat, and for other purposes."

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

Americans With Disabilities Act (1992): Prohibits discrimination in public accommodations and services.

Executive Order 12996, Management and General Public Use of the National Wildlife Refuge System (1996): Defines the mission, purpose, and priority public uses of the National Wildlife Refuge System. It also presents four principles to guide management of the system.

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

Emergency Wetland 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 also requires the Secretary of the Interior to establish a National Wetlands Priority Conservation Plan, requires the states to include wetlands in their Comprehensive Outdoor Recreation Plans, and transfers to the Migratory Bird Conservation Fund an amount equal to import duties on arms and ammunition.

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

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

Executive Order 11988, Flood plain Management: The purpose of this Executive Order, signed May 24, 1977, is to prevent federal agencies from contributing to the adverse impacts associated with occupancy and modification of floodplains and the direct or indirect support of 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.

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

Historic Preservation Acts include:

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

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

Public Law 100 588, approved November 3, 1988, (102 Stat. 2983) lowered the threshold value of artifacts triggering the felony provisions of the Act from \$5,000 to \$500, made attempting to commit an action pro-

hibited by the Act a violation, and required the land managing agencies to establish public awareness programs regarding the value of archaeological resources to the nation.

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

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

National Historic Preservation Act of 1966 (16 U.S.C. 470-470b, 470c-470n) Public Law 89 665, approved October 15, 1966, (80 Stat. 915) and repeatedly amended, provided for preservation of significant historical features (buildings, objects, and sites) through a grant in aid program to the states. It established a National Register of Historic Places and a program of matching grants under the existing National Trust for Historic Preservation (16 U.S.C. 468-468d).

The Act established an Advisory Council on Historic Preservation, which was made a permanent independent agency in Public Law 94 422, approved September 28, 1976 (90 Stat. 1319). That Act also created the Historic Preservation Fund. Federal agencies are directed to take into account the effects of their actions on items or sites listed in, or eligible for listing in, the National Register of Historic Places. As of January 1989, ninety one such sites on national wildlife refuges are listed in this Register.

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

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

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

American Conservation and Youth Service Corps: A federal grant program established under Subtitle C of the law, the Corps offers an opportunity for young adults between the ages of 16-25, or in the case of summer programs, 15-21, to engage in approved human and natural resources projects which benefit the public or are carried out on Federal or Indian lands. To be eligible for assistance, natural resource programs must focus on improvement of wildlife habitat and recreational areas, fish culture, fishery assistance, erosion, wetlands protection, pollution control and similar projects. A stipend of not more than 100 percent of the poverty level will be paid to participants. A Commission established to administer the Youth Service Corps will make grants to States, the Secretaries of Agriculture and Interior and the Director of ACTION to carry out these responsibilities.

National Environmental Policy Act of 1959 (P.L. 91 190, 42 U.S.C. 4321-4347, January 1, 1970, 83 Stat. 852) as amended by Public Law 94 52, July 3, 1975, 89 Stat. 258, and Public Law 94 83, August 9, 1975,

89 Stat. 424). Title I of the 1969 National Environmental Policy Act requires that all federal agencies prepare detailed environmental impact statements for every recommendation or report on proposals for legislation and other major federal actions significantly affecting the quality of the human environment. The 1969 statute stipulated the factors to be considered in environmental impact statements, and required that federal agencies employ an interdisciplinary approach in related decision making and develop means to ensure that unquantified environmental values are given appropriate consideration, along with economic and technical considerations. Title II of this statute requires annual reports on environmental quality from the President to the Congress, and established a Council on Environmental Quality in the Executive Office of the President with specific duties and functions.

National Wildlife Refuge System Improvement Act of 1997: Public Law 105 57, amended the National Wildlife Refuge System Act of 1966 (16 U.S.C. 668dd ee), and provided guidance for management and public use of the refuge system. The Act mandates that the refuge system be consistently directed and managed as a national system of lands and waters devoted to wildlife conservation and management. The Act establishes priorities for recreational uses of the refuge system. Six wildlife dependent uses are specifically named in the Act: hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation. These activities are to be promoted on the refuge system, while all non wildlife dependent uses are subject to compatibility determinations. A compatible use is one which, in the sound professional judgment of the Refuge Manger, will not materially interfere with, or detract from, fulfillment of the National Wildlife Refuge System Mission or refuge purpose(s). As stated in the Act, the mission of the system is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans. The Act also requires development of a comprehensive conservation plan for each refuge and that management is consistent with the plan. When writing a plan for expanded or new refuges, and when making management decisions, the Act requires effective coordination with other federal agencies, state fish and wildlife or conservation agencies, and refuge neighbors. A refuge must also provide opportunities for public involvement when making a compatibility determination.

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

Refuge Recreation Act of 1952: 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.

Refuge Revenue Sharing Act (16 U.S.C. 715s) Section 401 of the Act of June 15, 1935, (49 Stat. 383) provided for payments to counties in lieu of taxes, using revenues derived from the sale of products from refuges. Public Law 88 523, approved August 30, 1964, (78 Stat. 701) made major revisions by requiring that all revenues received from refuge products, such as animals, timber and minerals, or from leases or other privileges, be deposited in a special Treasury account and net receipts distributed to counties for public schools and roads. Public Law 93 509, approved December 3, 1974, (88 Stat. 1603) required that moneys remaining in the fund after payments be transferred to the Migratory Bird Conservation Fund for land acquisition under provisions of the Migratory Bird Conservation Act. Public Law 95 469, approved October 17, 1978, (92 Stat. 1319) expanded the revenue sharing system to include National Fish Hatcheries and Service research stations. It also included in the Refuge Revenue Sharing Fund receipts from the sale of salmonid carcasses. Payments to counties were established as follows: on acquired land,

the greatest amount calculated on the basis of 75 cents per acre, three fourths of one percent of the appraised value, or 25 percent of the net receipts produced from the land; and on land withdrawn from the public domain, 25 percent of net receipts and basic payments under Public Law 94 565 (31 U.S.C. 1601 1607, 90 Stat. 2662). This amendment also authorized appropriations to make up any difference between the amount in the fund and the amount scheduled for payment in any year. The stipulation that payments be used for schools and roads was removed, but counties were required to pass payments along to other units of local government within counties that suffer losses in revenues due to the establishment of Service areas.

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

APPENDIX D. BIOTA

THREATENED, ENDANGERED, AND CANDIDATE SPECIES

The federally listed Louisiana Black Bear is the only known listed species to occasionally occur on the refuge, although the Rafinesque's big eared bat is another likely candidate. Formerly listed species such as the American alligator and the bald eagle appear on the refuge. The Louisiana black bear is targeted for special reintroduction emphasis in the future as part of a population recovery effort to delist this species. The refuge will not only serve as permanent habitat for this species, but will serve as habitat linkage for the Atchafalaya population and the Tensas Basin population which will ensure genetic diversity. Other potential candidate species include the alligator snapping turtle and the wood stork. (See Figure 19 for a list of species that occur or have the potential to occur on the refuge.)

The Florida panther and the red wolf were once residents of this area, but none have been documented in the last 40 years.



Florida panther



Red wolf

USFWS Photos

Figure 19. Refuge biota

BIRDS

A=abundant; c=common; u=uncommon; r=rare

*species with confirmed breeding records

Common Name	Spring March-May	June-August	Summer Sept-Nov	Fall Winter Dec-February
Pied-billed grebe	u	r	u	u
White pelican	r		r	r
Double-crested cormorant	c	c	a	a
Anhinga*	u	c	u	r
American bittern	r		r	
Least bittern	r	r	r	
Great blue heron*	c	a	c	c
Great egret	c	a	c	u
Snowy egret*	c	a	c	r
Little blue heron*	c	a	c	
Cattle egret	c	a	c	u
Green-backed heron*	c	c	u	
Black-crowned night heron*	u	u	u	
Yellow-crowned night heron*	u	a	u	
White ibis	u	c	u	
Wood stork				r
Greater white-fronted goose				u
Snow goose				u
Ross' goose				r
Canada goose				r
Wood duck*	a	a	a	a
Green-winged teal			c	u
Black duck				r
Mottled duck				u
Mallard				a
Northern pintail				c
Blue-winged teal			c	r
Northern shoveler				c
Gadwall				u
American wigeon				u
Ring-necked duck				u
Lesser scaup				r
Hooded merganser*	u	c	u	u
Black vulture*	a	a	a	a
Mississippi kite*	c	c	c	
Bald eagle	r		r	r
Northern harrier			u	u
Sharp-skinned hawk	u		u	c
Cooper's hawk*	u	r	u	c
Red-shouldered hawk*	a	a	a	a
Broad-winged hawk	u	r	u	
Red-tailed hawk*	c	u	c	a
American kestrel	c	r	c	c
Merlin				r
Wild turkey*	c	c	c	c
Northern bobwhite*	u	u	u	u
King rail	r		r	
Sora	u		u	
Common moorhen	r		r	

Common Name	Spring March-May	June-August	Summer Sept-Nov	Fall Winter Dec-February
American coot	u		u	c
Killdeer*	a	a	a	a
Greater yellowlegs	u		u	r
Lesser yellowlegs	u		u	r
Solitary sandpiper	c		u	
Spotted sandpiper	u		u	r
Semipalmated sandpiper	u		u	
Least sandpiper	u		u	u
Pectoral sandpiper	u		u	
Western sandpiper	u		u	r
Short-billed dowitcher	u		u	u
Long-billed dowitcher	r		r	
Common snipe	u		u	c
American woodcock	u		u	c
Ring-billed gull	u		u	u
Rock dove	r	r	r	r
Mourning dove*	a	a	a	a
Common ground-dove				r
Black-billed cuckoo	u		r	
Yellow-billed cuckoo*	c	a	u	
Common barn owl	r	r	r	r
Eastern screech owl*	c	c	c	c
Great horned owl*	u	u	u	u
Barred owl*	a	a	a	a
Common nighthawk	u	c	u	
Chuck-will's-widow	u	c	u	
Whip-poor-will	u		r	
Chimney swift*	c	c	c	
Ruby-throated hummingbird*	a	a	c	
Belted kingfisher	c	c	c	c
Red-headed woodpecker*	c	c	c	a
Red-bellied woodpecker*	a	a	a	a
Yellow-bellied sapsucker	u		u	c
Downy woodpecker*	c	c	c	c
Hairy woodpecker*	u	u	u	u
Northern flicker	u	u	u	c
Pileated woodpecker*	c	c	c	c
Eastern wood-pewee*	c	c	c	
Acadian flycatcher*	a	a	a	
Eastern phoebe	u		u	c
Great crested flycatcher*	c	a	c	
Eastern kingbird	c	c	c	
Horned lark*	u	u	u	c
Purple martin	c	c	c	
Tree swallow	c		c	
Northern rough-winged swallow	c	u	c	
Barn swallow	c	c	c	
Blue jay*	c	u	c	c
American crow*	c	c	c	c
Fish crow	u	u	u	u
Carolina chickadee*	a	a	a	a
Tufted titmouse*	a	a	a	a
Red-breasted nuthatch				r
White-breasted nuthatch				r
Brown-headed nuthatch	r	r	r	r
Brown creeper				u

Common Name	Spring March-May	June-August	Summer Sept-Nov	Fall Winter Dec-February
Carolina wren*	a	a	a	a
House wren	r		r	u
Winter wren	r		r	u
Sedge wren	r		r	r
Golden-crowned kinglet	c		u	c
Ruby-crowned kinglet	a		c	a
Blue-gray gnatcatcher*	a	a	a	r
Eastern bluebird	c	c	c	c
Veery	u		r	
Gray-checked thrush	c		u	
Swainson's thrush	c		u	
Hermit thrush	c		u	
Wood thrush*	c	u	u	
American robin	c	r	c	c
Gray catbird	c	r	c	r
Northern mockingbird*	u	u	u	u
Brown thrasher	c	c	c	c
American pipit	r		r	u
Cedar waxwing	c		r	c
Loggerhead shrike*	c	c	c	c
European starling	u	u	u	u
White-eyed vireo*	a	a	a	r
Blue-headed vireo	c		u	u
Yellow-throated vireo*	c	c	u	
Red-eyed vireo*	a	a	a	
Philadelphia vireo	u		u	
Blue-winged warbler	c		u	
Golden-winged warbler	c		u	
Tennessee warbler	c		u	
Orange-crowned warbler	c		u	c
Northern parula*	c	a	c	
Yellow warbler	u		c	
Chestnut-sided warbler	c		u	
Magnolia warbler	c		u	
Yellow-rumped warbler	c		u	a
Black-throated green warbler	c		u	
Blackburnian warbler	c		u	
Yellow-throated warbler*	c	c	c	
Pine warbler	r		r	u
Prairie warbler	u		u	
Palm warbler	u		u	
Bay-breasted warbler	c		u	
Blackpoll warbler	c			
Cerulean warbler				
Black-and-white warbler	c		c	
American redstart*	c	u	c	
Prothonotary warbler*	a	a	a	
Worm-eating warbler	u		u	
Swainson's warbler*	u	u	u	
Ovenbird	c		u	
Northern waterthrush	c		u	
Louisiana waterthrush	c		u	
Kentucky warbler*	c	c	c	
Common yellowthroat*	c	u	c	u
Hooded warbler*	c	c	c	
Wilson's warbler	u		u	

Common Name	Spring March-May	June-August	Summer Sept-Nov	Fall Winter Dec-February
Canada warbler	c		u	
Yellow-breasted chat*	c	c	c	
Summer tanager*	c	c	c	
Scarlet tanager	c		u	
Northern cardinal*	a	a	a	a
Rose-breasted grosbeak	c		u	
Blue grosbeak	c	u	c	
Indigo bunting*	a	a	a	
Painted bunting*	c	c	c	
Dickcissel*	c	c	c	
Rufous-sided towhee*	c	c	c	c
Chipping sparrow	u		u	r
Field sparrow	u		u	u
Savannah sparrow	c		u	c
Fox sparrow	u		u	u
Song sparrow	c		u	c
Swamp sparrow	c		u	c
White-throated sparrow	c		u	a
Dark-eyed junco	c		u	c
Lapland longspur				u
Bobolink	u			
Red-winged blackbird*	a	a	a	a
Eastern meadowlark*	c	c	c	c
Rusty blackbird	u		u	u
Brewer's blackbird	r		r	r
Common grackle*	u	u	u	c
Brown-headed cowbird*	a	a	a	a
Orchard oriole	c	u	u	
Baltimore oriole	c		u	
Purple finch			u	u
House finch	r	r	r	r
Pine siskin				u
American goldfinch	u		u	c
House sparrow	r	r	r	r

MAMMALS

Armadillo

Bats

(Southeastern myotis, eastern pipistrelle, big brown, red, Seminole, hoary, northern yellow, evening, Rafinesque's big-eared, Brazilian free-tailed)

Beaver

Bobcat

Coyote

Feral hogs

Fox *(grey and red)*

Long-tailed weasel

Mink

Mouse *(house, deer, harvest)*

Nutria

Oposum

Otter

Rabbit *(swamp, cotton-tailed)*

Raccoon

Rats *(wood, rice, cotton)*

Shrew *(short-tailed, least)*

Squirrel *(grey, fox, flying)*

Striped skunk
White-tailed deer
Woodland vole

AMPHIBIANS AND REPTILES

Snakes

Canebrake rattle
Copperhead
Cottonmouth moccasin
Garter
King
Mud
Rat
(Various water)

Frogs

Bull
Eastern narrow-mouthed toad
Gray tree
Green
Green tree
King
Mud
Northern cricket
Southern leopard
Squirrel tree
Striped chorus
Woodhouse's toad

Alligators

Turtles

Alligator snapping
Cooters
Eastern box
False map
Mississippi map
Musk
Painted
Slider
Snapping
Spiny softshell
Stinkpot

Lizards

Borad-headed skink
Eastern fence
Five-lined skink
Green anole
Ground skink

Mussels

Fat pocketbook
Flat floater
Giant floater
Mapleleaf
Paper pondshell
Papershell
Pink papershell
Pond
Southern mapleleaf
Texas liliput
Yellow sandshell

FISH

Redbreast sunfish
Bluegill
Spotted sunfish
Redear
White crappie
Black crappie
Spotted bass
Large mouth bass
Freshwater drum
White catfish
Brownhead
Flathead

TREES-DOMINANT VEGETATION

Black willow
Cherry bark willow
Cottonwood
Cypress
Drummond red maple
Elms (winged, water, cedar)
Green ash
Gum (red, tupelo)
Hackberry
Oaks (overcup, nuttall, shumard, water, willow)
Pecans (sweet, bitter)
Red mulberry
Swamp cottonwood
Sweetgum

UNDERSTORY-SUBDOMINANT VEGETATION

Blackberry
Black locust
Box elder
Button bush
Deciduous holly
Dewberry
French mulberry
Haws
Honey locust
Honeysuckle
Hornbeam
Palmetto
Prickly ash
Smilax
Swamp dogwood
Swamp privet
Switchcane
Vines
(rattan, muscadine, poison ivy, poison oak,
Virginia creeper, pepper, cross, grape)

WET SITES

Water locust
Pickerel-weed
Day lower
Water hyacinth
Iris
Spider lily
Lizard's tail
Marsh mallow
Cardinal flower
Various sedges

APPENDIX E. CONSULTATION AND COORDINATION

PUBLIC INVOLVEMENT PROCESS

Public involvement in the development of the Comprehensive Conservation Plan and Environment Assessment for Bayou Cocodrie National Wildlife Refuge, located in Concordia Parish, Louisiana, was sought throughout the planning process. Notices were mailed in September 1997, to landowners, various conservation organizations, and state and local government agencies announcing that planning was commencing, and giving dates for public scoping meetings. Using the information obtained from these meetings and written comments received by the refuge, a planning team developed a list of major issues and concerns to be addressed in the plan. Over a 3 year period, a draft plan was developed for the refuge, which, when approved by the Fish and Wildlife Service, would direct management of the refuge over a 15 year period.

Approximately 180 copies of the draft plan were made available for public review, beginning June 12, 2001, and ending August 13, 2001. Individuals reviewing this document represented landowners, conservation organizations, and state and local government agencies. Copies were also provided to local libraries. A letter announcing the 60 day comment period was sent to those on the refuge's official mailing list 1 month prior to the draft plan mailings. A flyer which announced the dates of the comment period, and the date and location of a public meeting to discuss the draft, was mailed along with the plans. A public meeting/open house was held on June 28, 2001, from 2 p.m. until 8 p.m., at the refuge headquarters. Twenty individuals were in attendance. Three individuals submitted written comments, and two presented oral comments. One comment was received by mail. Eighteen individuals were local landowners and two individuals represented the Louisiana Department of Wildlife and Fisheries.

There were no comments, either written or oral, that questioned the refuge's proposed management action or suggested that any of the other alternatives presented be adopted. Two individuals were concerned about hunting restrictions being placed on their lands which fall within the refuge's proposed acquisition boundary. The Refuge Manager explained that the Service does not place restrictions of any kind on private property either inside or outside the proposed or approved acquisition boundaries. A majority of attendees were interested in the types of hunting opportunities available on the refuge--none wanted them removed or restricted. The Refuge Manager explained that hunting is one of the priority public uses defined in the National Wildlife Refuge System Improvement Act of 1997, and that the plan clearly supports improving hunting opportunities on the refuge.

Most comments concerning refuge management can be addressed in specific step down plans already in place, while other plans will need to be developed. Some of these comments dealt with methods of deer harvest data collection, deer herd monitoring, and baseline data collection for plant and wildlife populations (personal contact, Bill Williams); feral hog control (written comment, Richard Hennigan); and re establishment of wild turkey populations and development of education programs (personal contact, written comment, Ellis Booth). Some written comments addressed recreation uses that are not managed as priority public uses, and as such, are neither appropriate nor compatible with refuge purposes. One such comment requested that mountain bike trails be established and that the refuge offer overnight camping (written comment, Richard Hennigan); another suggested a public archery/gun range (personal and written comment, Ellis Booth). Other comments (written and verbal, Ellis Booth) requested that the refuge establish and maintain historical records of the area. Both are noteworthy endeavors, and the Refuge Manager proposed that such projects become a task of the recently formed Bayou Cocodrie Refuge Association. The Refuge Manager will discuss these tasks with its Board of Directors as soon as possible. A written comment (Ellis Booth) requested that youth hunts for deer be conducted. The Refuge Manager stated that this activity is already occurring on the refuge and will continue. One comment requested, and the Refuge Manager so noted, that a mailing address be corrected on the refuge's official mailing list. The same individual commented that the refuge should take into account the needs of the country and when setting policy for the National Wildlife Refuge System, to please use common sense (written comment, Elizabeth Terrell).

Acknowledgments

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- Kevin Bridgewater, Natural Resource Conservation Service, Wetland Reserve Program
- Cindy Brown, The Nature Conservancy, Louisiana (land protection and conservation and ecosystem management)
- Kevin Case, Farm Service Agency Conservation Reserve Program
- Keith Ouchley, Ph.D., The Nature Conservancy, Louisiana (avian management, land protection and conservation, biological review)
- Rena Pitts, Farmer (access to property, local history)
- Burl Roberts, Farmer (access to property)
- Reggie Wycoff, Biologist, Louisiana Department of Wildlife and Fisheries (wildlife, fish and game management comments)

APPENDIX F. MANAGEMENT METHODS AND PROCEDURES

PARTNERSHIPS

The Service's Partners for Fish and Wildlife program helps accomplish its mission by offering technical and financial assistance to private landowners who voluntarily restore wetlands and other fish and wildlife habitats on their land. The program emphasizes the reestablishment of native vegetation and ecological communities for the benefit of fish and wildlife in concert with the needs and desires of private landowners.

The Service also enlists the assistance of a wide variety of other partners to help restore wildlife habitat on private lands. These partners include other Federal agencies, Native American tribes, State and local governments, conservation organizations, academic institutions, businesses and industries, school groups, and private individuals. While not a program requirement, a dollar for dollar cost share is usually sought on a project by project basis.

Since the program's inception in 1987, these partnerships have generated significant habitat restoration accomplishments on private lands, primarily focused on the restoration of wetlands, native grasslands, stream banks, riparian areas, and in stream aquatic habitats. These restored habitats now provide important food, cover, and water for federal trust species including migratory birds (e.g., waterfowl, shore and wading birds, songbirds, and birds of prey) and anadromous fish, threatened and endangered species, as well as other fish, wildlife, and plant species that have experienced population declines in the recent past. Many of these projects are located near existing National Wildlife Refuge System lands, or State Wildlife Management Areas, providing increased benefits to fish and wildlife that rely on these lands for survival.

The assistance that the Service offers to private landowners may take the form of informal advice on the design and location of potential restoration projects, or it may consist of designing and funding restoration projects under a voluntary cooperative agreement with the landowner. Under the cooperative agreement, the landowner agrees to maintain the restoration project as specified in the agreement for a minimum of 10 years.

Typical restoration projects may include, but are not limited to:

- Restoring wetland hydrology by plugging drainage ditches, breaking tile drainage systems, installing water control structures, dike construction, and re establishing old connections with waterways.
- Installing fencing and off stream livestock watering facilities to allow for restoration of stream and riparian areas.
- Removal of exotic plants and animals which compete with native fish and wildlife and alter their natural habitats.
- Prescribed burning as a method of removing exotic species and to restore natural disturbance regimes necessary for some species survival.
- Reconstruction of in stream aquatic habitat through bioengineering techniques.

In addition to providing restoration assistance to private landowners, the Service also provides biological technical assistance to U.S. Department of Agriculture agencies implementing key conservation programs of the Farm Bill. The Service's assistance helps the Department of Agriculture meet the technical challenges presented by these programs while maximizing benefits to fish and wildlife resources. The Service also assists in on the ground habitat restoration actions associated with several of these programs.

Under the Wetlands Reserve Program, conservation easements are required to protect and restore formerly degraded agricultural wetlands. The Service provides technical assistance to Department of Agriculture agencies and to private landowners on site selection, restoration planning, and compatible uses for easements offered voluntarily by interested landowners.

The Service provides technical assistance to the Farm Service Agency's farm credit programs in the implementation of three important conservation programs. Two of these programs involve conservation measures related to disposal of inventory farm property obtained through loan failure. The Service reviews these inventory properties and makes recommendations for: (1) the establishment of perpetual conservation easements for protection and restoration of wetlands and the conservation of other important natural resources; and (2) the fee title transfer of inventory properties to state or federal agencies for conservation purposes. The third area in which the Service provides technical assistance involves property owned by Farm Service Agency borrowers. The Fish and Wildlife Service assists in evaluating natural resource values of property securing Farm Service Agency loans and makes recommendations for establishment of conservation contracts where borrowers voluntarily set aside the lands for conservation in exchange for partial debt cancellation. The Fish and Wildlife Service is the primary manager of inventory easements, and receives approximately 40 percent of the fee title transfers. These lands become part of the National Wildlife Refuge System. In addition, the Service restores wetlands and other important habitats on Farm Service Agency easements and transfer properties.

AVIFAUNAL ANALYSIS

The goal for forest breeding birds in the Lower Mississippi Valley was to establish self sustaining populations for all of the roughly 70 species that breed in the valley. Although habitat objectives must ultimately address both quality and quantity, the Service initially concentrated on the size and number of forest patches in this highly fragmented landscape. A 6 step process was established to set habitat objectives and population goals. The Partners in Flight prioritization process (Hunter et al., 1993) was utilized to set breeding bird species priorities in the valley. Six of the seven highest priority species breeding in the valley nest in bottomland hardwood forests. Based on this and the historical ecosystem structure of the valley, bottomland hardwood forests were selected as the highest priority habitat type for breeding bird conservation. To determine forest patch sizes, two sources of information were used: empirical studies and a mathematically derived theoretical genetically viable population. Empirical studies were used primarily for the swallow tailed kite and the Cerulean warbler. To determine the forest patch size requirements for the theoretical genetically viable populations the following formula was used:

$$A = (N c D) + B$$

A = area of forest patch required to support a source population

N = number reproductive units (usually breeding pairs) required for a source population

D = breeding density (usually expressed as hectares/breeding pair)

B = the area of a 1-kilometer forested buffer around the forest core ($N \cdot D$)

For each of several populations, the Service adopted a proposed minimum effective population size of 500 breeding adults in the recovery plan for the red cockaded woodpecker. For monogamous species this constitutes 250 breeding pairs. However, establishing conservation goals at the minimum threshold seems fraught with peril. Thus, to buffer breeding populations within forest patches, a goal of 500 breeding pairs per forest patch ($N=500$) was adopted.

For the value of **D**, average breeding densities from Breeding Bird Censuses conducted in the southeastern United States was used. Even under optimal conditions, bird density in bottomland hardwoods is determined by the frequency of occurrence of patchily distributed micro habitat features (e.g., thickets for Swainson's warblers, cypress brakes for yellow throated warblers, etc.). To account for these habitat quality factors, it was assumed that birds rarely occur in the valley at densities as high as reported in the literature, which is an additional reason for the adoption of 500 breeding pairs per forest patch as a target population.

The agricultural matrix that dominates the valley is generally considered hostile to birds breeding within forest patches. Researchers working in fragmented landscapes have found that nest predation and parasitism were high even in large forest patches (5,000 acres) in landscapes with a low percentage of forest cover. They also have found that female brown headed cowbirds travel an average of 2 miles between feeding and breeding sites. One researcher has found that male ovenbirds singing on territories less than 900 feet from the edge of the forest were more likely to be unpaired than males from the interior of

the forest. For planning purposes, it is assumed that a 0.6 mile forest buffer surrounding an interior forest core will reduce these negative impacts. Only those pairs within the forest core are assumed to reproduce at a rate sufficient to serve as a source population. Because the area of a 0.6 mile buffer will vary with the geometric configuration of each forest patch, the area requirements of each will differ. For planning purposes, until the actual areas of interior forest within each forest patch are determined, doubling the core forest area ($B=2$) will generally result in forest patch requirements that approximate or exceed a 0.6 mile buffer around the desired interior forest area.

As an example, Swainson's warblers have been noted to occur at densities generally ranging of one pair per 6 to 11 acres. Taking the average of one pair per 9 acres, if Swainson's warblers occur over a large area at this density, 500 pairs would require 4,500 acres. Applying the doubling factor as a surrogate for the 0.6 mile buffer produces a desired forest patch size of 9,000 acres. The Service made this calculation for all valley forest breeding species. For planning purposes, the Service placed species into 3 forest patch size groups designed to meet their specific area requirements: 10,000 20,000, 20,000 100,000, and >100,000 acres.

Having determined the aerial habitat requirements of the high priority species and measured the existing habitat using 1992 thematic mapper images, specific locations across the valley were identified for habitat protection/restoration. In addition to habitat requirements and existing forest locations, several other factors such as flooding frequency, current land use, adjacent land use, ownership, and reforestation potential were used to identify proposed habitat protection/restoration sites. Where possible, restoration sites were centered on existing public land. Where linkages could logically be created, existing forest patches were combined to reach target sizes. This sometimes resulted in several existing 10,000 or 20,000 acre patches being combined into a proposed 100,000 acre patch.

Ultimately 101 proposed Breeding Bird Forest Patches were identified for the valley, but the number and location of these sites are not final, and probably never will be. A massive reforestation effort will be necessary to meet these objectives and their achievement often will be opportunity driven. As new opportunities arise and old objectives become unattainable, the locations of the Breeding Bird Forest Patches will change.

For Bayou Cocodrie National Wildlife Refuge, specifically, present data suggest densities for Swainson's warblers are now about 6/100 acres in optimal habitat and that this figure is lower than found at Tensas and Atchafalaya National Wildlife Refuges in comparable habitat (Ouchley unpubl. data, pers. observ.). To support 500 pairs, assuming all acreage is suitable or optimal habitat, about 8,500 acres (without the buffer included) will be needed. However, as stated above, it is risky to accept the assumption that all habitat is suitable or optimal for any priority species within a discrete habitat patch. A better assumption is that no more than half of all forested acreage is optimal or suitable (e.g., ridges, within a ridge and swale topography) for this species and therefore 17,000 acres (with buffer included) may be necessary to support the population target of 500 pairs. This acreage requirement is well above that suggested for this species elsewhere in the valley, but where there are already larger existing forest patches, Swainson's warblers occur in higher densities.

The potential for establishing an acreage target for Bayou Cocodrie National Wildlife Refuge at 20,000 acres (with buffer included) or more of bottomland hardwoods would be made in the hope that eventually Cerulean warblers and some swallow tailed kites may re colonize the area. As efforts continue to expand forested acreage, increasing densities from 6 to 9 pairs/100 acres may be an appropriate population objective. Reproductive data collection should also be undertaken to measure whether nesting success and fledgling survival changes accordingly for this and other species on the above list.

Food is assumed to be the limiting factor for both southbound migrating shorebirds and wintering waterfowl. Following this assumption, the amount of energy required to support one bird for one day and the length of each bird's stay in the valley (wintering or transient) were calculated along with the amount of energy available from potential food sources.

$$H = \frac{P c S c E}{C c F}$$

H = amount of habitat (hectares)

P = population goal (number of birds)

S = length of stay in the Lower Mississippi Valley (days)

E = energetic requirement of one bird for one day (kilojoules [kj])

K = energetic value of food source (kj/gram)

F = available food (grams/ha)

With some adjustments, this formula was used to calculate the amount of habitat needed to support the target populations of shorebirds and waterfowl.

Transient Shorebirds

Typically, mudflat foraging habitat is abundant in the valley during the spring northward migration. In early spring the agricultural fields are bare and winter flood water is receding; in late spring rice fields are flooded. During southward migration, in late summer and fall, fields of maturing crops are dry. Therefore, the period from July 15 to September 30 is the period when foraging habitat for migrating shorebirds is least available. The objective is to ensure that adequate shallow water habitat is available in the valley to meet the foraging requirements of the species during their southward migration.

Neither census data nor any specific estimates of shorebird populations moving through the valley during southward migration currently exist. To establish such an estimate, we examined data from the International Shorebird Survey and consulted shorebird biologists (D. L. Helmers and B. A. Harrington) with knowledge of migration patterns and continental population estimates. Based on these sources, about 500,000 shorebirds are estimated to move through the valley during fall migration.

Shorebirds using the valley range in size from 30 to 200 grams (g). The average mass (weighted by abundance) is 45 g. A 45 g. shorebird requires 102.77 kilojoules (kj)/day to maintain its existence metabolic rate. For the purpose of modeling, we assumed that chironomids are the primary food item consumed by shorebirds. A gram of chironomids has a gross energy content of 23.8 kj. Because the assimilation efficiency of birds feeding on invertebrates is approximately 73 percent, the net energy content of chironomids is about 17.6 kj/g. Thus a 45 g. shorebird requires about 6 g./day ($102.77/17.6 = 5.84$) of invertebrate forage to maintain its body mass.

In addition, to provide the fat reserves necessary to complete migration, shorebirds must gain about 1 g./day. About 2 g. of invertebrate forage must be consumed each day to increase biomass by 1 g. The daily food requirement then becomes about 8 g.

We used estimates of 2 g./square meter for invertebrate food density and a 10 day stopover period for each shorebird migrating south through the Lower Mississippi Valley (D. L. Helmers, pers. comm.). The overall habitat objective for shorebird foraging habitat during southward migration is 5,000 acres. The 5,000 acre goal was distributed among valley states based on their ability to provide managed mudflat habitat during the fall migration period.

For Bayou Cocodrie National Wildlife Refuge, specifically, present and projected future refuge capabilities suggest that habitat should be provided to support about 12,000 southbound shorebirds.

Wintering Waterfowl

The valley wide goal for waterfowl is to provide enough habitat to support 4.3 million wintering ducks and 1.0 million wintering geese. The duck goal was derived from goals of the North American Waterfowl Management Plan by determining the proportion of the continental wintering population found in the valley and then multiplying the continental breeding population goal by this proportion. Duck population levels from the 1970s were used as the basis for this goal because those levels are believed to be high enough to maintain huntable populations yet attainable in today's social and economic environment. The

goose population goal was derived from the number of geese observed in the valley during the mid winter waterfowl inventories in the mid 1980s, a period when most goose populations in the Mississippi Flyway were at or near historic high levels.

As with shorebirds, it is assumed that food is the limiting factor on wintering populations. The energy value and availability of various foods (soybean, rice, corn, moist soil, and bottomland hardwood forest) were calculated, and the daily energy requirement of a female mallard (292 kilocalories/day) was used. The wintering period for waterfowl is 120 days.

Approximately 650,000 acres of foraging habitat and an additional 625,000 acres of naturally flooded habitat are needed to support the wintering waterfowl population goal. Within each state, habitat objectives are divided between public and private ownership, managed and unmanaged lands, and three foraging habitats: bottomland hardwood forests, moist soil, and agricultural fields. The availability of waterfowl foraging habitat depends on adequate precipitation and the resultant ponding or overbank flooding and water control infrastructure (e.g., levees, dikes, water control structures, pumps) to facilitate flooding.

CULTURAL RESOURCES

With the enactment of the Antiquities Act of 1906, the Federal Government recognized the importance of cultural resources to the national identity and sought to protect archaeological sites and historic structures on those lands either owned, managed, or controlled by the United States. The body of historic preservation laws has grown dramatically since 1906. Several themes are consistently present in the laws and the promulgating regulations. They include: 1) each agency to systematically inventory the "historic sites" on their holdings and to scientifically assess each site's eligibility for the National Register of Historic Places; 2) consideration of impacts to cultural resources during the agency's management activities and the avoidance or mitigation of adverse impacts; 3) protection of cultural resources from looting and vandalism to be accomplished through a mix of informed management, law enforcement efforts, and public education; and 4) the increasing role of consultation with groups, such as Native American tribes and African American communities, to address how a project or management activity may impact specific archaeological sites and landscapes deemed important to those groups. The objectives and strategies previously outlined are the Service's attempt to achieve mandated historic preservation responsibilities in a manner consistent with its mission and the refuge's mission.

The Fish and Wildlife Service's Regional Archaeologist coordinates a Memorandum of Understanding with pertinent federal and state agencies, such as the Louisiana Fish and Game Commission, to enhance law enforcement of the Archaeological Resources Protection Act, the Native American Grave Protection and Repatriation Act, and Section 50 of the Code of Federal Regulations, as well as to facilitate investigations of the Archaeological Resources Protection Act violations and unpermitted artifact collection on the refuge.

A review of the State Site Files located at the Louisiana Division of Archaeology has provided preliminary information on the known or potential archaeological sites and historic structures within and near the refuge. Such information will aid the Service in the development of a long term management plan for cultural resources. A comprehensive refuge wide archaeological survey is recommended so that the Service's management options can be fully realized in a cost effective manner. The survey will provide a site predictive model based upon the region's cultural history, known site distribution, oral history interviews, historic documents, historic land use patterns, topography, geomorphology, soils, hydrology, and vegetative patterns.

ECOSYSTEM MANAGEMENT

Healthy habitats are necessary to sustain fish, wildlife, and plants on lands in the system. In the past, the administrative boundaries of national wildlife refuges have often bounded the scope of planning and policy decisions. The Service develops conservation strategies at two spatial levels in a collaborative process to solve broad scale ecological problems. Within a large spatial level, the Service has developed a cross program approach for the Lower Mississippi Valley considering issues within

the ecological, political, and social boundaries. The Lower Mississippi River Ecosystem Team focuses on landscape problems affecting fish and wildlife resources, and provides specific guidance that will best serve trust species and species of concern and reduce impacts associated with forest fragmentation. At a smaller spatial level, the comprehensive conservation planning team reflects the conservation strategies for national wildlife refuges within the ecosystem and identifies select area species on which to focus management efforts.

Ecosystems are communities of living organisms interacting among themselves and with the physical component of their environment. Ecosystems are experiencing increasing impacts from human activities, the threat of which will require extraordinary flexibility and innovation to successfully conserve and manage them. In recent years, conservationists have fostered the idea that resource conservation can best be achieved by taking a holistic approach to management. The Service is working with divergent interests on ecosystem based approaches to conserve the variety of life and its processes in the Nation's diverse ecosystem.

The Service's mission is to conserve, protect, and enhance the Nation's fish and wildlife and their habitats for the continuing benefit of the American people. The Service has adopted an ecosystem approach to more effectively achieve this mission. Our objective is to implement consistent policies and procedures that will embrace the ecosystem approach in a "management environment" which considers the needs of all our resources in decision making. This holistic approach to fish and wildlife conservation will enable the Service to more efficiently and effectively maintain healthy ecosystems on a long term basis and to conserve the Nation's rich biological heritage.

An ecosystem approach to fish and wildlife conservation means protecting or restoring the function, structure, and species composition of an ecosystem while providing for its sustainable socioeconomic use. It involves recognizing that, in some way, all things are connected. The ecosystem approach emphasizes conservation and management of discrete land units, watersheds, or ecosystems and requires the identification of ecosystem goals that represent resource priorities on which all programs of the Service will collectively focus their efforts. The Service must work closely and consistently with external partners, public and private, who share responsibility for ecosystem health and biological diversity. This approach will enable the Service to fulfill its fish and wildlife trust responsibilities with greater efficiency and effectiveness.

In the Southeast Region, the Service is approaching its nationally mandated leadership role for fish and wildlife conservation on an ecosystem basis, partnering with other Service regions, with other Federal agencies, with States and their local governments and citizenry, and with non governmental organizations. By working together, the Service is able to achieve healthy, sustainable ecosystems that ensure a continuing legacy of abundant fish and wildlife resources for all Americans to use and enjoy.



USFWS Photo

APPENDIX G. COMPATABILITY DETERMINATIONS

INTRODUCTION

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

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

The following compatibility determinations rely on best estimates of current public use levels as provided by the Louisiana Department of Wildlife and Fisheries and the Fish and Wildlife Service. Information obtained by the refuge staff during the first year of refuge-administered public use activities is also incorporated. During subsequent years, the Service will continue, as indicated in the comprehensive conservation plan, to gather definitive public use data, conduct surveys to estimate wildlife populations, and assess public use impacts on the resources. If adverse impacts are identified, modifications to that particular public use activity will occur to minimize the impact. For additional details and to reference specific citations outlined, refer to the Comprehensive Conservation Plan for Bayou Cocodrie National Wildlife Refuge.

Refuge Name: Bayou Cocodrie National Wildlife Refuge

Date Established: November 6, 1990

Establishing and Acquisition Authority: Public Law 101 593 (Section 108 of H.R. 3338)

Purposes for Which the Refuge Was Established

Public Law 101 593 (Section 108 of H.R. 3338) states that the refuge will be managed for the purposes of: conservation and enhancement of wetlands; management of migratory birds; and fish and wildlife recreation activities. In establishing the purpose, Congress recognized the significance of this refuge by stating, "...the Bayou Cocodrie area is a bottomland hardwood swamp which borders (supports or harbors) over one hundred and fifty species of birds and many other types of wildlife, including several species threatened with extinction, such as the Louisiana population of black bears." The Bayou Cocodrie area includes some of the least disturbed bottomland hardwood forests in the southeast and significantly contributes to the biological diversity of the region.

Mission of the National Wildlife Refuge System

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.

Refuge Uses

This compatibility determination applies to: (1) Recreational hunting of white-tailed deer and turkey, furbearers, and migratory birds in accordance with State of Louisiana regulations; (2) recreational fishing of freshwater fish (bass, perch and catfish); (3) wildlife observation and photography and environmental education and interpretation; (4) all-terrain vehicle use associated with wildlife-dependent recreational uses; and (5) trapping of selected furbearers to achieve wildlife and habitat management objectives outlined in the comprehensive conservation plan.

Other Applicable Laws, Regulations, and Policies

Antiquities Act of 1906 (34 Stat. 225)
Migratory Bird Treaty Act of 1918 (15 U.S.C. 703 711; 40 Stat. 755)
Migratory Bird Conservation Act of 1929 (16 U.S.C. 715r; 45 Stat. 1222)
Migratory Bird Hunting Stamp Act of 1934 (16 U.S.C. 718 178h; 48 Stat. 451)
Criminal Code Provisions of 1940 (18 U.S.C. 41)
Bald and Gold Eagle Protection Act (16 U.S.C. 668 668d; 54 Stat. 250)
Refuge Trespass Act of June 25, 1948 (18 U.S.C. 41; 62 Stat. 1119)
Fish and Wildlife Act of 1956 (16 U.S.C. 742a 742j; 70 Stat. 1119)
Refuge Recreation Act of 1962 (16 U.S.C. 460k 4; 76 Stat. 653)
Wilderness Act (16 U.S.C. 1131; 78 Stat. 890)
Land and Water Conservation Fund Act of 1965
National Historic Preservation Act of 1966, as amended (16 U.S.C. 470, et seq.; 80 Stat. 915)
National Wildlife Refuge System Administration Act of 1966, as amended (16 U.S.C. 668dd, 668ee; 80 Stat. 927)
National Environmental Policy Act of 1969, NEPA (42 U.S.C. 4321, et seq; 83 Stat. 852)
Use of Off Road Vehicles on Public Lands (Executive Order 11644, as amended by Executive Order 10989)
Endangered Species Act of 1973 (16 U.S.C. 1531 et seq; 87 Stat. 884)
Refuge Revenue Sharing Act of 1973 (16 U.S.C. 1531 et seq; 87 Stat. 884)
National Wildlife Refuge Regulations for the Most Recent Fiscal Year (50 CFR Subchapter C; 43 CFR 3101.3 3)
Emergency Wetlands Resources Act of 1986 (S.B.740)
North American Wetlands Conservation Act of 1990
Food Security Act (Farm Bill) of 1990 as amended (HR 2100)
The Property Clause of the U.S. Constitution Article IV 3, Clause 2
The Commerce Clause of the U.S. Constitution Article I, Section 8
The National Wildlife Refuge System Improvement Act of 1997 (Public Law 105 57, USC668dd)
Executive Order 12996, Management and General Public Use of the National Wildlife Refuge System.
March 25, 1996
Title 50, Code of Federal Regulations, Pats 25 33
Archaeological Resources Protection Act of 1979
Native American Graves Protection and Repatriation Act of 1990

National Environmental Policy Act Compliance

Development of a public use program that provides optimum opportunities for wildlife dependent recreational uses, for provision of all-terrain vehicles, and for trapping programs focusing on selected furbearers would, as evaluated in this compatibility determination, have negligible impacts on refuge resources. Allowing these uses to be developed and/or continued is not expected to be controversial regarding the impacts on refuge resources.

In assessing the potential impacts of refuge uses, all available tools were utilized (Fish and Wildlife Service 1986). A site specific document (Final Environmental Assessment and Land Protection Plan for Proposed Establishment of Bayou Cocodrie National Wildlife Refuge), site specific personal communications (Louisiana Department of Wildlife and Fisheries), data collection from 1994-1999, development of the draft and final comprehensive conservation plans, environmental assessment and general references are considered to be sufficient bases on which to make these compatibility determinations.

Bayou Cocodrie National Wildlife Refuge is a relatively new refuge and data cover only a 5-year period. As the public use program is developed and fully implemented, refuge staff will assess any possible impacts it may have on resources and wildlife populations. Changes in the program will be implemented as needed to address impacts identified, and to respond to anticipated wildlife population changes due to implementation of state-of-the-art wildlife management activities.

During the scoping phase of preparing the comprehensive conservation plan, a public meeting was held to solicit input and comments on all aspects of refuge management. Copies of the draft comprehensive conservation plan were distributed for a 60-day review period to garner public comments, written and verbal, on the draft plan. During this review period, an open house was held to solicit comments on the draft. Each refuge use analyzed and described below is considered a separate or "stand alone" compatibility determination. For brevity, the above information in sections "Introduction" through "Other Applicable Laws, Regulations, and Policies" applies to each compatibility determination listed in this appendix.

Description of Use:

Hunting

Primitive and modern gun hunt for white-tailed deer and modern gun hunt for small game and waterfowl.

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 this use at its current level. Additional fiscal resources are needed to conduct this use as proposed. An additional wildlife biologist is needed to develop and implement a fish and wildlife management plan and water management activities. The addition of a permanent wildlife enforcement officer and radio communication system is needed to improve emergency response and ensure the safety of officers in the field. Additional hunter check stations, hunter safety classes, and annual hunt brochures are proposed.

Anticipated Impacts of the Use: Harvest management of upland game and furbearers (squirrel, rabbit, raccoon, opossum, beaver) is considerably different from that of both big game and migratory birds. Current literature suggests that user take (<50% of total mortality) of most upland game is compensatory; that factors such as immigration from adjacent areas and density dependent production occur in most upland game populations; and that hunting does not significantly impact populations. Hunting is substituted for natural mortality. Production of large, annual surpluses of young allows for lengthy seasons and generous bag limits with little concern for over harvest and minimal chance of population impacts in most areas (Bookhout 1994).

Harvest management of migratory birds (ducks, woodcock) is more difficult to assess. Migratory bird regulations are established at the federal level each year following a series of meetings involving both state and federal biologists. Harvest guidelines are based on population survey data with regulations that are subject to change each year, including bag limits, season lengths, and framework dates (Bookhout 1994).

Based on available information, no threatened or endangered species, other than the Louisiana black bear, have been documented on the Bayou Cocodrie National Wildlife Refuge. It is anticipated that the current levels and expected future levels of hunting or other wildlife-dependent recreation activities will not directly, indirectly, or cumulatively impact any listed, proposed, or candidate species or designated/proposed critical habitat. Data gathered from future biological surveys regarding the importance or potential importance of the refuge to threatened or endangered species or critical habitat (or proposed threatened, endangered, or critical habitat) could result in changes to public use activities across time; however, these changes will have no effect on listed species.

Disturbance to neotropical migratory birds will be minimal and temporary, as the habitat will be slightly altered for the betterment of these species. The potential of disturbance, especially during the nesting season, does exist for wading bird rookeries; however, this potential will virtually be nonexistent due to no overlap of hunting seasons with nesting season.

The refuge hunter visits have consistently been near 5,000/year. This probably reflects an increase in use because this area was hunted by private hunting parties prior to the refuge's establishment. Annual

averages on harvested species from 1994 through 1999 are as follows: 230 white-tailed deer; 2,000 squirrels; 100 rabbits; 20 feral pigs; and 5 raccoons.

Incidental take of other wildlife species, either illegally or unintentionally, may occur with any consumptive use program. At current and anticipated public use levels, incidental take will be very small and will not directly or cumulatively impact current or future populations of wildlife either on this refuge or in the surrounding areas.

Allowing the projected levels of managed hunting evaluated in this compatibility determination will have negligible impacts on refuge resources. Permitting this use should not be controversial. In assessing the potential impacts of hunting, all available tools were utilized. During the comprehensive conservation planning process, the Service evaluated the long term consequences of hunting through the preparation of an Environmental Assessment.

Public Review and Comment: Proposed uses and compatibility determinations were available for review during the Draft Comprehensive Conservation Plan and Environmental Assessment public review period which began June 12, 2001, and ended August 13, 2001. There were no comments, either written or oral, that questioned the Service's proposed management action or suggested that any of the other alternatives be adopted.

Determination (check one below):

Use is Not Compatible

Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility: Hunting will be permitted in accordance with State of Louisiana regulations and licensing requirements.

Vehicles will be restricted to existing roads. All-terrain vehicles will be restricted to designated trails/roads. Off-road travel will be limited to foot travel only. Use of horses will be restricted to designated roads and trails and allowed only in conjunction with specially permitted wildlife dependent activities. Firearms, bows, and other weapons will be prohibited except during designated hunting seasons. Hunting deer with dogs will not be allowed on the refuge. Use of dogs for hunting rabbit, squirrel, raccoon, feral hogs, and woodcock will be allowed during designed seasons only. Other dogs and pets must be confined or on a leash. Camping overnight on the refuge will be prohibited.

All hunts will be designed to provide quality user opportunities based upon known wildlife population levels and biological parameters. Hunt season dates and bag limits will be adjusted as needed to achieve balanced wildlife population levels within carrying capacities, regardless of impacts to user opportunities.

As data are collected and a long-range hunt plan developed, additional refuge-specific regulations could be implemented. These regulations could include, but may not be limited to, season dates that differ from those in surrounding state zones, refuge permit requirements, and closed areas on a permanent or seasonal basis (to reduce disturbance to specific wildlife species or habitats, such as bird rookeries, wintering waterfowl or threatened/endangered species, or to provide for public safety).

Hunting is conducted in accordance with the provisions of the approved Refuge Hunting Plan.

All hunts will be designed to provide quality user opportunities based upon known wildlife population levels and biological parameters. Hunt season dates and bag limits will be adjusted as needed to achieve balanced wildlife population levels within carrying capacities, regardless of impacts to user opportunities.

Harvest management of big game (white-tailed deer and turkey) involves combining wildlife science and wildlife objectives for the attainment of a specific management goal. Harvest management strategies should be based on objectives established as part of hunting plans developed for the area. The objective-setting process must be based on a complete analysis of biological data. Specific objectives allow the setting of hunting regulations. Results of each hunting season will be thoroughly evaluated to ensure that the harvest management program remains dynamic and responsive to an evolving management environment (Bookhout 1994).

There are very few turkeys in the area at this time and very little hunter effort directed toward this species. However, a dramatic increase in the turkey population is expected with the implementation of the management action. Until this occurs, turkey hunting will remain closed.

Implementation of an effective law enforcement program and development of site-specific refuge regulations/special conditions will eliminate most incidental take problems.

If adverse impacts to refuge resources associated with hunting are identified in future years, modifications to those programs in question will be implemented to minimize impacts.

Waterfowl hunting will be limited to 3 days per week until noon and expanded when deemed appropriate.

All hunting activities will be managed to protect the threatened Louisiana black bear.

Justification: Hunting is a priority wildlife-dependent use as listed and described in the National Wildlife Refuge System Improvement Act of 1997.

At all public meetings conducted for the comprehensive conservation planning effort, an overwhelming issue raised by the public and Louisiana Department of Wildlife and Fisheries was to increase hunting opportunities on the refuge.

Many of the local residents enjoy an informal, rural lifestyle that includes frequent recreational use of the area's natural resources. Hunting and fishing have been, and continue to be, popular uses of refuge lands. Implementation of the hunting activities described in the comprehensive conservation plan will ensure that opportunities for various types of wildlife-dependent recreation will continue for future generations.

Flooded sloughs and backwater areas of the Brooks Brake Unit provide an excellent opportunity to allow limited waterfowl hunting without causing disturbance to waterfowl using the refuge's moist-soil management units located in the Cross Bayou Unit.

Most of the refuge area is a contiguous forest of mature bottomland hardwoods. There is a great variety of tree species on the refuge that includes oak, hackberry, black gum, hickory, elm, green ash, bitter pecan, cypress, tupelo, and willow. This rich forested wetland provides good habitat for a number of game species including white-tailed deer, turkey, squirrel, raccoon, and waterfowl.

The flood plain hardwood forests of the area support high squirrel populations and have for several years. As a result, fall squirrel hunting is one of the most popular activities on the refuge. Squirrel dogs are occasionally used in late winter following leaf fall.

The raccoon population appears to be very high throughout the area, and in the absence of predators, populations rapidly build to levels resulting in disease problems and impacts to the reproduction of non-game forest breeding birds and wild turkeys. Therefore, in addition to providing hunting opportunities, harvest of raccoons is particularly important to control population levels.

Current levels and anticipated future levels of hunting are considered to be compatible with the purpose for which the refuge was established. There has been substantial historical use of this forested wetland area for hunting. Based on available information, there is no indication of long-term adverse biological impacts associated with this activity. Allowing it to continue is consistent with refuge objectives and follows current Service policy.

NEPA Compliance for Refuge Use Decision: Place an X in appropriate space.

- Categorical Exclusion without Environmental Action Statement
- Categorical Exclusion and Environmental Action Statement
- Environmental Assessment and Finding of No Significant Impact
- Environmental Impact Statement and Record of Decision

Mandatory 10- or 15-Year Re-evaluation Date: September 2016

Description of Use:

Recreational Fishing

Sport fishing including bank fishing and by canoe/small skiff on Bayou Cocodrie (mainstream).

Availability of Resources: Based on a review of the refuge's budget allocated for this activity, there is adequate funding to ensure compatibility and to administer the use at its current level. Additional fiscal resources are needed to conduct this use as proposed. To improve sport fishing opportunities, an additional game enforcement officer, as well as evaluation and development of boat and bank fishing access, is needed on the Cross Bayou.

Anticipated Impacts of the Use: There are minor wildlife conflicts when fishermen inadvertently disturb wildlife in and around the water. Allowing the projected levels of managed fishing evaluated in this compatibility determination will have negligible impacts on refuge resources. Permitting this use should not be controversial. Construction of fishing platforms will alter small portions of the natural environment. The construction of these facilities and the repair and maintenance of boat launching facilities will reduce negative biological impacts. Clearings improve access and reduce trampling of vegetation along the river bank. Negative environmental impacts will occur through illegal activities such as anglers taking species out of season, or under-sized fish. Litter, especially monofilament line that can injure and kill wildlife, is also a negative impact. Providing information to refuge visitors about rules and regulations, along with increased law enforcement patrol, will keep negative impacts to a minimum. In assessing the potential impacts of fishing, all available tools were utilized.

Recreational fishing should not adversely affect the fisheries resource or other related resources on the refuge. There may be some limited disturbance to certain species of wildlife and some trampling of vegetation; however, this should be short lived and relatively minor and will not negatively impact wetland values of the refuge. Known bird rookery sites do not occur at locations currently popular for fishing activities, therefore, disturbance should not be a problem. During the comprehensive conservation planning process, the Service evaluated the long-term consequences of fishing through the preparation of an environmental assessment.

Public Review and Comment: Proposed uses and compatibility determinations were available during the Draft Comprehensive Conservation Plan and Environmental Assessment public review period which began on June 12, 2001, and ended on August 13, 2001. There were no comments, either written or oral, that questioned the Service's proposed management action or suggested that any of the other alternatives be adopted.

Determination (check one below):

Use is Not Compatible

Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility: The refuge must first assess the fishery resource and inventory and evaluate its potential to assure that the ecological integrity of native fish populations supports sport fishery opportunities.

Fishing will be permitted in accordance with State of Louisiana regulations and licensing requirements.

The refuge will coordinate with county, state, and federal partners to develop and implement a Sport Fishing Management Plan, conduct creel surveys, and perform water quality analyses.

Only day-use activities will be permitted. Sport fishing seasons will be set to avoid conflicts with migratory bird concentrations and hunting. Proper permits through the county, state, and federal regulatory agencies will be obtained prior to any construction to ensure protection of wetlands.

If disturbance at these sites is identified as a problem in future years, closed areas will be established during nesting season to eliminate this concern. Problems associated with littering and illegal take of fish will be controlled through law enforcement activities.

Justification: Fishing is a priority wildlife-dependent use as listed and described in the National Wildlife Refuge System Improvement Act of 1997.

Sport fishing is perhaps the most common public use surrounding the refuge. Some interest was expressed by local citizens and the Louisiana Department of Wildlife and Fisheries at public meetings to improve access for fishing. The two refuge lakes offer very limited opportunities for sport fishing. Local citizens expressed that historically, refuge lakes have contained largemouth bass, crappie, and catfish and these lakes were extensively fished by local residents. Currently, access to these remote lakes is virtually nonexistent thereby nullifying all public use. However, the scenic Bayou Cocodrie River meanders through the refuge providing a variety of fish species including bass, crappie, gaspergou, bream, buffalo, and catfish.

The public is a strong advocate of fishing in the area. Allowing the public to continue to fish on the refuge would have a positive effect on public opinion and would help build support for the Service and for natural resource issues. Providing fishing opportunities will also allow the use of a renewable natural resource without adversely impacting other resource values.

Although a few refuge visitors have inquired about canoeing opportunities, no canoeists have been observed using Bayou Cocodrie. This may be attributed to a lack of sufficient access to this watercourse. Canoeing is likely to be an infrequent activity at best on refuge waters. However, the scenic Bayou Cocodrie River meanders through the refuge from north to south and would provide an excellent canoe trail during certain times of the year.

Current levels and anticipated future levels of fishing are considered to be compatible with the purpose for which the refuge was established.

There has been substantial historical use of this forested wetland area for fishing. Based on available information, there is no indication of long term adverse biological impacts associated with this activity. Allowing this use to continue is consistent with refuge objectives and follows current Service policy.

NEPA Compliance for Refuge Use Decision: Place an X in appropriate space.

- Categorical Exclusion without Environmental Action Statement
- Categorical Exclusion and Environmental Action Statement
- Environmental Assessment and Finding of No Significant Impact
- Environmental Impact Statement and Record of Decision

Mandatory 10- or 15-Year Re-evaluation Date: September 2016

Description of Use:

Wildlife Observation, Wildlife Photography, and Environmental Education and Interpretation

Wildlife observation, wildlife photography, and environmental education and interpretation on designated trails and proposed observation areas in the Brooks Brake Unit.

Availability of Resources: Based on a review of the refuge's budget allocated for these activities, funding is inadequate to ensure compatibility and to administer these uses at current or proposed levels. Additional fiscal resources are needed to conduct these uses. Current staffing is extremely limited with no public use staff. The management of a volunteer program will be essential to successfully implementing the education and visitor use program. Volunteers will be recruited and trained to assist staff in developing and implementing environmental education and interpretive programs. The addition of a permanent outdoor recreation planner/public use specialist and facilities including wildlife observation platform, boardwalks, signs, parking and trail head development, visitor center, kiosks, and environmental education materials are needed to provide and conduct wildlife observation, wildlife photography, and environmental education and interpretation activities.

Anticipated Impacts of Use: Nonconsumptive uses such as birdwatching, hiking, and nature photography are minimal at this time due to the area's distance from large metropolitan areas and the general lack of access. It is estimated that 2,000 visits/year are attributed to wildlife observation and related activities. Disturbance from environmental education activities is expected to be minimal and to have an insignificant effect on refuge resources, including fish and wildlife and their habitats and wetland values.

Wildlife observation/photography activities might result in some disturbance to wildlife, especially if visitors venture too close to the bird rookeries. Refuge road systems and all terrain vehicle trails opened to public use will be routed to minimize disturbance to these sensitive areas. If unacceptable levels of disturbance are identified at any time, these areas will be closed to public entry during the nesting season. Some minimal trampling of vegetation also may occur.

Construction of facilities such as boardwalks, kiosks, observation towers, and visitor centers will alter small portions of the natural environment on the refuge. Proper planning and placement of the facilities will ensure that wetlands, threatened and endangered species, or species of special concern are not negatively impacted. Proper permits through the parish, state, and federal regulatory agencies will be obtained prior to construction to ensure resource protection. Boardwalks will reduce human impacts and control access. Anticipated impacts from this use are minor and might include damage to vegetation, littering, increased maintenance activity, potential conflicts with other visitors, and minor disturbances to wildlife. Allowing the projected levels of managed wildlife observation, wildlife photography, and environmental education and interpretation evaluated in this compatibility determination will result in only negligible impacts on refuge resources. Permitting these uses should not be controversial. In assessing the potential impacts, all available tools were utilized. During the comprehensive conservation planning process, the Service evaluated the long-term consequences of wildlife observation, wildlife photography, and environmental education and interpretation through the preparation of an environmental assessment.

Public Review and Comment: Proposed uses and compatibility determinations were available for review by the public during the Draft Comprehensive Conservation Plan and Environmental Assessment public review period, which began June 12, 2001, and ended August 13, 2001. There were no comments, either written or oral, that questioned the proposed management action or suggested that any of the other alternatives be adopted.

Determination (check one below):

Use is Not Compatible

Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility: Wildlife observation, wildlife photography, and environmental education and interpretation activities and facilities will be reviewed and evaluated annually to ensure the quality of their contributions. Zoning of visitor activities by time and space, clustering public use facilities, proper monitoring, educating visitors, and enforcement will ensure compatibility with the purpose of the refuge and the purpose of the National Wildlife Refuge System. If human impacts are detrimental to the refuge's natural resources, actions will be taken to reduce or eliminate those impacts. Portions of the refuge will remain undeveloped.

Justification: Wildlife observation, wildlife photography, and environmental education and interpretation are priority wildlife-dependent public uses as listed and described in the National Wildlife Refuge System Improvement Act of 1997.

There are no public facilities within the parish that support wildlife observation and photography. The nearest parish schools and communities are largely unaware of the refuge's unique features, values, and management activities. Implementation of these projects will increase awareness and understanding on a variety of environmental and ecological subjects and will improve awareness and support of the refuge.

The number one attraction for the public to visit national wildlife refuges is to observe wildlife. Bayou Cocodrie Refuge's great variety and abundance of high quality forested wetland areas provide prime habitat for a number of species. Migratory and resident birds are abundant on the refuge. Wading birds frequent the wetlands and four known rookeries are present on the property. Primary species include the great blue heron, little blue heron, green heron, cattle egret, snowy egret, great egret, anhinga, and night herons (Fish and Wildlife Service 1999). Similar to wading birds, the area's habitat for neotropical migratory birds is outstanding (Fish and Wildlife Service 1992). Neotropical migratory birds use the interior hardwood forested areas and edges.

There are no primary or secondary roads or trails maintained for the public to access the refuge in order to observe and photograph wildlife. There are no regularly maintained foot trails in two management units of the refuge.

Environmental education and interpretation activities have been nonexistent in prior years. Efforts are underway to develop these programs and will be associated with structured activities conducted by refuge staff or trained volunteers.

It is anticipated that an increase in nonconsumptive wildlife-dependent uses will occur over the next few years as facilities are provided and especially as the public and conservation groups become aware of the excellent birding opportunities on the refuge. This anticipated increase will be slow in developing and due to the remoteness of the area, high numbers of users are not expected.

The current and anticipated levels of wildlife observation, wildlife photography, and environmental education and interpretation activities are compatible with the purpose for which the refuge was established. There is no indication of long term adverse biological impacts associated with these activities. Allowing these uses is consistent with refuge objectives and follows current Service policy.

NEPA Compliance for Refuge Use Decision: Place an X in appropriate space.

- Categorical Exclusion without Environmental Action Statement
- Categorical Exclusion and Environmental Action Statement
- Environmental Assessment and Finding of No Significant Impact
- Environmental Impact Statement and Record of Decision

Mandatory 10- or 15-Year Re-evaluation Date: September 2016

Description of Use:*All-Terrain Vehicle Use*

All-terrain vehicle use on designated trails during deer hunting season.

Availability of Resources: Some additional fiscal resources are needed to conduct this use as proposed. Additional trail maintenance and development can be accomplished with existing staff. However, additional game enforcement will be needed.

Anticipated Impacts of Use: In order to disperse hunters and access remote areas for hunting, refuge users have historically utilized all-terrain vehicles throughout the area resulting in a "maze" of trails to virtually every possible location. This uncontrolled use has resulted in severe rutting throughout the refuge. The increase in use has the potential to cause disturbance to wildlife species. All-terrain vehicles may flush wildlife and disturb other users. The increase in trail access could result in physical impacts to vegetation and soils. These impacts would be localized and confined to the trail.

Allowing the projected levels of managed all-terrain vehicle use evaluated in this compatibility determination will have negligible impacts on refuge resources. Permitting this use should not be controversial. In assessing the potential impacts of this use, all available tools were utilized. During the comprehensive conservation planning process, the Service evaluated the long term consequences of all-terrain vehicle use through the preparation of an environmental assessment.

Public Review and Comment: Proposed uses and compatibility determinations were available for review by the public during the Draft Comprehensive Conservation Plan and Environmental Assessment public review period, which began June 12, 2001, and ended August 13, 2001. There were no comments, either written or oral, that questioned the proposed management action or suggested that any of the other alternatives be adopted.

Determination (check one below):

Use is Not Compatible

Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility: As additional data are collected and as all terrain vehicle use increases, more refuge specific regulations could be implemented. These regulations could include, but not be limited to, season dates that differ from those in surrounding state zones, refuge permit requirements, and closed areas on a permanent or seasonal basis (to reduce disturbance to specific wildlife species or habitats, such as bird rookeries, wintering waterfowl, threatened/endangered species, or to provide for public safety).

Implementation of an effective law enforcement program and development of site specific refuge regulations/special conditions will eliminate most user-conflict problems (e.g., disturbing research or wildlife photography).

Service policy pertaining to all-terrain vehicle use requires that such use be in conjunction with wildlife-dependent activities only, and be confined to designated areas or trails identified for such use; all other off-road use is restricted to foot travel only. Approximately 13 miles of trails are designated for public use by signs and colored markers. Some modifications to this initial trail system will be necessary from time-to-time as refuge public use patterns change and/or other public use development occurs.

All-terrain vehicle use will be on a permit basis and limited to designated trails in the fall and winter. If use approaches levels potentially harmful to habitat or wildlife, the staff will reevaluate the use which could be nullified or suspended.

Justification: A large portion of the refuge is inaccessible to conventional vehicles due to either impassible roads or no roads. In order to disperse hunters and access remote areas for hunting, refuge users have historically utilized all-terrain vehicles throughout the area resulting in a "maze" of

trails to virtually every possible location. Uncontrolled off-road vehicle use has impacted the area in that severe rutting has occurred throughout, disturbance to wildlife is perhaps very high, and disturbance to refuge users very high.

Considering the topography of the area and its remoteness, the need for limited use of all-terrain vehicles by certain refuge users is apparent. It will be impossible to develop an effective public use program that provides optimum consumptive use opportunities without providing for all-terrain vehicle use.

With these regulations in place, all-terrain vehicle use on the refuge in support of wildlife-dependent activities is compatible with the purposes for which this refuge was established.

NEPA Compliance for Refuge Use Decision: Place an X in appropriate space.

- Categorical Exclusion without Environmental Action Statement
- Categorical Exclusion and Environmental Action Statement
- Environmental Assessment and Finding of No Significant Impact
- Environmental Impact Statement and Record of Decision

Mandatory 10- or 15-Year Re evaluation Date: September 2016

Description of Use:

Trapping of Selected Furbearers

Trapping of beavers and raccoons to protect forest breeding bird species.

Availability of Resources: No additional fiscal resources are needed to conduct this use. The existing staff can administer permits and monitor this use as part of routine management duties.

Anticipated Impacts of Use: Beaver activities have caused significant deterioration and loss of bottomland hardwood forests throughout the refuge. Excessive numbers of raccoons can negatively affect the reproduction of forest breeding birds and wild turkeys. Raccoons and beavers are the species upon which management activities may be directed. Both species are at a level to adversely impact ecosystem functions. Protection and restoration of bottomland hardwoods and improvements in game and nongame populations are central components of the comprehensive conservation plan. To this end, trapping and/or hunting remain the only viable methods to reduce population levels of beavers and raccoons.

No trapping program, regardless of how well it is designed, can prevent the possible take of other species. A negligible impact on other wildlife species is expected in both short term and long term. There has been substantial historical use of this forested wetland area for trapping. Based on available information, there is no indication of long-term adverse biological impacts associated with this activity.

Allowing the projected levels of managed trapping of selected furbearers evaluated in this compatibility determination will have negligible impacts on refuge resources. Permitting this use should not be controversial. In assessing the potential impacts of trapping, all available tools were utilized. During the comprehensive conservation planning process, the Service evaluated the long-term consequences of trapping uses through the preparation of an environmental assessment.

Public Review and Comment: Proposed uses and compatibility determinations were available for review by the public during the Draft Comprehensive Conservation Plan and Environmental Assessment public review period, which began June 12, 2001, and ended August 13, 2001. There were no comments, either written or oral, that questioned the proposed management action or suggested that any of the other alternatives be adopted.

Determination (check one below):

Use is Not Compatible

Use is Compatible with Following Stipulations

Stipulation Necessary to Ensure Compatibility: The Service will issue special use permits to administer a trapping program consistent with sound biology, refuge purposes, and conservation of ecosystem functions. This program will mandate accurate reports of the number of species taken which will enable refuge staff to assess the impacts of the program on wildlife. Trappers will be required to report the incidental take of other species.

Trapping will be permitted in accordance with State of Louisiana regulations and licensing requirements. A refuge special use permit will be required for trapping which contains conditions designed to meet wildlife population goals.

The trapping program will be closely monitored to assess the potential adverse effects on other wildlife as well as the benefits to game and nongame species and their habitats. Modifications to the program will be implemented as needed to maintain compatibility.

Justification: The implementation of a trapping program, under controlled conditions, provides an essential population control management tool. Trapping of selected furbearers is essential to the protection and restoration of bottomland hardwood wetlands and ultimate increases of game and nongame wildlife species on the refuge. Therefore, trapping is considered a compatible use.

Allowing this use to continue is consistent with these refuge objectives and follows current Service policy.

NEPA Compliance for Refuge Use Decision: Place an X in appropriate space.

- Categorical Exclusion without Environmental Action Statement
- Categorical Exclusion and Environmental Action Statement
- Environmental Assessment and Finding of No Significant Impact
- Environmental Impact Statement and Record of Decision

Mandatory 10- or 15-Year Re-evaluation Date: September 2016

Literature Cited

Bookhout, T.A. 1994. Research and management techniques for wildlife and habitats. Fifth edition. The Wildlife Society, Bethesda, MD 740pp.

Fish and Wildlife Service. 1986 Refuge Manual 5 RM 20, Compatibility Determinations. U.S. Department of the Interior, Fish and Wildlife Service.

Fish and Wildlife Service. 1992. Final Environmental Assessment and Land Protection Plan, Proposed Establishment of Bayou Cocodrie National Wildlife Refuge, Concordia Parish, Louisiana. U.S. Department of the Interior, Fish and Wildlife Service, Southeast Region.

Fish and Wildlife Service. 2001. Draft Comprehensive Conservation Plan and Environmental Assessment of Bayou Cocodrie National Wildlife Refuge, Concordia Parish, Louisiana. U.S. Department of the Interior, Fish and Wildlife Service, Southeast Region.

Louisiana Department of Wildlife and Fisheries. 1997 and 1999. Personal communication. District IV Biologists Reginald Wycoff and John Lincecum, Law Enforcement Captain Charles Tarver.

Approval of Compatibility Determination

The signature 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 plan, the approval signature becomes part of that determination.

Refuge Manager:

//S// Michael Esters
Signature/Date 9/15/04

Regional Compatibility Coordinator:

//S// Steve Johnson
Signature/Date 9/15/04

Refuge Supervisor

//S// Pete Jerome
Signature/Date 9/15/04

Regional Chief, National Wildlife Refuge System, Southeast Region

//S// Jon Andrew
Signature/Date 9/15/04

APPENDIX H. FINDING OF NO SIGNIFICANT IMPACT

Bayou Cocodrie National Wildlife Refuge Comprehensive Conservation Plan Concordia Parish, Louisiana

INTRODUCTION

The U.S. Fish and Wildlife Service proposes to protect and manage certain fish and wildlife resources in Concordia Parish, Louisiana, through the Bayou Cocodrie National Wildlife Refuge. An Environmental Assessment has been prepared to inform the public of the possible environmental consequences of implementing the Comprehensive Conservation Plan for Bayou Cocodrie National Wildlife Refuge. A description of the alternatives, the rationale for selecting the preferred alternative, the environmental effects of the preferred alternative, the potential adverse effects of the action, and a declaration concerning the factors determining the significance of effects, in compliance with the National Environmental Policy Act of 1969, are outlined below. The supporting information can be found in the Environmental Assessment.

Alternatives

In developing the Comprehensive Conservation Plan for Bayou Cocodrie National Wildlife Refuge, the Fish and Wildlife Service evaluated three alternatives: Alternatives A, B, and C.

The Service adopted some components of Alternative B, the "Preferred Alternative," and some components of Alternative A, the "No Action Alternative," as the plan for guiding the direction of the refuge for the next 15 years. The overriding concern reflected in this plan is that wildlife conservation assumes first priority in refuge management; public uses are allowed if they are compatible with wildlife conservation. Wildlife-dependent recreation uses (hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation) will be emphasized.

Alternative A. No Action Alternative

Under this alternative, all lands within the approved 22,920-acre acquisition boundary would be purchased. Throughout the refuge, habitats would be protected by virtue of ownership and reforested where needed, wildfires would be suppressed, and existing forests would be left largely to let nature take its course. Minimal law enforcement activities would occur to enforce regulations and manage the hunting program. Management actions would protect threatened and endangered species. Improvements in hydrology and water impoundments in the Brooks Brake Unit would continue. Routine maintenance on refuge roads would be ongoing.

Hunting would be allowed to control wildlife population levels. Hunting opportunities to provide quality hunts would be expanded on lands that may be acquired. Public access would be expanded near the refuge headquarters for fishing and wildlife viewing. Parts of the refuge would be closed seasonally to provide maximum wildlife protection. Management would respond to the concerns of adjacent landowners by providing technical information and continuing to establish partnerships with the local community.

Alternative B.

Under this action, 42,269 acres of refuge lands would be protected, maintained, and enhanced for migratory nongame birds, threatened and endangered species, resident wildlife, waterfowl, and shorebirds. Extensive inventory activities would be initiated to develop the baseline biological information needed to implement management programs. Active habitat management would be implemented through actions such as forest management and improvement in water impoundments to achieve wildlife objectives. In addition, the main or primary gravel roads would be periodically maintained and improved for access to refuge headquarters. The refuge staff would implement a beaver control program wherever beavers impact forest songbird nesting habitat.

High quality wildlife dependent activities (i.e., hunting, fishing, wildlife observation) and environmental education opportunities would be provided. Access to support wildlife-dependent recreation would be provided at a level that does not exceed wildlife capability to tolerate human disturbance. Quality hunting and fishing opportunities would be provided consistent with sound biological principles. Fishing would be allowed in most refuge waters. Opportunities for hiking would be provided to support wildlife-dependent recreation to the extent that these opportunities do not significantly interfere with, or detract from, the achievement of wildlife conservation. Partnerships would be developed with landowners, organizations, and private firms to improve environmental awareness through education programs, and to achieve wildlife habitat and wildlife-dependent recreation objectives.

Alternative C.

Under this alternative, 59,269 acres of refuge lands would be protected, restored, and enhanced for migratory nongame birds, threatened and endangered species, and resident wildlife. Extensive inventory activities would be initiated to develop biological information needed to implement management programs. Throughout the refuge, habitats would be protected by virtue of ownership and reforested where needed, wildfires would be suppressed, and existing forests would be left largely to let nature take its course to achieve wildlife objectives. In addition, the main or primary gravel roads would be periodically maintained and improved for access to refuge headquarters. The staff would implement a beaver and feral hog control program where these animals impact forest breeding bird habitat.

Hunting would be expanded on the basis of wildlife population control and to provide quality hunting experiences. Public access would be provided only to support management and recreation programs. Fishing access would be provided in waters accessible by canoe from the Cross Bayou and Bayou Cocodrie and parish roads. Wildlife observation opportunities, including the development of boardwalks for hikers, would be provided and educational opportunities would be emphasized.

Partnerships would be established with organizations interested in habitat improvement. Expertise and funding through Partners for Wildlife projects would be provided to landowners for habitat improvements.

Selection Rationale

Components of Alternatives A and B are selected for implementation because they direct the development of programs to correct habitat and hydrological deficiencies; emphasize the restoration of forest habitats within the existing refuge boundary; collect habitat and wildlife data; and ensure long term achievement of refuge and Service objectives. At the same time, these management actions provide balanced levels of compatible public use opportunities consistent with existing laws, Service policies, and sound biological principles. They provide the best mix of program elements to achieve desired long term conditions.

Under the combination of Alternatives A and B, all lands within the approved 22,920-acre acquisition boundary will be protected versus the Service protecting, maintaining, and enhancing 42,269 acres, 20,000 of which exist outside the current refuge boundary. The Service has selected the remaining part of Alternative B, minus the large land protection component, since reviewers questioned the utility of the land acquisition component of Alternative B relative to Region-wide funding and priorities. Internal discussions led the Service to conclude that if the lands within the existing refuge boundary were prioritized

for land protection and acquisition (as analyzed in Alternative A), it would best achieve national, ecosystem, and refuge specific goals and objectives within anticipated funding and staffing levels. In addition, the action positively addresses significant issues and concerns expressed by the public.

Environmental Effects

Implementation of the Service's management action is expected to result in environmental, social, and economic effects as outlined in the comprehensive conservation plan. Habitat management, population management, land conservation, and visitor service management activities on Bayou Cocodrie National Wildlife Refuge would result in bottomland forest restoration; increased migratory bird utilization and production; increased protection for threatened and endangered species; enhanced wildlife populations; and enhanced opportunities for wildlife-dependent recreation and environmental education. These effects are detailed as follows:

1. As a result of restoration and management, mature bottomland hardwood forests would be protected from loss and fragmentation. A large net increase would occur as a result of reforesting lands within the current refuge boundary as they are acquired. This would result in reforesting a 20,000-acre block of bottomland hardwoods and protect more than 13,000 acres of core habitat.
2. Migratory bird production would increase by enhancing forest habitat quality for neotropical migratory birds, habitat and food availability for wintering waterfowl, and through hydrological restoration and reforestation. Forest management practices such as reforestation, selective harvests, and preservation of mature and old-growth stand components would benefit nesting and feeding habitat for neotropical migratory birds.
3. Habitats for threatened, endangered, and candidate species would be preserved, restored, and enhanced. Black bear monitoring and providing educational awareness to landowners and local communities would be ongoing. Nesting sites for waterfowl and raptors would be protected and enhanced.
4. Restoration of hydrology and bottomland hardwood habitat, as well as habitat management, would improve food and cover for resident wildlife species and enhance wetland communities within the refuge.
5. Habitat restoration and management, along with a focus on accessibility and facility developments, would result in improved wildlife-dependent recreational opportunities. While public use would result in some minimal, short-term adverse effects on wildlife, and user conflicts may occur at certain times of the year, these effects are minimized by site design, time zoning, and implementing refuge regulations. Anticipated long-term impacts to wildlife and wildlife habitats of implementing the management action are positive. In the long run, wildlife habitat and increased opportunities for wildlife-dependent recreation opportunities could result in an increase in economic benefits to the local community.
6. Implementing the comprehensive conservation plan is not expected to have any significant adverse effects on wetlands and floodplains, pursuant to Executive Orders 11990 and 11988, as actions would not result in development of buildings and/or structures within floodplain areas, nor would they result in irrevocable, long-term adverse impacts. In fact, a major thrust of the management action is to implement large-scale hardwood forest restoration within the wildlife communities of the refuge that have been severely impacted by actions of previous landowners. Implementing the management action would result in substantial enhancement of forest wetland communities and net increases to the Nation's bottomland hardwood forest acreage and quality.

Potential Adverse Effects and Mitigation Measures

Wildlife Disturbance

Disturbance to wildlife at some level is an unavoidable consequence of any public use program, regardless of the activity involved. Obviously, some activities innately have the potential to be more disturbing than others. The management actions to be implemented have been carefully planned to avoid unacceptable levels of impact.

As currently proposed, the known and anticipated levels of disturbance of the management action are considered minimal and well within the tolerance level of known wildlife species and populations present in the area. Implementation of the public use program would take place through carefully controlled time and space zoning such as establishment of black bear sanctuary areas, establishment of protection zones around key sites, such as rookeries and eagle nests (if necessary), closures of all-terrain vehicle trails, and routing of roads and trails to avoid direct contact with sensitive areas, such as nesting bird habitat and black bear dens, etc. All hunting activities (season lengths, bag limits, number of hunters) would be conducted within the constraints of sound biological principles and refuge-specific regulations established to restrict illegal or non-conforming activities. Monitoring activities through wildlife inventories and assessments of public use levels and activities would be utilized, and public use programs would be adjusted as needed to limit disturbance.

User Group Conflicts

As public use levels expand across time, some conflicts between user groups may occur. Programs would be adjusted, as needed, to eliminate or minimize these problems and provide quality wildlife-dependent recreational opportunities. Experience has proven that time and space zonings, such as establishment of separate use areas, use periods, and restricting numbers of users, are effective tools in eliminating conflicts between user groups.

Effects on Adjacent Landowners

Implementation of the management action would not impact adjacent or in holding landowners. Essential access to private property would be allowed through issuance of special use permits. Future land acquisition would occur on a willing-seller basis only, at fair market values within the approved acquisition boundary. Lands are acquired through a combination of fee title purchases and/or donations and less-than-fee title interests (e.g., conservation easements, cooperative agreements) from willing sellers. Funds for the acquisition of lands within the approved acquisition boundary would likely come from the Land and Water Conservation Fund which was established by law. The management action contains neither provisions nor proposals to pursue off refuge stream bank riparian zone protection measures (e.g., fencing) other than on a volunteer/partnership basis.

Land Ownership and Site Development

Proposed acquisition efforts by the Service would result in changes in land and recreational use patterns, since all uses on national wildlife refuges must meet compatibility standards. Land ownership by the Service also precludes any future economic development by the private sector. Potential development of access roads, dikes, control structures, and visitor parking areas could lead to minor short-term negative impacts on plants, soil, and some wildlife species. When site development activities are proposed, each activity will be given the appropriate National Environmental Policy Act consideration during pre-construction planning. At that time, any required mitigation activities will be incorporated into the specific project to reduce the level of impacts to the human environment and to protect fish and wildlife and their habitats.

As indicated earlier, one of the direct effects of site development is increased public use; this increased use may lead to littering, noise, and vehicle traffic. While funding and personnel resources will be allocated to minimize these effects, such allocations make these resources unavailable for other programs.

The management action is not expected to have significant adverse effects on wetlands and floodplains, pursuant to Executive Orders 11990 and 11988.

Coordination

The management action has been thoroughly coordinated with all interested and/or affected parties.

Parties contacted include:

All affected landowners
Congressional representatives
Governor of Louisiana
Louisiana Department of Wildlife and Fisheries
Louisiana State Historic Preservation Officer
Louisiana Department of Natural Resources, Coastal Management Division
Kisatchie-Delta Regional Planning and Economic Development District
Local community officials
Interested citizens
Conservation organizations

Findings

It is my determination that the management action does not constitute a major federal action significantly affecting the quality of the human environment under the meaning of Section 102(2)(c) of the National Environmental Policy Act of 1969 (as amended). As such, an environmental impact statement is not required. This determination is based on the following factors (40 C.F.R. 1508.27), as addressed in the Environmental Assessment for the Bayou Cocodrie National Wildlife Refuge:

1. Both beneficial and adverse effects have been considered and this action will not have a significant effect on the human environment. (Environmental Assessment, page 109).
2. The actions will not have a significant effect on public health and safety. (Environmental Assessment, page 109).
3. The project will not significantly affect any unique characteristics of the geographic area such as proximity to historical or cultural resources, wild and scenic rivers, or ecologically critical areas. (Environmental Assessment, pages 114 and 119).
4. The effects on the quality of the human environment are not likely to be highly controversial. (Environmental Assessment, pages 109-113, and page 120).
5. The actions do not involve highly uncertain, unique, or unknown environmental risks to the human environment. (Environmental Assessment, pages 109-113, and page 120).
6. The actions will not establish a precedent for future actions with significant effects nor do they represent a decision in principle about a future consideration. (Environmental Assessment, pages 109-114, and 116-119).
7. There will be no cumulatively significant impacts on the environment. Cumulative impacts have been analyzed with consideration of other similar activities on adjacent lands, in past action, and in foreseeable future actions. (Environmental Assessment, pages 119-120).
8. The actions will not significantly affect any site listed in, or eligible for listing in, the National Register of Historic Places, nor will they cause loss or destruction of significant scientific, cultural, or historic resources. (Environmental Assessment, pages 113, 114 and 119).

9. The actions are not likely to adversely affect threatened or endangered species, or their habitats. (Environmental Assessment, page 110).

10. The actions will not lead to a violation of federal, state, or local laws imposed for the protection of the environment. (Environmental Assessment, page 120).

Supporting References

Fish and Wildlife Service. 2001. Draft Comprehensive Conservation Plan and Environmental Assessment for Bayou Cocodrie National Wildlife Refuge, Ferriday, Louisiana. U.S. Department of the Interior, Fish and Wildlife Service, Southeast Region.

Fish and Wildlife Service. 2001. Final Comprehensive Conservation Plan for Bayou Cocodrie National Wildlife Refuge, Land Protection Plan, pp. 177-180, Ferriday, Louisiana. U.S. Department of the Interior, Fish and Wildlife Service, Southeast Region.

Document Availability

The Environmental Assessment was an appendix to the Draft Comprehensive Conservation Plan for Bayou Cocodrie National Wildlife Refuge and was made available in June 2001. Additional copies are available by writing: U.S. Fish and Wildlife Service, 1875 Century Boulevard, Atlanta, GA 30345.


//S// **Sam D. Hamilton**

Sam D. Hamilton
Regional Director



Date