DRAFT COMPREHENSIVE CONSERVATION PLAN AND ENVIRONMENTAL ASSESSMENT

ATCHAFALAYA NATIONAL WILDLIFE REFUGE

St. Martin and Iberville Parishes, Louisiana

U.S. Department of the Interior
Fish and Wildlife Service

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SECTION A. DRAFT COMPREHENSIVE CONSERVATION PLAN

I. Background

INTRODUCTION

This Draft Comprehensive Conservation Plan and Environmental Assessment (Draft CCP/EA) for Atchafalaya National Wildlife Refuge (NWR), located in the Lower Atchafalaya Basin Floodway System in St. Martin and Iberville Parishes, Louisiana (Figure 1), was prepared to guide management actions and direction for the refuge. Fish and wildlife conservation will receive first priority in refuge management. Wildlife-dependent recreation will be allowed and encouraged as long as it is compatible with, and does not detract from, the mission of the refuge or the purposes for which it was established.

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 planning period. This Draft CCP/EA describes the U.S. Fish and Wildlife Service's (Service) proposed plan, as well as other alternatives considered and their effects on the environment. The Draft CCP/EA will be made available to state and federal government agencies, conservation partners, and the general public for review and comment. Comments from each entity will be considered in the development of the Final CCP.

PURPOSE AND NEED FOR THE PLAN

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

Specifically, the plan is needed to:

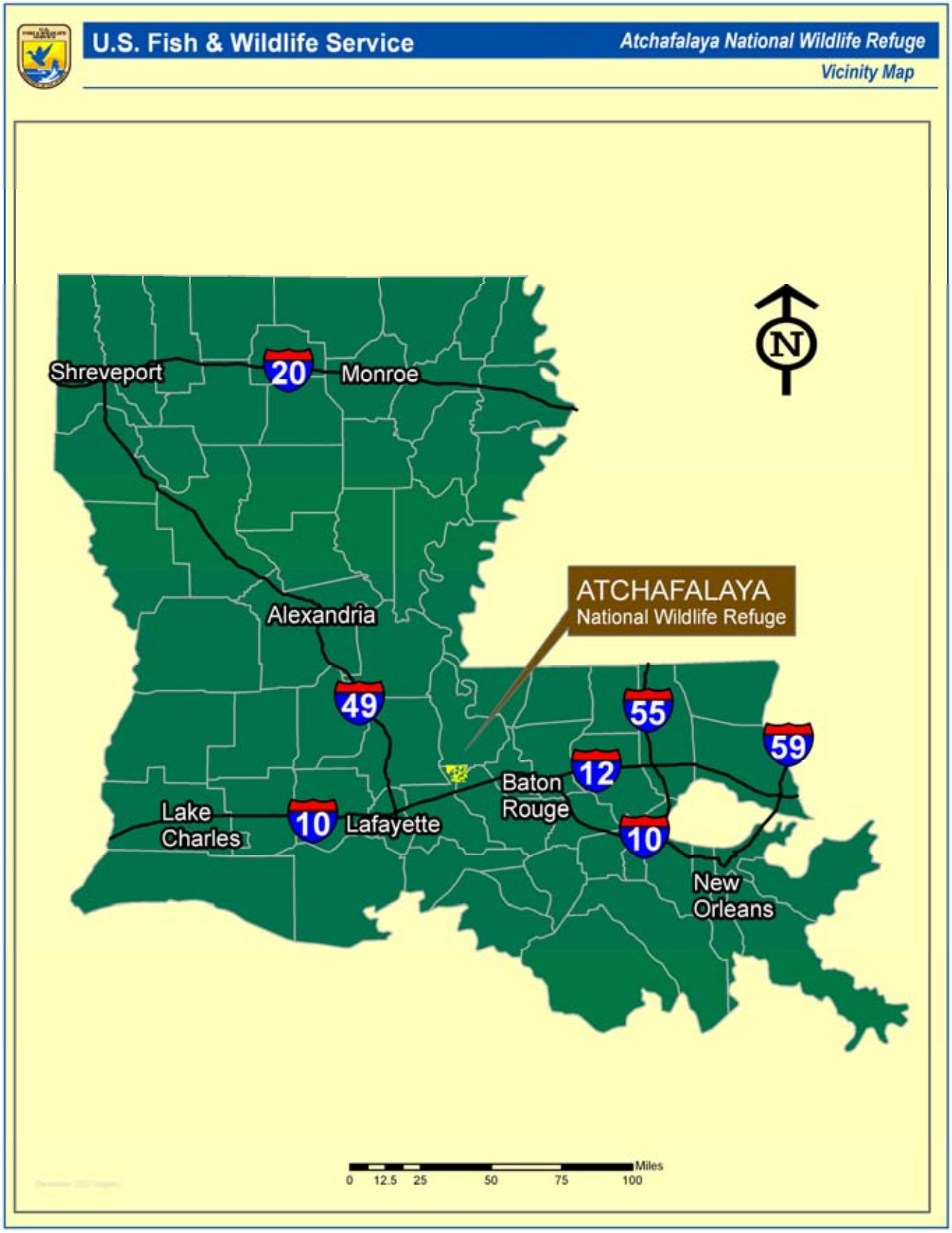
- Provide a clear statement of refuge management direction;
- Provide refuge neighbors, visitors, and government officials with an understanding of Service management actions on and around the refuge;
- Ensure that Service management actions, including land protection and recreation/education programs,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

FISH AND WILDLIFE SERVICE

The Service traces its roots to 1871 and the establishment of the Commission of Fisheries involved with research and fish culture. The once-independent commission was renamed the Bureau of Fisheries and placed under the Department of Commerce and Labor in 1903.

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

Figure 1. Location of Atchafalaya NWR



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

The Fish and Wildlife Service, working with others, is responsible for conserving, protecting, and enhancing fish and wildlife and their habitats for the continuing benefit of the American people through Federal programs relating to migratory birds, endangered species, interjurisdictional fish and marine mammals, and inland sport fisheries (142 DM 1.1).

As part of its mission, the Service manages more than 540 national wildlife refuges covering over 95 million acres. These areas comprise the National Wildlife Refuge System, the world's largest collection of lands set aside specifically for fish and wildlife. The majority of these lands, 77 million acres, is in Alaska. The remaining acres are spread across the other 49 states and several United States territories. In addition to refuges, the Service manages thousands of small wetlands, national fish hatcheries, 64 fishery resource offices, and 78 ecological services field stations. The Service enforces federal wildlife laws, administers the Endangered Species Act, manages migratory bird populations, restores nationally significant fisheries, conserves and restores wildlife habitat, and helps foreign governments with their conservation efforts. It also oversees the Federal Aid program that distributes hundreds of millions of dollars in excise taxes on fishing and hunting equipment to state fish and wildlife agencies.

NATIONAL WILDLIFE REFUGE SYSTEM

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

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

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

- Fulfill the mission of the Refuge System;
- Fulfill the individual purposes of each refuge;
- Consider the needs of wildlife first;
- Fulfill requirements of comprehensive conservation plans that are prepared for each unit of the Refuge System;
- Maintain the biological integrity, diversity, and environmental health of the Refuge System; and

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

The following are just a few examples of your national network of conservation lands. Pelican Island NWR, the first refuge, was established in 1903 for the protection of colonial nesting birds in Florida, such as the snowy egret and the brown pelican. Western refuges were established for American bison (1906), elk (1912), prong-horned antelope (1931), and desert bighorn sheep (1936) after over-hunting, competition with cattle, and natural disasters decimated once-abundant herds. The drought conditions of the 1930s Dust Bowl severely depleted breeding populations of ducks and geese. Refuges established during the Great Depression focused on waterfowl production areas (i.e., protection of prairie wetlands in America's heartland). The emphasis on waterfowl continues today but also includes protection of wintering habitat in response to a dramatic loss of bottomland hardwoods. By 1973, the Service had begun to focus on establishing refuges for endangered species.

Approximately 38 million people visited national wildlife refuges in 2002, most to observe wildlife in their natural habitats. As the number of visitors grows, there are significant economic benefits to local communities. In 2001, 82 million people, 16 years and older, fished, hunted, or observed wildlife, generating $108 billion. In a study completed in 2002 on 15 refuges, visitation had grown 36 percent in 7 years. At the same time, the number of jobs generated in surrounding communities grew to 120 per refuge, up from 87 jobs in 1995, pouring more than $2.2 million into local economies. The 15 refuges in the study were Chincoteague (Virginia); National Elk (Wyoming); Crab Orchard (Illinois); Eufaula (Alabama); Charles M. Russell (Montana); Umatilla (Oregon); Quivira (Kansas); Mattamuskeet (North Carolina); Upper Souris (North Dakota); San Francisco Bay (California); Laguna Atacosa (Texas); Horicon (Wisconsin); Las Vegas (Nevada); Tule Lake (California); and Tensas River (Louisiana) – the same refuges identified for the 1995 study. Other findings also validate the belief that communities near refuges benefit economically. Expenditures on food, lodging, and transportation grew to $6.8 million per refuge, up 31 percent from $5.2 million in 1995. For each dollar spent on the Refuge System, surrounding communities benefited with $4.43 in recreation expenditures and $1.42 in job-related income (Caudill and Laughland, unpubl. data).

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

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

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

All lands of the Refuge System will be managed in accordance with an approved comprehensive conservation plan that will guide management decisions and set forth strategies for achieving refuge unit purposes. The plan will be consistent with sound resource management principles, practices, and legal mandates, including Service compatibility standards and other Service policies, guidelines, and planning documents (602 FW 1.1).

LEGAL AND POLICY CONTEXT

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

Administration of national wildlife refuges is guided by the mission and goals of the Refuge System, congressional legislation, presidential executive orders, and international treaties. Policies for management options of refuges are further refined by administrative guidelines established by the Secretary of the Interior and by policy guidelines established by the Director of the Fish and Wildlife Service. Select legal summaries of treaties and laws relevant to administration of the Refuge System and management of the Atchafalaya NWR are provided in Appendix C.

Treaties, laws, administrative guidelines, and policy guidelines assist the refuge manager in making decisions pertaining to soil, water, air, flora, fauna, and other natural resources; historical and cultural resources; research and recreation on refuge lands; and provide a framework for cooperation between Atchafalaya NWR and other partners, such as the Louisiana Department of Wildlife and Fisheries, National Park Service, Audubon Society, Friends of Louisiana Wildlife Refuges, Army Corps of Engineers, corporations, and private landowners, etc.

Lands within the Refuge System are closed to public use unless specifically and legally opened. No refuge use may be allowed unless it is determined to be compatible. A compatible use is a use that, in the sound professional judgment of the refuge manager, will not materially interfere with, or detract from, the fulfillment of the mission of the Refuge System or the purposes of the refuge. All programs and uses must be evaluated based on mandates set forth in the Improvement Act. Those mandates are to:

- Contribute to ecosystem goals, as well as refuge purposes and goals;
- Conserve, manage, and restore fish, wildlife, and plant resources and their habitats;
- Monitor the trends of fish, wildlife, and plants;
- Manage and ensure appropriate visitor uses as those uses benefit the conservation of fish and wildlife resources and contribute to the enjoyment of the public; and
- Ensure that visitor activities are compatible with refuge purposes.

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

Biological Integrity, Diversity, and Environmental Health Policy

The Improvement Act directs the Service to ensure that the biological integrity, diversity, and environmental health of the Refuge System are maintained for the benefit of present and future generations of Americans. The policy is an additional directive for refuge managers to follow while achieving refuge purpose(s) and the Refuge System mission. It provides for the consideration and protection of the broad spectrum of fish, wildlife, and habitat resources found on refuges and associated ecosystems. When evaluating the appropriate management direction for refuges, refuge managers will use sound professional judgment to determine their refuges' contribution to biological integrity, diversity, and environmental health at multiple landscape scales. Sound professional judgment incorporates field experience, knowledge of refuge resources and role within the ecosystem, applicable laws, and best available science, including consultation with others both inside and outside the Service.

NATIONAL AND INTERNATIONAL CONSERVATION PLANS AND INITIATIVES

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

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

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

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

Partners-in-Flight Bird Conservation Plan. Managed as part of the Partners-in-Flight Plan, the Mississippi Alluvial Valley (MAV) physiographic area represents a scientifically based land bird conservation planning effort that ensures long-term maintenance of healthy populations of native land birds, primarily non-game land birds. Non-game land birds have been vastly under-represented in conservation efforts, and many are exhibiting significant declines. This plan is voluntary and non-regulatory, and focuses on relatively common species in areas where conservation actions can be most effective, rather than the frequent local emphasis on rare and peripheral populations.

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

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

RELATIONSHIP TO STATE WILDLIFE AGENCY

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

The Louisiana Department of Wildlife and Fisheries (LDWF) (*http://www.wlf.louisiana.gov*) is vested with responsibility for the conservation and management of wildlife in the state, including aquatic life, and is authorized to execute the laws enacted for the control and supervision of programs relating to the management, protection, conservation, and replenishment of wildlife, fish, and aquatic life, and the regulation of the shipping of wildlife fish, furs, and skins. LDWF's mission is to manage, conserve, and promote wise utilization of Louisiana's renewable fish and wildlife resources and their supporting habitats through replenishment, protection, enhancement, research, development, and education for the social and economic benefit of current and future generations; to provide opportunities for knowledge of and use and enjoyment of these resources; and to promote a safe and healthy environment for the users of the resources. LDWF is divided into four divisions for management of the state's resources: Coastal and Nongame Resources, Fisheries, Enforcement, and Wildlife.

Public access on all refuge lands is currently managed by the LDWF under Cooperative Agreement No. 1416000486946. Since the federal and state lands share common boundaries, LDWF technical and field personnel manage the wildlife on both the wildlife management areas and the refuge. Service personnel are responsible for all forest management, law enforcement, and issuance of special use permits. The Atchafalaya NWR (Service), Bayou Des Ourses Area (USACE), and Sherburne Wildlife Management Area (LDWF), are collectively referred to as the Sherburne Complex.

The state's participation and contribution throughout this planning process will provide for ongoing opportunities and open dialogue to improve the ecological sustainment of fish and wildlife in the State of Louisiana. An essential part of comprehensive conservation planning is integrating common mission objectives where appropriate.

II. Refuge Overview

INTRODUCTION

Atchafalaya NWR is located in the lower Atchafalaya Basin Floodway System in St. Martin and Iberville Parishes, Louisiana. The name originated from its location within the Atchafalaya River Basin. Atchafalaya NWR is bounded on the north by U.S. Highway 190, on the south by Interstate 10, on the west by the Atchafalaya River, and on the east by the East Atchafalaya Basin Protection Levee (Figure 1). Atchafalaya NWR is part of the Southeast Louisiana NWR Complex.

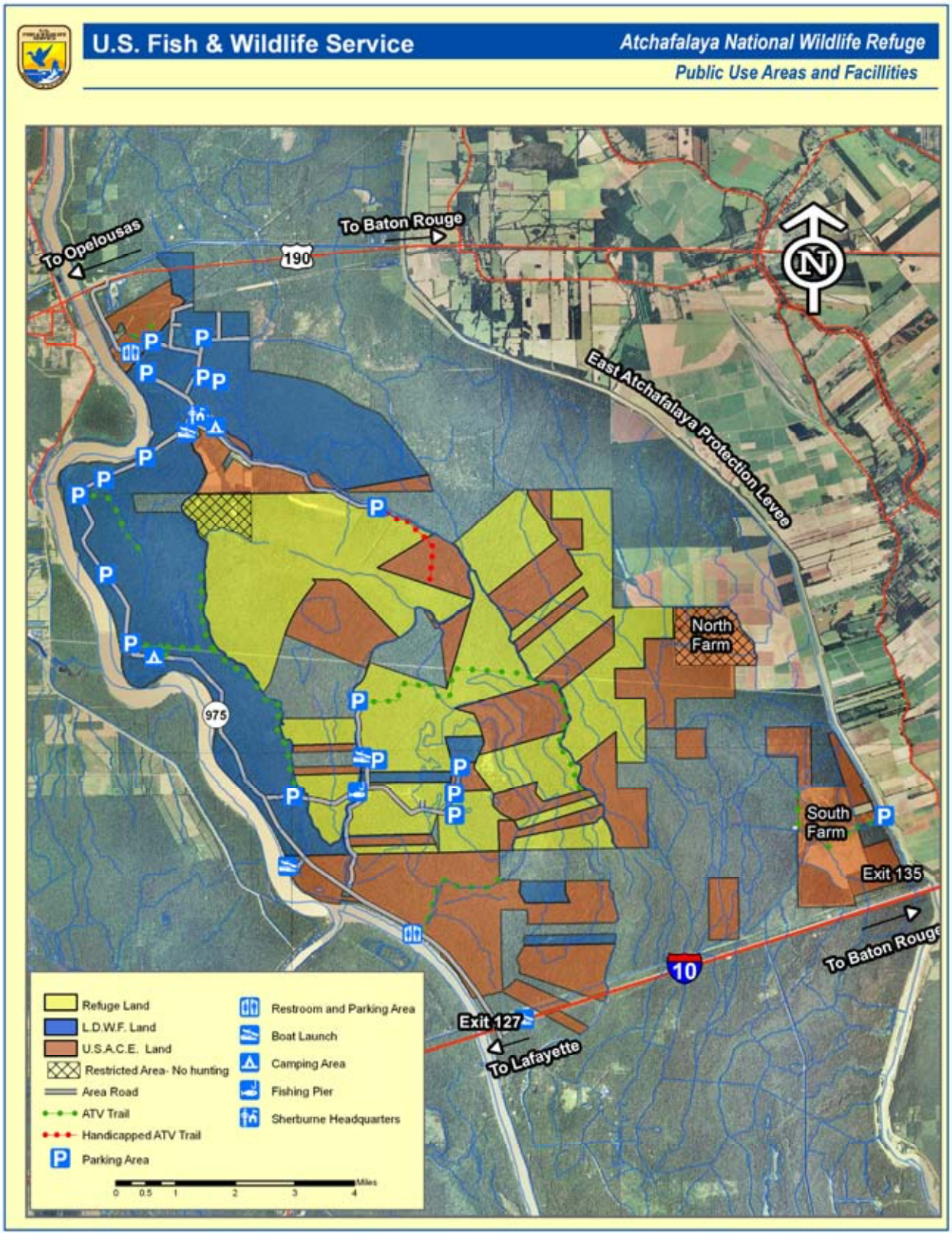
Atchafalaya NWR was established in 1986, when 15,255 acres were purchased from the Iberville Land Company, as directed by Public Law 98-548. The LDWF and the USACE have also purchased fee title land adjacent to and within the Atchafalaya NWR, which brings the current acreage among all three agencies (LDWF, Service, and USACE) to approximately 44,000. The USACE has authority to purchase additional lands within the Atchafalaya Basin Floodway.

All three agencies' public access lands are managed by the LDWF under Cooperative Agreements. The Service operates under Contract No. 1416000486946. Since the federal and state lands share common boundaries, LDWF technical and field personnel manage the wildlife on both the wildlife management area and the refuge. Service personnel are responsible for all forest management, law enforcement, and issuance of special use permits. The Atchafalaya NWR, Bayou Des Ourses Area (USACE), and Sherburne Wildlife Management Area (LDWF), are collectively referred to as the Sherburne Complex (Figure 2).

Approximately 12 percent of the refuge is inundated open water, with isolated cypress trees and willow stands. Bottomland hardwood forest is the primary habitat. Self-guided tours can be accessed by auto, boat, or foot. Traditional use of the area is hunting and fishing, which follows the state's annual season dates and specific regulations. Camping is allowed nearby on the Sherburne Wildlife Management Area.

The bottomland hardwood forests in the area of Atchafalaya NWR have four dominant tree species associations: cottonwood-sycamore; oak-gum-sugarberry-ash; willow-cypress-ash; and, overcup oak-bitter pecan. Mid-story species encompass seedlings of dominant species along with boxelder, maple, red mulberry, and rough-leaf dogwood. Ground cover is sparse, in areas, due to shading out and prolonged inundation. In those areas where habitat improvement, through the practice of forest management, has taken place, the ground cover is very dense and provides excellent habitat for many game and non-game wildlife species. Common groundcover species found include rattan, greenbriar, rubus, trumpet creeper, Virginia creeper, poison ivy, and milkweed. Much of the area supports lush stands of fern (Louisiana Department of Wildlife and Fisheries 2005a).

Figure 2. Sherburne Wildlife Management Area Complex



REFUGE HISTORY AND PURPOSE

LAND ACQUISITION HISTORY

The LDWF purchased 11,780 acres on September 13, 1983, and created the Sherburne Wildlife Management Area. In the 1984 Supplemental Appropriations Act (Public Law 98-396), passed by Congress and signed into law by President Reagan, a total of $10 million from the Land and Water Conservation Fund was appropriated to the Service to acquire lands and waters in the Atchafalaya River Basin in accordance with statutory authority applicable to the Fish and Wildlife Act of 1956 (see below). Subsequently, in 1986, the Service purchased 15,220 acres from the Iberville Land Company with these funds and established Atchafalaya NWR.

Since 1989, the USACE has also purchased 17,000 acres of fee title land adjacent to and within the Atchafalaya NWR current acquisition boundary (Figure 3), which brings the current concomitant acreage among all three agencies (LDWF, Service, and USACE) to approximately 44,000 (Figure 2). The Sherburne Complex is managed cooperatively with LDWF's Sherburne Wildlife Management Area and the USACE's Atchafalaya Basin Floodway System, Louisiana Project. Since the federal and state lands share common boundaries, LDWF technical and field personnel manage the wildlife on both the wildlife management area and the refuge on a day-to-day basis. Service personnel are responsible for all forest management and issuance of special use permits. (Sources: USFWS 2008a, 2008b, and 2009a; *Federal Register* 2009)

PURPOSES

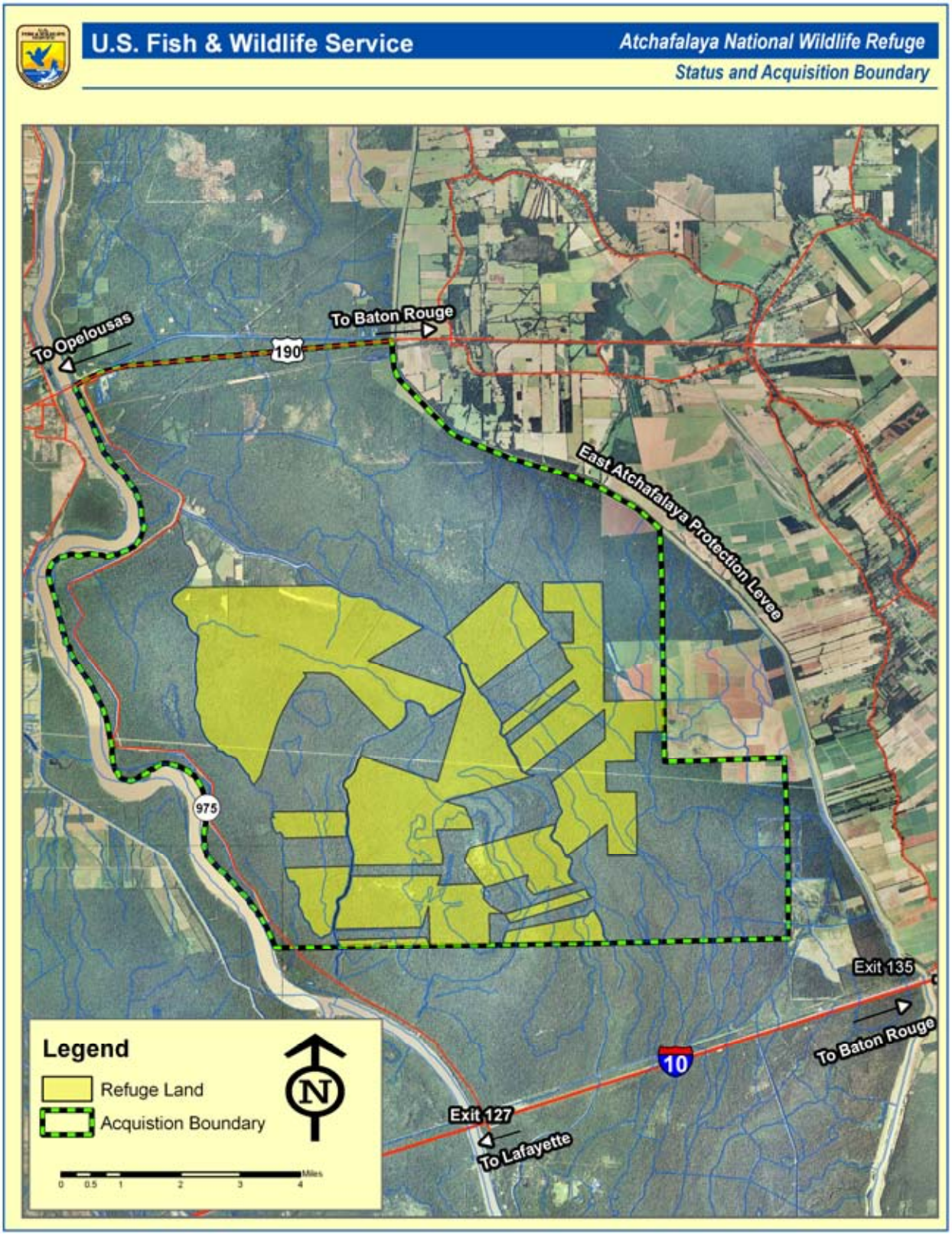
The purposes shown here are based upon land acquisition documents and authorities. The refuge purposes may also include purposes included as deed restrictions, management agreements with primary land managers, and congressionally established wilderness designations which were not part of the acquisition documents and authorities.

On October 26, 1984, Congress authorized the establishment of Atchafalaya NWR (Public Law 98-548) for the following purposes:

(1) To provide for the conservation and management of fish and wildlife within the refuge;
(2) To fulfill the international treaty obligations of the United States with respect to fish and wildlife; and
(3) To provide opportunities for scientific research, environmental education, and fish and wildlife-oriented recreation, including hunting, fishing, and trapping, bird watching, nature photography, and others.

Additionally, the earlier Fish and Wildlife Act of 1956, authorized the establishment of national wildlife refuges "for the development, advancement, management, conservation, and protection of fish and wildlife resources" [16 U.S.C. 742f(a)(4)] and "for the benefit of the United States Fish and Wildlife Service, in performing its activities and services. Such acceptance may be subject to the terms of any restrictive or affirmative covenant, or condition of servitude" [16 U.S.C. 742f(b)(1) (Fish and Wildlife Act of 1956)].

Figure 3. Atchafalaya NWR current fee title lands and acquisition boundary



MANAGEMENT GOALS

The nine current management objectives of Atchafalaya NWR are to:

- Manage the refuge in a manner that will conserve the natural state of the floodway system, consistent with the public harvest of the surplus wildlife resources and protection of rare and endangered species.
- Provide habitat and protection for threatened and endangered species
- Provide habitat for wildlife and plant species of special concern.
- Provide, enhance, and maintain habitat meeting the requirements of all wildlife, while providing for wildlife diversity.
- Provide migrating and wintering habitat for migratory waterfowl and other migratory birds;
- Provide compatible recreation, environmental education, scientific research, and interpretive/ demonstration activities.
- Provide areas for quality observation of wildlife in their native habitats.
- Provide demonstration areas for exhibition of sound habitat and wildlife management practices.
- Protect refuge resources, visitors, and facilities while providing compatible public outdoor recreation opportunities.

SPECIAL DESIGNATIONS

Natural Areas

No natural areas have been designated on the Atchafalaya NWR. If any unique habitats or ecosystems are identified, they will be considered for designation or otherwise be protected. In order to meet criteria for a natural area, an area must have some unique or otherwise valuable characteristic which will perpetuate itself. Consequently, old growth forests, while very valuable to particular species of wildlife, are changing and will not maintain present conditions (Boykin 1990).

Wilderness Review

Currently, there are no areas of special designation on Atchafalaya NWR. However, refuge planning policy requires a wilderness review as part of the comprehensive conservation planning process. The Wilderness Act of 1964 defines a wilderness area as an area of federal land that retains its primeval character and influence, without permanent improvements or human inhabitation, and is managed so as to preserve its natural condition, which generally appears to have been influenced primarily by the forces of nature, with the imprint of man's work substantially unnoticeable; has outstanding opportunities for solitude or primitive and unconfined type of recreation; has at least 5,000 contiguous roadless acres, or is of sufficient size to make practicable its preservation and use in an unimpeded condition, or is a roadless island regardless of size; does not substantially exhibit the effects of logging, farming, grazing, or other extensive development or alteration of the landscape, or its wilderness character could be restored through appropriate management at the time of review; and may contain ecological, geological, or other features of scientific, educational, scenic, or historic value.

Lands within the Atchafalaya NWR were reviewed for their suitability in meeting the criteria for Wilderness Areas, as defined by the Wilderness Act of 1964. No areas were found to meet these criteria. Therefore, the suitability of refuge lands for wilderness designation is not further analyzed in this Draft CCP/EA.

Critical Habitat

The Service has designated critical habitat for the Louisiana black bear in the State of Louisiana. On March 10, 2009, the Service designated 1,195,821 acres of critical habitat in Avoyelles, East Carroll, Catahoula, Concordia, Franklin, Iberia, Iberville, Madison, Pointe Coupee, Richland, St. Martin, St. Mary, Tensas, West Carroll, and West Feliciana Parishes, Louisiana. Critical habitat is a term used in the Endangered Species Act (ESA) that refers to specific geographic areas that are essential for the conservation of a threatened or endangered species and that may require special management or protection. The Louisiana black bear was listed as a threatened species under the ESA in 1992.

Other

The refuge has been identified as a Globally Important Bird Area by the American Bird Conservancy and an "Important Bird Area" by the National Audubon Council. The bottomland hardwood forests and the mix of bayous, oxbow lakes, sloughs, and swamps create a diversity of habitats important to a wide range of bird species. Neotropical migratory birds abound during the fall and spring migrations, and many species nest on the refuge. The refuge supports a number of small wading bird rookeries. Each winter, several thousand waterfowl make their home on the refuge. The wood duck is a common summer nester on the refuge.

Although Louisiana's Natural and Scenic River System is one of the nations' largest, oldest, and most diverse, none of the streams or rivers in the Atchafalaya Basin is designated as such. However, a National Wild and Scenic River designation for the Atchafalaya River and the waterways within the basin is being proposed by the Delta Chapter of the Sierra Club (Sierra Club 2009).

Atchafalaya NWR does not contain any other lands under special designation by the Federal Government, such as demonstration areas or research natural areas. However, (GAO-03-517) Report on Oil and Gas on Wildlife Refuges, lists 35 inactive wells and pipelines and 2 active wells, in addition to exploration activities ongoing at Atchafalaya NWR (U.S. General Accounting Office 2003).

ECOSYSTEM CONTEXT

LOWER MISSISSIPPI RIVER ECOSYSTEM

An ecosystem is a geographical area that includes and interconnects all the living (biotic) organisms, and their physical (abiotic) surroundings, and the natural cycles that sustain them. All of these elements are interconnected. Managing any one resource affects the others in that ecosystem. Ecosystems can be small (a single stand of bottomland hardwoods) or large (an entire watershed including hundreds of forest stands across many different ownerships).

The Mississippi Alluvial Valley (MAV) (also referred to as the Mississippi Alluvial Plain) was at one time a 25-million-acre, forested wetland complex that extended along the Mississippi River from the confluence of the Ohio and Mississippi Rivers southward to the Gulf of Mexico, before as much as 80 percent was cleared and drained for cultivation. The MAV is a broad, nearly level, now agriculturally dominated alluvial plain. It is veneered by Quaternary alluvium, loess, glacial outwash, and lacustrine deposits. River terraces, swales, and levees provide limited topographic relief. Nearly flat, clayey, poorly drained soils are widespread and characteristic. Streams and rivers have very low gradients and fine-grained substrates. Many reaches have ill-defined stream channels. The MAV provides important habitat for fish and wildlife, and includes the largest continuous system of wetlands in North America. It is also a major bird migration corridor used in fall and spring migrations. Potential natural vegetation is largely southern floodplain forest and is unlike the oak–hickory and oak–hickory–pine forests that

dominate upland areas. The MAV has been widely cleared and drained for cultivation; this widespread loss or degradation of forest and wetland habitat has impacted wildlife and reduced bird populations. Fish communities in least altered streams typically have an insignificant proportion of sensitive species; sunfishes are dominant followed by minnows. Man-made flood control levees, in effect, separate the river and its adjoining habitat from the remainder of its natural hydrologic system; in so doing, they interfere with sediment transfer and have reduced available habitat for many species.

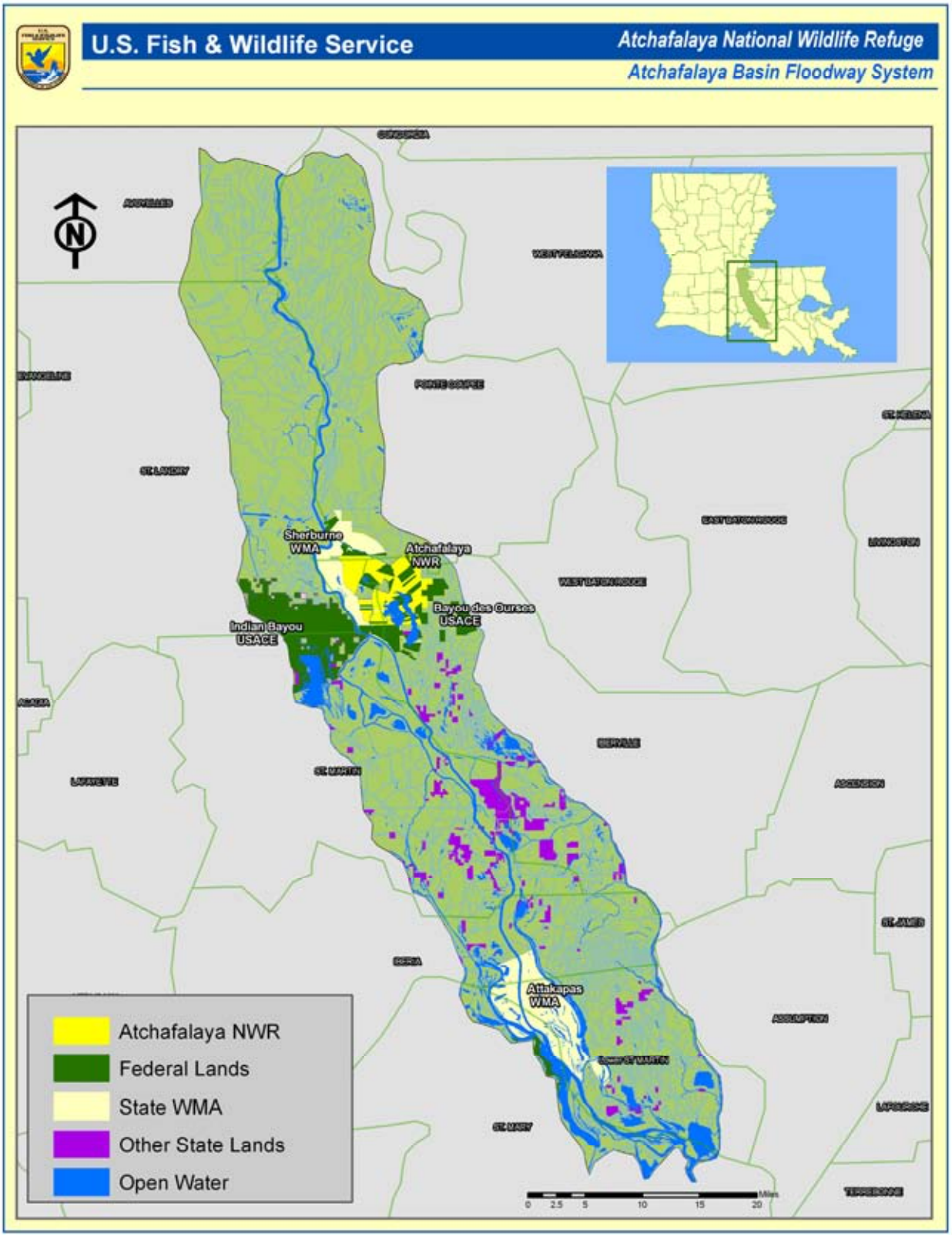
The Atchafalaya River Basin drains the lower portions of the MAV as the alluvial plain transitions to a deltaic plain (Figure 4). This region marks a transition from the freshwater areas at the northern extent of intra-tidal basins (freshwater back swamps) to the more brackish and saline areas of the southern coastal marshes. The natural floodplain of the Atchafalaya River flows for about 140 miles south from its junction with the Mississippi River to the Gulf of Mexico and contains over one-half million acres of hardwood swamps, lakes, and bayous. The natural vegetation of swamp forest communities is dominated by bald cypress and tupelo gum, which are generally intolerant of brackish water except for short periods. In areas where freshwater flooding is more prolonged, the vegetation community is dominated by grasses, sedges, and rushes. This region contains the largest bottomland hardwood forest, freshwater swamps in North America. Deposits include organic clays and peats, up to 20 feet thick, and inter-bedded freshwater and brackish-water carbonaceous clays.

The Atchafalaya River Basin is well-defined by a system of levees which surround it on the north, east, and west. The entire basin serves as a major floodway for the Mississippi River floodwaters. The Atchafalaya River presently carries about 30 percent of the combined flow of the Red and Mississippi Rivers. The levees extend almost the full length of the Atchafalaya River. The levees in the upper portion of the Atchafalaya Basin form two floodways which parallel the river. Atchafalaya NWR is located in the east floodway. The refuge is characterized by bottomland hardwoods and wetlands (characterized by cottonwood, sycamore, willow, and cypress/tupelo forests). Common tree species on the higher, well-drained sites include red oak, sugarberry, sweetgum, and elm. The wetter, lower sites contain predominantly cypress, willow, and ash. Other common species found in association within these forest types include red maple, cottonwood, sycamore, locust, box elder, and bitter pecan. The refuge serves as a primary wintering habitat for mid-continent waterfowl populations, as well as breeding and migrating habitat for migratory songbirds. The expansive floodplain forests of the past are now fragmented bottomland hardwood patches due to conversion to agriculture and flood control projects (Chapman et al. 2009, Lester et al. 2005, and USFWS 2009b). The Service's Lower Mississippi River Ecosystem Team has eight goals (Chandler et al. 2002):

Resource Goals: The first five goals address the primary living natural resources and their habitats of concern to the Service in the Lower Mississippi River Ecosystem.

- Conserve, enhance, protect, and monitor migratory bird populations and their habitats in the Lower Mississippi River Ecosystem.
- Protect, restore, and manage the wetlands of the Lower Mississippi River Ecosystem.
- Protect and/or restore imperiled habitats and viable populations of all endangered, threatened, and candidate species and species of concern in the Lower Mississippi River Ecosystem.
- Protect, restore, and manage the fisheries and other aquatic resources historically associated with the wetlands and waters of the Lower Mississippi River Ecosystem.
- Restore, manage, and protect National Wildlife Refuges and National Fish Hatcheries.

Figure 4. Protected lands within the Atchafalaya Basin Floodway System



Support Goals: The following goals support the accomplishment of all five goals listed above: wetlands, migratory birds, endangered species, fisheries, and Service lands. The support goals are essential to the overall accomplishment of our mission, but do not fit entirely within any one of the five resource goals.

- Increase public awareness and support for Lower Mississippi River Ecosystem resources and their management.
- Enforce natural resource laws.
- Protect, restore, and enhance water and air quality throughout the Lower Mississippi River Ecosystem.

REGIONAL CONSERVATION PLANS AND INITIATIVES

The mission of the 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.

Comprehensive conservation plans are being prepared to provide each of the refuge managers with a 15-year strategy and broad direction; to conserve wildlife and their habitats; to achieve refuge purposes; and, to contribute toward the mission of the Refuge System. In addition, the plans identify wildlife-dependent opportunities available to the public, including opportunities for hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation.

There are eight national wildlife refuges in the Service's Southeast Louisiana National Wildlife Refuge Complex. These are:

Atchafalaya NWR
Bayou Sauvage NWR
Bayou Teche NWR
Big Branch March NWR
Bogue Chitto NWR
Breton NWR
Delta NWR
Mandalay NWR

Atchafalaya NWR is considered to be in the MAV Bird Conservation Area. As such, Atchafalaya NWR is a component of the following regional and ecosystem conservation planning initiatives in addition to the national and international conservations plans listed in Chapter I.

<u>American Woodcock Management Plan</u>
This plan was written by the Service in 1990 to "guide the conservation of woodcock in the United States." The plan's objective is to protect and enhance wintering and migrating habitat by developing and implementing forest management plans that provide moist mid-story and ground-story vegetation (thickets) in forested lands for daytime cover and foraging habitat and open nocturnal foraging habitat in moist croplands and grassland habitats near scrub/shrub areas. Although no step-down plans have been written, the plan gives general guidance for habitat population management at the national level. Woodcock populations within the central region of the eastern United States have declined 19 percent since 1968, probably due to land use changes associated with land conversion and the maturing of forest habitats.

Lower Mississippi River Ecosystem Plan

The "*Lower Mississippi River Ecosystem Plan*" seeks to enhance, restore, and conserve the natural functional processes and habitat types of the Lower Mississippi River Ecosystem (LMRE) unit, while maintaining the economic productivity and recreational opportunities of the region (Chandler et al. 2002). Objectives of this plan are to take actions to achieve existing population and habitats goals for all migratory birds. These goals are contained in the MAV Migratory Bird Plan (Twedt 1999).

The Lower Mississippi Valley Joint Venture is a self-directed, non-regulatory private, state, and federal conservation partnership that exists for the purpose of implementing the goals and objectives of national and international bird conservation plans within the Lower Mississippi Valley (LMV) region. The Lower Mississippi Valley Joint Venture (LMVJV) will function as the forum in which the private, state, and federal conservation community develops a shared vision of bird conservation for the LMV region; cooperates in its implementation; and collaborates in its refinement. The LMVJV partnership is focused on the protection, restoration, and management of those species of North American avifauna and their habitats (endemic to the LMV Region), lying entirely or mostly within the MAV and West Gulf Coastal Plain (Lower Mississippi Valley Joint Venture 2009]).

Louisiana's Comprehensive Wildlife Conservation Strategy

Two federal funding programs, the Wildlife Conservation and Restoration Program (WCRP) and the State Wildlife Grants Program (SWG) resulted in the State of Louisiana developing a Comprehensive Wildlife Conservation Strategy (CWCS). In December 2005, the LDWF, as part of its mission to manage, conserve, and promote wise utilization of Louisiana's fish and wildlife resources and their supporting habitats, released its *Comprehensive Wildlife Conservation Strategy (Wildlife Action Plan)*. The conservation actions and strategies were developed in public focus groups held across the state with invited conservation organizations, forestry and wildlife associations, federal and state agencies, industry, universities, and private citizens. The intent of the robust plan is to guide the conservation efforts of the LDWF over a 10-year period (Lester et al. 2005).

Atchafalaya Basin Program

The LDNR oversees the management of the state master plan for the Atchafalaya Basin Floodway System. The Atchafalaya Basin Program (ABP) operates under the authority of Act 3 of 1998 and Act 920 of 1999. LDNR, USACE, and the basin parishes work together in creating projects by executing cooperative endeavors or agreements that protect and enhance the basin. Several other state agencies, like the departments of Wildlife and Fisheries and Culture, Recreation and Tourism, also work to establish projects aimed at enhancing the basin (Louisiana Department of Natural Resources 2009). One of the ABP's most important projects, particularly as it relates to Atchafalaya NWR, is the Sherburne Freshwater Diversion Structure at Big Alabama Bayou. This project was authorized by the Water Resource Development Act of 1986 in accordance with the plan recommended in the February 1983 Chief's Report. The plan included construction of freshwater distribution structures from the Atchafalaya River to provide water inflow into the Alabama Bayou area. To date, no funds have been budgeted for or allocated to this effort by the USACE; however, the ABP is actively working with the USACE New Orleans District to move this project forward (Louisiana Department of Natural Resources 2009).

Mississippi Embayment Regional Aquifer Study

As part of the USGS Ground-Water Resources Program, a ground-water flow model of the northern Mississippi embayment will be developed using data and knowledge gained from the Gulf Coast Regional Aquifer System Analysis studies and other more recently completed USGS models to aid in answering questions about ground-water availability. The proposed study area covers portions of seven states including Arkansas, Louisiana, Mississippi, Tennessee, Alabama, Missouri, and

Kentucky. The rectangular model grid will cover almost 158,000 square miles, while the active portion to be simulated will cover approximately 70,000 square miles (U.S. Geological Survey 2007).

Southeast Aquatic Resources Partnership

The Southeast Aquatic Resources Partnership (SARP) includes fish and wildlife agencies from 14 southeastern States (Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, Missouri, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, and Virginia); the Gulf and Atlantic States Marine Fisheries Commissions; the Gulf of Mexico and South Atlantic Fishery Management Councils; the Service; and NOAA Fisheries. The SARP focuses on six key issue areas: Aquatic Habitat Conservation; Public Use; Imperiled Fish and Aquatic Species Recovery; Fishery Mitigation; Interjurisdictional Fisheries; and Aquatic Nuisance Species. These partnering entities work together for the conservation and management of aquatic resources in the southeast (Southeast Aquatic Resources Partnership 2009).

The Louisiana Native Plant Initiative and the Emergency Watershed Protection Program are two programs initiated by the Natural Resources Conservation Service, U.S. Department of Agriculture. The former program seeks to conserve vanishing native plants by identifying resource areas and developing partnerships with the Coastal Plain Conservancy, USGS National Wetlands Research Center, Barataria Terrebonne National Estuary Program, and state universities (USDA Natural Resources Conservation Service 2008), while the later program removes debris from waterways and downed timber on forest lands (USDA Natural Resources Conservation Service 2009).

Black Bear Conservation Coalition

The Black Bear Conservation Coalition (BBCC) is a group of Federal, State, and private partners in Mississippi, Louisiana, Arkansas, and east Texas dedicated to restoring the federally listed Louisiana black bear to suitable habitat. The recovery of this species in Louisiana will be accomplished when: there are at least two viable subpopulations (one in the Tensas River Basin and one in the Atchafalaya River Basin); immigration and emigration corridors are established between those two subpopulations; and, habitat and interconnecting corridors that support those two subpopulations are protected.

Landscape Conservation Cooperatives

To ensure that the Service is “putting science in the right places,” the Directorate determined in April 2009 that the agency needed a national geographic framework for implementing landscape conservation. Just as migratory bird flyways have provided an effective spatial frame of reference to build capacity and partnerships for international, national, state, and local waterfowl conservation, this geographic framework will provide a continental platform upon which the Service can work with partners to connect site-specific efforts to larger biological goals and outcomes. In its meeting on August 4-6, 2009, the Directorate approved a map of the geographic framework developed by a team of Service and U.S. Geological Survey experts from across the country. The map defines *Geographic Areas* that provide a spatial frame of reference for building and targeting science capacity that will support the Service and partners in planning and designing conservation strategies at landscape scales. It also allows us to more precisely explain to partners, Congress, and the American public why, where, and how we target conservation resources and how our science-based efforts connect to a greater whole. Atchafalaya NWR is part of the Gulf Coastal Plains and Ozarks Landscape Conservation Cooperative (Figure 5).

ECOLOGICAL THREATS AND PROBLEMS

In order to prepare a CCP that will establish goals and objectives on refuge management over the next 15 years, a number of planning steps are followed. One of those steps is a review of known ecological threats and problems that may hinder the ability of refuge personnel to fulfill the objectives of the individual refuges. This iterative, ongoing review process has recognized a number of common regional concerns, which are of particular importance to Atchafalaya NWR.

ATCHAFALAYA BASIN

From a regional perspective, the Atchafalaya Basin faces several, broad ecological threats:

- Logging of the cypress that remains and the bottomland hardwoods continues.
- Lack of public access through private holdings restricts public use and support for conservation.
- Dredging has changed natural hydraulics, accelerated siltation, and created oxygen-deprived dead zones where aquatic life cannot survive.
- Increased siltation has created dry land from wetland, and development pressures south of I-10 are increasing.
- At least one lake in the basin is polluted with mercury, and a fish advisory has been issued.

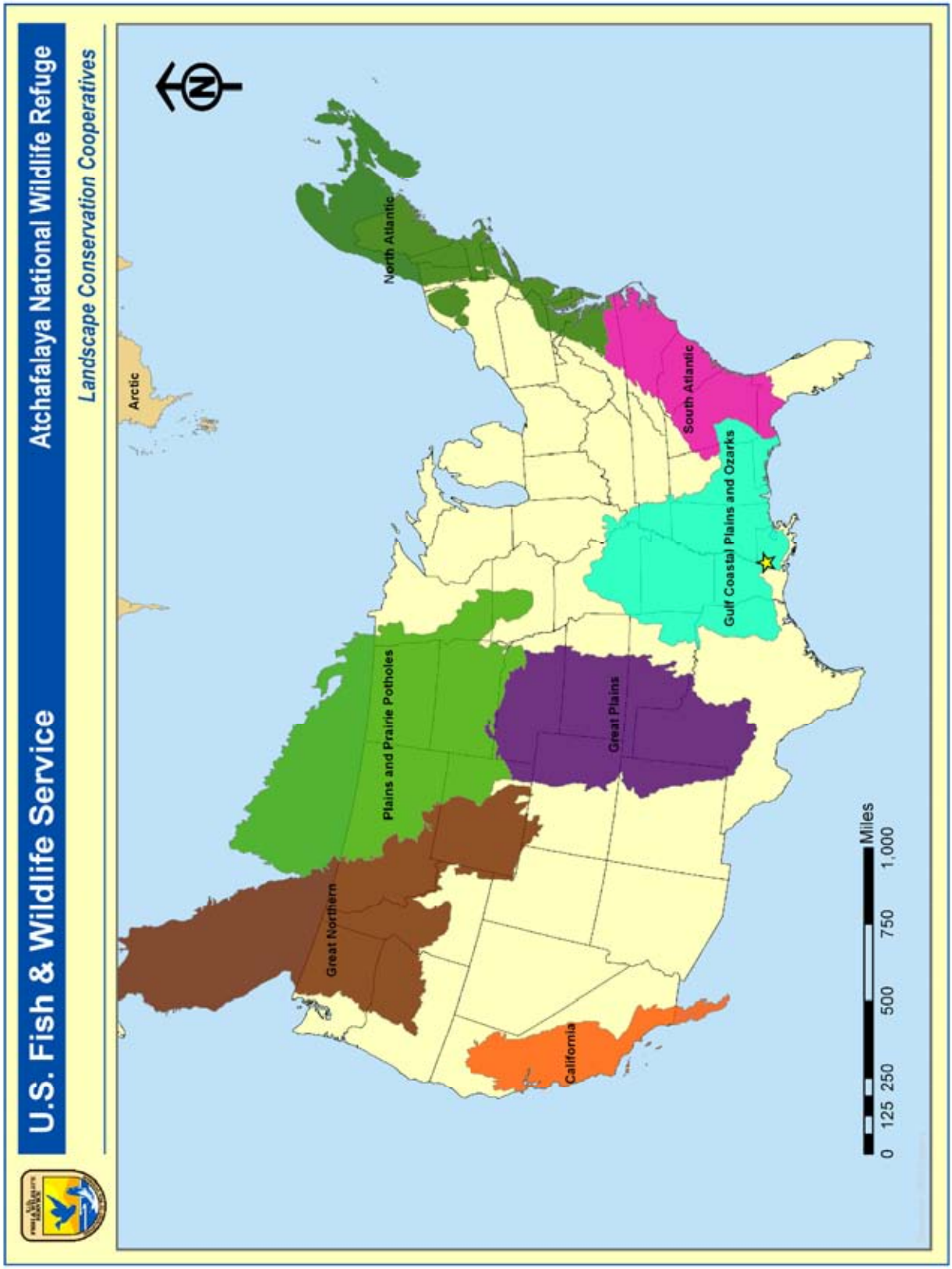
These regional ecological threats lead to the following specific concerns and threats to the Atchafalaya NWR.

FOREST LOSS AND FRAGMENTATION EFFECTS ON BIOLOGICAL DIVERSITY

The MAV has changed markedly over the last 100 years as civilization spread throughout the area. From the 1950s to the 1990s, it has been estimated that 20 million acres of bottomland hardwood forested wetlands were lost. The greatest changes to the landscape have been in the form of land clearing for agricultural and flood control projects. Although these changes have allowed people to settle and earn a living in the area, they have had a tremendous effect on biological diversity and integrity, and environmental health of the MAV. Vast areas of bottomland hardwood forests have been reduced to forest fragments, ranging in size from very small tracts of limited functional value to a few large areas that have maintained many of the original functions and values of forested wetlands. This process, which is known as forest fragmentation, has reduced the size and connectivity of forest habitat patches and resulted in the disruption of extensive forest habitats into smaller and smaller isolated patches. Severe forest fragmentation has resulted in a significant decline in biological diversity and integrity. Species endemic to the MAV that have become extinct, threatened, or endangered include the red wolf, Florida panther, ivory-billed woodpecker, Bachman's warbler, and Louisiana black bear.

Breeding bird surveys show continuing declines in species and species population numbers. The avian species most adversely affected by forest fragmentation include those that are area-sensitive (i.e., dependent on large continuous blocks of hardwood forest); those that depend on forest interiors; those that have special habitat requirements, such as mature forests or a particular food source; and those that require good water quality. More than 70 species of breeding migratory birds are found in the region. Some of these species, including Swainson's warbler, prothonotary warbler, swallow-tailed kites, wood thrush, and cerulean warbler, have declined significantly and need the benefits of large forested blocks to recover and sustain their existence. Due to forest fragmentation, the brown-headed cowbird (a seed-eating bird common in agricultural areas) are now closer to the natural nesting sites of many forest interior nesting birds. The brown-headed cowbird is a nest parasite that

Figure 5. Landscape conservation cooperatives and Atchafalaya NWR



lays eggs in the nests of other birds, rather than building a nest of its own. Nestling cowbirds often out-compete host species, because the cowbirds are typically larger and more aggressive. This results in poor reproductive success and declining populations of forest interior-nesting species.

Fragmentation of bottomland hardwood forests has left many of the remaining forested tracts surrounded by agricultural lands. Intensive agriculture has removed most of the forested corridors along sloughs that formerly connected the forest patches. The loss of connectivity between the remaining forested areas hinders the movement of wildlife between tracts, and reduces the functional values of many remaining smaller forest tracts. The lost connections also result in a loss of gene flow. Restoring the connections to allow gene flow and reestablishing travel corridors is particularly important for some wide-ranging species, such as the threatened Louisiana black bear. (National Audubon Society 1999)

ALTERATIONS TO NATURAL HYDROLOGY AND WETLANDS

In addition to the loss of a vast acreage of bottomland hardwood forested wetlands, there have been significant alterations in the region's hydrology due to urban development, river channel modification, flood control levees, reservoirs, and deforestation, as well as degradation of aquatic systems from excessive sedimentation and contaminants. The natural hydrology of a region is directly responsible for the connectedness of forested wetlands and indirectly responsible for the complexity and diversity of habitats through its effects on topography and soils. Natural resource managers recognize the importance of dynamic hydrology to forested wetlands and waterfowl-habitat relationships (Fredrickson and Heitmeyer 1988). Large-scale, man-made hydrological alterations have changed the natural spatial and temporal patterns of flooding throughout the entire MAV. Since 1932, there has been a net accretion of nearly 2.5 billion cubic meters of sediments in the Atchafalaya Basin floodway, converting much open water and cypress swamps to bottomland forests (Louisiana Department of Natural Resources 2009).

In addition, these alterations have reduced both the extent and the duration of annual seasonal flooding. The loss of this annual flooding regime has had a tremendous effect on the forested wetlands and their associated wetland-dependent species. In view of the hydrologic changes, it is very difficult–if not impossible–to fully emulate and reconstruct the structure and functions of a natural wetland. Restoration of wetland functions is especially difficult since wetlands depend on a dynamic interface of hydrologic regimes to maintain water, vegetation, and animal complexes and processes (Mitsch and Gosselink 1993). (See further discussion of Hydrology in the Physical Resources section of Chapter II.)

NON-POINT SOURCE POLLUTION AND SILTATION OF AQUATIC ECOSYSTEMS

Aquatic systems, including lakes, rivers, sloughs and bayous, have been degraded as a result of deforestation and hydrologic alteration. Clearing of bottomland hardwood forests has led to an accelerated accumulation of sediments and contaminants in all aquatic systems. Many water bodies are now filled with sediments, which greatly reduce their surface area and depth. Spoil banks, oilfield canals, and natural levees inhibit the historical sheeting pattern of water flow, causing hypoxic conditions and poor water quality in many large swamps. Concurrently, the non-point source runoff of excess nutrients and contaminants is threatening the area's remaining aquatic resources. In Louisiana, the Service lists one fish species as threatened (Gulf sturgeon) and one as endangered (pallid sturgeon). Hydrologic alterations have basically eliminated the geomorphological processes that created oxbow lakes, sloughs, and river meander scars. Consequently, the protection, conservation, and restoration of these aquatic resources take on an added importance in light of the alterations associated with flood control and navigation. From a fishery resource perspective, excessive sedimentation and poor water quality pose the greatest threats to the Atchafalaya Basin floodway's aquatic productivity.

PROLIFERATION OF INVASIVE AQUATIC PLANTS

Compounding the problems faced by aquatic systems is the growing threat from invasive aquatic vegetation. Static water levels caused by the lack of annual flooding and reduced water depths resulting from excessive sedimentation have created conditions favorable for the establishment and proliferation of several species of invasive aquatic plants. Additionally, the introduction of exotic (non-native) vegetation capable of aggressive growth is further threatening viability of aquatic systems. These invasive aquatic species threaten the natural aquatic vegetation important to aquatic systems, and choke waterways to a degree that often prevents recreational use. Massive growth of hydrilla and water hyacinth restricts access to many areas and exacerbates hypoxic conditions in the swamps.

OIL AND GAS CONTAMINANT ACTIVITIES

Litigation and cleanup activities related to past and present oil and gas extraction activities on refuge property are needed to mitigate and rehabilitate contaminated well sites. Numerous oil and brine spills are documented on the refuge, which have damaged natural habitats. A study of Atchafalaya NWR found that levels of oil contamination near oil and gas facilities are lethal to most species of wildlife (Shea et al. 2001). Oil and gas companies are often slow, reluctant, and uncooperative in assuming responsibility and cleaning up these sites – sites which were contaminated by their extraction activities. As oil and gas exploration and development occurs, it is important that the best available environmental and petroleum industry standards, information, and technologies are used to minimize potential impacts to refuge resources and to ensure appropriate compensation and replacement of lost resources and loss use and access to the public (Strader and Chouinard 2008).

PHYSICAL RESOURCES

CLIMATE

The refuge has a humid, subtropical climate, which is primarily influenced by the refuge's subtropical latitude and proximity to the Gulf of Mexico. The climate is controlled by two principal air masses: warm, moist air from the Gulf of Mexico (dominant in the summer); and, cooler, drier air from the Central Plains (dominant during the winter). Occasional outbreaks of cold continental air in winter can cause an abrupt and rather large drop in temperature, but cold spells seldom last more than a couple of days. Extended hot, sultry summers and moderately cool winters are the norm. Normal average temperatures are about 80°F in summer (June-July-August) and about 50°F in the winter (December-January-February) (Table 1 and Figure 5). At the weather station in Baton Rouge, all time maximum and minimum recorded temperatures were 105°F in August 2000 and 8°F in December 1989, respectively. The growing season is roughly 220 days in length.

Precipitation is abundant and is distributed fairly uniformly throughout the year. Normal annual precipitation is about 63 inches, with January usually having the greatest amounts of precipitation (~6.20 inches) and October the least (~3.81 inches) (Table 1). Over a span of almost 70 years, total annual rainfall has varied from 36 to nearly 100 inches. The number of days with measurable precipitation averages about 113 per year, with precipitation occurring most frequently during summer thunderstorms. Heavy local storms that produce totals of five or more inches in 24 hours occur about once in 5 years. Louisiana is impacted by tropical weather disturbances, with an average frequency of one tropical storm every 1.6 years, one hurricane every 3.3 years, and a major hurricane every 14 years. Tropical storms and hurricanes are likely to affect the refuge in about three years in ten. The highest recorded rainfall in the area (Baton Rouge weather station) was observed in April of 1967, with 12.08 inches falling in a 24 hour period. Snowfall does occur rarely, but is generally light and remains on the ground only briefly. Snowfall accumulation averages only about 0.2 inches a year; but on occasion heavier accumulations

have been observed – for example, 3.2 inches of snowfall was recorded in Baton Rouge in February 1988. Prevailing winds, which are usually from the south-southeast, are highest in the spring and average about seven and a half miles per hour for the year. (NOAA Southern Regional Climate Center [Accessed 2009]; Spicer et al. 1977; Murphy et al. 1977; and Roth 1998)

CLIMATE CHANGE AND GLOBAL WARMING

The Intergovernmental Panel on Climate Change (IPCC) has concluded that "warming of the climate system is unequivocal." Global climate change poses risks not only to human health but also to terrestrial and aquatic ecosystems. Abundance and distribution of wildlife and fish will change, particularly affecting those species already "at risk." Important economic resources such as agriculture, forestry, and water resources also can be affected. Warmer temperatures, more severe droughts and floods, and sea level rise will have a wide range of impacts. All these stresses, added to existing stresses on resources caused by other influences such as population growth, land-use changes, and pollution, pose a significant challenge for fish and wildlife conservation.

According to National Oceanic and Atmospheric Administration (NOAA) and National Aeronautics and Space Administration (NASA) data, the Earth's average surface temperature has increased by about 1.2 to 1.4ºF since 1900. The ten warmest years in the 20th century have all occurred within the past 15 years. Some climate models, based on emissions of greenhouse gases, primarily carbon dioxide, methane, and nitrous oxide, predict that average surface temperatures could increase from 2.5 to 10.4^{o}F by the end of this century. The frequency of extremely hot summer days is expected to increase, along with this general warming trend. Increases in atmospheric CO_2 are attributed largely to human activities, which have grown rapidly since the 1940s. The burning of fossil fuels adds 5.6 billion tons of carbon (deforestation contributes another 0.4 to 2.5 billion tons of carbon) to the atmosphere each year.

Global warming, resulting in melting of glaciers and ice sheets and the thermal expansion of ocean water, will cause sea levels to rise. Globally, sea level has risen 4–10 inches during the past century. NASA estimates that yearly, 50 billion tons of ice is melting from the Greenland ice sheet. NASA aerial surveys show that more than 11 cubic miles of ice are disappearing from the ice sheet annually. Considering that land less than 10 meters above sea level contains 2 percent of the world's land surface but 10 percent of its population, major impacts will be felt by large numbers of people living on the lower-lying coastlands, particularly the Gulf Coast states. In Louisiana, coastal land subsidence exacerbates the effects of sea level rise. At Grand Isle, sea level already is rising by 41 inches per century, and is likely to rise another 55 inches by 2100. A 1- to 3-foot increase in sea level over the next century would submerge about 70 percent of Louisiana's remaining salt marshes, as well as convert inland freshwater marshes to brackish or salt marshes. Louisiana currently is losing coastal wetlands at a more rapid rate (~25 to 50 square miles a year) than any other coastal state or region in the United States (EPA 1997). The IPCC lists New Orleans as North America's most vulnerable city to the impacts of climate change.

In addition to the rising seas, the effects of climate change and global warming will be changes in weather/rainfall patterns, decreases in snow and ice cover, rising sea levels, and stressed ecosystems. For the southeastern United States and the Louisiana region, this could mean extreme precipitation events; greater likelihood of warmer/dryer summers and wetter/reduced winter cold; and, alterations of ecosystems and habitats due to these changes in weather patterns. For Atchafalaya NWR, warmer conditions would favor increased densities of vegetation and wetter conditions would favor trees that are better adapted to these conditions, such as bald cypress and water tupelo. If conditions become drier, the current range and density of forests would be reduced and replaced by grasslands and pasture and the probability of wildfires would increase.

A recent study of the effects of climate change on eastern United States' bird species concluded that as many as 78 bird species could decrease by at least 25 percent while as many as 33 species could increase in abundance by at least 25 percent due to climate and habitat changes (Matthews et al. 2004). In short, global warming could increase storm intensity, negatively change Atchafalaya NWR's ecologically important plant species, alter the spread of invasive species, increase drought-induced fires, transition sub-tidal marshes and shift marshes inland, and further imperil already threatened and endangered species.

With respect to future impacts on other Service refuges, the IPCC projects with "high" or "very high confidence" the following likely events (Eisenhauer 2007):

- "Coasts are projected to be exposed to increasing risks, including coastal erosion, due to climate change and sea-level rise and the effect will be exacerbated by increasing human-induced pressures on coastal areas."
- Coastal wetlands are projected to be negatively affected by sea-level rise.
- "Many millions more people are projected to be flooded every year due to sea-level rise by the 2080s."
- Warming in North America's western mountains is projected to cause "decreased snow pack, more winter flooding, and reduced summer flows, exacerbating competition for over-allocated water resources."
- "Disturbances from pests, diseases, and fires are projected to have increasing impacts on forests, with an extended period of high fire risk and large increases in area burned."
- Heat waves will increase during the course of the century in North America, and the "growing number of the elderly population is most at risk."
- In North America, readiness for increased exposure to climate change impacts in coastal communities is low.
- Small islands, whether in high latitudes or the tropics have characteristics which make them especially vulnerable to the effects of climate change, sea level rise and extreme events.
- Heavy precipitation events are very likely to increase in frequency.
- Drought-affected areas will likely increase in extent.
- "The resilience of many ecosystems is likely to be exceeded this century by an unprecedented combination of climate change, associated disturbances (e.g., flooding, drought, wildfire, insects, and ocean acidification) and other global climate change drivers."
- "For increases in global average temperature exceeding 1.5-2.5 °C … there are projected to be major changes in ecosystem structure and function, species' ecological interactions, and species' geographic ranges, with predominantly negative consequences for biodiversity, and ecosystem goods and services, e.g., water and food supply."
- "Regional changes in the distribution and production of particular fish species are expected due to continued warming, with adverse effects projected for aquaculture and fisheries."
- Poor communities are especially vulnerable.
- Projected climate change is likely to affect the health status of millions of people through: increases in malnutrition; increased deaths, disease, and injury due to heat waves, floods, storms, fires and droughts; and altered distribution of some infectious disease vectors. The negative health impacts outweigh any positive impacts.
- In Polar Regions, it is projected that there will be reductions in thickness and extent of glaciers and ice sheets, "and changes in natural ecosystems with detrimental effects on many organisms including migratory birds, mammals and higher predators."
- There will be detrimental impacts on infrastructure and traditional indigenous ways of life, and there is "medium confidence" that there will be reduced heating costs and more navigable northern sea routes. (U.S. Environmental Protection Agency [EPA] 2009a and Krabill et al. 2000)

However, it should be noted that humans, plants, and animals, have coexisted on this planet and have evolved together for many thousands of years. They have adapted to ice ages as well as warming trends, and some species have managed to avoid extinction. The above discussion on climate change is not intended to promote fear but only awareness that climate change is natural and inevitable, and humans may be increasing the rate of change with our actions.

Table 1. Climatological normals for the years 1971-2000 - Baton Rouge, LA (Ryan Air Port Weather Station)

Month	NORMAL				
	Mean (°F)	Minimum (°F)	Maximum (°F)	Rainfall (inches)	Snowfall (inches)
Jan	50.1	40.2	60.0	6.19	0.0
Feb	53.5	43.1	63.9	5.10	0.2
Mar	60.3	49.6	71.0	5.07	0.0
Apr	66.6	55.8	77.3	5.56	0.0
May	74.0	64.1	84.0	5.34	0.0
Jun	79.7	70.2	89.2	5.33	0.0
Jul	81.7	72.7	90.7	5.96	0.0
Aug	81.4	71.9	90.9	5.86	0.0
Sep	77.5	67.5	87.4	4.84	0.0
Oct	68.1	56.4	79.7	3.81	0.0
Nov	59.0	47.9	70.1	4.76	0.0
Dec	52.4	42.1	62.8	5.26	0.0
Annual	67.0	56.8	77.3	63.08	0.2

Source: (NOAA, accessed May 2009)

GEOLOGY AND TOPOGRAPHY

Bedrock in the area of Atchafalaya NWR consists of Tertiary and Cretaceous sands formed as beach deposits during the retreat of the Cretaceous ocean from the midsection of the U.S. Alluvial deposits from flooding and lateral migration of the Mississippi River typically lie above the bedrock. These sediments are sandy to clayey fluvial deposits of Quaternary age and are many meters thick. The surface of Louisiana is characterized by geologically young sedimentary sequences that were deposited in or adjacent to rivers and deltas in a coastal-plain setting. These deposits indicate that a major river system corresponding to the Mississippi has persisted at least since the Gulf of Mexico began to form. Through time, fluvial, deltaic, and coastal deposits have advanced southward toward the coastline and continue to fill the Gulf of Mexico. Most of Louisiana was formed by these Mississippi River sediment deposits. As sea-level rose and fell over this low-lying region, the Mississippi River carried vast sediment loads and sedimentary rocks from the core of the North American continent and deposited it on the rim of the Gulf of Mexico. Organic matter from highly productive marine waters was deeply buried under the sediments, and through various processes has turned into petroleum. Massive salt deposits, formed by evaporation of sea water during pre-historic dry periods, provide a stable confining layer for the underlying petroleum. Most surface exposures consist of Quaternary (Pleistocene and Holocene) sediment (Figure 6) (Louisiana Geological Survey 2008; Louisiana Department of Environmental Quality et al. 2007a; USFWS 2006a; and Boykin 1990).

Tertiary

About 25 percent of Louisiana's surface is comprised of rocks of Tertiary age. The oldest surface rocks are the Paleocene/Eocene formations (Wilcox Group) found in the Sabine Uplift of northwest Louisiana, which date back over 54 million years and are composed of a thick series of non-marine sands, silty sands, clays, and gravels with some thick deposits of lignite. North central Louisiana is typified by Eocene formations (Claiborne and Jackson Groups from 54 to 38 million years ago, mya) of non-marine and marine medium to very fine grained sands, silts, and silty clays, which lie on top of elevated salt-domes. Oligocene (38 to 26 mya) and Miocene (26 to 5 mya) formations (Catahoula and Fleming) are apparent, but not dominant, in central Louisiana and are typified by tan to reddish brown silt with some clay and minor amounts of very fine sand.

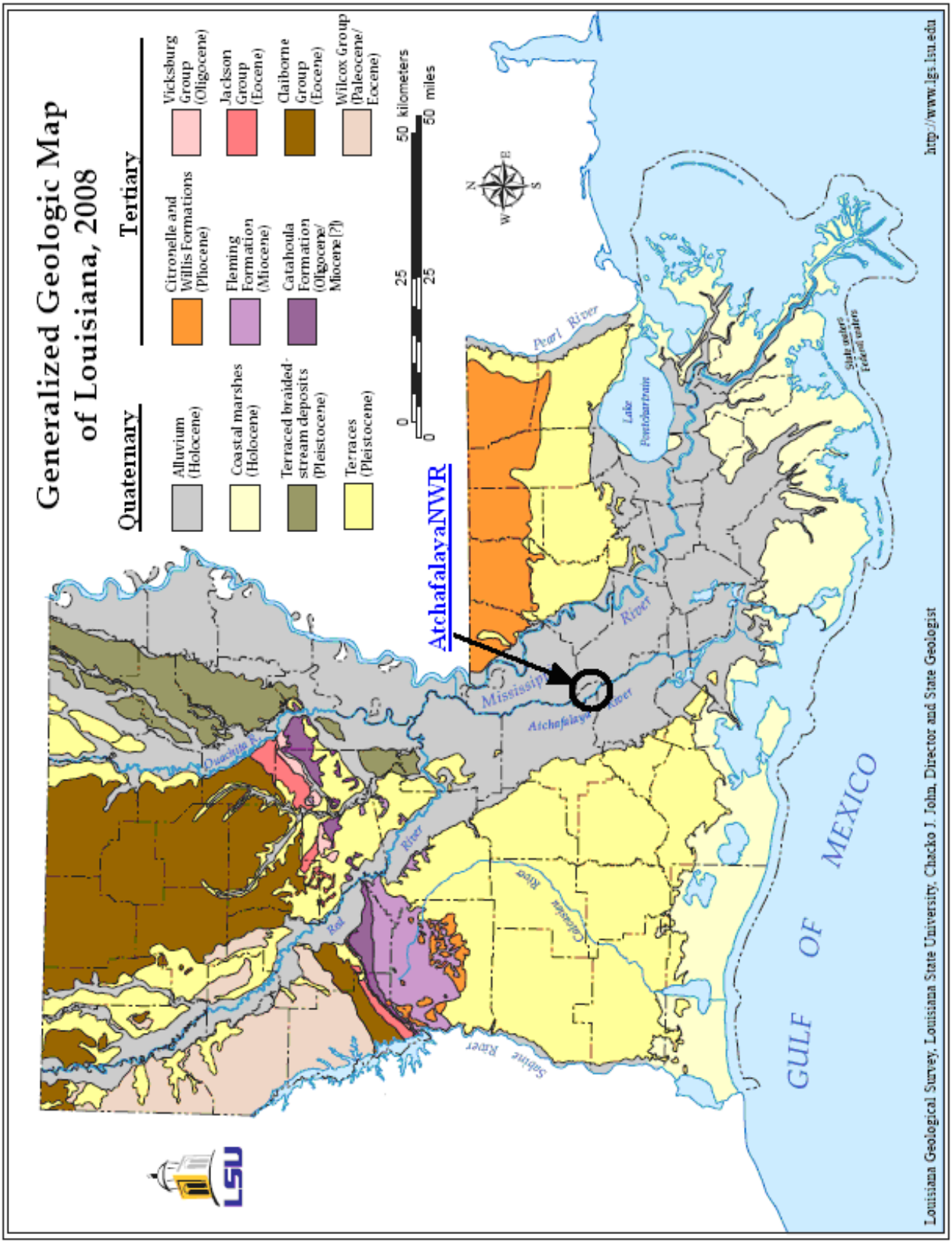
Quaternary-Pleistocene

Approximately 20-25 percent of the state's surface is occupied by deposits associated with Pleistocene (1.6 to 0.01 mya) Terraces in the eastern and western parts of southern Louisiana. These terraces also consist of sand, gravel, and mud, but underlie raised, flat surfaces with varying degrees of tilt and dissection depending on their relative ages. These surfaces are remnants of pre-existing floodplains, and form trends along the major rivers in north Louisiana and coast-parallel belts in south Louisiana.

Quaternary-Holocene

Holocene (10,000 years to present) alluvial sediments of the Mississippi, Red, Atchafalaya, and other rivers and smaller tributaries, together with coastal marsh deposits, occupy about 55 percent of Louisiana’s surface. The alluvial sediments consist of sandy and gravelly channel deposits mantled by sandy to muddy natural levee deposits, with organic-rich muddy backswamp deposits in between; coastal marsh deposits are chiefly fine grained clay, silt, and organic matter. The coastal region of Louisiana was formed over the last 7,500 years.

Figure 6. Generalized geologic map of Louisiana



Atchafalaya NWR is underlain by these Holocene alluvial sediments from the Mississippi, Red, and Atchafalaya Rivers. Bayous and sloughs are common throughout the refuge. The topography of the refuge has been greatly influenced by the build-up of the land surfaces and streambeds through the natural deposition of the Holocene alluvial materials. The resulting relict channels and natural levees are often referred to as ridge and swale topography (wide flats broken by low ridges and swales are typical). Human disturbances, including construction of artificial levees and channelization projects, have altered these natural alluvial processes within the Mississippi and Atchafalaya River floodplains. Elevations range from about 13 feet above mean sea level (msl) to 23 feet msl on Atchafalaya NWR. Local relief within the floodplains is less than 3 feet. Although the floodplain would appear flat to casual observance, the 2 to 3 feet of local relief has a dramatic impact on vegetation changes. This is due to a shallow water table and changes in internal drainage caused by localized sedimentation patterns.

SOILS

Soils directly influence the kind and amount of vegetation and the amount of water available. In this way they indirectly influence the kind of wildlife that can live in an area. Soils are organized into a taxonomic classification system by the U.S. Department of Agriculture, Natural Resources Conservation Service, in which each soil is categorized by order, suborder, great group, subgroup, family, and soil series. Nationwide, there are twelve soil orders, of which three soil orders are predominantly found in the Atchafalaya NWR area: Vertisols (great group Epiaquerts), Entisols (great group Hydraquents), and Inceptisols (great group Endoaquepts). Within these three orders, there are three dominant soil series found on Atchafalaya NWR:

- The **Convent soil series** (classified as thermic Fluvaquentic Endoaquepts) consists of very deep, somewhat poorly drained, low to negligible runoff, moderately permeable soils that formed in recent loamy alluvium. The soils are found on nearly level to very gently sloping natural levee positions on flood plains, with slopes ranging from 0 to 3 percent. Most areas are protected from flooding by levees. Convent soils are neutral to mildly alkaline silty loams. They are high in fertility. Plant roots penetrate easily, and water and air move moderately fast through the soil. Convent soils are found on the highest elevations of the refuge, generally along streams, and on the natural levees of Alabama Bayou, Bayou Des Glaises, Whiskey Bayou Pilot Channel, and other streams. These soils occur in several large tracts ranging from about 300 to over 2,000 acres in size. The native forest vegetation found on this soil series is predominantly oaks, cottonwoods, hickories, and sweetgum. Areas that have been cleared are primarily used for cotton, sugarcane, small grain, soybeans, and corn.

- The **Fausse soil series** (classified as hyperthermic Vertic Endoaquepts) consists of very deep, very poorly drained, low runoff, very slowly permeable soils that formed in thick deposits of clayey alluvium. Typically the surface layer of the Fausse soils is slightly acid. The clayey soil restricts root penetration. These soils are flooded much of the time and are found in low, ponded backswamp areas with slopes of less than 1 percent. Fausse soils are saturated throughout during normal years, and saturated below a depth of 2 feet even during dry years. These soils occur in large tracts ranging from several hundred acres to several thousand acres in size. These soils are mainly used for wildlife habitat and for growing timber, but their potential for timber production is poor and timber management is difficult due to flooding and wetness. Timber is dominantly bald cypress, water tupelo, and red maple.

- The **Sharkey soil series** (classified as thermic Chromic Epiaquerts) are similar to Fausse soils. They also consist of very deep, poorly and very poorly drained, very slowly permeable soils that formed in clayey alluvium. Sharkey soils are distinguished in that they are formed in clayey alluvium that is dominantly smectites (phyllosilicate minerals). Typically, the surface layer of the Sharkey soils is slightly acid, increasing in alkalinity with depth. These soils are found on the flood plains and low terraces of the Atchafalaya River with slopes usually less than 1 percent, but sometimes up to 5 percent. They may also be found in backswamps and abandoned channels and on interfluves and low terraces. These soils occur in tracts as small as 50 acres, with other tracts that range in size from several hundred to over 1,000 acres. These soils provide good natural habitat and their potential for woodland is good. Frequently flooded and ponded areas are mainly bottomland hardwoods – common trees might be black willow, persimmon, red maple, and various oaks. When cleared, the Sharkey soils are used mostly for cropland, soybeans, and rice being the principal crops (Murphy et al. 1977; Spicer et al. 1977; USDA NRCS 1998, 2002, and 2004; and Boykin 1990).

HYDROLOGY AND WATER QUALITY

Groundwater Hydrology

Louisiana's ground water supply is contained within geologic formations termed aquifers. Aquifers are permeable, saturated zones of rock, sand, and gravel confined by layers of clay and silt that contain sufficient water to yield usable amounts to wells. The aquifers that supply fresh ground water to most of Louisiana are contained within Quaternary or Tertiary sediments of sand and gravel deposited in the Gulf Coast geosyncline and the Mississippi embayment (Chapter II, Geology and Topography). Louisiana has an abundance of fresh ground water within these sand and gravel deposits, but these aquifers and confining layers are not uniformly distributed, and the quality of the ground water varies from one aquifer to another. Louisiana's abundant ground water supply is held in 13 major aquifers and aquifer systems (Table 2). Typically groundwater in Louisiana moves in a southerly direction, and towards stream/river valleys; however, pumping in urbanized and industrialized areas has resulted in the formation of cones of water table depression, thus altering regional ground water flow patterns in major urban and industrial areas (viz. Baton Rouge). The four largest producing aquifer systems in Louisiana are: the Southern Hills aquifer system in the southeast (comprised of the Chicot equivalent, Evangeline equivalent, and Jasper equivalent aquifer systems); the Chicot aquifer system in the southwest; the Sparta aquifer in the northwest, and Mississippi River Alluvial aquifer running from the northeast, south through the central part of southern Louisiana.

Atchafalaya NWR is underlain by the Mississippi River Alluvial aquifer. The Mississippi River alluvium consists of fining upward sequences of gravel, sand, silt, and clay of Holocene-Pleistocene age. The aquifer is poorly to moderately well-sorted, with fine-grained to medium-grained sand near the top, grading to coarse sand and gravel in the lower portions. It is confined by layers of silt and clay of varying thicknesses and extent. The Mississippi River Alluvial aquifer is hydraulically connected with the Mississippi River and its major streams. Recharge of the Mississippi River Alluvial aquifer is accomplished by direct infiltration of rainfall in the river valley, lateral and upward movement of water from adjacent and underlying aquifers, and overbank stream flooding (water moves into the aquifer when stream stages are above aquifer water levels). The amount of recharge from rainfall depends on the thickness and permeability of the silt and clay layers overlying the aquifer. Water levels fluctuate seasonally in response to precipitation trends and river stages. Water levels are generally within 30 to 40 feet of the land surface and movement is down gradient (in a generally southerly direction) and toward larger rivers and streams. On Atchafalaya NWR, ground water is seldom far from the surface with many old wells on the refuge only 15-30 feet deep. Natural

aquifer discharge occurs by seepage of water into the Mississippi River and its tributaries. The hydraulic conductivity of the aquifer varies between 10-530 feet/day, and the maximum depths of occurrence of freshwater range from 20 feet below sea level, to 500 feet below sea level. Typical wells yield from less than 500 to as much as 4,000 gallons per minute (Louisiana Department of Environmental Quality 1996).

Groundwater Quality

The water of the Mississippi River Alluvial aquifer is very hard and has high iron content. Consequently, the aquifer is not well-suited for drinking water use. However, the aquifer is widely used for irrigation (e.g., rice, soybeans, corn) and aquaculture (e.g., catfish). Over 400 million gallons of freshwater are withdrawn from the Mississippi River Alluvial Aquifer each day, of which over 70 percent is used for agricultural irrigation (Sargent 2007). Water quality data collected over the period FY96 to FY05 by the Louisiana Department of Environmental Quality (LDEQ) from wells in the Mississippi River Alluvial aquifer show that the aquifer is of poor quality when considering taste, odor, or appearance (Table 3). Over this sampling period (FY96 to FY05) the aquifer was found to be increasing in color, sulfate, barium, and iron concentrations; while chloride concentrations were decreasing. Additionally, several wells showed concentrations of arsenic above the present 10 ppb maximum contaminant level (MCL). Ground water quality data collected in FY05 are listed in Table 3 (Louisiana Department of Environmental Quality 2005)

Surface Water Hydrology -- Atchafalaya Basin Floodway System (ABFS)

The Atchafalaya River Basin, located in south-central Louisiana, is a natural alluvial flood plain of the Atchafalaya River which heads at Old River near Simmesport, Louisiana and flows into the Gulf of Mexico, about 140 miles to the south. The Atchafalaya River is the largest distributary of the Mississippi River. The Atchafalaya River Basin has been described as the greatest river swamp in the United States, and it encompasses more than one-half million acres of wetlands, providing habitat for a diversity of wildlife species. Its waters also support a tremendous sport and commercial fisheries resource.

Alteration of the natural drainage pattern began in the late 1880s, with closures or partial closures of various tributaries and distributaries along the Atchafalaya River for navigation purposes. Those closures were not substantial and were overtopped and/or washed out during flood events. Railroad construction across the Atchafalaya Basin Floodway (east-west) in the early 1900s was one of the earliest activities that permanently affected water flow in the Atchafalaya Basin. By 1910, private and federal flood control levees along the Atchafalaya River were constructed as far south as Alabama Bayou; however, these levees were undersized and easily overtopped by seasonal floods. Following the flood of 1927, in order to provide for safe passage of major floods in the lower Mississippi system below Old River, the USACE modified a portion of the natural Atchafalaya Basin to convey flood water in excess of the capacity of the levied Mississippi and Red rivers. The USACE began building Atchafalaya Basin Floodway levees, closing distributaries and tributaries of the Atchafalaya River, and dredging the Atchafalaya River and using the dredged material to build levees confining the river flows. This Atchafalaya Basin Floodway was formed by constructing protection levees to the east, west, and parallel to the Atchafalaya River channel. In addition to the Atchafalaya River, the Morganza Floodway (on the east) and the West Atchafalaya Floodway (on the west), divert excess flood waters of the levied river channels into the Atchafalaya Basin. Today, these three floodways, Atchafalaya, Morganza and West Atchafalaya, are collectively referred to as the Atchafalaya Basin Floodway System (ABFS). (Strader and Chouinard 2008)

The ABFS is 65 miles long, 15 miles wide, and lies on both sides of the Atchafalaya River from Krotz Springs, Louisiana, to Morgan City, Louisiana. Flow is terminally discharged into Atchafalaya Bay and the Gulf of Mexico through the lower Atchafalaya River at Morgan City and through an artificial channel (known as the Wax Lake Outlet) about 10 miles west of Morgan City. The USACE operates and maintains the ABFS, which is designed to divert approximately 1.5 million cubic feet per second (cfs) of water from the Mississippi River's (and Red River's) combined flow of about 3 million cfs during flood conditions. To accomplish this, the ABFS independently diverts water from the Mississippi and Red Rivers into the Morganza Floodway (~600,000 cfs), the Atchafalaya River (~650,000 cfs), and the West Atchafalaya Floodway (~250,000 cfs).

The east Atchafalaya Basin protection levees were constructed in the late 1930s using adjacent borrow material which created channels next to those levees. More substantial distributary channel closures were constructed in the early 1930s and by 1955 Alabama Bayou, Bayou Des Ourses, and Bayou Des Glaises were permanently closed. In 1956, the USACE completed the navigation channel through the Atchafalaya Basin, which included the Whiskey Bay Pilot Channel. Dredged material from that channel was disposed on the adjacent banks effectively constructing a levee that confined river flows. Further modifications to the area during the late 1950s to the late 1960s included the construction of oil and gas exploration canals and roads. The Interstate 10 (I-10) Canal was dug between 1970 and 1971. After completion of this particular canal, three weirs constructed of concrete debris and having a sill elevation of approximately 5 feet were placed in the canals that would drain the I-10 Canal. Those weirs prevent the dewatering of the area north of I-10, including the Atchafalaya NWR, during low-water periods.

On a daily basis, water from the Mississippi River is diverted down the Atchafalaya River through the Old River Control Complex. The Old River Control Complex consists of several structures that divert water from the Mississippi River while preventing the Mississippi River from changing its course to that of the Atchafalaya River. The volume of water diverted by the Old River Control Complex is equal to about 30 percent of the combined flow of the Red River and the Mississippi River. Average annual flow of the Atchafalaya River is 229,000 cfs (USACE 1977-2001) (U.S. Geological Survey 2001).

Current flood control features along the main channel of the Atchafalaya River consist of Atchafalaya River levees, distributary channel closures (both natural and manmade), and channel realignments. The east Atchafalaya River levee confines flows to the river during all but the highest river stages, eliminating and/or reducing the extent of headwater aquatic habitats previously available during lower river stages. Distributary channel closures (e.g., Bayou DesGlaises, Alabama Bayou) eliminated all river flows, excluding extremely large floods. In addition, dredging and confining of most floods to within the river banks has increased the efficiency of the river’s channel. A more efficient channel reduces the extent and duration of overbank flooding. This efficiency also allows water within the major dredged channels (i.e., Atchafalaya River) to maintain a higher water surface elevation (i.e., hydraulic head) than water slowly flowing through the adjacent swamps. Because the higher water surface elevation effectively prevents any connecting channels from functioning as outlets, the areal extent of backwater flooding in the adjacent swamps has increased. Flooding in those backwater swamps may form areas of stagnant water that are usually characterized by poor water quality (primarily low dissolved oxygen levels). The higher water surface elevation in the more efficient channels also allows sediment-laden river water to flow north through distributaries that historically were outlets. Waters flowing north into those distributaries result in shoaling within the channel and a corresponding reduction in the channel’s cross-section. The reduced cross-section decreases water flowing through the channel, thus reducing headwater habitat. In addition, sedimentation occurs in open water areas and swamps directly connected to those major channels reducing the areal extent of their aquatic habitats.

Drainage is in a north to south direction with runoff from the refuge being gathered by many small bayous which flow primarily into Alabama Bayou, Little Alabama Bayou, and Bayou Des Glaises. The three bayous intersect with Alabama Bayou being the primary drainage from the refuge to the Atchafalaya River. Before construction of the Atchafalaya Basin Floodway, water from the Atchafalaya River flowed through the area primarily from Alabama Bayou into Big and Little Alabama Bayous and Bayou DesGlaises and then into the East Fork of Bayou DesGlaises. From the East Fork of Bayou DesGlaises water would flow via over bank or through swamps and many smaller bayous and leave the present location of the Atchafalaya NWR. Today, water levels in Atchafalaya NWR fluctuate from almost complete inundation during periods of high rainfall and when the ABFS is being used as a relief outlet, to only the three primary bayous (Alabama, Little Alabama, and Bayou DesGlaises) containing surface during droughts. Late winter and spring usually experiences some flooding of the refuge with late summer and fall being the driest periods.

Surface Water Quality

Water quality data from the area was collected from 1974 to 1977 by the Environmental Protection Agency (Hern et al. 1980) and recently by the Service. Using four parts per million (ppm) dissolved oxygen (DO) level as a criteria to identify decreased water quality, Hern et al. (1980) found that most of the low DO levels occurred in the spring, followed next by summer, fall, and then winter. With two ppm DO level criteria the same trend was noticed. Stagnant water conditions occur during high water stages when backwater flooding, minimal water circulation, and high water temperatures (i.e., >18°C) predominate. These conditions lead to low dissolved oxygen levels, which are primarily the result of decomposition of organic material, high water temperatures, and insufficient supply of oxygenated river water (Constant et al. 1999, Hern et al. 1980, Wells and Demas 1977). Limited Service water quality samples indicated a large variation in DO levels within and between years. In addition, stratification of the water column often occurred with bottom DO levels often below the two ppm level. In a summary of the DO conditions in Hern et al. (1980) stated, ". . . most of the extremely low DO conditions during high water conditions were at locations with little or no water circulation due to man-made or natural obstructions."

Lakes and bayous that become isolated during low river stages may also experience high temperatures as well as low dissolved oxygen levels. However, as the turbidity from high river stages decreases, a corresponding increase in aquatic plant growth sometimes occurs. Those aquatic plants help to maintain a dissolved oxygen level that will support aquatic life. In other aquatic habitats, plankton may produce enough dissolved oxygen to support aquatic life throughout most of the water column.

Constant et al. (2002) examined the interactive effects of water hyacinth and/or hydrilla species (introduced exotic floating plants) coverage, primary production, river water inputs, and dissolved oxygen. They found that decreased dissolved oxygen concentrations in areas isolated from river flow was spatially and temporally variable due to: the proximity to river water; the obstruction of sunlight at the surface of the water; and, the potential for biological respiration to consume dissolved oxygen. The capacity of isolated areas to replenish dissolved oxygen through photosynthesis was contrasted in 1998 (no hyacinth cover), with the capacity of river water to supply oxygen to the same sites in the absence of photosynthesis in 1997 (complete hyacinth cover). Isolated areas were able to produce more oxygen than was consumed in respiration when hyacinth cover was absent in 1998. However, when hyacinth covered the surface in 1997, oxygen saturation continually decreased with distance from the river water inflow sites, demonstrating the limited distance over which the river could supply oxygenated water to the floodplain. Because of the altered hydrology, primary production must supply floodplain organisms with oxygen, and extensive floating aquatic vegetation cover minimizes photosynthesis (i.e., primary production) and the associated oxygen production.

An extensive fish kill occurred in 1992 and 2008 when Hurricanes Andrew and Gustav passed over the Atchafalaya Basin Floodway. The fish kill is believed to be a result of anoxic conditions produced by the suspension of anaerobic sediments and the decomposition of large amounts of organic debris (e.g., leaves, branches) in the water bodies. Anoxic conditions persisted over much of the lower Atchafalaya Basin Floodway for almost one month. A few localized areas remained anoxic for almost two and one-half months following the passage of the hurricane (Charles Demas, U.S. Geological Service, pers. comm.). Approximately 2 years passed before fish populations recovered from hurricane Andrew (Louisiana Department of Wildlife and Fisheries 1995). It is believed that similar recovery rates would occur with any subsequent storms.

The Louisiana Department of Environmental Quality (LDEQ) has issued a fish consumption advisory for fish caught in Big Alabama Bayou. This advisory was in response to elevated mercury levels found in largemouth bass, crappie, bigmouth buffalo, freshwater drum, flathead catfish, and bowfin (LDEQ 2003). Sediments sample from on and/or adjacent to the Atchafalaya NWR contained mercury, however, the concentration did not exceed a probable effects concentration level for benthic communities (Shea et al. 2001). Mercury found within the area is most likely a product of atmospheric deposition.

Water quality issues related to agricultural chemicals have also been found in the Atchafalaya Basin. Shea et al. (2001) examined the chemical contamination on U.S. Fish and Wildlife refuges within the Lower Mississippi River Ecosystem. Nitrates and atrazine were the major contaminants found in the Atchafalaya Basin. A total of 17 of 50 pesticides were detected in water samples taken from on and/or adjacent to Atchafalaya NWR. Atrazine was detected at a level above the aquatic life criteria. Agricultural activities north of the refuge possibly contribute to the occurrence of those compounds. Polychlorinated biphenyl's (PCBs) were detected at elevated levels in sediments but at low enough concentrations to not cause adverse effects to the benthic community. It was also detected in predatory and benthic fish but those levels were also low enough to not cause adverse effects. Polycyclic aromatic hydrocarbons (PAHs) are associated with the production, transport and use of fossil fuels and were detected near active and/or abandoned oil field production equipment (Strader and Chouinard 2008).

Table 2. Louisiana's major aquifers and aquifer systems

Aquifer	Location	Sediments	Recharge	Use	Description
Cockfield	Northeast Louisiana	Very fine to fine sand	Rainfall on outcrop area; leakage from overlying alluvial aquifer; leakage from underlying aquifers	˜600 million gal/day; primarily public supply	Water movement is eastward and southward
Sparta	North and north-central Louisiana	Very fine to medium sand; interbedded with thin layers of clay and lignite	Rainfall on outcrop area and water moving downward through terrace deposits; leakage from overlying Cockfield and underlying Carrizo-Wilcox aquifers	˜64 million gal/day; primarily industry and public supply	Recharge towards east and south and Monroe; high sodium in eastern part of aquifer makes unsuitable for irrigation
Carrizo-Wilcox	Northwest Lousiana; both sides of Red River	Fine to medium sand, silt, clay, and lignite	Rainfall on surficial sediments	˜13 million gal/day; public, domestic, and small farm supply	Aquifer discharges into Red and Sabine Rivers
Chicot Aquifer System	Southwest Louisiana	Coarse sand and gravel	Primarily in northern part of aquifer; rainfall in Allen and Beauregard Parishes; leakage from overlying and underlying areas	˜690 million gal/day; primarily agriculture	Ground water movement towards coast and pumping stations; water soft in recharge and southern area; harder in central and southeastern areas; subdivision: 220 ft. sand, 500 ft. sand, 700 ft. sand, upper sand unit; lower sand unit
Evangeline	Southwest Louisiana	Fine to medium sand; sand units separated by clay	Rainfall in Vernon, Avoyelles, and Rapides Parishes; leakage from Chicot aquifer; leakage from underlying aquifers	˜14 million gal/day; primarily public supply	Water generally moves southward; seepage into Sabine and Calcasieu Rivers towards west and into Atchafalaya River towards east; overlying Chicot system provides water for irrigation
Jasper Aquifer System	Southwest Louisiana	Fine to medium sand; extensive clay layers separate from overlying and underlying aquifers	Rainfall in Vernon and Natchitoches Parishes	˜46 million gal/day; primarily public supply	Comprised of the Williamson Creek (upper) aquifer and the Carnahan Bayou (lower) aquifer; ground water movement towards south and southeast and pumping centers; water from Carnahan Bayou slightly harder than from Williamson Creek
Catahoula	Western edge of Louisiana in a northeasterly direction across the State	Fine to medium sand; forms sandstone	Rainfall on outcrop area and percolating through overlying alluvial and terrace deposits	˜3 million gal/day; primarily public supply	Limited use as a source of freshwater; divided into three freshwater areas by saltwater under Red River Valley and Little River divide.
Chicot Equivalent	Southeast Louisiana	Fine to course sand and gravel	Along Louisiana-Mississippi state line; rainfall or leakage from surficial sands; leakage from underlying aquifers	˜88 million gal/day; primarily industry	Principal sands are 400 ft and 600 ft Baton Rouge, Gramercy, Norco, and Gonzales-New Orleans; 1,200 ft New Orleans; upper Pontchatoula; water generally moves southward, saltwater moves northward across Baton Rouge fault into 600 ft sand; 1,200 ft sand in New Orleans not pumped because water is saline; upper Pontchatoula is least developed
Evangeline Equivalent	Southeast Louisiana	Fine to medium sand	In south-central and southwest Mississippi; rainfall and surficial sands	˜68 million gal/day; primarily public use	Comprised of 800 ft sand, 1,000 ft sand, 1,200 ft sand, 1,500 ft sand, and 1,700 ft sand of the Baton Rouge area; lower Pontchatoula; Big Branch; Kentwood; Abita; Covington; and Slidell aquifers; water generally moves southward
Jasper Equivalent	Southeast Louisiana	Fine to course sand	In southwestern Mississippi, rainfall on surficial sands; leakage from overlying aquifers	˜112 million gal/day; primarily industry and	Principal aquifers are 2,000 ft sand, 2,400 ft sand, and 2,800 ft sand of Baton Rouge area; Tchefuncta; Hammond; Amite; and Ramsay

Aquifer	Location	Sediments	Recharge	Use	Description
				public use	aquifers
Mississippi River Alluvial	Follows the river's course from northeastern to south-central Louisiana	Sand and gravel; fine grained in upper part grading to course in lower part; confined by overlying fine sand, silt, and clay (0 to 150 ft thick)	Rainfall on aquifer surface and underlying aquifers; leakage from underlying aquifers; locally from Mississippi River near pumping centers	˜284 million gal/day; primarily irrigation	In southern Louisiana joins with alluvium of the Atchafalaya River to form a large alluvial aquifer; water generally moves southward; seepage into major streams and withdrawal from wells; requires treatment for domestic and public supply use; saltwater from underlying aquifers, oil and gas activities, and ancient unflushed saltwater; threats include improperly plugged or abandoned wells and misuse of agricultural chemicals; no detection of major organic contamination
Red River Alluvial	Red River Valley	Clay, silt, and fine sand grading to course sand and gravel	Rainfall on fine-grained surficial sediments; leakage from underlying aquifers	˜4 million gal/day; primarily aquaculture	Small amount of water pumped because treatment is required for most uses
Upland Terrace	Discontinuous band along northwestern edge of Red River Valley and western edge of Mississippi River Valley	Clay, silt, and fine sand grading to course sand and gravel	Rainfall on fine-grained surficial sediments; leakage from underlying aquifers	˜22 million gal/day; primarily public supply and industry	Not extensively used for freshwater due to potential for contamination

Source: (Louisiana Department of Environmental Quality 2007a)

Table 3. Mississippi River alluvial aquifer water quality data FY2005

	PARAMETER	MINIMUM	MAXIMUM	AVERAGE
FIELD	Temperature (°C)	14.75	23.55	19.62
	pH (SU)	6.62	7.44	6.98
	Specific Conductance (mmhos/cm)	0.03	1.28	0.80
	Salinity (ppt)	0.01	0.64	0.40
	TDS (g/L)	0.02	0.83	0.52
LABORATORY	Alkalinity (ppm)	2	616	347.16
	Chloride (ppm)	8.6	246	48.64
	Color (PCU)	5	220	37.98
	Specific Conductance (umhos/cm)	10	1356	766.21
	Sulfate (ppm)	1.25	186	22.46
	TDS (ppm)	178	896	488.96
	TSS (ppm)	4	56	16.42
	Turbidity (NTU)	1	280	75.25
	Ammonia, as N (ppm)	0.1	6.54	1.10
	Hardness (ppm)	5	530	297.50
	Nitrate-Nitrite, as N (ppm)	0.05	3.08	0.19
	TKN (ppm)	0.1	7.86	1.36
	Total Phosphorous (ppm)	0.05	1.96	0.59
	Antimony (ppb)	<60	<60	<60
	Arsenic (ppb)	<10	72.2	14.31
	Barium (ppb)	<1	1,080	524.5
	Beryllium (ppb)	<5	<5	<5
	Cadmium (ppb)	<5	<5	<5
	Chromium (ppb)	<10	<10	<10
	Copper (ppb)	<10	123	<10
	Iron (ppb)	<100	23,600	8,726
	Lead (ppb)	<10	17.1	<10
	Mercury (ppb)	<0.2	<0.2	<0.2
	Nickel (ppb)	<40	<40	<40
	Selenium (ppb)	<35	<35	<35
	Silver (ppb)	<10	<10	<10
	Thallium (ppb)	<5	<5	<5
	Zinc (ppb)	<10	374	29.6

Source: (Louisiana Department of Environmental Quality 2005)

AIR QUALITY

The Clean Air Act (CAA) of 1970 (as amended in 1990 and 1997), required the EPA to implement air quality standards to protect public health and welfare. National Ambient Air Quality Standards (NAAQS) were set for six pollutants commonly found throughout the United States: lead, ozone, nitrogen oxides (NOx), carbon monoxide (CO), sulfur dioxide (SO2), and particulate matter less than 10 and 2.5 microns in diameter (PM10 and PM2.5). The CAA establishes two types of NAAQS standards – primary and secondary. Primary standards set limits to protect public health, including the health of sensitive populations such as asthmatics, children, and the elderly. Secondary standards set limits to protect public welfare, including protection against decreased visibility, damage to crops, vegetation, animals, and buildings. These standards are shown in Table 4 (EPA 2009b).

The LDEQ operates Ambient Air Monitoring Stations at approximately 40 locations throughout the state to measure ambient concentrations of these NAAQS pollutants. Volatile organic pollutants, many of which are hazardous air pollutants, are not listed as criteria air pollutants but are also measured at selected sites throughout Louisiana. Areas that meet the NAAQS standards are designated “attainment areas,” while areas not meeting the standards are termed “non-attainment” areas. The monitoring results indicate that all NAAQS standards are currently being met with the exception of five parishes (Ascension, East Baton Rouge, Iberville, Livingston, and West Baton Rouge) in the Baton Rouge area that are in "non-attainment" of EPA's 8-hour ozone standard. Pollutant monitoring data are not collected on Atchafalaya NWR, per se; however air quality is monitored on a regular basis at four nearby locations in Iberville Parish. Table 5 presents air quality data collected in Iberville Parish over the 3-year period 2005-2007 (Louisiana Department of Environmental Quality 2007b and EPA 2009c).

The Air Quality Index (AQI) is a summary index for reporting daily air quality. It tells how clean or polluted the air is, and what associated health effects might be cause for concern. The AQI focuses on health effects that may be experienced within a few hours or days after breathing polluted air. EPA calculates the AQI for five major air pollutants regulated by the Clean Air Act: ground-level ozone, particle pollution (also known as particulate matter), carbon monoxide, sulfur dioxide, and nitrogen dioxide. (Because all areas of the United States are currently attaining the NAAQS for lead, the AQI does not specifically address lead.) For each of these pollutants, EPA has established national air quality standards to protect public health (EPA 2009d). A higher AQI value indicates a greater the level of air pollution, and therefore a greater health concern. For example, an AQI value of 50 represents good air quality with little potential to affect public health, while an AQI value over 300 represents hazardous air quality. An AQI value of 100 generally corresponds to the national air quality standard for the pollutant, which is the level the EPA has set to protect public health. AQI values below 100 are generally considered satisfactory. When AQI values are above 100, air quality is considered to be unhealthy for certain sensitive groups of people, then for everyone as AQI values get higher. Based on this Index, in 2008, air quality in the Iberville Parish area was categorized as "good" 81 percent of the time, "moderate" 17 percent of the time, and "unhealthy" 2 percent of the time (EPA 2009e). The single pollutant responsible for the highest index value is referred to as the "Main Pollutant." The Main Pollutant in Iberville Parish in 2008 was ozone (88 percent of the time) and particulate matter less than 2.5 microns (12 percent of the time). High AQI values due to ozone and small particulate matter are often associated with bright summer days and periods of hot, stagnant, summertime air, favoring the formation of ozone and condensation nuclei.

Table 4. National ambient air quality standards

Pollutant	Primary Standard	Averaging Times	Secondary Standard	Attainment Status For Louisiana
Carbon Monoxide	9 ppm (10 mg/m^3)	8-hour[1]	None	Attainment
	35 ppm (40 mg/m^3)	1-hour[1]	None	Attainment
Lead	1.5 µg/m^3	Quarterly Average	Same as Primary	Attainment
Nitrogen Dioxide	0.053 ppm (100 µg/m^3)	Annual (Arith. Mean)	Same as Primary	Attainment
Particulate Matter (PM10)	150 µg/m^3	24-hour[2]	Same as Primary	Attainment
Particulate Matter (PM2.5)	15.0 µg/m^3	Annual [3] (Arith. Mean)	Same as Primary	Attainment
	35 µg/m^3	24-hour[4]	Same as Primary	Attainment
Ozone: *Standard effective May 27, 2008*	0.075 ppm	8-hour[5]	Same as Primary	EPA will make designations under this standard in 2010
Ozone: (*1997-2008 Standard)*	0.08 ppm	8-hour[6]	Same as Primary	Based on 2006-2008 monitored data, all areas are in attainment and the State will be requesting redesignation by EPA
Sulfur Oxides	0.03 ppm	Annual (Arith. Mean)	-------	Attainment
	0.14 ppm	24-hour[1]	-------	Attainment
	-------	3-hour[1]	0.5 ppm	
			(1300 µg/m^3)	Attainment

[1] Not to be exceeded more than once per year.
[2] Not to be exceeded more than once per year on average over 3 years.
[3] To attain this standard, the 3-year average of the weighted annual mean PM2.5 concentrations from single or multiple community-oriented monitors must not exceed 15.0 µg/m^3
[4] To attain this standard, the 3-year average of the 98th percentile of 24-hour concentrations at each population-oriented monitor within an area must not exceed 35 µg/m^3 (effective December 17, 2006).
[5] To attain this standard, the 3-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.075 ppm (effective May 27, 2008).
[6] a) To attain this standard, the 3-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.08 ppm.
b) The 1997 standard - and the implementation rules for that standard - will remain in place for implementation purposes as EPA undertakes rulemaking to address the transition from the 1997 ozone standard to the 2008 ozone standard.

***Source**: (EPA 2009b)*

Table 5. NAAQS ambient air monitoring data in the vicinity of Atchafalaya NWR

County	CO 8-hr (ppm)	Pb Qmax ($\mu g/m^3$)	NO_2 AM (ppm)	O_3 1-hr (ppm)	O_3 8-hr (ppm)	PM_{10} Wtd AM ($\mu g/m^3$	PM_{10} 24-hr ($\mu g/m^3$)	$PM_{2.5}$ Wtd AM ($\mu g/m^3$)	$PM_{2.5}$ 24-hr ($\mu g/m^3$)	SO_2 AM (ppm)	SO_2 24-hr (ppm)
Iberville Parish, Louisiana 2007	ND	ND	0.009		0.086		ND	12.2	26	ND	ND
Iberville Parish, Louisiana 2006	ND	ND	0.008	0.112	0.087		ND	12.9	32	ND	ND
Iberville Parish, Louisiana 2005	ND	ND	0.007	0.122	0.088	ND	ND	IN	IN	ND	ND

CO - Highest second maximum non-overlapping 8-hour concentration (applicable NAAQS is 9 ppm)
Pb - Highest quarterly maximum concentration (applicable NAAQS is 1.5 $\mu g/m^3$)
NO_2 - Highest arithmetic mean concentration (applicable NAAQS is 0.053 ppm)
O_3 (8-hour) - Highest fourth daily maximum 8-hour concentration (applicable NAAQS is 0.075 ppm)
PM_{10} - Highest second maximum 24-hour concentration (applicable NAAQS is 150 µg/m3)
$PM_{2.5}$ - Highest weighted annual mean concentration (applicable NAAQS is 15 $\mu g/m^3$)
- Highest 98th percentile 24-hour concentration (applicable NAAQS is 35 $\mu g/m^3$)
SO_2 - Highest annual mean concentration (applicable NAAQS is 0.03 ppm)
- Highest second maximum 24-hour concentration (applicalbe NAAQS is 0.14 ppm)
ND - Indicates data not available
IN - Indicates insufficient data to calculate summary statistic
Wtd - Weighted
AM - Annual mean
Qmax - Quarterly maximum
$\mu g/m^3$ - Units are micrograms per cubic meter
ppm - Units are parts per million

Source: (EPA 2009c)

BIOLOGICAL RESOURCES

HABITAT

The upper reaches of the Atchafalaya Basin offer a great diversity of wildlife habitat that can be broadly classified as mid- to late-successional bottomland hardwood forests, cypress forests mixed with bottomland hardwoods, open water, and agricultural lands (Figure 7). Bottomland hardwoods are forested, alluvial wetlands occupying broad floodplain areas flanking large river systems (Atchafalaya/Mississippi Rivers) and are maintained by a natural hydrologic regime of alternating wet and dry periods that tend to follow seasonal flooding events; and, are the primary habitat of Atchafalaya NWR.

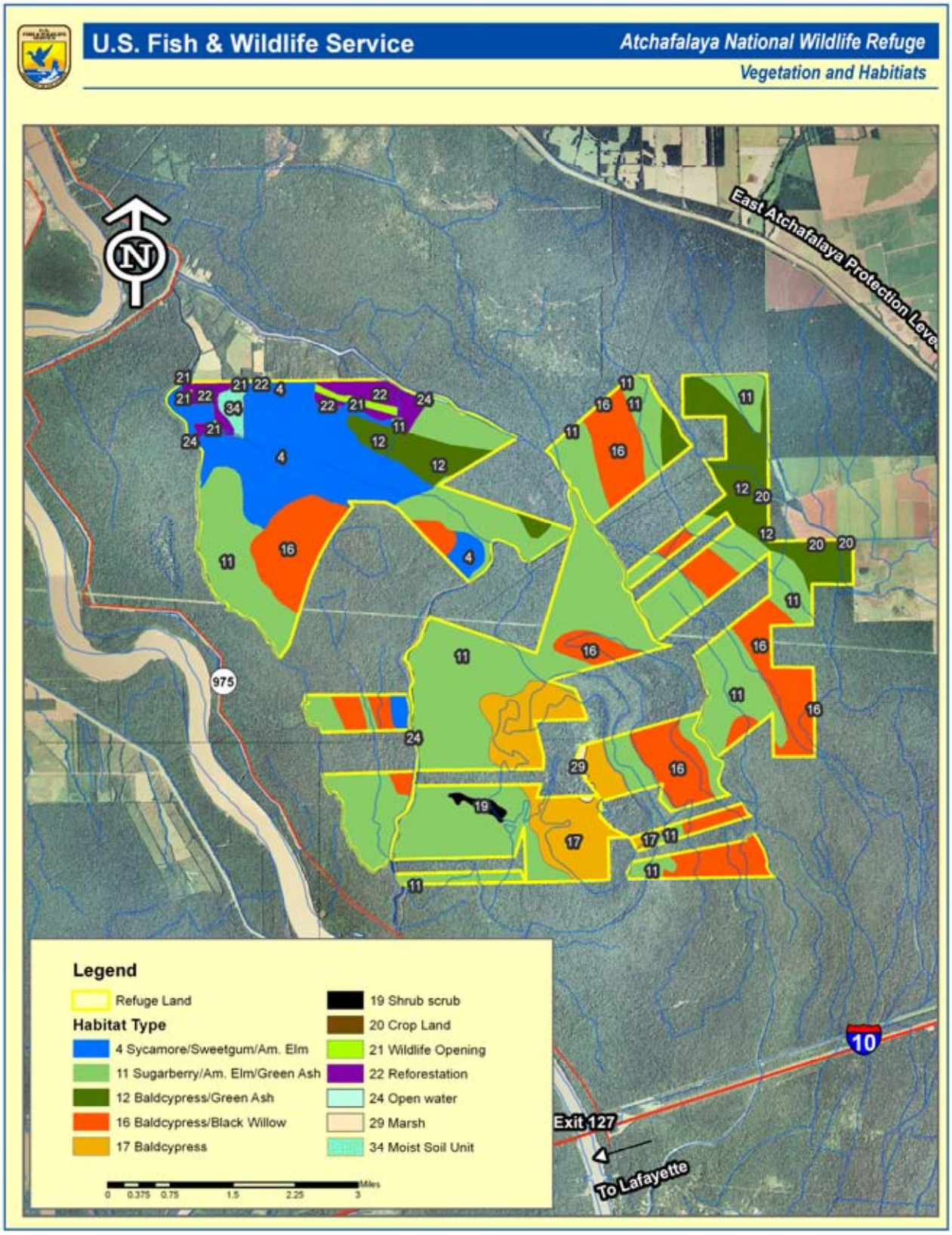
The refuge within the Atchafalaya Floodway is largely unsettled. Some petroleum extracting and storage facilities exist, as well as several hunting camps – occupied primarily during the hunting season. Approximately 500 acres of agriculturally developed land originally occurred near the extreme northern boundary of the refuge. Much of the bottomland forest on Atchafalaya NWR is within 1 to 2 miles of an agricultural area on the west side of the refuge or along major roadways and rights-of-way. The east side of the refuge is bordered by a mixture of agriculture and forested tracts (USFWS January 1992). Forest habitat management at Atchafalaya NWR is oriented toward providing habitat for wood duck and waterfowl as well as other indigenous wildlife. A 400-acre greentree reservoir is also present on the east bank of Big Alabama Bayou and stop log structures were installed in 2006 (USFWS 2006b).

The bottomland hardwood forests in the area of Atchafalaya NWR have four dominant tree species associations: cottonwood-sycamore; oak-gum- sugarberry-ash; willow-cypress-ash; and, overcup oak-bitter pecan. Midstory species encompass seedlings of dominant species along with boxelder, maple, red mulberry, and rough-leaf dogwood. Ground cover is sparse, in areas, due to shading out and prolonged inundation. In those areas where habitat improvement, through the practice of forest management, has taken place, the ground cover is very dense and provides excellent habitat for many game and non-game wildlife species. Common groundcover species found include rattan, greenbriar, rubus, trumpet creeper, Virginia creeper, poison ivy, and milkweed. Much of the area supports lush stands of fern (Louisiana Department of Wildlife and Fisheries 2005a).

Tree species within this bottomland hardwood forest vary according to the wetness of the specific site. Common tree species on the higher, well-drained sites include red oak, sugarberry, sweet gum, and elm. The wetter, lower sites contain predominantly cypress, willow, and ash. Other common species found in association within these forest types include red maple, cottonwood, sycamore, honey locust, box elder, and bitter pecan. Buttonbush and water-elm are common mid-story species on wet sites, while rough-leaf dogwood is common on drier sites. Common understory plants on wet sites include lizard's tail, smartweed, water hyacinth, frog's bit, American lotus, Bidens sp., and cattail. Alligator weed and duckweed are prevalent in some areas. Approximately 12 percent of the refuge is inundated open water, with isolated cypress trees and willow stands (USFWS 2006b).

The primary forest types on the refuge according to the Society of American Foresters Classification System are: Type 93, Sugarberry-American Elm-Green Ash; Type 94, Sycamore-Sweet gum-American Elm; and Type 95, Black Willow. Except for the lowest swampy areas in the Bayou DesGlaises area, merchantable timber stands exist throughout most of the refuge, covering approximately 14,455 of the total 15,220 acres

Figure 7. General habitat types on Atchafalaya NWR



Fishery habitats on the refuge consist chiefly of bayous, swamps, and borrow ditches dug for road bed material. Many ditches were dug by petroleum companies prior to acquisition of the refuge. The only refuge water which supports a stable fish population is the Des Ourses swamp, on the southern end of the refuge, totaling roughly 2,000 acres in size (USFWS 1990).

Plant Species of Special Interest

There are no federally threatened or endangered plants or natural communities found on Atchafalaya NWR. However, the State of Louisiana's Natural Heritage Program lists the following plants as rare or imperiled in Iberville and/or St. Martin Parishes (Table 6) (Louisiana Department of Wildlife and Fisheries 2005b):

Table 6. Rare or imperiled plants in Iberville and/or St. Martin Parishes, Louisiana according to the State of Louisiana's Natural Heritage Program

Scientific Name	Common Name	State Rank	Parish
Blechnum occidentale	Sink-hole Fern	**SH**	Iberville
Melanthera nivea	Snow Melanthera	**S2**	Iberville
Triphora trianthophora	Nodding Pogonia	**S2**	Iberville
Thalia dealbata	Powdery Thalia	**S2S3**	Iberville/St Martin
Carex decomposita	Cypress-knee Sedge	**S3**	St Martin
Ceratopteris pteridoides	Floating Antler-fern	**S2**	St Martin
Cyperus cephalanthus	Flatsedge	**S2**	St Martin
Didiplis diandra	Water-purslane	**S2**	St Martin
Platythelys querceticola	Low Erythrodes	**S1**	St Martin
Rudbeckia triloba	Three-lobed Coneflower	**S3**	St Martin
Tradescantia subaspera	Broad-leaved Spiderwort	**S2**	St Martin

KEY:
S1 *- Critically imperiled in Louisiana*
S2 *- Imperiled in Louisiana*
S3 *- Rare*
SH *- Historically present, but no recent occurrence*

Exotic, Invasive, and Nuisance Plant Species

Several species of exotic plants occur on the refuge. One of the most threatening problems facing native plant species is the introduction of exotic or non-native species. Invasive species can pose significant problems to habitats in the region when they out-compete native species. Chinese tallow, mimosa, privet, and Chinaberry are all found on the refuge. Birds play a major role in the distribution of these species by eating the fruit and later discarding the undigested seeds miles from the seed source. Invasive aquatic species threaten the natural aquatic vegetation important to aquatic systems, and choke waterways to a degree that often prevents recreational use. Massive growth of hydrilla and water hyacinth restricts access to many areas and exacerbates hypoxic conditions in the swamps.

WILDLIFE

Atchafalaya NWR supports a diversity of wildlife species common to the MAV of Louisiana. Most of the wildlife that lives on the refuge is found typically in bottomland hardwood forests. Few species surveys have been conducted on the refuge. The basin's dense bottomland hardwoods, cypress-tupelo swamps, overflow lakes, and meandering bayous provide a tremendous diversity of habitat for more than 200 species of resident and migratory birds (and numerous other wildlife), and the area has been recognized as an Internationally Important Bird Area. The basin's wooded wetlands provide vital nesting habitat for wood ducks, and support the nation's largest concentration of American woodcock. Eagles, ospreys, swallow-tailed kites, and Mississippi kites can occasionally be seen soaring overhead. Wild turkeys (the refuge supports the highest population of wild turkeys in the state) (USFWS 2006b), white-tailed deer, gray and fox squirrels, eastern cottontail and swamp rabbit, gray and red fox, coyote, striped skunk, and opossum inhabit the refuge, as do a small remnant population of black bears. Furbearers found in the great swamp are raccoon, mink, bobcat, nutria, muskrat, river otter, and beaver. Squirrel habitat within the Atchafalaya Basin is considered to be the best in Louisiana and possibly the best in the Nation (USFWS 1986). In addition, the Atchafalaya Basin is the westernmost known outpost for breeding swallow-tailed kites (USFWS 1992).

Each of these individual species requires food, water, and cover to survive. However, the particular food and cover requirements of a given species are often very specialized. The specific habitat needs of each species vary in some degree from those of every other kind of animal although many different animals may occupy the same general area. A diversity of habitats tends to encourage and support a diversity of wildlife species. (USFWS 2009c and USFWS 2006c)

Birds

Atchafalaya NWR lies within the Mississippi Flyway—the "highway in the sky"—from nesting grounds to wintering areas through middle North America, used by vast numbers of migrating waterfowl, shorebirds, neotropical songbirds, and birds of prey. Almost 100 species of birds are known to nest in the area, and more than 200 species have been sighted on the refuge.

Waterfowl begin arriving in September with blue-wing teal, mallards, gadwall, ring-neck ducks, and widgeon among the 20 (or more) species that winter on the refuge. An estimated 8,000-10,000 waterfowl may overwinter on the refuge on a given year. The wood duck, a year-round resident, nests in tree cavities and in nest boxes placed throughout the hardwood forests. Wood ducks and mallards constitute approximately 80 percent of the waterfowl population with lesser numbers of gadwall, scaup, teal, and pintail (USFWS 1986). Duck populations (in general order of abundance) include: wood ducks, mallards, green-winged teal, pintails, gadwalls, blue-winged teal, and hooded mergansers.

During the spring, summer, and through early fall, Atchafalaya NWR is a haven for a variety of other migratory game birds such as snipe, rails, and mourning doves. A myriad of songbirds and shorebirds stop briefly in the fall and spring to replenish energy reserves for the long journey to and from wintering areas in Central and South America, while other birds, such as northern parula, prothonotary warbler and American redstart, utilize the refuges for nesting. Nearly 100 different songbirds have been observed during the spring and summer months. The refuge remains a "mecca" for great blue herons, green herons, little blue herons, black and yellow-crowned night herons, great egrets, white ibis, wood storks, anhinga, and double-crested cormorants. In addition, large numbers of woodcock winter in the area.

Although no known nesting has occurred, Atchafalaya NWR is home to bald eagles during the winter as these magnificent birds follow waterfowl down the flyway. Other raptors commonly observed are red-shouldered and red-tailed hawks, turkey vulture, black vulture, barred owl, great-horned owl, American kestrel, Northern harrier, broad-winged hawk, Cooper's hawk and sharp-shinned hawk.

Mammals

Temporarily flooded bottomland forests provide ideal habitat for many species of mammals. Food and cover are abundant and diverse, and a variety of mammalian species are present. No non-game mammal surveys have been conducted (to date) on Atchafalaya NWR. Based on mammals presumed to occur in similar, nearby habitats -- 40 (or more) species of mammals are likely to be found on Atchafalaya NWR. In addition to a small number of black bear (which are primarily associated with the upland forests that are joined by extensive forested wetland corridors), other forest wetland inhabitants are the white-tailed deer, bobcat, coyote, river otter, raccoon, gray fox, red fox, beaver, mink, swamp rabbit, cottontail rabbit, eastern gray squirrel, fox squirrel, nutria, opossum, muskrat, and skunk. No accurate inventories have been conducted on small mammals, such as mice, voles, or moles.

Amphibians and Reptiles

Amphibian management and conservation are of great interest due to apparent global amphibian declines. Habitat loss, fragmentation, and degradation appear to be the primary factors in declines. This group of animals requires quality wetland habitat for their survival and they also serve as important indicators of environmental health. Numerous species of frogs, snakes, turtles, lizards, skinks, and salamanders have been seen by refuge staff. At least four species of venomous snakes are believed to inhabit the area and hunters have reported seeing alligators on more than one occasion.

USGS has been conducting amphibian surveys on Atchafalaya NWR since 2002 as part of the Amphibian Research and Monitoring Initiative (ARMI). ARMI staff conducted call surveys to detect frogs and toads by vocalization from 2002-2006, and from 2008-2010. ARMI has been conducting both call and visual encounter surveys. In addition, tadpoles collected on the refuge have been sent to the National Wildlife Health Center for disease screening. This ARMI monitoring is expected to continue for the next several years. There is currently a manuscript in press (accepted for publication) in the Journal of Wildlife Management on the monitoring from 2002-2006. Also, annual updates of research results starting at the end of 2008 through 2010 have been forwarded to refuge staff.

Fish

The lifeblood of the fishery is Atchafalaya Basin's annual flooding and dewatering cycle. Overflows occur during the winter and spring rains, with many areas gradually becoming dewatered during the summer and fall. Sport fishing is popular throughout the basin. Largemouth bass, white crappie, black crappie, warmouth, bluegill, redear sunfish, and channel catfish are the primary species sought. More than 85 species of fish occur in the basin, and their populations frequently exceed 1,000 pounds per acre. Red swamp crawfish and white river crawfish are also important for both a sport and commercial harvest.

Threatened and Endangered Species

Only two federally listed threatened and endangered species may be presently found on Atchafalaya NWR: the Louisiana black bear (*Ursus americanus luteolus*) and the pallid sturgeon (*Scaphirhynchus albus*). The bald eagle (*Haliaeetus leucocephalus*) was removed from the federal list of threatened and endangered species on August 9, 2007. After nearly disappearing from most of the United States decades ago, the bald eagle is now flourishing across the nation and no longer needs the protection of the Endangered Species Act.

The Louisiana black bear is a subspecies of the American black bear, found in Louisiana, south Mississippi and east Texas. This bear is black in color and typically weighs 150-300 pounds as an adult. These bears typically require relatively large areas of bottomland and other hardwood forested habitat to meet their survival needs, including hardwood mast trees, fruiting plants, and secluded locations for den sites to bear young. The Louisiana black bear is omnivorous and typically feeds on a variety of food resources including nuts such as acorns, soft fruits such as blackberries and persimmon, herbaceous vegetation such as grasses and forbs, animal matter such as ants and grubs, and supplemented by carrion or small animals. Louisiana black bears are a large animal with a relatively long life span. They may live up to 20 years and generally reproduce every other year after 3-4 years of age. Female bears give birth to cubs during the winter while hibernating in a den. Louisiana black bears often spend their period of winter sleep in a den either in a very big hollow tree, or in a protected site on the ground (USFWS 2008c). The Sherburne Complex, including Atchafalaya NWR, has a history of light bear use. It is highly likely that the lack of hard mast forest species is severely limiting the habitat suitability of Atchafalaya NWR for Louisiana black bear (Strader and Chouinard 2008).

The pallid sturgeon (*Scaphirhynchus albus*) is a relatively large, cylindrical fish with shovel-shaped head and slender tail base. Adults typically range in size between 19.5 and 31.2 inches in length and up to 65 pounds in weight. Its tail fin is 2-lobed with the top lobe larger than the bottom, terminating in a long filament. Its mouth is placed on the underside of the head and is preceded by several fleshy barbels (Louisiana Department of Wildlife and Fisheries 2005c)

The pallid sturgeon is similar to the shovelnose sturgeon (*S. platorhynchus)*, but there are several distinct differences such as the larger head, the wider mouth, the smaller eye, and the paler gray-white color above and on sides (Page and Burr 1991). It can be separated from the similar and more common shovelnose sturgeon by the absence of bony plates on the belly. The pallid sturgeon is one of the most poorly known and infrequently recorded freshwater fishes in North America. The pallid sturgeon's preferred temperature range is from 32 to 86 °Fahrenheit (0 to 30 °Celsius) (USFWS 1993 and 2007). Aquatic insects and small fishes comprise a majority of the diet. The pallid sturgeon's range is quite large and includes approximately 3,515 miles (5,656 kilometers) of river encompassing 13 states including Louisiana and Mississippi (USFWS 1993). In Louisiana, the most frequent occurrence of the pallid sturgeon is in the Mississippi and Atchafalaya Rivers, where the Atchafalaya River diverges from the Mississippi River (USFWS 1993 and 2007). The spawning season for the pallid sturgeon lasts from July to August. Males sexually mature at 3 to 4 years of age (Kallemeyn 1983), and females sexually mature at 7 years, with several years for eggs to mature between spawnings (USFWS 1993 and 2007).

In addition to threatened and endangered species, several species of wildlife are of special concern on the refuge. The State of Louisiana's Natural Heritage Program identifies several species of wildlife as rare or imperiled, and of special concern in vicinity of Atchafalaya NWR. These are detailed in Appendix I, Tables I-5 (Louisiana Department of Wildlife and Fisheries 2005b and 2009).

Exotic and Nuisance Wildlife

Some unregulated exotic nuisance animals, such as feral hog and nutria, and native nuisance species, such as coyote, raccoon, and beaver, occur on the refuge. These species are thought to occur throughout the refuge in varying densities. Several species, including hog and beaver, greatly affect and change the habitat, and in the case of feral hogs, compete with native wildlife for limited food resources and thus have a negative impact on other wildlife species (e.g., deer, squirrels, and songbirds). Beavers manipulate hydrology both on and off the refuge by constructing dams that inundate bottomland hardwood forests for prolonged periods. Predation of nests by raccoons adversely affects populations of breeding neotropical migratory birds, wood ducks, turkeys, and wading birds.

CULTURAL RESOURCES

Historical Background

Atchafalaya NWR is located within the nation's largest swamp being encompassed by nearly one-half million acres of nationally significant expanses of bottomland hardwoods, swamp lands, bayous, and back-water lakes, which provide a tremendous diversity of habitat for more than 200 species of birds, and well as more than 100 species of mammals, reptiles, and fish.

The region was inhabited by mound building societies as early as the 12th century B.C. and later resettled by various Indian tribes between 500 and 700 A.D. The remains of these mound constructs and the preserved ceramic artifacts from this time period offer enduring evidence of the sophistication and rich cultural heritage of these prehistoric societies. The Atchafalaya Basin's cultural history may go back 2,500 years when Native Americans are believed to have first settled in the basin, a time when the Mississippi River flowed down the course of the present-day Bayou Teche. From 1000 – 1700 A.D., Indian villages were located within the wetlands and on grassy prairies along what is generally the current channel of Bayou Teche. Villagers harvested and hunted fish, shellfish, reptiles, birds, deer, and small mammals that were plentiful in the area. Tribes with a history in the Atchafalaya Basin include the Chitimacha, Attakapas, Opelousa, Houma, Coushatta and Alabama, Tunica-Biloxi and Avoyel, and Taensas. Native American association with the "great swamp" is evidenced by many place names in the modern basin, including Atchafalaya (hacha falaia), bayou (bayuk), Catahoula (oka hullo), Chacahoula (chukka hullo), Plaquemine (piakimin), and Whiskey Bay (oski abeha).

In the early 1700s, French settlers and slaves arrived in the Atchafalaya Basin to trade with the Native Americans, primarily in the fur trade. In 1755, however, one of the most culturally significant migrations into the Atchafalaya Basin occurred when refugees expelled from the Canadian province of Acadia found a home here. These immigrants quickly adapted to their new environment and developed skills that allowed them to survive in the challenging, yet fertile, swamp. As the years went by, they intermarried with other settlers of the area, including Hispanics, Old World and Canadian French, Anglo-Americans, and Native Americans, resulting in a people and culture referred to as "Cajun." Many residents in the region surrounding the Basin, in fact, can trace their roots back to the Acadians, and the unique Cajun heritage is expressed in the food, music, and traditions of the area. Other ethnic groups who immigrated to the area over the years include Creoles, African-Americans, Colonial Spanish, and Islenos, Italians, and Asians, with each contributing their own cultural "seasonings" to the Atchafalaya Basin region's cultural "gumbo."

In the early years, the one element that seemed to tie all of the basin settlers together was the bountiful resources of the hardwood forests, cypress swamps, bayous, and marshes, and the utilization of these resources for subsistence and commerce. Logging, agriculture and cattle farming were staples of life in the basin. Based on an 1874 river commerce survey report, “The products of the Atchafalaya country are cotton, sugar, molasses, moss, lumber, staves and shingles." Today, people from across south Louisiana and beyond continue to rely on these natural resources for their livelihood and for recreation. According to a USDA Census report, the market value of all agricultural products sold in the Atchafalaya Basin area total almost $900 million, about 45 percent of the state’s total. The value of livestock and livestock products sold total about $168 million, or 28 percent of the Louisiana total.

The 1900s were years of dispute and compromise over conservation issues in the basin. Flood control, agriculture, energy development, recreation, and other interests in the basin were difficult to reconcile. In 1985, Congress enacted the Multipurpose Plan, which authorized the USACE to spend $250 million to preserve and restore the Atchafalaya Basin ecosystem. In 1986, Atchafalaya NWR was established (Public law 98-396), with the purchase of 15,220 acres of land from the Iberville Land Company. In 1998, the Louisiana Department of Natural Resources created the Atchafalaya Basin Program to manage and protect the cultural and natural resources of the basin. All parties (LDWF, USFWS, and USACE) involved developed a cooperative agreement to resolve issues and delineate management responsibilities. The agreement, which is incorporated in a feasibility study developed by the USACE for the basin, calls for specific flood control measures, water flow rates, and the purchase of flowage and conservation easements designed to keep the basin in a natural state, while providing navigation and flood protection for surrounding communities.

Cultural Resources Protection

Cultural resources include historic properties as defined in the National Historic Preservation Act (NHPA), cultural items as defined in the Native American Graves Protection and Repatriation Act (NAGPRA), archaeological resources as defined in the Archaeological Resources Protection Act (ARPA), sacred sites as defined in Executive Order 13007, *Protection and Accommodation of Access To "Indian Sacred Sites,"* to which access is provided under the American Indian Religious Freedom Act (AIRFA), and collections. As defined by the NHPA, a historic property or historic resource is any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places (NRHP), including any artifacts, records, and remains that are related to and located in such properties. The term also includes properties of traditional religious and cultural importance (traditional cultural properties), which are eligible for inclusion in the NRHP as a result of their association with the cultural practices or beliefs of an American Indian tribe. Archaeological resources include any material of human life or activities that is at least 100 years old, and that is of archaeological interest.

Although Atchafalaya NWR has not been subjected to systematic archaeological and historical investigations, the refuge follows these procedures to protect any cultural/historic legacy that may potentially occur on the refuge. Whenever construction work is undertaken that involves any excavation with heavy earth-moving equipment like tractors, graders, and bulldozers, such as for the development of moist-soil units, the refuge contracts with a qualified archaeologist/cultural resources expert to conduct an archaeological survey of the subject property. The results of this survey are submitted to the Service’s Regional Historic Preservation Officer, as well as the Louisiana State Historic Preservation Office (SHPO), which in Louisiana is an agency within the Department of Culture, Recreation and Tourism, Office of Cultural Development, Division of Historic Preservation Louisiana (Louisiana Department of Culture, Recreation and Tourism 2009).

The SHPO reviews the surveys and determines whether cultural resources will be impacted, that is, whether any properties listed in or eligible for listing in the NRHP will be affected. If cultural resources are actually encountered during construction activities, the refuge is to notify the SHPO immediately. Given the region's settlement during both the prehistoric and historic periods, the likelihood of cultural resources is considered relatively high.

SOCIOECONOMIC ENVIRONMENT

REGIONAL DEMOGRAPHICS AND ECONOMY

The 15,220-acre Atchafalaya NWR is in Iberville and St. Martin Parishes of Louisiana. Atchafalaya NWR is about 30 miles west of Baton Rouge, Louisiana, and 1 mile east of Krotz Springs, Louisiana, lying just east of the Atchafalaya River. The refuge is located roughly between latitudes 30 degrees 24 minutes and 30 degrees 30 minutes north and longitudes 91 degrees 35 minutes and 91 degrees 43 minutes west. Atchafalaya NWR is bordered on the west by Louisiana's Sherburne Wildlife Management Area (11,780 acres); on the north by agricultural land; and on the east and south by private holdings in bottomland hardwoods. Substantial private holdings interrupt the continuity of the refuge. In addition to the adjacent Sherburne Wildlife Management Area, the USACE owns over 16,000 acres in the vicinity of Atchafalaya NWR, known as the Bayou Des Ourses Area. The entire three agency complex (referred to as the Sherburne Complex), comprising approximately 44,000 acres, is cooperatively managed by the LDWF.

Table 7 provides data related to the area's demographics and socioeconomics. Iberville and St. Martin Parishes are predominantly rural, with the largest towns being Plaquemine (Iberville Parish); and Breaux Bridge and St. Martinville (St. Martin Parish), all with populations of about 8,000 people. The population of Iberville Parish decreased by 1.0 percent, and the population of St. Martin Parish increased by 5.7 percent from April 2000 to July 2006. Iberville Parish has one of the lower growth rates, while St. Martin Parish has one of the higher growth rates among the 64 parishes in Louisiana. These rates compare with an overall 4.1 percent decrease in population for Louisiana, and a 6.4 percent increase for the United States, for the same time period. Non-farm employment decreased by 1.9 percent and 3.2 percent for Iberville and St. Martin Parishes, respectively, from 1995 to 2005. During this same time period, the State of Louisiana showed a 1.6 percent gain, and the United States a 2.0 percent gain in non-farm employment. Area per capita incomes in Iberville and St. Martin Parishes were below the state's averages in 2005; and the unemployment rates for Iberville and St. Martin Parishes were higher and lower, respectively, than the state's averages in 2006.

As in other rural areas throughout Louisiana, outdoor activities are both popular and necessary. Hunting and recreational fishing are popular pastimes, and farming, commercial fishing, and forestry are important elements of the economy. Atchafalaya Basin's commercial fisheries are extremely valuable (crawfish being an important component), with an estimated average annual commercial harvest of nearly 22 million pounds (USFWS 2006c). Because much of the area is considered wetlands and is subject to periodic inundation by rising waters, limited development has occurred, with farming and recreation as primary purposes for land use. There are significant agricultural operations in the Rosedale, Grosse Tete, and Maringouin areas (e.g., timber, sugarcane, soybeans). The local area is unique with respect to its geography, transportation systems, and land use. The chemical and agricultural industries help power the economy. The area lies within the Atchafalaya Basin and is marked by numerous oil and gas fields. Nearby access to the Mississippi River provides transportation facilities as well as water availability for the numerous industrial and chemical plants located on its banks. Dow Chemical Company is the largest employer in the region, providing about 3,000 jobs. Other major employers include Georgia Gulf Corporation, Valero Energy Corporation, and Martin Mills, among others.

Statewide Outdoor Recreational Economics

Sportspersons and wildlife watchers across the United States spend over $122 billion annually, about 1.1 percent of the Nation's gross domestic product in 2006. In the Louisiana region, 16-18 percent of the population identify themselves as anglers, 7-8 percent as hunters, and 25-34 percent of the population participates in wildlife viewing activities (USFWS and U.S. Census Bureau 2006). Table 8 presents information summarizing the economic value of hunting, fishing, and wildlife watching in Louisiana by United States' residents. It estimates over 1.7 million people participated in fishing, hunting, and wildlife watching in Louisiana; and total expenditures from these activities were over $1.8 billion dollars in 2006 (USFWS and U.S. Census Bureau 2006).

According to the LDWF, the commercial fishing industry in the Atchafalaya Basin is valued at $95.7 million per year, and the recreational fishing industry is valued at $47 million. In addition, LDWF estimates that an average of 10-15 million pounds of crawfish is harvested each year in the Atchafalaya Basin, making crawfish the most profitable industry in the basin. Approximately 30,270 hunting licenses were sold in the Atchafalaya Basin parishes in 2007 (Louisiana Department of Natural Resources 2009).

Atchafalaya NWR Activity Levels

During 2009, 24,629 visitors (and over 32,632 total station visits) were documented for Atchafalaya NWR (however, not all refuge users are thought to have been counted) (USFWS 2006b). In 2007, the Sherburne Complex (which includes Atchafalaya NWR) received about 62,000 visits (USFWS 2008b). The natural resources of Atchafalaya NWR provide numerous sites for hunting, recreational fishing, hiking, and wildlife observation and are important economically to the central Louisiana region. As the country's population increases and the number of places left to enjoy wildlife decreases, the refuges will become even more important to the community. The refuge benefits the community directly by providing recreational and employment opportunities for the local population and indirectly by attracting tourists from outside the area to generate additional income to the local economy. Whether it is gas used to travel to and from the refuge, a meal at a local restaurant, ammunition, or an overnight at a local motel, visitors to Atchafalaya NWR add substantially to the regional economy. It is estimated that visitors to Atchafalaya NWR generate over $2,000,000 in expenditures annually (USFWS 2008a).

REFUGE ADMINISTRATION AND MANAGEMENT

LAND PROTECTION AND CONSERVATION

Atchafalaya NWR is administered from an office located at the Service's Southeast Louisiana NWR Complex headquarters. The Complex headquarters, known as "Bayou Lacombe Centre," is in Lacombe, Louisiana, on Highway 434, 2 miles south of I-12 (Exit 74).

The management staff of Atchafalaya NWR seeks to establish a multi-layered forest canopy that develops and/or maintains a diversity of plant species at various stages of development, to provide a variety of wildlife habitat conditions for the various wildlife species. This will be accomplished through active forest management via timber harvest, forest habitat improvement, and other means of wildlife habitat enhancement—thus providing a diverse forested habitat (diverse in plant species composition, vertical structure, canopy development, and age) capable of meeting the various needs of many wildlife species including waterfowl, neotropical migratory songbirds, and resident wildlife, as well as the threatened Louisiana black bear.

Table 7. Demographics and socioeconomics for the Atchafalaya NWR area

Characteristic	Iberville Parish	Pointe Coupe Parish	St. Landry Parish	St. Martin Parish	W. Baton Rouge Parish	5-Parish Louisiana Summary	State of Louisiana	United States
Demographic								
Population (2006 estimate)	32,974	22,648	91,528	51,341	22,463	220,954	4,287,768	299,398,484
Percent Change (4/1/00 to 7/1/06)	-1.0%	-0.5%	4.4%	5.7%	4.0%	3.3%	-4.1%	6.4%
Total Land Area (sq. miles)	618.6	557.3	928.7	739.9	191.2	3,035.7	43,561.9	3,537,438
Population Density (pop./sq. mile)	53	41	99	69	117	73	98	85
Race/Ethnicity (% of Population)								
White	48.4%	61.0%	55.7%	66.6%	62.1%	58.3%	65.4%	80.1%
Black/African American	50.7%	37.9%	43.2%	31.5%	36.7%	40.4%	31.7%	12.8%
Hispanic/Latino (of any race)	1.3%	1.3%	1.0%	1.1%	2.0%	1.2%	2.9%	14.8%
Asian	0.3%	0.3%	0.3%	1.1%	0.3%	0.5%	1.4%	4.4%
Education (% of population over 25)								
High School degree, 2000	65.7%	69.1%	62.0%	62.9%	73.4%	64.6%	74.8%	80.4%
College degree, 2000	9.6%	12.8%	10.7%	8.5%	11.1%	10.3%	18.7%	24.4%
Economic								
Median Household Income, 2004	$ 30,738	$ 32,256	$ 26,290	$ 31,977	$ 37,120	$ 29,988	$ 35,216	$ 44,334
Per capita Income, 2005	$ 22,234	$ 24,170	$ 22,069	$ 21,554	$ 27,844	$ 22,776	$ 24,664	$ 34,471
Individuals below poverty level, 2004	22.5%	19.9%	23.9%	20.4%	16.8%	21.7%	19.2%	12.7%
Unemployment Rate, 2006	5.3%	4.2%	3.9%	3.3%	3.7%	4.0%	4.0%	4.6%
Employment Growth, 2006	-0.3%	-0.9%	3.5%	3.8%	1.7%	2.4%	-1.9%	1.9%
Non-farm Employment Growth, 2000-2005	-1.4%	2.6%	--	-3.2%	-8.6%	--	1.6%	2.0%

[a] *Source: (U.S. Census Bureau 2008)*
[b] *Source: (Federal Deposit Insurance Corporation 2008)*

Table 8. Outdoor recreational economics in Louisiana by U.S. residents

Fishing	
Anglers	702,000
Days of fishing	11,204,000
Average days per angler	1
Total expenditures	$1,007,231,000
Trip-related	$337,363,000
Equipment and other	$669,868,000
Average per angler	$1434
Average trip expenditure per day	$30
Hunting	
Hunters	270,000
Days of hunting	5,979,000
Average days per hunter	22
Total expenditures	$525,505,000
Trip-related	$205,355,000
Equipment and other	$320,150,000
Average per hunter	$1,946
Average trip expenditure per day	$34
Wildlife Watching	
Total wildlife-watching participants	738,000
Nonresidential	225,000
Residential	671,000
Total expenditures	$312,430,000
Trip-related	$ 61,822,000
Equipment and other	$250,608,000
Average per participant	$423

Source: (USFWS and U.S. Census Bureau 2006)

The habitat management opportunities that Atchafalaya NWR offers are many and varied. Refuge staff and management adopt and incorporate appropriate various national, regional, and state plans (Chapters I and II) and coordinate with partners (LDWF, Universities, USACE, USGS) and other major public and private nearby land holdings to achieve the goals and objectives of the refuge (Strader and Chouinard 2008).

Important management activities and issues for Atchafalaya NWR include:

- Management efforts that focus on providing habitats for migratory waterfowl, forest breeding birds, American woodcock, and wintering waterfowl-colonial waterbirds/wading birds. Few opportunities exist to manage for shorebirds (other than woodcock) and marshbirds. Long-legged wader management opportunities are limited. Moist-soil habitat management and greentree reservoir management are both limited by reliable sources of water, lack of water pump equipment, and limited water holding/control capabilities. Management efforts also seek to provide outdoor recreational opportunities consistent with the priority public uses of wildlife refuges as identified in the Improvement Act (e.g., hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation). Inventorying and monitoring of all flora and fauna are needed.

- Staff manages resident, native wildlife habitats and populations to maintain carrying capacity and to meet the objectives of the Improvement Act to include: maintaining and enhancing habitats for a diverse assemblage of resident non-game mammal species, threatened and endangered species, and reptile and amphibian species. Management efforts also integrate multiple methods for exotic and nuisance animal (e.g., feral hogs) and plant (e.g., Chinese tallow, mimosa, privet, Chinaberry) removal into management programs. Efforts to manage, maintain, and improve a recreational warm water fishery, to include crawfishing and bullfrog harvests are also being undertaken.

- Staff works with the state, USACE, LMJV, The Conservation Fund, landowners within the boundary, and others to identify and complete acquisition of the remaining in-holdings within the refuge acquisition boundary. Efforts to acquire lands between the Atchafalaya River, the east floodway protection levee, Interstate 10, and Highway 190 are ongoing in order to protect a larger contiguous block of bottomland hardwood habitat.

- In accordance with applicable laws and statutes, Atchafalaya NWR staff manages and regulates both existing and future oil and gas operations to ensure the protection of refuge resources.

VISITOR SERVICES

The Improvement Act and Executive Order 12996 emphasize the importance of providing compatible wildlife-dependent educational and recreational opportunities on national wildlife refuges. A variety of public use opportunities are available on Atchafalaya NWR (Figure 2). Atchafalaya NWR provides all of the priority wildlife-dependent recreation opportunities as identified in the Improvement Act, to include hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation. Hunting of migratory game birds, small game and big game, sport fishing, hiking, bird watching, wildlife observation, wildlife photography and environmental education are all popular activities among visitors to the refuge. During 2006, 33,350 visitors (and over 74,000 total refuge visits) were documented for

Atchafalaya NWR (however, not all refuge users are thought to have been counted) (USFWS 2006b). In 2007, the Sherburne Complex received about 62,000 visits (USFWS 2008b).

Hunting

According to 2009 Refuge Annual Performance Planning (RAPP) data, approximately 13,343 of the total 32,632 visits to the refuge were hunting related. Atchafalaya NWR offers the public a wide range of hunting opportunities for those using archery, primitive firearms, and modern guns, as well as special opportunities for youth and mobility impaired hunters with access available to most portions of the refuge. Hunters have the opportunity to hunt squirrel, rabbit, woodcock, mourning dove, waterfowl, deer, raccoon, turkey, and wild hog. The refuge is well known for providing hunters opportunities for migratory woodcock as well as waterfowl hunting in the bayous and flooded bottomlands. Hunting for deer, squirrel, and woodcock may be rated as good, while rabbit hunting rated as fair. Waterfowl hunting can be seasonal, depending on many factors, but the opportunities to hunt waterfowl are excellent. Turkey hunting is very good on this bottomland hardwood area; in fact, the refuge supports the highest population and success for wild turkeys across the state (Louisiana Department of Wildlife and Fisheries 2005a and USFWS 2008b).

All hunting seasons on the refuge coincide with the managing agencies within the Sherburne Complex. Due to the numerous boundaries and multi-ownership, all hunting and fishing regulations are set within the Sherburne Complex, making it easier from not only a law enforcement standpoint but also to provide the public maximum opportunities. Certain areas of the refuge are closed to all hunting and closed to waterfowl hunting. Hunters should check with the wildlife management area headquarters for a map of these areas (USFWS 2009f).

A self-clearing permit is required for all activities on the management area, which requires daily check-in, check-out, and bag reports. All hunters are required to check in/out at selected checkpoints and complete a harvest report card for all hunts. To date, hunter compliance is 95 percent. The permits are available at kiosks along the entrance roads to the area. All persons older than 16 or younger than 60 using wildlife management areas including the refuge for any reason must purchase a Wild Louisiana Stamp, hunting, or fishing license from the LDWF, or other local supplier of licenses. Hunters may enter no earlier than 3 a.m. and exit no later than two hours after sunset.

Hunts offered include deer (open and lottery; archery, muzzleloader, and gun); turkey (open and lottery); fox and grey squirrel; rabbit; raccoon; waterfowl, snipe, rail, and gallinules; woodcock and mourning dove. Opportunities for handicapped (e.g., wheelchair bound) hunters are available that include marked all-terrain vehicle (ATV) trails and deer and waterfowl hunting areas that include wheelchair accessible blinds. In addition, youth hunts are offered for deer (lottery), waterfowl (lottery), and squirrel each year (USFWS 2008b).

A shooting range on the Sherburne Complex near the camping area and area headquarters has accommodations for shooters to sharpen their marksmanship skills. The shooting range complex consists of rifle, handgun, skeet/trap, and archery ranges. The rifle range has targets at 25, 50, and 100 yards, and the handgun range has targets at 10, 25, and 50 yards. There are 2 skeet ranges, with one having a trap bunker. The archery range has targets at 10, 20, 30, and 40 yards. There is also a 15-foot tower on the archery range that can be used to shoot at 3-D targets. The rifle, pistol and archery ranges are open daily from official sunrise to official sunset. The skeet/trap range has set days and hours of operation (Louisiana Department of Wildlife and Fisheries 2005a).

A bird dog training area on Complex lands adjacent to the refuge provides opportunities for hunters to work and train their dogs (USFWS 2008b).

Fishing

Fishing is open year-round in conjunction with Louisiana fishing regulations and anglers are allowed to fish many miles of bayous such as Little Alabama and Big Alabama bayous. Recreational fishing is excellent for largemouth bass, crappie, catfish, and sunfish, as well as crawfishing (from April 1 to July 31). Recreational crawfish (commercial crawfishing is not allowed) harvest is limited to 100 pounds per vehicle or boat per day. No traps or nets can be left overnight, and no motorized water craft are allowed on the South Farm Complex (Louisiana Department of Wildlife and Fisheries 2005a). Boat access to the bayous on the refuge is through the public boat launches near the Sherburne Complex Headquarters, Big Alabama Bayou, and Little Alabama Bayou.

Wildlife Observation/Photography/Interpretation and Education

Management of forest wildlife species provides Atchafalaya NWR an opportunity to incorporate interpretive education into refuge activities so the public will have a better understanding of the needs and benefits of selected habitat management techniques. Providing this interpretive information on kiosks and signs and providing outreach at the annual Step Outside Day and special professional tours convey to the public the need for techniques such as forest thinning and moist-soil management. While no on-site structured educational programs are available from the refuge staff, local universities often use the refuge as an outdoor classroom. In addition, staff site visits to local schools in the Southeast Louisiana NWR Complex area are available (USFWS 2009f).

The old Big Alabama Bridge has been converted into a viewing area for birders with interpretive panels. The bayou has parking, benches, and a kiosk to allow birders access to the edge of the bayou. The Section 120 Road trail area includes an overlook that allows views over Bayou Des Ourses and the surrounding swamp (USFWS 2008b). The refuge has an ATV nature trail for visitors with disabilities and mobility impaired hunting blinds that can be opened to wildlife photographers (outside of the hunting season). There is excellent bird watching and alligators are frequently observed. The refuge which has been identified as an "Internationally Important Bird Area" by American Bird Conservancy is an important breeding site for the wood thrush, swallow-tailed kite, prothonotary warbler and other declining bird species. A birding and general brochure are available for downloading at http://www.fws.gov/atchafalaya/index.html (USFWS 2009f).

The Atchafalaya Basin Program sponsors a neotropical migratory bird tour at Big Alabama Bayou overlook with the help of professional birders (USFWS 2008b).

Auto, walking, and boating self-guided tours are available. Additional public uses include hiking as well as two primitive camping areas available nearby on Sherburne Complex lands.

Atchafalaya NWR co-sponsors "*Step Outside Day*" with the LDWF and the USACE, New Orleans District. Local and regional contributors participate and volunteer every year. Activities include antler shed hunting, longbow and cross bow archery, a bear maze, bird watching, boat rides, decoy painting, fishing, laser shooting, nature photography, target and trap shooting, and wood crafts. Exhibits include wildlife equipment, birds of prey, black bear, alligator, dog training, trapping techniques, turkey and duck calling, turkey trapping, and water safety. Lunches have been provided.

PERSONNEL, OPERATIONS, AND MAINTENANCE

Staffing

Currently, there is no permanent staff employed solely to support Atchafalaya NWR. Five employees, including refuge manager, forester, biologist, park ranger (environmental education) and law enforcement officer manage the refuge as a collateral duty. These same five positions are also responsible for management of Big Branch Marsh and Bogue Chitto NWRs, and must assist with activities on all eight refuges of the Southeast Louisiana NWR Complex. The Complex staff consists of 26 permanent full-time employees.

The staffing level limits the refuge's ability to meet its waterfowl and habitat management, public use, and law enforcement objectives. The refuge is predominately bottomland hardwood forest in need of management and a biologist/forester position would allow the refuge to provide quality habitat for neotropical migratory birds and Louisiana black bear. A full-time law enforcement officer would help protect the resources.

Funding

Atchafalaya NWR's funding is received as part of the Southeast Louisiana NWR Complex funding allocation. There is no dedicated funding for Atchafalaya NWR.

Operations

Buildings/Equipment/Machinery

The Complex has a good base of equipment and facilities to support the management of all eight refuges. The staff is responsible for the maintenance and operation of over $3 million in assets, including buildings, roads, parking lots, boardwalks, foot trails, a fleet of heavy equipment, light trucks, boats, and miscellaneous small equipment.

Roads

All refuge roads (6.7 miles) that are open to public travel are graveled. Grading and other maintenance (i.e., mowing of vegetation on levees) is conducted by LDWF staff. Five parking areas are located at major access points on the refuge. Parking areas are refurbished and all refuge roads and parking areas are graveled on an as-needed basis.

Maintenance

Day-to-day maintenance such as grass mowing is provided by LDWF. The Service occasionally provides road material, culverts, and gates. Boundary posting maintenance is also performed by the Service.

III. Plan Development

INTRODUCTION

Development of this Draft CCP/EA for Atchafalaya NWR was initiated in October 2008 and a Final CCP is scheduled for completion by September 2011. The planning team tasked with this responsibility includes natural resource management professionals representing the Southeast Louisiana NWR Complex. The Service established a biological review team, with representatives from local and regional offices and state and federal agencies, including LDNR. The team conducted on-site evaluations and completed a Biological Review Report. A visitor services review team was also established that presented recommendations to the staff and prepared a Visitor Services Review Report (USFWS 2008b).

Public input in the development of this Draft CCP/EA was obtained, in part, through a public scoping meeting held in the vicinity of the refuge. A notice of intent to prepare a Draft CCP/EA was published in the *Federal Register* on January 9, 2009. The public was notified in the local newspapers and media of the public scoping meeting held on January 29, 2009; approximately 25 members of the public attended. During the public scoping process, both written and verbal comments were received. Comments received during this process are listed in Appendix D.

In identifying key issues to be addressed during the planning process, the team considered recommendations from the biological review and visitor services review reports, comments received as a result of the public scoping meeting, and input from comment packets and personal contacts of planning team members. In addition, the team considered opportunities for coordination with other relevant conservation plans; applicable legal mandates; the purposes of all national wildlife refuges, as well as the mission, goals, and policies of the Refuge System; and evaluations and documentation required by Service procedures for refuge planning.

SUMMARY OF ISSUES, CONCERNS, AND OPPORTUNITIES

The planning team identified a number of issues, concerns, and opportunities related to fish and wildlife protection, habitat management and restoration, visitor and educational services, and refuge administration. Issues and concerns are based on the professional judgment of the team and on recommendations and discussions with personnel from other conservation agencies and refuges arising from the biological review, visitor services program, and comments from the public made at a public scoping meeting and mailed to the refuge. Key issues included forest management, management of oil and gas activities, commercial activities allowed on the refuge and the management of these activities, migratory bird and waterfowl nesting habitats, invasive species of plants and animals, refuge access, law enforcement, and easement and property ownership. The planning team considered federal and state mandates, as well as applicable local ordinances, regulations, and plans throughout the Draft CCP/EA process.

All public and advisory team comments were considered; however, some issues important to the public fall outside the scope of the decisions made within this planning process. The team considered all issues that were raised throughout the planning process, and developed this plan, which attempts to balance the competing opinions relating to important issues. The team identified the issues that, in its best professional judgment, are most significant to the refuge. A summary of these issues follows.

FISH AND WILDLIFE POPULATION MANAGEMENT

Threatened and Endangered Species

The protection of threatened and endangered plants and animals is an important responsibility delegated to the Service and its national wildlife refuges. Only two federally listed threatened and endangered species are thought to use, or have the potential to use, Atchafalaya NWR. These include the Louisiana black bear and the pallid sturgeon.

The Louisiana black bear is omnivorous and typically feeds on a variety of food resources including nuts such as acorns, soft fruits such as blackberries and persimmon, herbaceous vegetation such as grasses and forbs, animal matter such as ants and grubs, and supplemented by carrion or small animals. The Sherburne Complex, including Atchafalaya NWR, has a history of light bear use. One reason for this lack of use is thought to be the lack of hard mast food resources, which are one of the most important food needs for black bear in hardwood-dominated systems. Research indicates that hard mast availability often drives female reproductive success. It is highly likely that the lack of hard mast forest component is severely limiting the habitat suitability of Atchafalaya NWR for Louisiana black bear, despite the considerable potential of the site, including the positive characteristics of forested habitat continuity with an adjacent Louisiana black bear population center, security provided by public land ownership and related law enforcement and education attention, and other food resources including soft mast, forbs, grasses, insects, and small mammals (Strader and Chouinard 2008). This lack of hard mast availability as a viable food supply for black bear and other resident wildlife was identified as an issue that needs to be addressed in future forest management goals and strategies.

The pallid sturgeon's range is quite large and includes approximately 3,515 miles (5,656 kilometers) of river encompassing 13 states including Louisiana and Mississippi (USFWS 1993). In Louisiana, the most frequent occurrence of the pallid sturgeon is in the Mississippi and Atchafalaya Rivers, where the Atchafalaya River diverges from the Mississippi River (USFWS 1993 and 2007). It is unlikely that this species would actively use the refuge waters due to the fact that the refuge is cut off hydrologically from the Atchafalaya River except during extreme flooding conditions.

Invasive and Nuisance Species

An invasive species is defined as a species that is non-native to the ecosystem under consideration, and whose interdiction causes or is likely to cause economic harm, environmental harm, or harm to human health (Executive Order 13112). These species are normally introduced by direct or inadvertent human actions. Nuisance species are defined in relation to humans, and are unwanted plant and animal species that may be native but cause property damage or damage to human life and the human environment.

According to 2009 Refuge Annual Performance Planning (RAPP) data, 2.5 million acres of Refuge System lands are infested with invasive plants. There are currently 3,894 invasive animal populations recorded on refuge lands as well. On Atchafalaya NWR, there are approximately 4,955 acres of

invasive plants and two types of animal species. Although refuge staff members do their best to control these populations, only about 25 percent of infested acres have been treated thus far.

Both plant and animal invasive and nuisance species currently occur on the refuge. Animal species such as coyote, beaver, nutria, and feral hogs compete with native species for limited food supplies and can be destructive to habitats. These species are thought to occur throughout the refuge in varying densities. Several species, including hog and beaver, adversely impact and change the habitat, and in the case of feral hogs, compete with native wildlife for limited food resources and thus have a negative impact on other wildlife species (e.g., deer, squirrels, and songbirds). Beavers manipulate hydrology both on and off the refuge by constructing dams that inundate bottomland hardwood forests for prolonged periods. Removal of hogs has been attempted opportunistically by refuge staff and hunting programs offered to the public.

Nuisance and invasive plant species, including Chinese tallow trees, mimosa trees, privet, and Chinaberry trees, are present on the refuge. Because of the opportunistic and resilient nature of these invasive plant species, they have thrived. Currently, management controls these species by opportunistically removing them, but more aggressive measures are needed to control their spread. This issue was brought up in internal meetings and by the biological review team.

Resident Wildlife

While the Service's primary goal is the protection of federal trust species, the refuge's purposes include improving natural diversity of resident fish and wildlife species. Therefore, it is the responsibility of the refuge to manage resident wildlife within the refuge boundaries. This management needs to be performed in conjunction with, and not to the detriment of, migratory, shore, and wading birds within the refuge. An array of wildlife species indigenous to the LMAV Ecosystem inhabits Atchafalaya NWR. The most widely recognized species include white-tailed deer, bobcat, coyote, river otter, raccoon, gray fox, red fox, beaver, mink, swamp rabbit, cottontail rabbit, eastern gray squirrel, fox squirrel, opossum, muskrat, wild turkey, and skunk. Resident reptiles and amphibians include alligators, various snakes, frogs, skinks, and turtles.

The biological review team recognized that the refuge lacked specific data on many resident wildlife species, particularly non-game wildlife, such as reptiles, amphibians, mussels, insects, small mammals, and their habitats. Most efforts to collect data on resident wildlife species has focused on studying and management of game species, such as white-tailed deer. The needed studies on species and habitats will require additional staff and funding to complete.

Migratory Birds

A primary purpose of the refuge is to provide wintering and nesting habitats for migratory and resident waterfowl, wading birds and migrating songbirds. The operation and management of the refuge helps provide the basic needs of these species, including feeding, resting, and breeding. Management measures on Atchafalaya NWR include management of forested and moist-soil habitats that cater to a variety of different species. Comments from the biological review team and the public expressed a desire to support and expand these efforts. A major issue facing the refuge is the reduction in migratory waterfowl use of the refuge. Possible reasons for this could be mild winters in the northern United States and/or the reduction in food and critical habitats locally.

Within the LMAV, the two greatest issues affecting forest breeding birds are forest fragmentation and poor stand quality. Atchafalaya NWR lies within the Atchafalaya Basin, a 650,000-acre mostly forested wetland complex. The basin is the largest forest block in the LMAV and certainly one of the largest

remaining blocks of forested wetlands in the continental United States. The huge forest tract is interrupted east to west only by the Atchafalaya River and a levee and road that parallel the river in the northern one-third of the basin, and north to south by U.S. Highway 190 and Interstate Highway 10.

The area holds a second important distinction in that it extends nearly to the Gulf of Mexico and, as such, likely serves as an extremely important site for forest birds migrating to and from Central and South America in the fall and spring. Large forested complexes along major rivers have been illustrated to be used heavily by these long-distance migratory birds as they build energy reserves for southbound migration or recover from trans-gulf flights headed north in spring. The Atchafalaya Basin may be one of the most important sites in North America for migrating songbirds.

The biological review team identified a need to properly survey and monitor migratory and resident breeding waterfowl and songbird populations to determine population numbers and to identify management needs. These surveys would help evaluate impacts of previous management actions, as well as uncontrollable factors such as weather and outside pollution sources. Nesting boxes for wood ducks already exist, are used by wood ducks on the refuge, and are a good source of valuable breeding information.

HABITAT MANAGEMENT

The refuge is located in the physiographic region known as the MAV (also referred to as the Mississippi Alluvial Plain). The MAV is a broad, nearly level, now agriculturally dominated alluvial plain. The MAV provides important habitat for fish and wildlife, and includes the largest continuous system of wetlands in North America. Potential natural vegetation is largely southern floodplain forest and is unlike the oak-hickory and pine-oak-hickory forests that dominate upland areas. The MAV has been widely cleared and drained for cultivation; this widespread loss or degradation of forest and wetland habitat has impacted wildlife and reduced bird populations. For a complete listing of habitat sizes and types within the refuge see Chapter II for specific details.

Forest Management

Forest composition on the refuge can be broadly classified as mid- to late-successional bottomland hardwood forests and cypress mixed with bottomland hardwoods. Forest fragmentation and poor stand quality are issues being faced by the refuge. Improved forest management is needed to develop a forested landscape on Atchafalaya NWR. Currently, Sherburne WMA, which is diverse in plant species composition, vertical structure, canopy development, and age, is meeting the objectives of its active forest management plan. This diversity would allow natural resource managers to provide a variety of habitat conditions to meet the habitat needs of a variety of wildlife species (Strader and Chouinard 2008).

Several comments were made by the public wanting to stop all timber harvesting within the Atchafalaya Basin, including on the refuge. Some of these comments also included the desire to see the forest returned to old growth status and/or to see non-management areas introduced. The biological review team and refuge staff identified a need to create a partnership for the implementation of forest management activities throughout the properties owned and shared by each party within the boundaries of the Sherburne WMA. This partnership should include such items as establishing a natural area that will provide a core area of the WMA that is managed passively to provide habitat for species in need of such habitat; distributing forest habitat management activities throughout the WMA to create a variety of different age classes that mimic forest succession throughout the landscape; developing a monitoring schedule to monitor the impact of forest management activities on habitat conditions, neotropical bird populations, and resident wildlife

populations; and sharing of funding and personnel to implement the forest habitat management activities on Sherburne WMA as a whole. To assist with accomplishment of these tasks, the Complex recently hired a full-time forester.

Aquatic Habitat Management

Before construction of the Atchafalaya Basin, water from the Atchafalaya River flowed through the area primarily through Big and Little Alabama Bayous and Bayou DesGlaises and then into the East Fork of Bayou DesGlaises. From the East Fork of Bayou DesGlaises, water would flow via overbank or through swamps and many smaller bayous and leave the present location of the Atchafalaya NWR (Strader and Chouinard 2008).

Alteration of the natural drainage pattern began in the late 1880s and still continues today. Approximately 12 percent of the refuge is inundated by open water, with isolated cypress trees and willow stands. For most of the year, water levels are influenced by rainfall in the floodway system of the Atchafalaya River. However, when the river level at the gauge located at Interstate 10 registers 14 feet mean sea level, river water backs into natural and manmade drainage. Backwater combined with local rainfall inundates the land between the ridges. Current flood control features along the main channel of the Atchafalaya River have eliminated all river flows, excluding extremely large floods. Because the higher water surface elevation effectively prevents any connecting channels from functioning as outlets, the areal extent of backwater flooding in the adjacent swamps has increased. Flooding in those backwater swamps may form areas of stagnant water that are usually characterized by poor water quality (primarily low dissolved oxygen levels). The higher water surface elevation in the more efficient channels also allows sediment-laden river water to flow north through distributaries that historically were outlets. Water flowing north into those distributaries results in shoaling within the channel, and causes a corresponding reduction in the channel's cross-section. The reduced cross-section decreases water flowing through the channel, thus reducing headwater habitat. In addition, sedimentation occurs in open water areas and swamps directly connected to those major channels reducing the areal extent of their aquatic habitats (Strader and Chouinard 2008).

Greentree Reservoir

Greentree reservoir habitat consists of seasonally flooded low-lying bottomland hardwood forests. Atchafalaya NWR's 400-acre greentree reservoir (which has been dry for the last few years due to low rainfall) is present on the west bank of Big Alabama Bayou (USFWS 2006b). Flooding of the Greentree reservoir usually begins in late November, when the Atchafalaya River overflows its banks and contributes to backwater flooding, or through the collection of winter rainfall, with expectations that water levels will reach desired levels by the end of December. Water levels are then allowed to slowly recede until they reach desired draw down levels in the late spring or early summer. An issue identified by the staff was the need to be able to manipulate the greentree reservoir's water supply to provide flexibility and support restoration of desirable tree species in the reservoir, control invasive aquatic vegetative species, and accommodate approved visitor service opportunities. Another issue raised was the possibility of the restoration of the historic hydraulic connection between the refuge and the Atchafalaya River, which would promote additional greentree reservoir habitat and public use opportunities.

Moist-soil Water Management

Moist-soil management refers to management of land to provide moist-soil conditions during the growing season to promote the natural production of beneficial plants. The high seed production of moist-soil plants and their value as waterfowl foods has been known since at least the 1940s (Low and Bellrose 1944). However, managing seasonally flooded herbaceous wetland impoundments or

“moist-soil units” only became a widely accepted practice after many years of research (Fredrickson and Taylor 1982, Fredrickson 1996). The refuge currently manages one 100-acre moist-soil unit and one 20-acre food plot that formerly was planted with Egyptian wheat, Japanese millet, and brown-top millet to provide wintering habitat for waterfowl, and is currently a fallow field.

Fire Management

Fire does not play a large role in shaping the wildlife habitats of Atchafalaya NWR. Fire management on the refuge consists only of wildland fire suppression and is handled by LDWF.

RESOURCE PROTECTION

Cultural Resources

In addition to its biological assets, the refuge has cultural sites relating to human settlement that date back as far as 2,500 years ago when the Chitimacha, Attakapas, Opelousa, Houma, Coushatta and Alabama, Tunica-Biloxi and Avoyel, and Taensas Indians occupied the area. These tribes hunted, fished, and trapped in places that are still popular for these activities today. No formal archaeological investigations have been performed on refuge lands; however, if cultural resources are discovered during the process of habitat management activities, all work will be stopped until the regional archaeologist has addressed the discovery and surveyed the area. As with all public lands, patrol by law enforcement and refuge staff is needed to prevent uncontrolled access to the refuge and disturbance to wildlife habitat. If discovered, the presence of cultural resources would add a degree of complexity to resource protection.

Pollution Prevention

Even though Atchafalaya NWR is located in a rural area, it is adjacent to a major interstate (I-10) and has several sources of pollution caused by on- and off-refuge sources. Pollutants, such as heavy metals, can have long-term effects when deposited into the soil column and bio-concentrated through the food chain. Pollutant effects on water quality also are exacerbated by drought, poor drainage, and flooding. The Louisiana Department of Environmental Quality (LDEQ) has issued a fish consumption advisory for fish caught in Big Alabama Bayou. This advisory was in response to elevated mercury levels found in largemouth bass, crappie, bigmouth buffalo, freshwater drum, flathead catfish, and bowfin (LDEQ 2003). Sediment samples from on and/or adjacent to the Atchafalaya NWR contained mercury; however, the concentration did not exceed a probable effects’ concentration level for benthic communities (Shea et al. 2001). Mercury found within the area is most likely a product of atmospheric deposition (Strader and Chouinard 2008).

On-site pollution is most likely attributed to oil and gas exploration and development, which has occurred on the lands comprising Atchafalaya NWR for decades. Most of these activities are located in the south-southwestern portion of the refuge and are accessed via a system of roads from Highway 975. A number of wells and facilities were present on refuge lands prior to acquisition, with new exploration and development continuing since acquisition. With aging infra-structure and little supervision, these enterprises have left lasting effects on the refuge. Refuge staff and law enforcement have worked to bring these ventures into compliance, but additional management/enforcement will be needed.

Additionally, a comment was made by a stakeholder that litter was an issue on the refuge and needed to be addressed.

VISITOR SERVICES

Six priority public uses on refuge lands have been identified and approved by the National Wildlife Refuge Improvement Act of 1997. These uses, which include fishing, hunting, wildlife observation, wildlife photography, and environmental education and interpretation, must be determined appropriate and compatible for each specific refuge.

Fishing and Hunting

Fishing and hunting opportunities are popular on the refuge and are of great public interest. All hunting seasons coincide with the managing agencies within the Sherburne Complex. Because of the numerous boundaries and multi-ownership, all hunting and fishing regulations within the Sherburne Complex are set by LDWF and fall under the rules and regulations of Sherburne WMA, making it easier from not only a law enforcement standpoint, but also from a public use standpoint. Hunters have the opportunity to hunt squirrel, rabbit, woodcock, mourning dove, waterfowl, white-tailed deer, raccoon, bobcat, turkey, and wild hog. The refuge is well-known for providing hunters opportunities for white-tailed deer and for migratory woodcock, as well as for waterfowl hunting in the bayous and flooded bottomlands.

Fishing is open year-round in conjunction with Louisiana fishing regulations, and anglers are allowed to fish many miles of bayous, such as Little Alabama and Big Alabama, both of which provide public boat launch/ramps. Anglers have opportunities to catch largemouth bass, crappie, catfish, and sunfish. Recreational crawfishing is also allowed. As previously mentioned, there is a mercury fish advisory for Big Alabama Bayou.

One stakeholder expressed the desire to ban hunting on all national lands. Another commenter expressed the need to ban air boat use because of sound pollution and the disturbance to wildlife.

Wildlife Observation and Photography

Atchafalaya NWR has a limited number of visitors coming to observe wildlife or to take photographs. Visitation for observation averages about 30 persons a month. However, in April and May, neotropical migratory birds move through and arrive to nest in the basin. During this time of year birding enthusiasts come from around the world to visit. The refuge has started providing more interpretation and facilities for these users. To view birds, the old Big Alabama Bridge has been converted to a viewing area with interpretive panels. Another area farther down the bayou has parking, benches, and a kiosk to allow birders access to the edge of the bayou. The Section 120 trail area includes an overlook that allows views over Bayou Des Ourses and the surrounding swamp.

A few professional photographers have traveled throughout the basin over the past 40 years and several books have been printed extolling its beauty. The refuge has a nature trail and an ATV trail for visitors with disabilities. There is excellent bird watching, and alligators are frequently observed. On state lands, two primitive campgrounds are maintained.

Several comments expressed the need for the refuge to better control commercial ventures, and many people expressed the desire to allow additional full-time commercial ventures that would include birding tours and paddling tours. Other comments expressed the need for the refuge to limit

these commercial ventures, only allowing a select few part-time commercial permits or none at all. Additionally, a stakeholder wanted the Service to add paddling as a priority public use.

Environmental Education and Interpretation

Atchafalaya NWR currently has one visitor services staff member who is shared with two other refuges. Because of the distance to Atchafalaya NWR from the headquarters, an environmental education program has not been initiated. However, even with this constraint, the refuge could improve environmental education opportunities by developing an activity kit and a set of self-guided activity lessons for teachers, and by partnering with local schools to involve their students in developing environmental education opportunities.

To the extent possible, the refuge has identified the need to expand opportunities for involvement with environmental educators from nearby state and USACE recreation areas, and should identify community-based outreach activities to enhance communication with off-site audiences.

If resources become available, it would be beneficial to develop a welcome/environmental education center on the refuge, in partnership with stakeholders.

REFUGE ADMINISTRATION

Law Enforcement

The demand for recreation, the need to provide visitor safety, and the enforcement of regulations prompted a recommendation for additional law enforcement presence on the refuge. Several different enforcement issues were brought up by staff and will need to be addressed, such as poaching, illegal trespassing, and on-site polluting.

Staffing Needs

The staff that administers Atchafalaya NWR is also responsible for the management of seven other refuges within the Complex. As part of the 8-refuge Complex, these same staff members support activities and issues on all of the refuges. Five employees, including the refuge manager, forester, biologist, park ranger, and law enforcement officer manage the refuge as a collateral duty. These same five positions are also responsible for management of Big Branch Marsh and Bogue Chitto NWRs or Bayou Teche and Mandalay NWRs. The refuge is predominantly bottomland hardwood forest in need of management, and a full-time biologist/forester position would allow the refuge to better provide habitat for neotropical migratory birds and Louisiana black bears. A full-time law enforcement officer would help protect refuge resources.

Additional funding and facilities are needed to meet the refuge's goals and vision for the next 15 years. This plan details these needs by establishing goals, objectives, and strategies.

Wilderness Review

Refuge planning policy requires a wilderness review as part of the comprehensive conservation planning process. The results of the wilderness review are included in Appendix H.

IV. Management Direction

INTRODUCTION

The Service manages fish and wildlife habitats while 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 Improvement Act is for the Service to maintain the ecological health, diversity, and integrity of refuges. Public uses are allowed if they are appropriate and compatible with wildlife and habitat conservation. The Service has identified six priority wildlife-dependent public uses. These uses are: hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation.

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

Three alternatives for managing the refuge were considered: Alternative A - Current Management (No Action), Alternative B - Optimize Biological and Visitor Services, and Alternative C - Maximize Public Use. Each of these alternatives is described in Section B. The Service chose Alternative B - Optimize Biological and Visitor Services - as the proposed management direction.

Implementing the proposed alternative would result in additional monitoring of fish and wildlife populations needed to adapt appropriate habitat management strategies and actions, with an emphasis on migratory birds and threatened and endangered species. The proposed alternative would also allow for a variety of additional wildlife-dependent recreation, education, and interpretive activities, while providing for law enforcement to ensure visitor safety, public compliance with refuge regulations, and protection of archaeological and historical sites.

VISION

The Atchafalaya Basin is the nation's largest complex of forested wetlands, composed of seasonally flooded hardwood swamps, lakes, and bayous. In the heart of the basin, the Atchafalaya NWR will be managed for the conservation of native systems of lands and waters to provide quality habitat for migratory birds, other wildlife, fisheries, and plants for the benefit and enjoyment of present and future generations. The cooperative agency management of wildlife and habitat is an active, science-driven, comprehensive endeavor that includes research projects to meet information needs of the refuge that aims to conserve the natural health and beauty of the land. When compatible, wildlife-dependent recreational opportunities for hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation will be provided so that visitors are able to experience the uniqueness of this national treasure.

GOALS, OBJECTIVES, AND STRATEGIES

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

These goals, objectives, and strategies reflect the Service's commitment to achieve the mandates of the Improvement Act, the mission of the Refuge System, and the purposes and vision of Atchafalaya NWR. The Service intends to accomplish these goals, objectives, and strategies within the next 15 years.

FISH AND WILDLIFE POPULATION MANAGEMENT

Goal 1. Protect, manage, enhance, and restore healthy and viable populations of migratory birds, resident wildlife, fish, and native plants, including all federal and state threatened and endangered species found within the Atchafalaya Basin, in a manner that supports national and international treaties, plans, and initiatives.

Discussion: Atchafalaya NWR is home to a large variety of resident fish and wildlife species. Most of the wildlife that live on the refuge can be found typically in bottomland hardwood forests. Many species of wading and shorebirds can be found on the refuge year-round. Migratory songbirds pass through in the spring and fall months, while a number of migratory waterfowl species spend the winters resting and feeding on the refuge. Additionally, the Service has designated critical habitat in Louisiana for the Louisiana black bear, which was listed as a threatened species in 1992.

Each individual species would have the same general requirements in that they require food, water, and cover to survive. However, the particular food and cover requirements of a given species are often very specialized. The specific habitat needs of each species vary in some degree although many different animals may occupy the same general area. A diversity of habitats tends to encourage and support a diversity of wildlife species. The key to the conservation and restoration of species' populations is increased monitoring that can be used to direct adaptive management of critical habitats.

Objective 1.1: By 2015, increase monitoring of waterfowl to assess and adapt habitat management strategies/actions.

Discussion: The LMV is a critical ecoregion for migrating and wintering ducks and geese in North America. Concern over waterfowl population declines in the 1980s resulted in the establishment of the North American Waterfowl Management Plan (NAWMP), which focused the attention of federal, state, and private conservation groups on critical wintering and breeding areas. Research indicates that the foods used by the species emphasized by NAWMP are obtained in three primary habitats: moist-soil areas, croplands, and forested wetlands. Atchafalaya NWR contains all three of these primary habitats, although the moist-soil and cropland habitats are limited. Currently, the refuge, in coordination with the state, monitors effects of waterfowl response through harvest surveys. Self-clearing permits are used to determine harvest and species composition of harvest. Additional monitoring would allow the staff to adapt habitat management strategies to focus on critical needs.

Strategy:

- Conduct bi-monthly waterfowl ground counts in all suitable habitats (Oct.-Mar.).

Objective 1.2: Determine regional population trends by continuing to participate in regional wood duck banding and monthly monitoring from January through May and increasing wood duck nest boxes.

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

Wood ducks are cavity nesters, seeking cavities in trees within a mile of water. Due to conversion of forest lands through urban sprawl, agriculture, forest practices, and competition for nest sites from a host of other species, the availability of natural cavities has limited wood duck reproduction. Nest boxes are commonly used to supplement natural cavities and increase local production of wood ducks. Refuge staff members have indicated that, due to time and staff constraints, these nest boxes have not been adequately maintained (i.e., protected from predators such as rat snakes and raccoons). Furthermore, because wood ducks are secretive birds, it is difficult to estimate populations and survival rates; therefore regional banding quotas have been established. Currently, the refuge is maintaining and monitoring 57 wood duck nesting boxes, using self-clearing permits to determine harvest rates and trends, and participating in regional wood duck banding to determine regional population trends. Additional monitoring and banding would help assess the need for habitat improvement, allowing staff to actively adapt habitat management strategies to focus on critical needs.

Strategies:

- Evaluate nest use and nest success in boxes and adjust the program according to established protocol, maintaining annual records in a file.
- Map all existing and any newly erected nest boxes using GPS; keep this location information in a file.
- Conduct wood duck banding annually.

Objective 1.3: Over the 15-year life of the CCP, develop a comprehensive woodcock survey and monitoring program.

Discussion: American woodcock are migratory game birds that occur throughout the forested portions of the eastern United States. The American woodcock is primarily a winter migrant, with localized breeding confirmed in Louisiana. Preferred woodcock habitats include alluvial floodplain forests and wetlands with well-developed sapling, shrub, vine, and cane understories, mixed with open fields and young forest stands in the uplands. Diurnally, woodcock probe for earthworms and other invertebrates in the moist soils of floodplains and wetlands; while nocturnally using openings, old fields, and newly established forest regeneration areas for courting and display.

Atchafalaya NWR is within the Central Region used for administrative management of the woodcock. Woodcock populations in this region have declined 19 percent since 1968, probably due to land use changes associated with land conversion and the maturing of forest habitats. Currently, the refuge relies on the state to monitor harvest rates of woodcock through the use of self-clearing permits. Additional monitoring will help assess the need for habitat improvement, allowing staff to actively adapt habitat management strategies to focus on critical needs.

Strategies:

- Assess and inventory suitable woodcock habitat on the refuge.
- Develop and implement forest management plans that provide preferred woodcock habitat.
- Inventory suitable woodcock wintering habitat on the refuge and conduct evening flight counts, nighttime counts, and flush counts (and/or other methods) to assess woodcock usage of the refuge at least twice monthly from mid-November to mid-March to assess woodcock densities and response to management action.

Objective 1.4: Within 5 years of completion of the CCP, continue and expand, where applicable, seasonal monitoring to reveal population trends and response of forest breeding birds to management actions.

Discussion: Within the LMAV, the two greatest issues affecting forest breeding birds are forest fragmentation and poor stand quality. The LMAV serves as an extremely important site for forest birds migrating to and from Central and South America in the spring and fall, and may be one of the most important sites in North America for migrating songbirds. There are a number of high-priority birds found on the refuge, including swallow-tailed kite, prothonotary warbler, Swainson's warbler, American woodcock, and cerulean warbler. Currently, the refuge maintains MAPS (Monitoring Avian Productivity and Survival) long-term monitoring stations in coordination with LDWF, opportunistically surveys and monitors forest breeding bird populations, and conducts an annual breeding bird survey. Population data for forest breeding birds is limited for many refuges in the LMAV. As such, bird population data from Atchafalaya NWR is critical for establishing baseline populations used to assess management actions and compare future habitat conditions. Additional monitoring would help assess the need for habitat improvement, allowing refuge staff to actively adapt habitat management strategies to focus on critical needs.

Strategy:

- Inventory populations of forest breeding birds and monitor their productivity utilizing regional standardized protocols and surveys.

Objective 1.5: Over the 15-year life of the CCP, maintain and enhance forest habitats for the purpose of improving conditions for swallow-tailed and Mississippi kites. Continue to monitor kite relative abundance and nest locations and productivity.

Discussion: As stated above, the Atchafalaya Basin serves as an extremely important site for forest birds migrating to and from Central and South America in the spring and fall. The swallow-tailed and Mississippi kites are species of concern found on the refuge (they live in woodland and forested wetlands). Currently the refuge monitors kite relative abundance and nest locations and productivity. Additional monitoring would help assess the need for habitat improvement, allowing refuge staff to actively adapt habitat management strategies to focus on critical needs.

Strategies:

- Coordinate research efforts with scientists and the research community to benefit forest breeding birds.
- Enlist volunteers (e.g., area birdwatchers, state birding groups and universities) to help expand monitoring and survey efforts on the refuge.
- Conduct spring kite nest surveys in coordination with local birding groups or researchers to limit disturbance.

Objective 1.6: Over the 15-year life of the CCP, identify colonial waterbird and wading bird rookeries.

Discussion: Atchafalaya NWR provides excellent habitat for breeding and wintering colonial wading birds. Shallow water areas found on the refuge provide critical foraging opportunities for long-legged wading birds, including herons, egrets, and ibis. Currently, the refuge only opportunistically surveys waterbird and wading bird populations.

Strategy:

- Conduct flight line counts as appropriate.

Objective 1.7: Over the 15-year life of the CCP, expand management and research activities which contribute to the recovery of any threatened and endangered species as indicated by a recovery plan.

Discussion: Populations of the Louisiana black bear, which were once distributed across much of the state, dropped precipitously by the mid-1970s, and LDWF closed the state hunting season. The bear populations continued to decline, and it was officially listed as threatened in January 1992, due to reduction in population size resulting from extensive habitat loss and modification. A notice to that effect was published in the *Federal Register*. Anecdotal evidence suggests bear populations are currently stable or increasing in some areas. The Atchafalaya NWR is located within core bear breeding and critical habitat of the Upper Atchafalaya sub-population. Considering the positive characteristics of the refuge's forested habitat continuity with an adjacent Louisiana black bear population center, security provided by public land ownership, related law enforcement and education attention, and other food resources (e.g., soft mast, forbs, grasses, insects, and small mammals), it is quite notable that bear use of the Complex is minimal. The most likely constraint on bear use of the Atchafalaya NWR is a paucity of hard mast species within the forest community. Portions of the refuge have the potential to be highly productive habitats for bears.

The Atchafalaya NWR is within the historical range of the ivory-billed woodpecker. There are no recent *confirmed* reports of this species within or nearby this area. However, credible reports during the last 3 years across the historical range (but particularly Arkansas and Florida) suggest the possibility that this species may persist in this area of Louisiana. Unconfirmed sightings have been reported in recent years within the Atchafalaya Basin. Although it is unlikely the species persists regularly due to the historical degradation of forested habitats during the mid-1990s, habitat designations in this area should be considered for the ivory-billed woodpecker if it persists.

Strategies:

- Establish a baseline and conduct annual surveys for threatened and endangered species and other priority species.
- Monitor Louisiana black bear.
- Coordinate all Louisiana black bear activities with the Louisiana Ecological Services Field Office.
- Increase educational opportunities and outreach on the topic of Louisiana black bears.
- Identify and protect any plant species of special concern in cooperation with partners such as LDWF.
- Staff should be alert to the possible existence of the ivory-billed woodpecker in the area and report possible sightings by staff or public through an established regional reporting site (as of 2010: http://www.birds.cornell.edu/ivory/identifying/)

Objective 1.8: In cooperation with partners, continue to conduct surveys of reptile and amphibian populations. Over the 15-year life of the CCP, develop a comprehensive reptile and amphibian species list.

Discussion: The bottomland and swamp habitats of Atchafalaya NWR are suitable for numerous species of reptiles and amphibians. Commonly seen species include American alligator, red-eared slider, water moccasin, eastern mud snake, five-lined skink, bullfrog, and southern leopard frog. No

thorough herpetological surveys have been conducted to date on refuge lands. Priority species likely to be found on refuge lands, as identified by the State Wildlife Action Plan, include the southern dusky salamander, alligator snapping turtle, and the timber rattlesnake.

Currently, there is little active management taking place on the refuge for reptiles and amphibians. The USGS has been conducting amphibian surveys on Atchafalaya NWR since 2002, as part of the Amphibian Research and Monitoring Initiative (ARMI). ARMI staff members conducted surveys to detect frogs and toads by vocalization from 2002-2006, and from 2008-2010 conducted both call and visual encounter surveys. In addition, tadpoles collected on the refuge have been sent to the National Wildlife Health Center for disease screening. This ARMI monitoring is expected to continue for the next several years. There is currently a manuscript in press (accepted for publication) in the Journal of Wildlife Management on the monitoring from 2002-2006. Also, we have sent annual updates of research results starting at the end of 2008 through 2010. The continuation of this monitoring would help assess the need for both wildlife population management and habitat improvement, allowing staff to actively adapt habitat management strategies to focus on critical needs.

Strategies:

- Work with partners (LDWF, USGS, other state and federal agencies, and universities) to conduct herpetological surveys to document species occurrence. Secondarily address species occurrence and relative abundance by habitat type and in response to management through time.
- Protect against illegal or incidental take of reptiles and amphibians.
- Work with others to develop a baseline abundance list of keystone species to determine long-term environmental health.

Objective 1.9: Annually manage to maintain healthy, resident wildlife populations of both small and big game species.

Discussion: Hunting is a popular activity on Atchafalaya NWR. The refuge offers hunters the opportunity to hunt squirrel, rabbit, woodcock, mourning dove, waterfowl, white-tailed deer, raccoon, bobcat, turkey, and feral hogs. The refuge is especially well-known for providing hunters with opportunities to hunt white-tailed deer and migratory woodcock, and for waterfowl hunting in the bayous and flooded bottomlands.

Population and habitat monitoring are an important component of resident wildlife management. Deer browse surveys may be used to monitor the deer herd and evaluate the habitat and are a useful tool to the manager. The information gathered through browse surveys can indicate herd density and habitat quality on which management decisions can be made. Other surveys, including harvest surveys, deer health herd checks, and wild turkey surveys can also be useful to evaluate deer and other game species use of the area. Annual mast surveys are a useful index to habitat condition as it relates to deer and also many other game and non-game species (e.g., deer, turkey, squirrel, black bear, and rodents).

Strategies:

- Maintain a stable deer and wild turkey population with hunting and establish annual harvest strategies based on harvest data, surveys, and other factors such as an influence of backwater flood events.

- Conduct deer health checks every three to five years and monitor habitat conditions with browse surveys to determine health and population of deer on the refuge.
- Assess self-clearing harvest cards to monitor trends in small game harvest and use data to assist in setting hunting season dates.

Objective 1.10: Over the 15-year life of the CCP, establish a comprehensive inventorying and monitoring program for fisheries, nongame mammals, and plants.

Discussion: Other mammals readily seen on Atchafalaya NWR include opossum and armadillo. Other, less easily recognized, nongame mammals include various rodents and bats. Of these, the Rafinesque's big-eared bat, southeastern myotis, Seminole bat, and northern yellow bat are currently considered state and/or federal species of special concern. Habitat components known to be important to these species include large cavity trees, abundant Spanish moss in trees, and a forested landscape with diverse flying insect components to support nutritional needs. No nongame mammal surveys have been conducted to date on refuge lands. The implementation of monitoring would help assess the need for both wildlife population management and habitat improvement, allowing refuge staff to actively adapt habitat management strategies to focus on critical needs.

Sport fishing is an extremely important recreational activity in the Atchafalaya Basin. Largemouth bass and crappie are the species most sought after on the Atchafalaya NWR. Recreationally harvested shellfish in the basin include red swamp crawfish and white river crawfish. As the swamp drains at the onset of the low-water season, crawfish burrow into the swamp floor prior to spawning. Adverse water quality during this period could affect the reproductive success of the crawfish, and reduced crawfish production could also translate into lower fish production. Monitoring is needed to determine the condition of fisheries and any feasible means of improving, if needed.

Strategies:

- Work with partners (LDWF, other state and federal agencies, and universities) to conduct nongame mammal surveys to document species occurrence.
- Address species occurrence and relative abundance by habitat type and in response to management through time.
- Monitor fisheries.

Objective 1.11: Over the 15-year life of the CCP, integrate exotic and nuisance animal removal into all refuge resource management programs through multiple control methods.

Discussion: Both invasive (e.g., feral hogs, nutria) and nuisance animal species (e.g., coyote, beaver) occur on the refuge, competing for food supplies and causing damage to refuge resources. Feral hogs, for example, can be an impediment to desired wildlife conservation strategies, invading nests of ground-nesting birds and eating small mammals and herpetofauna. They also can cause damage to sensitive habitat and agriculture. Currently, removal of hogs is done only opportunistically by refuge staff and through hunting programs.

Brown-headed cowbirds, which have long reproductive cycles and unusually short intervals between clutches, often lay their eggs in the nests of other birds, including both treetop and ground-nesting species. About one-third of all parasitized nests hold more than one cowbird egg, which are often accepted by the host species—the majority of hosts don't recognize the cowbird egg. Cowbird eggs usually hatch a day ahead of, and the fledglings grow faster than, the host's young, which causes the cowbird fledglings to receive more of the food intended for the host's fledglings. If the host species

abandons that nest and must re-nest, then that host species' reproductive success is much lower than it would have been, or it may even be zero for that breeding season (Cornell Lab of Ornithology 2010). Therefore, it is desirable to minimize habitat conditions conducive to the brown-headed cowbird.

Strategies:

- Remove feral hogs found on the refuge. Control may be by contract, special use permit, or by staff.
- Work with appropriate parties to delay mowing of the roads and levees from mid-March until August to reduce favorable brown-headed cowbird foraging habitat during the period of highest nest production (May through July).
- Monitor populations of coyote, beaver, and nutria to determine if control measures are necessary.

Objective 1.12: Continually assess wildlife and plant population changes over the life of the CCP to assess potential effects from global climate change.

Discussion: The Intergovernmental Panel on Climate Change (IPCC) has concluded that "warming of the climate system is unequivocal." Abundance and distribution of wildlife and fish will change in response to global warming, particularly affecting those species already at risk. This stress will add to existing stresses on resources such as population growth, land use changes, and pollution, causing a significant challenge for fish and wildlife conservation. It is desirable to continually assess the effects of climate change on fish and wildlife populations.

In addition to the rising seas, the effects of climate change and global warming will be changes in weather/rainfall patterns, decreases in snow and ice cover, rising sea levels, and stressed ecosystems. For the southern United States and the Atchafalaya region, this can mean extreme precipitation events; greater likelihood of warmer/drier summers and wetter/reduced winter cold; and alterations of ecosystems and habitats due to these changes in weather patterns--to name but a few possibilities. For example, a recent study of the effects of climate change on eastern United States' bird species concluded that as many as 78 bird species could decrease by at least 25 percent; while as many as 33 species could increase in abundance by at least 25 percent due to climate and habitat changes.

Strategies:

- Develop a GIS database on historical and present habitat types and wildlife and monitor changes over the 15-year life of the CCP.
- Integrate expected long-term changes in habitat types and wildlife to overall future management strategies.

HABITAT MANAGEMENT

Goal 2. Protect, manage, enhance, and where appropriate, restore suitable habitat for the conservation of migratory birds, resident wildlife, fish, and native plants, including all federal and state threatened and endangered species endemic to the Atchafalaya Basin.

Discussion: Atchafalaya NWR lies within the MAV, which has been greatly changed over the last 100 years as development has occurred. The greatest changes to the landscape have been in the form of land clearing for agricultural and flood control projects. Vast areas of bottomland hardwood forests have been reduced to forest fragments, leaving many very small tracts and only a few large areas.

This loss of connectivity between forested areas (forest fragmentation) has resulted in a significant decline in biological diversity and integrity. Breeding bird surveys show continuing declines in species and species population numbers, especially those species that depend on forest interiors; those that have special habitat requirements, such as mature forests or a particular food source; and those that require good water quality.

Historically, seasonal flooding created a broad range of dynamic habitats that supported diverse fish and wildlife resources. Alteration of the natural drainage pattern began in the late 1880s and still continues today. Current flood control features along the main channel of the Atchafalaya River have eliminated all river flows, except from extremely large floods. High surface water elevation then prevents connecting channels from functioning as outlets, causing increased flooding of backwater swamps resulting in areas of stagnant water with poor water quality; also high surface water elevation allows sediment-laden river water to flow north into distributaries, which historically were outlets. The resultant shoaling and reduced cross-section of these streams reduces headwater habitat and increases sedimentation, reducing areal extent of aquatic habitats.

A dynamic interface of hydrologic regimes is crucial to desired forested wetlands and waterfowl-habitat relationships. The hydrologic alterations have reduced the extent and duration of annual seasonal flooding, which has had a tremendous effect on the forested wetlands and therefore wetland-dependent species.

Finally, global climate change effects, such as warmer temperatures, more severe droughts, floods, and sea level rise, have the potential to add to the above-mentioned stresses on resources.

Objective 2.1: Develop and implement a habitat management plan by 2013.

Discussion: The need to develop and implement a habitat management plan was identified in the scoping stage of the CCP process. This management plan would identify resource needs and establish habitat restoration programs based on goals, objectives, and strategies identified in the CCP.

Strategy:

- Upon development and implementation of a habitat management plan, coordinate with the Louisiana Ecological Services Field Office on recommendations regarding flooding the greentree reservoir and operating heavy equipment in certain areas of the refuge during the Louisiana black bear denning season (December-April).

Objective 2.2: Over the 15-year life of the CCP, maintain and where possible expand the existing infrastructure to actively manage moist-soil habitat over the 100-acre moist-soil unit.

Discussion: A major issue facing the refuge is the reduction in migratory waterfowl use of the refuge. Possible reasons for this include the reduction in food and critical habitats locally. Moist-soil management is the management of land to provide moist-soil conditions during the growing season to promote the natural production of beneficial plants. The primary emphasis of moist-soil management is producing seed as food for ducks, although geese sometimes use moist-soil impoundments and eat shoots of germinating plants, rhizomes, roots, or tubers. Moist-soil impoundments are highly recommended as a means of diversifying habitat and supplying foods with nutrients not generally available in agricultural grains. Moist-soil management cannot be effectively accomplished unless the manager has the ability to manipulate water levels by flooding and draining management units. The refuge currently manages one 100-acre moist-soil unit and one 20-acre food plot.

Strategies:

- Purchase a power unit to facilitate management of the moist-soil unit.
- Remove willows and other woody plant species to promote moist soil.

Objective 2.3: Over the 15-year life of the CCP, enhance greentree reservoir management to achieve a sustainable wetland forest that provides forage for waterfowl, migratory birds, mammals, reptiles, amphibians, and fish.

Discussion: Greentree reservoir habitat consists of seasonally flooded low-lying bottomland hardwood forests. Flooded shrub swamps and bottomland forests provide foraging habitat and also serve to provide isolation during pair bonding and thermal protection on cold, windy days. Such areas can receive high usage by some waterfowl species (notably mallards) during the winter period. Atchafalaya NWR contains a 400-acre greentree reservoir on the west bank of Big Alabama Bayou. Flooding of this reservoir usually begins in late-November, when the Atchafalaya River overflows its banks, or through the collection of winter rainfall, with expectations that desired water levels will be reached by the end of December. The water levels are then allowed to recede until they reach desired summer draw-down levels. Consistent hydrologic cycles have reduced plant diversity and selected against the most desirable tree species over time. It is critical that these management units be flooded and dewatered at different dates annually. Therefore, there is a need to be able to manipulate the greentree reservoir's water supply to support restoration of desirable tree species and control invasive aquatic plant species. Currently, the greentree reservoir is flooded 2 out of 3 years when possible.

Strategies:

- Water management in the greentree reservoir should be modified to provide late season flooding of low areas to improve nesting and brood-rearing success for resident birds.
- Manipulate vegetation in low areas to enhance wood duck brood habitat.
- Encourage development of more mast bearing trees including oaks.

Objective 2.4: Over the 15-year life of the CCP, provide habitats sufficient to meet the habitat and population goals of the NAWMP, as stepped down through the LMVJV.

Discussion: The NAWMP is an international agreement among the United States, Canada, and Mexico, to increase waterfowl populations by restoring crucial wetland habitats across the continent. Further, the NAWMP is an international action plan to conserve migratory birds throughout the continent, with a goal of returning waterfowl populations to the levels of the 1970s by conserving wetland and upland habitat. The process of relating habitat objectives for individual management areas to overall habitat objectives for the MAV involved several steps. First, habitat objectives were allocated among states relative to historic abundance of waterfowl. Then, knowledgeable managers within states determined strategies for meeting state habitat objectives by allocating percentages of the objectives to habitats with managed or naturally flooded water regimes and habitats on public or private lands. One result of this "step-down" process was to clearly define the collective habitat objectives of state and federal wildlife areas in the MAV relative to objectives of the LMVJV, which, in turn, were related to the NAWMP. The collective objectives of state and federal wildlife areas then were assigned to individual management areas based on waterfowl management capabilities. The LMV is a critical ecoregion for migrating and wintering ducks and geese in North America (Reinecke et al. 1989), and step-down objectives have been developed for the MAV through the LMVJV cooperative effort.

The step-down objectives that were established for Atchafalaya NWR were originally expressed in acres and are provided in Table 9. Duck-energy-day (DED) objectives were calculated by multiplying the acreage objective by the assumed DED standard developed by the LMVJV for that habitat type.

Table 9. Migrating and wintering waterfowl foraging habitat objectives established by the LMVJV for Atchafalaya NWR

Habitat	Objective[1] Acres (DUD[3])	Current Capability[2] Acres (DUD)	(+ or -) Acres (DUD)
Moist-soil	0 (0)	100 (1,901)	+100 (+190,100)
Bottomland hardwood	0 (0)	300 (47,700)	+300 (+47,700)
Total	**0 (0)**	**400 (49,800)**	**+400 (+237,800)**

[1] Acreage and DUD objective provided by the LMVJV office.
[2] Current acreage and DUD capability (has levees and water-control structure, some have pumping capability) provided by refuge staff.
[3] DUD = duck-use day, calculated by multiplying acres by standard DUD/ac figures provided by the LMVJV: moist-soil, 1,901 DUDs/ac; bottomland hardwood, 159 DUDs/ac (assumes 40% red oak).

Foraging habitat objectives set through the step-down process are guides for the refuge to use in habitat management planning. Other factors must also be considered. The LMVJV objectives are being reviewed and revised to reflect more up-to-date information, a process that was initiated in spring 2005. Because of the relatively small acreage of the refuge that is not forested nor has water management capability and the lack of on-site staff, the importance of the Atchafalaya NWR's contribution to the NAWMP objective is small. The capability expressed in Table 8 is also largely dependent on rainfall. The addition of a pump to adequately manage the moist-soil unit would help significantly and is identified as one of the refuge priorities. These changes should be reported to the LMVJV office for consideration in their current review of statewide habitat objectives and should be assumed to be the maximum the refuge is capable of producing. In some years, crops and/or moist-soil will fail to meet the objective.

In general, high waterfowl harvest rates and hunting activity make sanctuary an important function of national wildlife refuges in Louisiana. However, waterfowl populations and hunting on Atchafalaya NWR are not intense, making sanctuary of less importance than other refuges.

Strategies:

- Control willow trees and invasive plants to improve habitat.
- Increase mast-bearing trees important to waterfowl through forest management.
- Some beaver ponds should be allowed to develop and mature as wood duck habitat, but not to exceed 5 percent of the refuge forested land.

Objective 2.5: Over the 15-year life of the CCP, provide and maintain forest openings for the benefit of resident and migratory species while limiting negative effects from brown-headed cowbirds.

Discussion: All native temperate grasslands have experienced major losses from agriculture, range management, and urban development. In addition, habitat fragmentation and degradation have been severe. Habitat loss is most frequently viewed when grassland is converted to cropland or other uses, but loss of habitat also includes more subtle degradation such as unnatural grazing regimes, planting of exotic grasses, and the succession of grassland to shrubland. These less obvious changes have resulted in the extirpations of many local bird populations. A priority should therefore be conservation and appropriate management of the largest tracts of existing native grasslands to avoid habitat fragmentation and degradation. Unfortunately, refuges have defined boundaries containing many different types of habitats and large tracts of grassland are not always available. Also, intense human disturbances occurring on the land prior to it being acquired by the Service can also be an issue. Atchafalaya NWR, due to its patchwork land ownership, has limited grassland or forested opening habitats. The refuge currently manages these habitats by plowing and planting cool season food plots or managing as mowed or fallow fields.

Scrub-shrub (or early successional) associated species is another group of vulnerable species within the southeastern United States. These species include northern bobwhite quail, dickcissel, and other grassland birds; this type of habitat is also used by the American woodcock during mating season. Brown-headed cowbirds, which prefer open grasslands, are parasitic to these vulnerable species, laying their eggs in the nests of these species. Most of the host species do not recognize the cowbird eggs, and the larger, more aggressive cowbird fledglings reduce the reproductive success of the vulnerable host species. Therefore, while the scrub-shrub habitat is preferred by these vulnerable species during breeding season, it is desirable to maintain this habitat to minimize its attractiveness to brown-headed cowbirds.

Strategies:

- Maintained forest fields, power lines, and pipeline rights-of-way will not be disced or mowed during neotropical migratory breeding season, to deter brown-headed cowbird parasitism.
- Maintain power line and pipeline rights-of-way in early successional stage habitat.

Objective 2.6: Over the 15-year life of the CCP, provide a diverse forested habitat to meet the various needs of many wildlife species including waterfowl, neotropical migratory songbirds, and resident wildlife, as well as the threatened Louisiana black bear.

Discussion: Forest management is needed to develop a forested landscape on Atchafalaya NWR and Sherburne WMA which is diverse in plant species composition, vertical structure, canopy development, and age. This diversity allows natural resource managers to provide a variety of habitat conditions to meet the habitat needs of a variety of wildlife species.

Without silvicultural management or natural disturbances (e.g., tornadoes), mature forests tend to develop closed overstory canopies that impede light penetration into the forest. Limited light penetration results in sparse understory and midstory vegetation. Many forest birds are dependent on dense understory vegetation for nesting, foraging, and escape cover. Thus, silvicultural harvests that increase light penetration, while maintaining an overstory canopy, are beneficial to many forest bird species of high conservation concern.

Options for silvicultural manipulation of forest structure are greater when higher value species are included with the harvest. In addition to limiting understory vegetation, closed overstory canopies also inhibit the regeneration of shade intolerant tree species, including many high value species (e.g., red oaks). Mast produced by many of these shade intolerant tree species is critical forage for black bears and is consumed extensively by many other species (e.g., wild turkey, blue jay, and white-tailed deer). Thus, harvests should ensure continued recruitment of shade-intolerant tree species as future canopy trees, in addition to increasing understory vegetation densities.

These results can most effectively be achieved by using group selection, in which small patches of trees are harvested to create openings in the forest that mimic natural disturbances and admit enough light to promote the regeneration of oaks and other high-value species.

In addition to promoting understory vegetation development and ensuring recruitment of shade-intolerant tree species, silvicultural treatments should, where possible (1) encourage development of emergent trees that rise above the predominant forest canopy, (2) retain large diameter class (>60 cm dbh) trees, (3) provide large (>50 cm dbh), standing, dead or dying trees, (4) contribute coarse woody debris to the forest floor, and (5) retain small diameter cavity trees (hole diameter <20 cm) and larger diameter den trees (hole diameter >20 cm).

Strategies:

- Establish a natural area in coordination with partners that will provide a control site that is managed passively.
- Develop a monitoring schedule to assess the possible effects of forest management activities on habitat conditions.
- Use forest management to re-establish site-appropriate native plant communities including hard and soft mast tree and shrub species to provide ideal wildlife habitat.
- Maintain connectivity between habitats to allow all wildlife species unrestricted movement between habitats needed to complete their life cycles.
- Aggressively act to control invasive exotic species.
- Forest management should emphasize retention of large trees and trees with large cavities. Prescriptions should be designed to address comprehensive goals for forest management aimed at controlling forest composition and structure.
- Promote existing Louisiana black bear habitat through forest management.
- Work to maintain a large contiguous tract of forested wetlands in the Atchafalaya Basin.
- Use the guidelines for desired forest conditions recommended by the LMVJV to guide annual forest management.
- Habitat management should serve to retain the largest trees, especially those with large cavities and all recently dead (within the last 3 years) or dying trees when such actions are not in conflict with other refuge obligations, and/or the management of other federally listed species or the LMVJV desired forest conditions.
- Staff should be alert to the possible existence of the ivory-billed woodpecker in the area and report possible sightings by staff or public through an established regional reporting site (as of 2010: http://www.birds.cornell.edu/ivory/identifying/)
- Complete the Habitat Management Plan by 2013.
- Evaluate hardwood wildfire areas to monitor for any increase in switchcane thickets.

Objective 2.7: Over the 15-year life of the CCP, integrate exotic plant removal into all refuge resource management programs to control Chinese tallow, mimosa, privet, Chinaberry, and other terrestrial exotic invasive plants on the refuge through mechanical and chemical control methods.

Discussion: According to 2009 RAPP data, 2.5 million acres of Refuge System lands are infested with invasive plants and 3,894 invasive animal species have been recorded. Intrusion of invasive plants can displace native plant species and change habitat productivity for native plant and animal species, through changes such as vegetative community, insect community, and structural environment. The presence of an invasive species can often cause environmental harm, such as harm to critical refuge habitat.

Atchafalaya NWR has several documented native and non-native invasive plant species. According to the 2009 RAPP database, 4,955 acres of the refuge are infested by invasive plants. These invasive species affect the refuge's ability to carry out desired wildlife and habitat management objectives and at times also reduce the range of visitor service activities. Many invasive plant species are difficult to control without applying chemical treatments. The moist-soil conditions conducive to providing quality habitat for migratory waterfowl management frequently encourages germination of those invasive species.

Currently, management controls these species by removing these plants as opportunity and resources allow, but more aggressive measures are needed to control the spread of these species. Future measures should integrate exotic plant removal into all refuge resource management programs to annually treat the refuge to control Chinese tallowtree, mimosa, privet, Chinaberry, and other exotic invasive plants on the refuge through mechanical, chemical, or controlled burning methods.

Strategies:

- Develop a GIS database of all exotic plants found and treated on the refuge.
- Develop a habitat management plan that addresses control of exotic plants.
- Seek advanced ways to control invasive and exotic plants through specialized herbicides, timber sale contracts, or grants.
- Pre-treat all timber harvest areas for exotic plants. Follow up with post treatment review and possible re-treatment each year for 2 to 3 years following harvest treatments or until exotics are controlled.
- Utilize timber receipts and oil and gas mitigation funds to perform chemical control of exotic plants.
- Coordinate annually with USACE and the state to identify and treat high access areas on the refuge and neighboring lands such as roads, rights-of-way, levees, skid trails, and logging roads.

Objective 2.8: Implement adaptive habitat management and monitor for global warming-induced plant species shifts.

Discussion: Global climate change poses risks to human health and to terrestrial and aquatic ecosystems. Important economic resources, such as agriculture, forestry, fisheries, and water resources, also may be affected. Warmer temperatures, more severe droughts and floods, and sea level rise could have a wide range of effects. All these stresses can add to existing stresses on resources caused by other influences such as population growth, land-use changes, and pollution.

Global-warming-induced changes, such as warmer temperatures, more severe droughts and floods, and sea level rise, are anticipated to have a wide range of effects, posing risks to terrestrial and aquatic ecosystems. As these changes occur, adjustments in habitat management may be required to maintain desirable habitat conditions.

Strategies:

- Monitor habitats and wildlife and utilize adaptive management to respond to possible climate change adverse impacts.
- Pursue opportunities for carbon sequestration with native trees.

VISITOR SERVICES

Goal 3. Provide compatible environmental education and interpretation, wildlife observation and photography, hunting, and fishing. Public use will provide visitors a greater understanding and enjoyment of fish, wildlife, and their habitats on the refuge and in the Atchafalaya Basin.

Discussion: The Improvement Act states that compatible wildlife-dependent recreational uses are the priority public uses of the Refuge System (e.g., hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation), which will receive enhanced consideration over the other general public uses. The Service will permit other uses only when they have been proven to be both appropriate and compatible (See 605 FW 1, General Guidance, and 603 FW 1, Appropriate Refuge Use).

Adjacent to the refuge is the Sherburne WMA and the USACE Bayou Des Ourses Area. Public use of these two areas, along with Atchafalaya NWR, is managed as one 44,000-acre unit by the LDWF Region 6, Opelousas Office. There is no public use specialist stationed at the refuge, and therefore the management of these programs relies heavily on collateral support of staff from both agencies stationed away from the refuge. The LDWF owns 11,780 acres, USFWS owns 15,220 acres, and the USACE owns the remaining 17,000 acres.

The refuge provides a variety of recreational opportunities. Fishing and hunting are popular on the refuge and are of great public interest; birding enthusiasts from around the world travel to the refuge during April and May when neotropical migratory birds move through and arrive to nest. Photographers who have travelled through the area have been published in books extolling the basin's beauty. Environmental education and wildlife interpretation occur but are limited because of additional staffing needs.

Objective 3.1: Develop and implement a visitor services management plan by 2016.

Discussion: A visitor services plan does not currently exist. The need to develop and implement a such a plan was identified in the visitor services review, held in the scoping stage of the CCP process. This plan will identify resource needs and establish visitor service programs based on goals, objectives, and strategies identified in the CCP. The refuge intends to complete a visitor services step-down plan after the completion of the CCP.

Strategies:

- The Visitor Services Plan should reflect current legislation, director's orders, initiatives, policies, and the mission of Atchafalaya NWR, the Refuge System, and the Service.
- The plan should address the current and future visitor services and recreation needs of visitors.
- The plan should include information and recommendations on the welcoming and orienting of visitors.

Objective 3.2: Over the 15-year life of the CCP, maintain and where possible expand interpretive opportunities on the refuge.

Discussion: Interpretive opportunities communicate important fish, wildlife, habitat, and other resource issues to visitors of all ages and abilities. The Refuge System tailors messages and delivery methods to specific audiences, presents them in appropriate locations, and encourages visitors to take positive actions supporting refuge goals and the Refuge System mission (See 605 FW 7, Interpretation). The primary interpretive themes and messages on the refuge are about the Refuge System, swallow-tailed kites, Big Alabama Bayou, watching wildlife, fish caught at the refuge, wading birds, bottomland hardwood forests, "be a better boater," cypress swamp, and waterfowl. Personal interpretation and guided tours are conducted only during special events and occasionally by volunteers and professional birders. Currently, there is a lack of staff to give personal interpretation; there is no visitor center or indoor information area for visitors on the Sherburne WMA or refuge; there are no interpretive publications available at the refuge dedicated to interpreting key resources and issues; and a refuge-specific portable exhibit has not been produced for interpreting key resources and issues for off-site audiences (the staff uses the portable exhibits available from the Southeast Louisiana NWR Complex). The refuge is, however, featured in an exhibit at the Bayou Lacombe Centre near the Complex headquarters in Lacombe, Louisiana.

Strategies:

- Develop swamp trail boardwalk with interpretive panels.
- Develop interpretive panels about the importance of the area to migratory songbirds.
- Develop and install new kiosks, waysides, and trail signs with appropriate interpretive panels/messages.
- Implement guided interpretive opportunities and expand where possible through partnerships, to include guided nature walks, canoe tours, birding tours, and similar programs.
- Update bird list and create reptile and amphibian brochures and paddle trail brochures.
- Develop an area for exclusive non-consumptive based recreation and education on the refuge.

Objective 3.3: Over the 15-year life of the CCP, maintain and where possible expand environmental education opportunities.

Discussion: Formal, curriculum-based environmental education tied to national and state education standards advances public awareness, understanding, appreciation, and knowledge of key fish, wildlife, plant, and resource issues. Atchafalaya NWR currently has one visitor services staff position that is shared with two other refuges. One of those refuges (Big Branch Marsh NWR) has a fully developed education program that takes up most of that staff person's time. Because of the two-hour one-way travel time to Atchafalaya NWR from the headquarters, an environmental education program

has not been initiated. There are three schools in the immediate area and many other schools within an hour drive which could benefit from such a program.

Strategies:

- Hire a visitor services specialist to be stationed with USFWS law enforcement officer and State employees at the Atchafalaya NWR.
- Spend 1-2 weeks per year using staff, interns, and volunteers from the Complex to conduct refuge programs in the local schools—either onsite or offsite.
- Seek funding from interested partners to develop a refuge-focused activity kit or DVD to give to elementary teachers in the area.
- Develop/adapt environmental education materials specific to Atchafalaya NWR and post them on the refuge website for teachers to download.
- Investigate research being done on refuge and look for topics that could be developed into teacher packets/activity pages.
- Develop teacher workshop within area school systems to promote programs to gain teacher input in program design.
- Implement the Junior Duck Stamp Program with area schools.
- Develop an area for exclusive non-consumptive nature-based recreation and education on the refuge that is not open to public hunting.

Objective 3.4: Over the 15-year life of the CCP, maintain and, where possible, expand walking, driving, and boating access for wildlife observation and photography.

Discussion: Wildlife observation and wildlife photography (reference 605 FW 4, Wildlife Observation, and 605 FW 5, Wildlife Photography) are appropriate wildlife-dependent recreational uses of Refuge System lands, when compatible. Viewing and photographing wildlife in natural or managed environments foster a connection between visitors and natural resources. Atchafalaya NWR normally has a limited number of visitors; however, in April and May, when neotropical migratory birds move through and arrive to nest, birding enthusiasts come from around the world to visit. Most usage is concentrated around the Highway 975 corridor and the Happytown area. Furthermore, a few professional photographers have traveled through the basin over the past 40 years and several books have been printed extolling the basin's beauty. Currently, the refuge has a nature trail and an ATV trail for visitors with disabilities. On state lands, two primitive campgrounds are maintained.

Strategies:

- Develop and install photography blinds.
- Build a new wildlife observation blind in area of high wildlife use.
- Develop a partnership with Audubon (or other interested group) under special use permit to provide specialized birding/wildlife observation tours in areas open to the public (such as a looped tour on Alabama Road, near the greentree reservoir, and the Johnson Bayou area).
- Develop a boardwalk in the wetlands within a non-consumptive use area, monitor use after development, and if necessary, restrict hunting around trails and roads.
- Design and build new and maintain current public use facilities in the Happytown area of the refuge to create a "destination" for non-consumptive priority public uses.
- Develop an accessible paddling route.

Objective 3.5: Over the 15-year life of the CCP, provide and improve fishing opportunities on the refuge.

Discussion: Fishing (including crabbing and cast-netting) is an appropriate use of wildlife resources on units of the Refuge System, when compatible. Fishing programs should be of the highest quality, conducted in a safe and cost-effective manner, and to the extent practicable, carried out in accordance with state regulations (See 605 FW 3, Fishing).

Atchafalaya NWR and Sherburne Complex are popular fishing spots. The refuge is open year-round for sport-fishing in accordance with state fishing regulations, although fishing is very seasonal and pressure is very low much of the year. Targeted species are crappie, bass, catfish, and perch. Shallow waters restrict motorboat operations. Recreational crawfishing is a popular activity in late winter, and the adjacent waters of the Atchafalaya River are the site of the largest wild crawfish harvest in the world. The South Farm area of the Sherburne WMA is open to recreational crawfishing from April 1 to July 31. Finally, there is a mercury fish advisory for Big Alabama Bayou. Currently, the refuge fishing plan needs to be updated.

Strategies:

- By 2020 update fishing plan.
- Post health advisories concerning fish consumption (high mercury levels) at the refuge boat launch.
- Develop a fishing pier/observation deck at Bayou Manual parking area number 1.
- Utilize sampling results to determine the condition of the fishery and any feasible means of improvement, if needed.
- Develop refuge fishing brochure.

Objective 3.6: Over the 15-year life of the CCP, maintain current hunting opportunities.

Discussion: Hunting is an appropriate use of wildlife resources of the Refuge System, when compatible. Hunting programs should be of the highest quality, conducted in a safe and cost-effective manner, and to the extent practicable, carried out in accordance with state regulations (See 605 FW 2, Hunting).

Atchafalaya NWR offers the public a wide range of hunting opportunities for those using archery, muzzleloader, and modern gun, as well as special opportunities for youth and mobility-impaired hunters, with access available to most portions of the refuge. Hunters have the opportunity to hunt squirrel, rabbit, woodcock, mourning dove, waterfowl, deer, raccoon, bobcat, turkey, and wild hog. The refuge is well known for providing hunters opportunities for migratory woodcock as well as waterfowl hunting in the bayous and flooded bottomlands. All general state hunting regulations and seasons are enforced on refuge lands.

Strategy:

- Provide guidance to state to complete the updating of the hunting and trapping plans. Ensure they consider all Refuge System priority public use activities when developing these plans.

Objective 3.7: Over the 15-year life of the CCP, develop an active volunteer program to enhance all aspects of refuge management including resident interns, friends groups, and local volunteers.

Discussion: Volunteers and refuge support groups fortify refuge staffs with their gifts of time, skills, and energy, and are integral to the future of the Refuge System. These volunteers or support groups, along with other important partnerships in the community, help to make the refuge an integral part of the community. Currently, the refuge generally has no volunteers beyond those that assist with the annual "Step Outside Day" during May. The LDWF and USACE use volunteers infrequently for special projects. The refuge does not have a friends group, but the Friends of Louisiana Wildlife Refuges, Inc., does provide assistance with funding for special projects on occasion.

Strategies:

- Identify possible volunteer opportunities and develop descriptions of some jobs that volunteers could do at Atchafalaya NWR. Coordinate these activities with the proposed visitor services specialist (volunteer coordinator).
- Partner with Audubon or other interested groups to do a volunteer work day at the refuge.
- Partner with the Friends of Louisiana Wildlife Refuges, Inc., USACE, and state to accomplish projects at Atchafalaya NWR.
- Host a friends' tour day at the refuge.

Objective 3.8: Over the 15-year life of the CCP, increase public outreach to emphasize resource management practices and promote public use opportunities.

Discussion: Effective outreach depends on open and continuing communication between the refuge staff and the public. This communication involves determining and understanding the issues, identifying audiences, crafting messages, selecting the most effective delivery techniques, and evaluating effectiveness.

Currently, refuge publications are distributed to the Atchafalaya Basin Welcome Center, which is located in Butte LaRose, approximately 12 miles from the refuge. The refuge also provides information via the refuge website, which is kept up-to-date and used to promote special events. The state and refuge staff market the refuge and promote one special event in May, "Step Outside Day," at the Sherburne Complex, where the refuge sponsors pontoon boat rides, hands-on youth activities, and wildlife exhibits. The state also sponsors a variety of activities.

Strategies:

- Continue to support the "Step Outside Day" event.
- Refuge, Sherburne, and friends group(s) host the staff from the Atchafalaya Welcome Center (and other community tourism organizations/businesses) for an annual tour/appreciation day at the Sherburne Complex.
- Conduct outreach to neighboring communities about living with black bears.
- Evaluate opportunities to participate in special events.
- Once additional staff is hired, develop outreach potential with other organizations, communities, and the Butte Larose Welcome Center.

Objective 3.9: Over the 15-year life of the CCP, improve program to welcome and orient visitors to the refuge through design and upkeep of facilities and the provision of information regarding programs and facilities.

Discussion: Under a 50-year agreement, the refuge's visitor services program is managed by the LDWF headquarters at Sherburne WMA. Public use is administered by the district supervisor and district biologist in Opelousas, Louisiana. One LDWF officer is assigned to patrol Sherburne WMA/Atchafalaya NWR. Refuge staff members support Atchafalaya NWR as part of their normal shared duties, including a refuge manager, forester, biologist, environmental education specialist, and a law enforcement officer. All of these positions are stationed at either the Complex headquarters in Lacombe, Louisiana, or at Houma, Louisiana.

In order to enter the Sherburne WMA, refuge visitors must possess a state hunting license, fishing license, or a Wild Louisiana Stamp.

There are few visitor facilities and many opportunities for improving the welcoming and orienting of visitors. The USACE has built two public restrooms at the north and south ends of Highway 975 which are available 24 hours per day, but they are inaccessible to wheelchairs. There is no visitor center or administrative site, or plans for such by the Service, but the state does have plans to build a visitor center and meeting facility at the present site of the maintenance facility. The LDWF office is open at times during the day but there is no regularly scheduled time that staff members are available to interact with visitors. Bulletin board kiosks are provided at all parking areas; however, refuge maps and publications are not provided at every kiosk, depending on land ownership. While public roads are maintained, areas of Highway 975 have drainage problems—during a rain event, the water pools on the levee side of the road or flows over the road, creating washouts.

Strategies:

- Partner with the state to have the "Duck Stamp" accepted as an entrance pass for the WMA/refuge.
- Work with state to improve/pave Highway 975, especially the section from Highway 190 to the Sherburne WMA maintenance area. This would include improving the existing railroad crossing.
- Work with Complex to develop 3-panel welcome and orientation kiosks at the north and south bathroom areas and at the state facility.
- Place a refuge-specific welcome and orientation kiosk at the Bayou Manuel parking area number 1.
- Develop ways to count visitors specific to the refuge.
- Make sure that ATV trail signs clearly state that ATVs may be used for hunting purposes during specified times and that the trails can also be used for hiking, biking, etc.
- Work with USACE to make the north and south entrance restrooms wheelchair accessible.
- Explore possibility to partner with the state and USACE to develop the Complex visitor center.
- Develop a law enforcement office and maintenance facility with an attached visitor contact station.
- Explore possibility of developing an exhibit at the Atchafalaya Welcome Center that would direct visitors to the "non-consumptive" use areas on the refuge.

- Develop a non-consumptive use area on south end of the refuge near Interstate Highway 10.

RESOURCE PROTECTION

Goal 4. Identify, conserve, and protect natural and cultural resources through partnerships, land protection programs, and law enforcement. Ensure a safe and secure environment for the visiting public and personnel.

Discussion: Inherent in ensuring that future generations can enjoy the refuge is protection of its resources. Cultural resources include archaeological resources, historic and architectural properties, and areas or sites of tradition or religious significance to Native Americans (614 FW 1, Policy, Responsibilities and Definitions). No comprehensive survey of refuge cultural resources has been completed. Enforcement of laws pertaining to wildlife and other natural resources is fundamental and necessary, especially in areas of high public use. Safety and protection of the people using the refuge is a priority. Also considered in this goal is protection of the resources by acquisition of land included in the acquisition boundary recognized in the initiating process of refuge establishment, and ensuring minimum negative effects to the refuge from oil and gas operations.

Objective 4.1: Over the 15-year life of the CCP, enforce all federal and state laws applicable to the refuge. Protect all archaeological sites on the refuge from illegal take or damage in compliance with the Archaeological Resources Protection Act, the Native American Graves Protection and Repatriation Act, and the National Historic Preservation Act.

Discussion: No formal archaeological investigations have been performed on refuge lands; however, the refuge has cultural sites relating to human settlement by several Native American tribes that date back as far as 2,500 years ago; the tribes hunted, fished, and trapped in places still popular for these activities. Patrol by law enforcement and refuge staff is needed to prevent uncontrolled access to the refuge, disturbance to wildlife habitat, and, if discovered, cultural resources.

Strategy:

- Conduct an archaeological survey on the refuge and implement law enforcement patrols on all sites to inspect for disturbances and illegal digging and/or looting.

Objective 4.2: Maintain refuge boundary and identify unmarked areas.

Discussion: The refuge should be welcoming and accessible. Refuge visitors should be provided with clear information so they can easily determine where they can go and what they can do. Currently, refuge entrance signs exist at Bayou Manuel Road, Happytown Road, and Big Alabama Road. Refuge boundaries are marked and maintained in some locations, but area closed signs could be added in some locations. Directional signs are needed at decision points.

Strategies:

- Maintain existing refuge boundary signs.
- Evaluate all entrance signs on an annual basis and make required repairs, changes, updates, or upgrades.
- Evaluate, add, and replace signs as needed. Attempt to inspect and replace boundary signs on a rotational basis.

Objective 4.3: Over the 15-year life of the CCP, provide visitor safety, protect resources, and ensure public compliance with refuge regulations.

Discussion: Protecting the natural resources of the refuge and ensuring the safety of its visitors are fundamental responsibilities of the Refuge System. As crime continues to increase in rural America, refuges face a larger and more complicated enforcement problem. With thousands of natural resource violations and other serious felonies (e.g., homicides, rapes, assaults, and acts of arson) occurring on the nation's refuges every year, law enforcement is necessary to ensure the safety of visitors and handle other miscellaneous issues such as poaching, illegal trespassing, and on-site pollution. Atchafalaya NWR is currently managed as collateral duty by a 5-person staff, including one law enforcement officer, also responsible for management of Big Branch Marsh and Bogue Chitto NWRs and assisting with other activities in the eight refuges of the Complex.

Strategies:

- Review and update the Law Enforcement Plan.
- Develop and work cooperatively with local, state, and other federal law enforcement agencies to supplement resource protection.
- Provide education and outreach programs in local communities as part of a preventive law enforcement effort to encourage voluntary compliance.

Objective 4.4: Over the 15-year life of the CCP, acquire lands within the current acquisition boundary that provide resource and public use values from willing sellers by: fee title purchase, donation, mitigation purchase and transfer, or other viable means.

Discussion: The LDWF purchased 11,780 acres on September 13, 1983, and created the Sherburne WMA. In 1986, the Service purchased 15,220 acres from the Iberville Land Company and established Atchafalaya NWR.

Since 1989, the USACE has also purchased 17,000 acres of fee title land adjacent to and within the Atchafalaya NWR, which brings the current concomitant acreage among all three agencies (LDWF, Service, and USACE) to approximately 44,000.

Strategies:

- Annually contact landowners within the approved acquisition boundary to seek their willingness to sell, and identify those lands for inclusion in land and waters or migratory bird fund requests.
- Pursue possibility of a land swap with the USACE.

Objective 4.5: Future Land Protection: Develop a preliminary land protection proposal to achieve a congressionally authorized refuge boundary expansion of 17,217 acres within the Atchafalaya Basin Floodplain to improve buffer conditions, contribute to biological objectives, close gaps between existing tracts, and improve public access. The proposed expansion of 17,217 acres would bring the total refuge acquisition boundary to approximately 72,241.

Discussion: On a larger landscape/ecosystem scale, refuge and private lands efforts need to be applied across a watershed area, at a minimum, in concert with other various agencies and stakeholders to promote a strategic habitat management to conservation of wildlife resources in the Atchafalaya Basin.

To protect a larger contiguous block of bottomland hardwood habitat from forest fragmentation, it is desirable to protect land between the Atchafalaya River, the east floodway protection levee, Interstate 10, and Highway 190.

Strategies:

- Focus on biological/environmental voids and gaps that could be filled via land additions to increase public access, provide better water management capabilities, facilitate existing refuge habitat goals and objectives (i.e., decrease fragmentation of forests), and that reduce impacts of lands use adjacent to and within the Atchafalaya River watershed.
- Continue to build relationships that support refuge land acquisitions through improvement of public use opportunities on the refuge.
- Continue to acquire lands from willing sellers only.

Objective 4.6: Over the 15-year life of the CCP, manage existing oil and gas operations to ensure proper maintenance and upkeep of facilities and infrastructure, and also to ensure minimum effects to refuge resources and proper mitigation and compensation for lost or damaged refuge resources.

Discussion: A number of wells and facilities were present on refuge lands prior to acquisition, with new exploration and development continuing since. As oil and gas facilities and infrastructure age, it is vitally important to ensure that maintenance and replacement activities are conducted in a timely manner to prevent the unintentional release of products such as oil, and waste products such as brine.

As additional oil and gas exploration and development occurs, it is important that the best available environmental and petroleum industry standards, information, and technologies are used to minimize potential effects to refuge resources and to ensure appropriate compensation and replacement of lost resources and lost use to the public. Maintenance and upkeep of facilities and infrastructure should occur in a timely manner and follow best management practices.

Refuge staff and law enforcement have worked to bring these ventures into compliance, but additional management/enforcement will be needed.

Strategies:

- Utilize mitigation funds to restore habitat on the refuge, treat Chinese tallow trees, and other activities.
- Continue to ensure compliance with deed language requiring the issuance of a special use permit with attached special conditions for all existing operations.
- Conduct periodic monitoring and site inspections in cooperation with applicable state agency personnel to ensure compliance with state and federal regulations and to detect potential problem areas with equipment and facilities.
- Conduct periodic monitoring and site inspections to ensure compliance with refuge-specific regulations and to detect any release of product or waste products.
- When unauthorized releases do occur, ensure timely cleanup of released material and develop remediation and mitigation requirements as needed.
- Require plug and abandonment activities for well sites with no future use potential as they are identified.
- Require restoration and reclamation of abandoned well sites in a timely manner.
- Develop suitable mitigation requirements and ensure suitable mitigation occurs to minimize possible effects to refuge resources.

REFUGE ADMINISTRATION

Goal 5. Work with partners to secure and enhance staffing, funding, infrastructure, and facilities to maintain the long-term integrity of the habitat and wildlife resources to fulfill the purposes of the refuge.

Discussion: The refuge, along with lands owned by the USACE, is managed by the LDWF, which purchased land and created the first public access area near the refuge—the Sherburne WMA. As part of a cooperative agreement, LDWF technical and field personnel manage the wildlife on the refuge, and Service personnel are responsible for all forest management, law enforcement, and issuance of special use permits. Therefore, it is desirable to continue this mutually beneficial agreement, and to seek any possible new partnerships to augment refuge staffing levels. The refuge shares five staff members with two other refuges and these five staff members also assist with activities at all eight refuges within the Southeast Louisiana NWR Complex. Therefore, current staffing levels restrict the refuge's ability to meet its objectives. Adequate funding, staffing, and maintenance/purchase of necessary equipment are vital to ensure adequate management of the refuge.

Objective 5.1: Continue current partnership with LDWF through the cooperative agreement; also explore opportunities for new partnerships.

Discussion: Public access for all three agencies' lands, including all refuge lands, is currently managed by the LDWF under the 1986 Cooperative Agreement No. 14-16-0004-86-946. Since the federal and state lands share common boundaries, LDWF technical and field personnel manage the wildlife on both the wildlife management areas and the refuge. Service personnel are responsible for all forest management, law enforcement, and issuance of special use permits. The Atchafalaya NWR, Bayou Des Ourses, and Sherburne WMA, are collectively referred to as the Sherburne Complex.

Strategies:

- Identify other groups that focus on the Atchafalaya Basin and seek partnership opportunities with them.
- Coordinate and improve our partnership with LDWF and USACE for the implementation of forest management activities throughout the properties owned and shared by each party within the boundaries of the Sherburne WMA.

Objective 5.2: Over the 15-year life of the CCP, maintain existing facilities and equipment used as a part of refuge management.

Discussion: Because Atchafalaya NWR is one of a complex of eight refuges, equipment is shared among the refuges instead of being assigned solely to one refuge. The equipment referred to here is not separate from the other refuges in the Complex. Project efficiency depends largely on age, condition, and maintenance of the equipment needed to get projects accomplished.

Strategies:

- Maintain more than $3,000,000 worth of capitalized equipment used in all aspects of refuge management such as habitat, wildlife, public use, and protection.
- Within 6 years of CCP approval, develop an equipment maintenance plan for heavy equipment and water craft.
- Maintain and replace equipment as needed.

- Acquire resources to purchase fundamental equipment necessary to perform habitat management activities.
- Explore possibility to partner with the state and USACE to develop the Complex visitor center.
- Develop new public use facilities in the Happytown area of the refuge to create a "destination" for non-consumptive priority public uses.

Objective 5.3: Over the 15-year life of the CCP, work with the Regional Office to identify critical staffing and budget needs that are realistically possible within the next 10-15 years.

Discussion: Currently, no permanent staff members are employed solely for Atchafalaya NWR. Five employees, including refuge manager, forester, biologist, park ranger, and law enforcement officer manage the refuge as collateral duty. These same five positions are also responsible for management of Big Branch Marsh and Bogue Chitto NWRs, and must assist with activities on all eight refuges within the Southeast Louisiana NWR Complex. The Complex staff consists of 26 permanent full-time employees. The staffing level limits our ability to meet waterfowl and habitat management, public use, and law enforcement objectives. The following positions are also supported in the Draft CCP/EA for Bogue Chitto NWR. A refuge forestry technician position would allow the refuge to provide quality habitat for neotropical birds and Louisiana black bear. A full-time law enforcement officer would help protect the resources, and a visitor service specialist could help develop an environmental education and interpretation program for the refuge. An assistant refuge manager, maintenance worker, and biological technician are also needed. All positions listed would be primarily assigned to Atchafalaya, Big Branch Marsh, and Bogue Chitto NWRs.

Strategies:

- Develop short- and long-term staffing plan with the Regional Office.
- Add a full-time law enforcement officer to the staff.
- Add a forestry technician position to the staff.
- Add a visitor services specialist (environmental educator) to the staff.
- Add a biological technician to the staff.
- Add an assistant refuge manager to the staff.
- Add a maintenance worker to the staff.

V. Plan Implementation

INTRODUCTION

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

To accomplish the purpose, vision, goals, and objectives contained in this Draft CCP/EA for Atchafalaya NWR, this section identifies specific projects, funding and personnel needs, along with partnership opportunities, and required step-down management plans.

This Draft CCP/EA focuses on the importance of funding the operations and maintenance needs of the refuge. This is necessary to ensure that refuge staff can achieve the goals and objectives identified, which are crucial to fulfilling the purpose for which the refuge was established. The refuge's role in protecting and providing habitat for migratory waterfowl, birds, and endangered species is critical. Proposed priority public use programs will establish opportunities for wildlife-dependent recreation.

PROPOSED PROJECTS

Listed below are the proposed project summaries and their associated costs for fish and wildlife population management, habitat management, resource protection, visitor services, and refuge administration over the next 15 years. This proposed project list reflects the priority needs identified by the public, planning team, and staff based upon available information (Table 10). These projects were generated for the purpose of achieving refuge-specific objectives and strategies. The primary linkages of these projects to those planning elements are identified in each summary.

FISH AND WILDLIFE POPULATION MANAGEMENT

Conduct Essential Wildlife and Habitat Studies (Wildlife Biological Technician) (RONS 2677) – Hire a wildlife biological technician to conduct important wildlife and habitat studies and monitor species of concern, targeted species, and species of federal responsibility on a 15,200-acre refuge. A wildlife biological technician will: work with partners (LDWF, Universities, USGS) to collect and evaluate data to make management decisions regarding non-game mammals, reptiles, amphibians, forest breeding birds, small game species, ivory-billed woodpecker, furbearers and the endangered Louisiana black bear; promote a complex forest structure, hard and soft mast bearing trees, large cavity supporting trees; make recommendations on hunting strategies; gather harvest data during deer and turkey hunts to evaluate herd/flock health and population dynamics; and evaluate songbird use as climate changes effect species fluctuations and abundance. Standardized census and survey techniques will be employed and all data compiled into databases including GIS for spatial analysis. The refuge currently attracts more than 300 species of resident and migratory birds. Responsibilities will include: developing a wildlife inventorying and monitoring plan based on species selected as special concern; conducting annual monitoring and nest counts; and partnering with local universities

to conduct research concerning forest management effects on neotropical migratory birds and black bears. *(Linkages: Goal A, Objectives A-1-10.)*

Recurring Costs: $97,911 Special Project Cost: $ 98,000

Inventory and Adaptive Management of Habitats and Trust Species Related to Climate Change (RONS 1481) – Atchafalaya NWR lies at the heart of the Atchafalaya River corridor and is made up primarily of swamps and other forested habitat. Climate change models predict refuge habitats will become increasingly important as wooded habitats to the south are lost or converted to other habitat types. Effective and responsible management options are needed to prepare for future changes in landscape use by wildlife and the public. Responsibilities include: establishment of long-term vegetation monitoring plots across refuge habitats; development of restoration options and adaptive management strategies for forested habitats; establishment of faunal monitoring programs with priority given to the threatened Louisiana black bear, neotropical migratory birds, resident reptile and amphibian communities, aquatic and non-game mammals; science-based inventorying and monitoring of populations critical to ensuring the biological integrity of the refuge; development of restoration and adaptive management options to enhance productivity of bottomland hardwoods for priority species groups; and participate in and work closely with LCC personnel to develop and implement appropriate SHC priorities and programs. *(Linkages: Goal 1, Objectives 1-11-12.)*

Recurring Costs: $30,000 Special Project Cost: $155,000

Control of Feral Swine – Atchafalaya NWR has an established population of feral swine. The scientific literature has documented many adverse effects caused by feral swine on the habitat productivity and reproduction of most native wildlife. Being omnivores, feral swine utilize virtually every component of the habitat and directly compete with native wildlife, reducing their carrying capacity and adversely affecting their reproduction and recruitment. Feral swine are compromising the refuge's efforts in wetland restoration, reforestation, and habitat management. Currently, the refuge is using public hunting and some staff time to control feral swine. This project will provide professional animal damage control personnel to supplement the current program and an expansion of feral swine control efforts. Control work will be contracted with U.S. Department of Agriculture (USDA) Animal and Plant Health Inspection Service and/or other professional nuisance animal control personnel. *(Linkages: Goal 1, Objectives 1-12.)*

Recurring Costs: $15,000 Special Project Cost: $30,000

Provide Management for Wood Ducks – Operate a program of well-maintained nest boxes. Over 50 wood duck boxes are checked and maintained monthly on the refuge. Replace or place new boxes where there is overhead cover within 1 to 2 feet of the water surface for wood duck broods. Optimum habitat should have 75 percent cover and 25 percent open water, with a minimum of 1/3 cover to 2/3's open water. Place boxes with functional predator guards such that it is difficult to see from one box to the next or at least 100 yards apart. The boxes must have a functional predator guard and be checked and repaired annually. It is important to place boxes so that they are easy to access. As a minimum, box checks should be conducted in January, just prior to nest initiation that should begin between late-January and mid-February. Preferably, boxes should also be checked in late-April, soon after the first round of nest exodus by ducklings and again in August, just after the nesting season is complete. Evaluate nest use and nesting success in boxes and adjust the program accordingly to add more boxes if over 50 percent of the existing boxes are used; however, do not add more nest boxes than refuge staff can

properly maintain. Annual records should be maintained in a file. All existing and any newly erected nest boxes should be mapped using GPS and locations must be kept in the file. Some beaver ponds should be allowed to develop and mature, but not to exceed 5 percent of the refuge forested land.

Recurring Costs: $15,000 Special Project Cost: 15,000

HABITAT MANAGEMENT

Improve Water Level Management for Wildlife – Restore water management capabilities on the 100-acre moist-soil unit and greentree reservoir by purchasing a power unit, replacing water management infrastructure, and removing willows and other invasive plants. Monitor wetland vegetation, invertebrates, and wildlife response to meet the needs of spring and fall migration of neotropical and other migratory birds. These impoundments provide critical roosting areas for wading birds as well as nesting habitat for wood ducks. Desired water levels will be maintained on a two or three year cycle. The addition of a pump to adequately manage the moist-soil unit would help significantly and is identified to provide more management capability for moist-soil flooding and dewatering to provide habitat for reptiles, amphibians, insects, and bugging areas for kites. Restoration and monitoring will be a joint effort between the Service and researchers.

Greentree Reservoir Management

Water management in the greentree reservoir should be modified to provide late-season flooding of low areas. This flooding will improve nesting and brood rearing habitat for resident birds. Consistent hydrologic cycles reduced plant diversity and often selected against the most desirable tree species (oaks) over time. It is critical that these management units be flooded and dewatered at different dates annually. Flooding after the duck season and into spring is less detrimental than early season flooding. Late-season flooding, providing habitat for wood duck broods and improving nest success for nesting prothonotary warblers, can be accomplished by either holding water into April or early May on occasion, or by not fully draining each unit every year. Allowing low areas such as sloughs to remain flooded and dry by evaporation in summer will accomplish this management objective. *(Linkages: Goal 1, Objectives 1- 1-12; Goal 2, Objectives 2-1-4.)*

Recurring Costs: $ 5,000 Special Project Cost: $60,000

Provide Information and Capability Necessary to Promote and Sustain Desired Forest Conditions (RONS 2664) – Hire a forestry technician to assist the forester in developing and implementing the habitat management plan at Atchafalaya NWR. Establish a multi-layered forest canopy and maintain a diversity of plant species at various stages of development. Over 15,000 acres of land are not currently managed to provide desired forest conditions. A forester will increase forest management activities by inventorying at least 1,500 acres each year and improving forest structure on 100-300 acres of mature forest annually in accordance with desired forest conditions and forest management guidelines developed by the LMV Forest Resource Working Group. This position will also help assess forest management needs and improve habitat for the endangered Louisiana black bear, migratory songbirds, and migratory and breeding waterfowl. The refuge is located within one of the largest river systems/swamps in the United States. This project will improve habitat for thousands of migratory birds that winter in South America and either stop over during migration or breed in this area. Implementing a forest habitat management plan that provides moist midstory and groundstory vegetation (thickets) in the forested lands provides habitat for woodcock and includes thickets and shrub areas with high vertical stem density in the understory and fairly open ground cover on spongy wet soil. Habitat can be created in existing forest stands through thinning and patch cuts that also benefit other high-priority bird species. A forestry technician will assist the forester with

inventorying and identifying conservation targets, as well as assist with timber sale preparation and administration and develop a research natural area in coordination with the state and USACE. *(Linkages: Goal 2, Objectives 2-1-8.)*

Recurring Costs: $118,458 Special Project Cost: $120,000

Control Invasive Vegetation (RONS 2766) – Control exotic Chinese tallow tree and mimosa infestation on approximately 2,500 acres of bottomland hardwood forest, restoring it to a natural wetland habitat condition. The tallow tree is a very aggressive invader and is well-established on the forested portion of the refuge. When left unchecked, tallow trees have replaced natural vegetation in similar conditions throughout the southeastern United States. The control of exotic species will be concentrated on seed producers near high-access areas. The refuge provides habitat for the endangered Louisiana black bear and sensitive forest interior songbirds, including many species of neotropical migratory songbirds. The need for this project will be further described within the habitat management plan and has already been identified as one of the Lower Mississippi Valley Ecosystem goals. The refuge forester and forestry technician will design the project and monitor the project contractors. *(Linkages: Goal 1-2.)*

Recurring Costs: $15,000 Special Project Cost: $250,000

RESOURCE PROTECTION

Land Protection Project – Through a combination of fee title purchases from willing sellers, cooperative agreements, conservation easements with willing landowners, and land exchanges with other federal agencies, the Service will continue to expand interests in the Atchafalaya Basin. Currently, there are 17,898 acres within the existing refuge acquisition boundary that may be purchased from willing sellers only. The Service will acquire sufficient interest from willing sellers only to prevent conflicting land uses and to provide the management flexibility required to protect and manage the habitat as a national wildlife refuge. Additionally, this project will improve local environmental conditions, contribute to biological objectives, close gaps between existing tracts, and improve public access. The acquired lands will be made available to the public for additional wildlife-dependent recreation where appropriate. Potential funding sources for this project include the Migratory Bird Conservation Fund, Land and Water Conservation Fund, and carbon sequestration and cooperative efforts with various Service partners. The estimated cost of this project is $29-47 million (2010 costs are approximately $1600-2600/acre). *(Linkage: Goal 4, Objective 4-1-4.)*

Recurring Costs: $ N/A Special Project Cost: $ 47 million

Cultural and Historical Resource Interpretation Overview of the Refuge – Using available scientific and historic information, the selected contractor will author an interdisciplinary overview of the refuge's cultural landscape as it has changed over the past 15-20,000 years. The final technical report will include, at a minimum, sections about the area's geomorphology and hydrological regime, paleoenvironmental reconstruction, the area's cultural history, the scope and scale of past archaeological investigations on and near the refuge, a detailed list of the refuge's historic properties, and future research questions.

Submission of the overview report will satisfy the cultural resource objectives listed in the Draft CCP/EA, as well as those listed in other Service documents. Using the information generated from the overview, as well as on-going scientific archaeological investigations of the area, the selected contractor will inventory and then evaluate the National Register's eligibility of historic properties located on the refuge. Recurring costs include conservation and protection of sites and administrative needs for existing or new

sites that are found. This project would also include interpretation and display of pertinent information for the visiting public. (Linkages: Goal 4, Objective 4-1.)

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

Conduct Boundary Survey (RONS 2758) – Locate and survey the boundary of the 15,220-acre bottomland hardwood refuge. Of the 26 miles of boundary, 14 miles of boundary boarder (e.g., private- and state-owned lands) have never been surveyed. The surveys will allow law enforcement officers to better protect refuge lands. Forest management, including commercial timber harvest, depends on proper ownership boundaries. The refuge lines and surrounding properties are heavily used by hunters, anglers, and other outdoor enthusiasts. Proper boundaries will assist refuge visitors and neighbors to know where they are as they enjoy the great outdoors. Proper boundaries are also important to the oil and gas companies that are extracting minerals from the refuge and adjoining properties. *(Linkages: Goal 4, Objectives 4-1-5.)*

Recurring Costs: $10,000 Special Project Cost: $70,000

VISITOR SERVICES

Provide Quality Refuge Visitor Services Program (RONS 2669) – Develop and implement the visitor services program at the refuge. Hire a visitor services specialist. Responsibilities include planning and implementing environmental education programs, planning and conducting special events, and overseeing the interpretive program, including update and upkeep of refuge-related publications and sign placement and maintenance. This position will also obtain accurate visitor counts through the state's self check stations. Atchafalaya NWR does not have a public use specialist. A specialist would present programs to over 12,000 students annually. Interpretive and educational programs provide one of the best means for proactive involvement with the public and will inspire cooperation and support among corporative, private, and public groups. A specialist will maintain liaison contacts with area school systems and curriculum coordinators to continuously upgrade refuge education programs. Continue to hire seasonal student interns to assist with visitor services and environmental education activities. Maintain and develop agreements with the Friends of Louisiana Wildlife Refuges, Inc., to cooperate on projects and provide refuge support. Increase our volunteer and intern pool to supplement education programs and staff visitor contact centers. Recruit volunteers and volunteer groups, such as recreational vehicle campers, to supplement and assist refuge staff, and to provide education, visitor services, maintenance, and clerical duties. This project will also support the addition of a visitor services law enforcement officer to maintain visitor safety. *(Linkages: Goal 3, Objectives 3-1-9.)*

Recurring Costs: $164,000 Special Project Cost: $164,000

Increase Outreach Opportunities to the General Public – Increase presence at Butte Larose Welcome Center, to include promoting activities, events, and educational programs. Supply refuge brochures, including hunt brochures, bird lists, and general brochures to parish convention centers, state welcome centers, and other tourist hubs. Maintain and improve interpretive exhibits at Complex visitor center. Update existing bird brochure. Issue press releases on important events on the refuge, including public events and changes to public use programs (e.g., hunting). Update and maintain an interactive refuge website with links to bird lists, trail maps and guides, refuge maps, contacts for assistance, signup for programs, etc. Develop and deliver refuge education programs for adults through civic groups and to neighborhood groups surrounding the refuge. Continue to participate in annual Step Outside Day event.

Recurring Costs: $10,000 Special Project Cost: $20,000

Develop and Maintain Service Infrastructure, Equipment, and Visitor Service Facilities – (SAMMS 2007701704, RONS 2675) Provide ability to service and maintain refuge equipment and infrastructure valued at more than $5 million to ensure all aspects of daily refuge management and significant refuge programs (e.g., biological, visitor services, law enforcement) are fully supported. The proper management of government investments in the form of refuge equipment, buildings, roads, levees, etc., requires the addition of a full-time maintenance worker position. Responsibilities include regular and routine maintenance of all small and heavy equipment; a 4,000-square-foot maintenance facility, 2,000-square-foot administrative building, and 2,400-square-foot bunkhouse; 10 miles of roads and trails; 3 miles of levees; and numerous parking areas, signs, kiosks, etc. The position will post 50 miles of boundary lines; maintain 11 kiosks; 2 fishing piers; several miles of roads and trails; and numerous boats, motors, and vehicles. This project will maintain facilities so that they will not deteriorate with increasing public use pressure. The project will increase the quality of the user experience on the refuge while improving hunting, fishing, photography, and environmental education and interpretation opportunities. The refuge entrance signs also need to be replaced and maintained. These signs depict the location of the refuge and the cooperating agencies that assist in public use management. Weathering and rot has damaged the signs beyond repair. The four signs will be removed and two new standard high-density overlay wooden entrance signs will be installed, consolidating the signs by adding a 1' banner to each 4'x8' sign depicting the refuges cooperative management. These signs are welcome signs and will be the first thing members of the public see when they enter the refuge by roads. *(Linkages: Goal 3, Objectives 3-1-9, Goal 5, Objectives 5-1-3.)*

Recurring Costs: $89,000 Special Project Cost: $89,000

Increase Visitor Services to Non-consumptive Users with Environmental Outdoor Activities (RONS 2779) – Create a ¼-mile boardwalk. Increase non-consumptive use by 1,500 birdwatchers and wildlife photographers, and annually capture visitors directed from the new Butte Larose Welcome Center. Conduct two educational tours annually and invite local school groups on new facilities to conduct outreach, interpretation, and environmental education in an effort to get more children involved in wildlife-oriented outdoor activities. Install an 8-foot-wide and ¼-mile-long boardwalk and overlook in an area where visitors get a solitary experience on the refuge, while being provided sufficient access to the site. Include photo blinds along trail to appeal to non-consumptive users such as bird watchers and wildlife photographers. This facility will provide the only type of this experience in this area of the largest swamp on the refuge and a part of the largest swamp in the nation. *(Linkages: Goal 3, Objectives 3-1-4.)*

Recurring Costs: $5,000 Special Project Cost: $185,000

Increase Educational Opportunities and Visitor Services for Local Students (RONS 3873) – Hire two annual interns**.** Increase educational opportunities on the Complex and in local schools to 1,500 new students and to conservation and civic groups. The project will increase opportunities to connect kids with nature, especially those near urban centers, by providing for and training two student interns each spring and fall annually to perform environmental educational programs in schools and at refuge public use sites. Up to three programs per week will be performed on such topics as refugology, junior refuge manager, friendly flames, creature features, and endangered species. These interns will provide educational canoe trips; restock brochures; maintain and clean signs, public restrooms, and kiosks; and perform regular maintenance and biological activities. Interns will be trained to increase public awareness of climate change and the challenges facing wildlife through development of, and effects of habitat loss and fragmentation on refuge species. Revise and maintain an array of formal, curriculum-based environmental education programs for students in

parishes bordering the refuge that, through first-hand experiences, promote understanding, appreciation, and stewardship of refuge resources and support for refuge management practices. To complement on-site programming, provide relevant classroom educational programming with the same goals of promoting understanding and stewardship of refuge resources. Develop and maintain liaison contacts with area school systems and curriculum coordinators to continuously upgrade refuge education programs in the classroom and on the refuge to match curriculum needs. Develop a monitoring plan with schools to evaluate educational program results and effectiveness relative to grade learning expectations. Visit school career fairs to promote Student Career Employment and Student Temporary Employment Programs and Youth Conservation Corps Programs to increase Fish and Wildlife Service's career awareness within the nearby community. *(Linkages: Goal 3, Objectives 3-1-3,* 3-1-9).

Recurring Costs: $5,000 Special Project Cost: $45,000

Improve Visitor Parking, Access, and Trails (SAMMS 2008881507, 02121864, 03124900, 04135064, 2005204257, 2006524996, 2006525011, 2006525017, 2006525022, 2006525032, 2006525038, 2006525045, 2006525047, 2006525049, 2006556214, 2006556221, 20066558870, 2006558996, 2006559023, 2007701435, 2008870200) – The refuge supports over 15,000 hunters, 34,000 wildlife observers, 3,000 anglers, and 3,500 photographers. Parking lots and trails are used to support several programs and the mission of the Refuge System, which include management, public use, waterfowl habitat, migratory birds, and law enforcement. Rehabilitating public use roads and associated parking areas throughout the refuge is a key priority of this Draft CCP/EA. Many existing ATV trails have been seriously degraded by heavy public use and severe weather events and are in need of repair and resurfacing. *(Linkages: Goal 3, Objectives 3-1-9.)*

This total cost estimate including $2,926,120 = roads and $39,959 = parking.

Recurring Costs: $3,000 Special Project Cost: $64,500

Improve Boat Access Areas (SAMMS 03124899, 2006559008) – Replace 1990 Pitman-Robertson Boat ramp off Landing Road. Plan, design, and construct a 2-vehicle wide concrete corrugated boat ramp into Big Alabama Bayou on Landing Road, to replace the existing single lane, 60-foot-long broken reinforced concrete ramp. The existing launch is long, has no preventive measures for sliding into the bayou, and no piers for ingress and egress into and out of boats, causing a safety hazard for users. *(Linkages: Goal 3, Objectives 3-1-5.)*

Recurring Costs: $3,000 Special Project Cost: $64,500

REFUGE ADMINISTRATION

Provide Management, Improve Refuge Operations, and Enhance Partnerships (RONS 2659, 2662) – Provide support to Atchafalaya NWR staff. Implement management programs by hiring an assistant refuge manager. The 15,220-acre refuge is one tract in a 60,000-acre land complex jointly managed with LDWF and USACE and needing a manager to coordinate management with cooperators. A refuge manager will implement the final CCP, fulfill pertinent administrative duties, provide visitor services and enhance community relations, issue permits, assist with hunt programs, post boundaries and signage, manage oil and gas activities, manage rights-of-way, maintain property inventory, coordinate research projects with universities, oversee facility and trails maintenance, and coordinate the public outreach program. This refuge is highly visited by hunters, anglers, birdwatchers, nature photographers, and other outdoor enthusiasts. *(Linkages: Goal 5, Objective 5-1-3.)*

Recurring Costs: $97,911 Special Project Cost: $100,000

Regulate Oil and Gas Operations in Accordance with Applicable Law and Statute to Ensure the Protection of Refuge Resources – Manage oil and gas producers closely through annual/monthly monitoring of all producing sites consistently through special use permit, providing for restoration and mitigation measures. Conduct periodic monitoring and site inspections in cooperation with EPA, LDEQ and Department of Natural Resources, Office of Conservation personnel, to ensure compliance with state and federal regulations and to detect potential problem areas with equipment and facilities. Monitor annually for refuge-specific regulation violations and to detect any release of waste products. When unauthorized releases occur, ensure timely cleanup of released material and develop remediation and mitigation requirements as needed. Require plug and abandonment activities for well sites with no future use potential as they are identified. Require restoration and reclamation of abandoned well sites in a timely manner.

Recurring Costs: $15,000 Special Project Cost: 15,000

FUNDING AND PERSONNEL

Table 10. Summary of projects

PROJECT TITLE	FIRST YEAR COST ($) *	RECURRING ANNUAL COST ($)	FTE
Conduct essential biological activities relative to wildlife and habitat management	98,000	97,911	1
Inventory and adaptive management of habitats and trust species related to climate change	155,000	30,000	
Control Invasive feral swine	30,000	15,000	
Improve water level management for wildlife	60,000	5,000	
Provide information and capability necessary to promote and sustain desired forest conditions	120,000	118,458	1
Control invasive vegetation	250,000	15,000	
Provide management for wood ducks	15,000	15,000	
Future land acquisition project	47,000,000	Unknown	
Cultural and historical resource interpretation overview of the Refuge	75,000	10,000	

PROJECT TITLE	FIRST YEAR COST ($) *	RECURRING ANNUAL COST ($)	FTE
Conduct boundary surveys	70,000	10,000	
Provide quality refuge visitor services programs	164,000	164,000	2
Increase outreach opportunities	20,000	10,000	
Develop and maintain service infrastructure, equipment, and visitor service facilities	89,000	89,000	1
Increase visitor services by building a boardwalk	185,000	5,000	
Increase educational opportunities and visitor services for local students	45,000	5,000	
Improve visitor parking, access, and trails	64,500	3,000	
Improve boat access areas	64,500	3,000	
Provide management, hire an assistant manager to improve refuge operations and enhance partnerships	100,000	97,911	1
Regulate oil and gas operations	15,000	15,000	

** cost estimates are rough, undocumented and funding sources would be various and not all FWS funding.*

PARTNERSHIP/VOLUNTEER OPPORTUNITIES

A key element of this Draft CCP/EA is to establish a cooperative agreement with LDWF, partnerships with private organizations, and other state and federal natural resource agencies. Partnerships are critically important to achieve refuge goals, leverage funds, minimize costs, reduce redundancy, and bridge relationships. In the immediate vicinity of the refuge, opportunities exist to establish more partnerships with local landowners, Department of Animal Control Services, and with the USACE. The refuge will continue to work with neighboring USACE and State of Louisiana land partners within the Sherburne Complex through agreements for managing neighboring land to enhance the refuge management program.

STEP-DOWN MANAGEMENT PLANS

A CCP is a strategic plan that guides the future direction of the refuge. Step-down management plans provide more specific guidance on activities, such as habitat and visitor services management. Step-down plans (Table 11) would be tiered to this Draft CCP/EA and developed in accordance with NEPA, which requires public review and involvement only when activities or effects to the environment would be significantly different or greater than effects already analyzed during the preparation of this document.

Table 11. Atchafalaya NWR step-down management plans

Step-down Plans	Completion Date
Habitat Management Plan	2012
Station Safety Plan	Annually
Law Enforcement Plan	2012
Fishery Management Plan	2017
Fire Management Plan	2015
Biological Inventorying and Monitoring Plan	2016
Nuisance Animal Plan	2014
Hunt Plan (update)	2013
Cultural Resource Protection Plan	2017
Visitor Services Management Plan	2014
Invasive Management Plan	2016
Disaster Action Plan	Annually

MONITORING AND ADAPTIVE MANAGEMENT

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

To apply adaptive management, specific surveying, inventorying, and monitoring protocols will be adopted for the refuge. The habitat management strategies would be systematically evaluated to determine management effects on wildlife populations. This information would be used to refine approaches and determine how effectively the objectives are being accomplished. Evaluations would include ecosystem

team and other appropriate partner participation. If monitoring and evaluation indicates undesirable effects for target and non-target species and/or communities, then alterations to the management projects would be made. Subsequently, the final CCP would be amended. Specific monitoring and evaluation activities would be described in the step-down management plans.

PLAN REVIEW AND REVISION

The final CCP would be reviewed annually in development of refuge annual work plans and budget. It would also be reviewed to determine the need for revision. A revision would occur if and when conditions change or significant information becomes available, such as a change in ecological conditions or a major refuge expansion that were not already mentioned in this Draft CCP/EA. The final CCP would be augmented by detailed step-down management plans to address the completion of specific strategies in support of goals and objectives. Major revisions to the final CCP would be subject to public review and NEPA compliance.

SECTION B. ENVIRONMENTAL ASSESSMENT

I. Background

INTRODUCTION

The Service prepared this Environmental Assessment (EA) for Atchafalaya NWR in compliance with NEPA and the Improvement Act. The Improvement Act requires the development of comprehensive conservation plans for all refuges. Following a public review and comment period on this Draft CCP/EA, a final decision will be made by the Service that will guide Atchafalaya NWR's management actions and decisions over the next 15 years, provide understanding about the refuge and management activities, and incorporate information and suggestions from the public and refuge partners.

This Draft CCP/EA proposes a management direction that is described in detail through a set of goals, objectives, and strategies. It addresses current management issues, provides long-term management direction and guidance for the refuge, and satisfies the legislative mandates of the Improvement Act. While this Draft CCP/EA provides general management direction, subsequent step-down plans will provide more detailed management direction and actions.

This EA determines and evaluates a range of reasonable management alternatives. The intent is to support informed decision-making regarding future management of the refuge. Each alternative presented in this EA was generated with the potential to be fully developed into a final CCP. The predicted biological, physical, social, and economic effects of implementing each alternative are analyzed in this EA. This analysis assists the Service in determining if the alternatives would have any significant effects on the human or natural environment. If not, a Finding of No Significant Impact (FONSI) will be prepared. If the chosen action alternative would cause significant effects, a more detailed analysis through an Environmental Impact Statement (EIS) and a Record of Decision (ROD) would be required. Following public review and comment, the Service will select an alternative to be fully developed for this refuge.

PURPOSE AND NEED FOR ACTION

The purpose of this EA is to meet the purpose(s) of the refuge and the vision and goals identified in the Draft CCP (for which we evaluate each alternative). The purpose is to ensure that Atchafalaya NWR serves as sanctuary for migrating birds; protects and conserves rare, threatened, and endangered species; serves the development, advancement, management, conservation, restoration, and protection of fish, wildlife, and habitat resources; provides opportunities for compatible wildlife-dependent recreation, interpretation, and environmental education; controls and eliminates exotic, invasive, and nuisance species; promotes awareness and appreciation of natural resources; administers and protects the wilderness character; and protects and preserves archaeological and historical resources.

This EA addresses the need to adopt a 15-year management plan for Atchafalaya NWR that provides guidance for future refuge management and meets the requirements of the Improvement Act.

DECISION FRAMEWORK

Based on the assessment described in this document, the Service will select an alternative to implement the final CCP for Atchafalaya NWR. The final CCP will include a FONSI, which is a statement explaining why the selected alternative will not have a significant effect on the quality of the human or natural environment. This determination is based on an evaluation of the Service and Refuge System mission, the purpose(s) for which the refuge was established, and other legal mandates. Assuming no significant effects are found, implementation of the plan will begin and will be monitored annually and revised when necessary.

PLANNING STUDY AREA

Atchafalaya NWR is in St. Martin and Iberville Parishes, Louisiana, and is located between Baton Rouge and Lafayette off of Interstate 10. Atchafalaya NWR, established in 1984, occupies a low-lying swamp throughout a vast bottomland hardwood forest. This 15,000-acre refuge is part of the largest bottomland hardwood swamp in the country. These wetlands support a wide diversity of native plants and animals, providing habitat for migratory and resident waterfowl, marsh and water birds, and neotropical migratory birds. This beautiful swampland also offers a multitude of recreational options. Hunting, fishing, hiking, and some of the best wildlife viewing opportunities in the country exist in the Atchafalaya Basin. The refuge is managed cooperatively with the LDWF. The LDWF also manages through agreement the USACE Bayou Des Ourses area.

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

AUTHORITY, LEGAL COMPLIANCE, AND COMPATIBILITY

The Service developed this Draft CCP/EA in compliance with the Improvement Act and Part 602 of the Fish and Wildlife Service Manual (National Wildlife Refuge System Planning). The actions described within this Draft CCP/EA also meet the requirements of NEPA. The refuge staff achieved compliance with NEPA through the involvement of the public and the incorporation of this EA, with a description of the alternatives considered and an analysis of the environmental consequences of the alternatives. When fully implemented, the final CCP will strive to achieve the vision and purposes of Atchafalaya NWR.

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

COMPATIBILITY

The National Wildlife Refuge System Administration Act of 1966, as amended by the National Wildlife Refuge System Improvement Act of 1997, states that national wildlife refuges must be protected from incompatible or harmful human activities to ensure that Americans can enjoy Refuge System lands and waters. Before activities or uses are allowed on a national wildlife refuge, the uses must be found to be compatible. A compatible use "...will not materially interfere with or detract from the fulfillment of the mission of the Refuge System or the purposes of the refuge." In addition, "wildlife-dependent recreational uses may be authorized on a refuge when they are compatible and not inconsistent with public safety."

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

PUBLIC INVOLVEMENT AND THE PLANNING PROCESS

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

The development of this Draft CCP/EA was executed in accordance with the Service's refuge planning policy (602 FW 3.4C(1)) and NEPA. Initial planning began in October 2008, with the establishment of the core planning team and the preparation of the team charter and work plan. Through the planning process, and with input from local, state, and federal agencies, the public, and conservation associations, the planning team identified issues and concerns that were relevant to the current and future conservation and management of the refuge.

In September 2008, a biological review was completed that assessed the status of the biological resources and programs currently in place on the refuge. This review also aided in identifying additional information needs and establishing preliminary management goals and objectives. The team that prepared the review was comprised of biologists, managers, conservation society members, and employees of local, state, and federal agencies. This review also served as an intergovernmental scoping meeting to obtain other government agency partners' participation in the CCP process. Issues discussed included habitat management, water quality, migratory birds, threatened and endangered species, other wildlife, fisheries, forest management, and refuge staffing and equipment needs.

In May 2008, a visitor services review was conducted to evaluate the status of the existing public use programs, facilities, and opportunities on the refuge. This review provided guidance for short, intermediate, and long term recommendations for improving the quality of public use and educational services. These recommendations included: developing a current visitor services plan, enhancing environmental education and volunteer programs, and increasing law enforcement presence on the refuge.

Public involvement and input into the development of this Draft CCP/EA was initiated by the submission of a *Federal Register* notice of intent published on January 9, 2009. One public scoping meeting was held at the Service's Ecological Services Office on January 29, 2009, that was attended by approximately 25 stakeholders. Both written and verbal comments were received from stakeholders. Comments received during the public scoping process are listed in Appendix D.

A complete summary of the issues and concerns is provided in Appendix D

II. Affected Environment

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

III. Description of Alternatives

FORMULATION OF ALTERNATIVES

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

The three alternatives identified and evaluated represent different approaches to provide permanent protection, restoration, and management of the refuge's fish, wildlife, plants, habitats, and other resources, as well as compatible wildlife-dependent recreation. Refuge staff assessed the biological conditions and analyzed the external relationships affecting the refuge. This information contributed to the development of refuge goals and, in turn, helped to formulate the alternatives. As a result, each alternative presents different sets of objectives for reaching refuge goals. Each alternative was evaluated based on how much progress it would make and how it would address the identified issues related to fish and wildlife populations, habitat management, resource protection and conservation, visitor services, and refuge administration. A summary of the three alternatives is provided in Table 12.

DESCRIPTION OF ALTERNATIVES

Serving as a basis for each alternative, a number of goals and sets of objectives were developed to help achieve the refuge's purpose and the mission of the Refuge System. Objectives are desired conditions or outcomes that are grouped into sets and, for this planning effort, consolidated into three alternatives. These alternatives represent different management approaches for managing the refuge over a 15-year time frame while still meeting the refuge purposes and goals. The three alternatives are summarized below. A comparison of each alternative follows the general description.

ALTERNATIVE A – CURRENT MANAGEMENT (NO ACTION)
ALTERNATIVE B – OPTIMIZE BIOLOGICAL AND VISITOR SERVICES (PROPOSED ALTERNATIVE)
ALTERNATIVE C – MAXIMIZE PUBLIC USE

ALTERNATIVE A – CURRENT MANAGEMENT (NO ACTION)

This alternative is required by NEPA and is the "no-action" or "status-quo" alternative in which no major management changes would be initiated by the Service. This alternative also provides a baseline to compare the current habitat, wildlife, and public use management to the two action alternatives (B and C).

Alternative A continues current management strategies, with little or no change in budget or funding. Management emphasis would continue to focus on maintaining biological integrity of habitats found on the refuge. Under this alternative, the Service would protect and maintain all refuge lands, primarily focusing on the needs of threatened and endangered species, with additional emphasis on the needs of migratory birds and resident wildlife.

The Service would continue mandated activities for protection of federally listed species. Conservation of federally listed threatened and endangered species would be continued through current habitat management and monitoring programs accomplished primarily through established partnership and research projects.

Current management of migratory birds would continue to provide suitable habitat for waterfowl, contributing to the objective of the North American Waterfowl Management Plan. Current levels of surveying, monitoring, and managing of migratory and resident birds would continue. The operation and management of the refuge providing for the basic needs of these species would continue to include feeding, resting, and breeding.

Mostly opportunistic monitoring and management of resident wildlife would occur under this alternative. The main objective for game species management would be to sustain healthy populations through hunting programs and current habitat management. Only current refuge wildlife management programs would continue to be maintained, and since little baseline biological information would be gathered on non-managed species or groups of species, new implementation of management would not be likely.

The Complex staff would continue habitat management of existing greentree reservoir, wetlands, open waters, forested habitats, scrub-shrub habitat, grasslands, and open lands. All impoundments, levees, moist-soil water management units, and water control structures would continue to be maintained to provide critical habitat for threatened and endangered species, waterfowl, and wetland-dependent birds. Current water quality information would be addressed on an as-needed basis and would continue to be limited. All other habitat management programs would remain unchanged.

Control of invasive and exotic plant species would continue to be performed by the Complex staff on an opportunistic basis as resources permitted. This limited control would be performed by chemical and/or mechanical means, but would remain intermittent. Thus habitats and wildlife would possibly be at risk because of this limited control. Additionally, the Complex staff would continue efforts to control/remove invasive, exotic, and/or nuisance wildlife on the refuges. These species tend to procreate rapidly and can be especially destructive to habitats. Control would continue to be implemented by the take of these animals as part of hunting programs, offered on some of the refuges, and opportunistically by Complex staff.

The Complex, with the support of volunteers and friends, manages an extensive visitor services program that includes recreation, education, and outreach programs for the Complex; however, not all of these programs are offered on the Atchafalaya NWR due to the small number of designated staff and the remoteness from the Complex headquarters. The Service would maintain the current levels of wildlife-dependent recreation activities (e.g., hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation opportunities) and current facilities.

Hunting is the most popular public use activity on the Sherburne WMA Complex. Hunting opportunities on refuge lands are managed by the LDWF as part of the Sherburne WMA. Due to the complex boundaries and multi-ownership, all hunting and fishing regulations are set by LDWF as part of a cooperative management agreement and fall under the rules and regulations of Sherburne WMA. This offers less confusion to the visiting public and also makes it easier for law enforcement. Hunts offered include white-tailed deer (archery, primitive firearms, and modern firearms); turkey (open and lottery); fox and grey squirrel; rabbit; raccoon; waterfowl, snipe, rail, and gallinules; woodcock; and mourning dove. Feral hogs may be taken by properly licensed hunters from October 1- February 28. Atchafalaya NWR and Sherburne WMA Complex also have very popular fishing programs. The refuge is open year-round for sport-fishing in accordance with state fishing regulations. Fishermen frequent Big

Alabama Bayou and some of the smaller waters of the Sherburne Complex. Targeted species are crappie, largemouth bass, catfish, and perch. Recreational crawfishing is allowed on the refuge and is a popular activity in late winter, spring, and summer. The Sherburne Complex maintains four boat launching facilities with parking areas that provide bayou access. There is also a designated pier for fishing.

Land would be acquired from willing sellers within the refuge's current acquisition boundary and in accordance with current Service policy. Law enforcement would continue at the current level with emphasis on resource protection and public safety. This includes being designated to uphold current regulations and for protection of wildlife, visitors, and cultural and historical resources. The Service would maintain the refuge as resources allow. The refuge staff would continue to include five shared staff members including: refuge manager, forester, biologist, park ranger, and law enforcement officer who manage the refuge as a collateral duty.

ALTERNATIVE B – OPTIMIZE BIOLOGICAL AND VISITOR SERVICES (PROPOSED ALTERNATIVE)

The proposed alternative (B) was selected by the Service as the alternative that best signifies the vision, goals, and purposes of the refuge. Additionally, this alternative was developed based on public input and the best professional judgment of the planning team. Under Alternative B, the emphasis would be on restoring and improving refuge resources needed for wildlife and habitat management and providing enhanced appropriate and compatible wildlife-dependent public use opportunities, while addressing key issues and refuge mandates.

This alternative would focus on augmenting wildlife and habitat management to identify, conserve, and restore populations of native fish and wildlife species with an emphasis on migratory birds and threatened and endangered species. This objective would partially be accomplished by increased monitoring of waterfowl, other migratory and resident birds, and endemic species, in order to assess and adapt management strategies and actions. Additionally, information gaps would be addressed by the initiation of baseline surveying, periodic monitoring, and ultimately adding adaptive habitat management.

Habitat management programs for impoundments, greentree reservoir, wetlands, open waters, forested habitats, scrub-shrub habitat, grasslands, and open lands would be reevaluated, and step-down management plans would be developed to meet the foraging, nesting, and breeding requirements of priority species. Additionally, monitoring and adaptive habitat management would be implemented to potentially counteract the impacts associated with long-term climate change and sea level rise.

The control of invasive and exotic plant species would be more aggressively managed by implementing a management plan, completing a baseline inventory, supporting research, and controlling with strategic mechanical and chemical means. Additionally, the Complex staff would utilize this management plan and monitoring to enhance efforts to control/remove invasive, exotic and/or nuisance wildlife on the refuge.

Alternative B enhances the refuge's visitor services opportunities by: improving the quality of fishing opportunities; implementing an environmental education program component for the refuge that utilizes volunteers and local schools as partners; enhancing wildlife viewing and photography opportunities by implementing blinds, a swamp trail boardwalk, and additional observational areas; developing and implementing a visitor services management plan, working with partners to develop a Complex visitors center, including a law enforcement office and maintenance facility with an attached visitors contact station; and enhancing personal interpretive and outreach opportunities. Volunteer programs and friends groups also would be expanded to enhance all aspects of refuge management and to increase resource availability.

In addition to the enforcement of all federal and state laws applicable to the refuge to protect archaeological and historical sites, the refuge would identify and develop a plan to protect all known sites. The development of an onsite office for law enforcement officers would not only better provide security for these resources, but would also ensure visitor safety and public compliance with refuge regulations.

Land acquisitions within the approved acquisition boundary would be based on the importance of the habitat for wildlife, management, and access. Administration plans would stress the need for increased maintenance of existing infrastructure and construction of new facilities. Funding for new construction projects would be balanced between habitat management and public use needs. Additional staff would be required to accomplish the goals of this alternative. Personnel priorities would include adding a visitor services specialist, assistant manager, biological technician, forestry technician, maintenance worker, and law enforcement officer to the staff. The increased budget and staffing levels would better enable the refuge to meet the obligations of wildlife stewardship, habitat management, and public use.

ALTERNATIVE C – MAXIMIZE PUBLIC USE

Under Alternative C, the active management of refuge resources would be employed to optimize public use opportunities. Staff and resources would be dedicated to increasing the public use activities of fishing, hunting, wildlife observation, wildlife photography, outreach, and environmental education and interpretation. All purposes of the refuge and mandated monitoring of federal trust species and archaeological resources would continue, but other wildlife management would be dependent on public interests.

This alternative would prioritize habitat management of species of public interest. Wetlands, the greentree reservoir, and the moist-soil unit would be maintained to facilitate public use opportunities, such as fishing and canoeing. Forest habitat in high public use areas would be managed while all other areas would have little management intervention. Forest opening demonstration sites would be implemented to serve as educational opportunities for public and private land managers. The control of invasive and exotic plant species would be more aggressively managed in public use areas.

Increased wildlife observation and wildlife photography and interpretation opportunities would result from the construction of an on-site Complex visitor's center, boardwalk, canoe and birding tours, kiosks, and trail signs. Additionally, waterfowl and wildlife monitoring would be conducted periodically to identify high use areas for the visiting public to observe. Environmental education would be expanded by addressing a wide range of local environmental concerns and would be offered to a broader range of student groups and schools through teacher workshops. A new on-site environmental education facility would be developed to better facilitate the new environmental education programs and workshops. New information brochures, tear sheets, and website postings would be published to increase public outreach and to promote public use and recreational opportunities.

Land acquisitions within the approved acquisition boundary would be based on the importance of the habitat for public use. Administration plans would stress the need for increased maintenance of existing infrastructure and construction of new facilities that would benefit public use activities. Additional funding would be needed to maintain the maximum number of trails and roads for access and to provide full-time staff and new facilities to support expanded public use activities.

FEATURES COMMON TO ALL ATCHAFALAYA NWR ALTERNATIVES

Although the alternatives differ in many ways, there are similarities among them as well. These common features are listed below to reduce the length and redundancy of the individual alternative descriptions.

- Resource Protection - Current enforcement of all federal and state laws applicable to the refuge to protect all known archaeological and historical sites would continue, including any efforts to increase resource protection through education and inventories. Certain mandated responsibilities such as protection of federal trust species, wetlands, prevention and control of invasive species, and payment of revenue sharing in lieu of taxes would be accomplished under all alternatives.

- Habitat Management - Existing management by habitat type would continue. Management activities may increase or decrease to meet other objectives under the various alternatives.

- Control of Invasive Plants - Each alternative would develop an Integrated Pest Management Plan that provides for control of invasive plants.

- Threatened and Endangered Species - Each alternative would provide protective conservation measures for federally listed species and their habitats on the refuge.

- Resident Wildlife - Each alternative would use sound scientific principles for managing populations of resident wildlife species such as white-tailed deer.

- Control of Nuisance Wildlife Populations - Each alternative would provide for control of wildlife populations that reach nuisance levels and negatively impact other refuge resources.

- Monitoring - Existing monitoring of waterfowl, other migratory birds, and endemic species would continue. Monitoring activities may increase or decrease to meet other objectives under the various alternatives.

- Management Plans - All alternatives include the development and implementation of visitor services and habitat management plans.

- Maintain Refuge Boundary - The existing refuge boundary and directional signs would be maintained as part of all alternatives.

- Law Enforcement - Law enforcement would provide visitor safety, protect resources, and ensure public compliance with refuge regulations under all alternatives. Enforcement presence varies under the various alternatives to meet specific objectives.

- Maintain Capitalized Equipment - All alternatives contain maintenance of refuge equipment, which is required to meet safety standards.

- Partnerships - Currently established partnerships with agencies, organizations, and individuals would continue to support refuge management programs.

COMPARISON OF THE ALTERNATIVES BY ISSUE

Table 12. Comparison of alternatives by management issues for Atchafalaya NWR

Goal 1. Protect, manage, enhance, and restore healthy and viable populations of migratory birds, resident wildlife, fish, and native plants, including all federal and state threatened and endangered species found within the Atchafalaya Basin in a manner that supports national and international treaties, plans, and initiatives.

Issues	Alternative A Current Management – (No Action)	Alternative B Optimize Biological and Visitor Services – (Proposed Alternative)	Alternative C Maximize Public Use
Populations - Waterfowl	1. In coordination with state, continue to monitor effects of waterfowl response through harvest surveys. Also, continue to use self-clearing permits to determine harvest and species composition of harvest.	1. Same as Alternative A and by year 2015, increase monitoring of waterfowl in order to assess and adapt habitat management strategies/actions by conducting bi-monthly waterfowl ground counts in all suitable habitats (Oct.-Mar.).	1. Same as Alternative A and provide updated information to public.
Populations - Wood duck	2. Participate in regional wood duck banding to determine regional population trends. Install, maintain, and monitor 57 wood duck nesting boxes. Also, continue to use self-clearing permits to determine harvest and trends.	2. Same as Alternative A by continuing to participate in regional wood duck banding and monitor monthly from Jan-May to determine regional population trends and increase wood duck nest boxes.	2. Discontinue wood duck banding program and install nest boxes for interpretation and observation opportunities.

Issues	Alternative A Current Management – (No Action)	Alternative B Optimize Biological and Visitor Services – (Proposed Alternative)	Alternative C Maximize Public Use
Populations - Woodcocks	3. Continue to rely on state to monitor harvest of woodcock through use of self-clearing permits.	3. Develop a comprehensive woodcock survey and monitoring program.	3. Same as Alternative A and provide updated information to public.
Populations - Forest Breeding Birds	4. Continue MAPS long-term monitoring stations in coordination with LDWF. Opportunistically survey and monitor forest breeding bird populations. Continue annual breeding bird survey.	4. Same as Alternative A, and within 5 years expand where applicable seasonal monitoring to reveal population trends and response of forest breeding birds to management actions.	4. Utilize birding groups to conduct CBC, annual breeding bird surveys, and MAPS station. Provide public with updated bird information and sightings for observational opportunities.
Populations - Forest Breeding Birds - Swallow-tailed and Mississippi kites	5. Continue to monitor kite relative abundance and nest locations and productivity.	5. Same as Alternative A, and within 15 years enhance forest habitats to improve conditions for kites. Continue to monitor kite relative abundance and nest locations and productivity. Coordinate research efforts with scientists and the research community to benefit forest breeding birds.	5. Same as Alternative A, but only to provide public viewing opportunities of kite nests and access for education.
Populations - Colonial Waterbirds/Wading Birds	6. Opportunistically survey water bird and wading bird populations.	6. Same as Alternative A, and also identify colonial waterbird and wading birds rookeries.	6. Same as Alternative A, but only to provide public viewing opportunities of rookeries and access for education, minimizing disturbance.

Issues	Alternative A Current Management – (No Action)	Alternative B Optimize Biological and Visitor Services – (Proposed Alternative)	Alternative C Maximize Public Use
Populations - Threatened and Endangered Species	7. Monitor populations of Louisiana black bear, American alligator, and state special concern species sufficient to discern population trends and effects of habitat management.	7. Save as Alternative A, and within the 15-year life of the CCP, expand management and research activities which contribute to the recovery of any T&E species as indicated by a recovery plan.	7. Same as Alternative A.
Populations - Reptiles and Amphibians	8. In cooperation with partners, continue to conduct surveys of reptile and amphibian populations.	8. Same as Alternative A and over the 15-year life of the CCP develop a comprehensive reptile and amphibian species list.	8. Develop reptile and amphibian brochure, then discontinue surveys.
Populations - Small and Big Game Species	9. In cooperation with partners, continue to conduct deer browse surveys, harvest surveys, deer health herd checks, and wild turkey survey.	9. Same as Alternative A, but also conduct deer health checks every 3 - 5 years and monitor habitat conditions with browse surveys to determine health and population of deer on the refuge. Assess self-clearing harvest cards to monitor trends in small game harvest and use data to assist in setting hunting season dates.	9. Same as Alternative A.

Issues	Alternative A Current Management – (No Action)	Alternative B Optimize Biological and Visitor Services – (Proposed Alternative)	Alternative C Maximize Public Use
Populations - Other Fish, Wildlife, and Plants	10. Opportunistically monitor other wildlife and plants as appropriate.	10. Establish a comprehensive inventorying and monitoring program for fisheries, nongame mammals, and plants. Work with partners (LDWF and State Wildlife Grants, Universities, USGS) to conduct non-game mammal surveys to document species occurrence. Address species occurrence and relative abundance by habitat type and in response to management through time, as opportunities allow.	10. Periodically monitor fisheries to provide public use optimal opportunities.
Populations - Exotic and Nuisance Animal Species	11. With available funding and in cooperation with partners opportunistically control exotic and nuisance animal species.	11. Integrate exotic and nuisance animal removal into all refuge resource management programs through multiple control methods. Remove feral hogs found on the refuge. Control may be by contract, special use permit, or by staff.	11. In coordination with law enforcement, the state, and the USACE, provide enhanced opportunities for the public to control nuisance animals, such as allowing more days, permits, etc., for hunting and trapping.
Populations Management - Climate Change/Sea Level Rise	12. No comprehensive monitoring.	12. Continually assess population changes over the life of the CCP in order to assess potential impacts from global climate change.	12. Same as Alternative B. Interpret climate change effects on the refuge to the public.

Goal 2. Protect, manage, enhance, and where appropriate, restore suitable habitat for the conservation of migratory birds, resident wildlife, fish, and native plants, including all federal and state threatened and endangered species endemic to the Atchafalaya Basin.

Issues	Alternative A Current Management – (No Action)	Alternative B Optimize Biological and Visitor Services – (Proposed Alternative)	Alternative C Maximize Public Use
Habitat Management Plan	1. Develop and implement a habitat management plan by 2015.	1. Same as Alternative A.	1. Same as Alternative A.
Moist-Soil Habitat Management	2. Maintain the existing infrastructure to actively manage 15 acres of moist-soil unit.	2. Same as Alternative A and where possible expand the existing infrastructure to actively manage moist-soil habitat over the 100-acre unit.	2. Develop moist-soil unit adjacent to public use viewing area.
Greentree Reservoir	3. Continue to flood unit 2 out of 3 years when possible.	3. Enhance management to achieve a sustainable wetland forest that provides forage for waterfowl, migratory birds, mammals, reptiles, amphibians, and fish. Water management in the greentree reservoir should be modified to provide late season flooding of low areas to improve nesting and brood rearing success for resident birds.	3. Same as Alternative A.

Issues	Alternative A Current Management – (No Action)	Alternative B Optimize Biological and Visitor Services – (Proposed Alternative)	Alternative C Maximize Public Use
Habitat Management - Waterfowl	4. No active habitat management.	4. Provide habitats sufficient to meet the habitat and population goals of the North American Waterfowl Management Plan as stepped down through the LMVJV by control of invasive plants and increase of hard mast for food.	4. Provide habitat improvement projects adjacent to public use viewing area for interpretation and demonstration opportunities.
Habitat Management - Forest openings	5. Continue plowing and planting cool season food plots or manage as mowed or fallow fields.	5. Same as Alternative A, provide and maintain forest openings for the benefit for resident and migratory species while limiting negative effects from brown-headed cowbirds.	5. Develop habitat demonstration sites to serve as educational opportunities for public and private land managers.
Forest Management	6. Opportunistically manage forests through invasive species control and limited timber harvest.	6. Expand current management to provide a diverse forested habitat to meet the various needs of many wildlife species including waterfowl, neotropical migratory songbirds, and resident wildlife, as well as the threatened Louisiana black bear. Establish a natural area in coordination with partners that will provide a control site that is managed passively. Develop a monitoring schedule to assess the potential effects of forest management activities on habitat conditions.	6. Prioritize forest management activities to benefit public and expand use.

Issues	Alternative A Current Management – (No Action)	Alternative B Optimize Biological and Visitor Services – (Proposed Alternative)	Alternative C Maximize Public Use
Invasive and Exotic Plant Species	7. Opportunistically control invasive plant species when resources allow.	7. Expand current management by integrating exotic plant removal into all refuge resource management programs to control Chinese tallow, mimosa, privet, Chinaberry, and other exotic invasive plants on the refuge through mechanical and chemical control methods. Hire a forestry technician to develop a forest habitat management plan to address control of exotic plants and seek advanced ways to control invasive and exotic plants through specialized herbicides, timber sale contracts, or grants	7. Same as Alternative A.
Habitat Management - Climate Change/Sea Level Rise	8. No Active Management	8. Implement adaptive habitat management and monitor for global warming induced plant and wildlife species shifts.	8. Same as Alternative B.

Goal 3. Provide compatible environmental education and interpretation, wildlife observation and photography, hunting, and fishing. Public use will provide visitors a greater understanding and enjoyment of fish, wildlife, and their habitats on the refuge and in the Atchafalaya Basin.

Issues	Alternative A Current Management – (No Action)	Alternative B Optimize Biological and Visitor Services – (Proposed Alternative)	Alternative C Maximize Public Use
Visitor Services Plan	1. Develop and implement a visitor services management plan by 2016.	1. Same as Alternative A.	1. Same as Alternative A.
Interpretation	2. Maintain current limited slate of interpretive opportunities, primarily non-personal interpretation (panels, kiosks). The primary interpretive themes and messages interpreted on the refuge are about the refuge system, kites, Big Alabama bayou, watching wildlife, fish caught at the refuge, wading birds, bottomland hardwood forests, be a better boater, cypress swamp, and waterfowl.	2. Same as Alternative A, plus where possible expand interpretive opportunities on the refuge by developing new trails with interpretive panels. Develop and install new kiosks, waysides, and trail signs with appropriate interpretive panels/messages. Also offer guided interpretive opportunities.	2. Same as Alternative B and add increase guided activities where compatible and evaluate concessionaire opportunities.

Issues	Alternative A Current Management – (No Action)	Alternative B Optimize Biological and Visitor Services – (Proposed Alternative)	Alternative C Maximize Public Use
Environmental Education	3. Minimal environmental education opportunities are currently offered on the refuge due to additional staffing needs.	3. Same as Alternative A, plus where possible expand environmental education opportunities by hiring a visitor services specialist to be stationed at refuge. Develop/adapt environmental education materials specific to Atchafalaya NWR and post them on the refuge website for teachers to download. Spend 1-2 weeks per year using staff, interns, and volunteers from the Complex to do refuge programs in the local schools – either onsite or offsite.	3. Same as Alternative B, plus develop multiple teacher workshops to showcase array of environmental education programs specific to Atchafalaya NWR, geared towards differing age groups; and build an on-site environmental education facility where programs and workshops will be held.

Issues	Alternative A Current Management – (No Action)	Alternative B Optimize Biological and Visitor Services – (Proposed Alternative)	Alternative C Maximize Public Use
Wildlife Observation and Photography	4. Continue to encourage and provide wildlife observation and photography opportunities. Maintain observation decks.	4. Same as Alternative A, plus where possible expand walking, driving, and boating access for wildlife observation and photography by developing photography and observation blinds and by adding a boardwalk in the wetlands. Also, develop new and maintain current public use facilities in the Happytown area of the refuge to create a "destination" for non-consumptive priority public uses, where the state will reduce hunting opportunities.	4. Same as Alternative B and create an auto tour loop with accompanying self guided audio CD; radio and web site updates on birding conditions; and solicit guides in applying for special use non-consumptive guiding permits.
Fishing	5. Fishing is open year-round in conjunction with Louisiana fishing regulations and anglers are allowed to fish many miles of bayous, such as Little Alabama and Big Alabama, both of which provide public boat launch/ramps. Anglers have opportunities to catch largemouth-bass, crappie, catfish, and sunfish, as well as recreational crawfishing.	5. Same as Alternative A, plus where possible improve fishing opportunities on the refuge by developing a fishing pier/observation deck at Bayou Manuel parking area #1, creating a brochure and improving water quality on the refuge.	5. Same as Alternative B, plus stock game fish in appropriate areas, evaluate the addition of boat launches, and create more bank fishing opportunities.

Issues	Alternative A Current Management – (No Action)	Alternative B Optimize Biological and Visitor Services – (Proposed Alternative)	Alternative C Maximize Public Use
Hunting	6. Atchafalaya NWR offers the public a wide range of hunting opportunities for those using archery, primitive firearms, and modern firearms, as well as special opportunities for youth and mobility-impaired hunters with access available to most portions of the refuge. Hunters have the opportunity to hunt squirrel, rabbit, woodcock, mourning dove, waterfowl, white-tailed deer, raccoon, bobcat, turkey, and feral hogs. The refuge is well known for providing hunters opportunities for migratory woodcock as well as waterfowl hunting in the bayous and flooded bottomlands.	6. Same as Alternative A. Maintain current hunting opportunities.	6. Same as Alternative A and maximize hunting opportunities.

Issues	Alternative A Current Management – (No Action)	Alternative B Optimize Biological and Visitor Services – (Proposed Alternative)	Alternative C Maximize Public Use
Volunteer Program and Friends Group	7. The refuge generally has no volunteers beyond those that assist with the annual Step Outside Day during May. The LDWF and USACE use volunteers infrequently for special projects.	7. Develop an active volunteer program to enhance all aspects of refuge management including resident interns, friends, and local volunteers. Identify possible volunteer opportunities and develop descriptions of some jobs that volunteers could do at Atchafalaya NWR. Coordinate these activities with new visitor services specialist. Partner with various groups to support projects on the refuge.	7. Same as Alternative B; develop friends group specific to Atchafalaya NWR; and explore options for partnering with state, local volunteer groups, birders, etc., to develop resident RV work camper pads at the state maintenance facility to host volunteer work campers.
Outreach	8. Continue current outreach activities including participating in Step Outside Day and Atchafalaya Basin Program meetings; development of the general and birding brochures; and working with the Butte Larose Welcome Center in bringing visitors to the refuge.	8. Same as Alternative A, plus where possible increase public outreach to emphasize resource management practices and promote public use opportunities. Evaluate opportunities to participate in additional special events.	8. Same as Alternative B and create an Explore the Basin interactive DVD and presentations for local non-profits, businesses, and others interested in Atchafalaya NWR.

Issues	Alternative A Current Management – (No Action)	Alternative B Optimize Biological and Visitor Services – (Proposed Alternative)	Alternative C Maximize Public Use
Welcome and Orient Visitors	9. Maintain current status of program to welcome and orient visitors to the refuge through design and upkeep of facilities and the provision of information regarding programs and facilities.	9. Same as A, plus where possible improve program to welcome and orient visitors to the refuge through design and upkeep of facilities and the provision of information regarding programs and facilities. This may be accomplished by partnering with the state to have the “Duck Stamp” accepted as an entrance pass for the WMA/refuge; working with DOTD to improve/pave Highway 975, especially the section from Highway 190 to the Sherburne WMA maintenance area; the installation of kiosks to welcome and orient visitors; developing new partnerships; developing a law enforcement office and maintenance facility with attached small visitor contact station and by updating signs and exhibits.	Same as Alternative B, plus develop new roads, looping auto tour route, connect section 120 to double gate road, and build a refuge-specific complex visitor center.

Goal 4. Identify, conserve, and protect natural and cultural resources through partnerships, land protection programs, and law enforcement. Ensure a safe and secure environment for the visiting public and personnel.

Issues	Alternative A Current Management – (No Action)	Alternative B Optimize Biological and Visitor Services – (Proposed Alternative)	Alternative C Maximize Public Use
Archaeological and Historical Site Protection	1. Enforce all federal and state laws applicable to the refuge. Protect all archaeological sites on the refuge from illegal take or damage in compliance with the Archaeological Resources Protection Act, the Native American Graves Protection and Repatriation Act, and the National Historic Preservation Act.	1. Same as Alternative A, plus conduct archaeological survey on refuge and implement law enforcement patrols on all sites to inspect for disturbances and illegal digging and or looting.	1. Same as Alternative A.
Maintain Marked Refuge Boundary	2. Maintain marked refuge boundary and other directional signs.	2. Same as A, plus evaluate all entrance signs on an annual basis and make required repairs, changes, updates, or upgrades. Evaluate, add, and replace signs as needed. Attempt to inspect and replace boundary signs on a rotational basis.	2. Same as Alternative B.

Issues	Alternative A Current Management – (No Action)	Alternative B Optimize Biological and Visitor Services – (Proposed Alternative)	Alternative C Maximize Public Use
Provide Visitor Safety, Protect Resources and Ensure Public Compliance with Refuge Regulations	3. Provide visitor safety, protect resources, and ensure public compliance with refuge regulations.	3. Same as Alternative A, plus develop and work cooperatively with local, state, and other federal law enforcement agencies to supplement resource protection, update law enforcement plan, and provide educational and outreach programs in local communities as part of preventive law enforcement effort to encourage voluntary compliance.	3. Same as Alternative B.
Land Acquisition	4. Acquire lands from willing sellers through fee title purchase.	4. Same as Alternative A, acquire lands that provide resource and public use values from willing sellers by: fee title purchase, donation, mitigation purchase and transfer, or other viable means.	4. Same as Alternative B.
Land Conservation	5. No boundary expansion	5. Develop a preliminary project proposal to propose an acquisition boundary expansion to include 17,164 acres of lands bounded by Highway 190, Interstate 10, and Atchafalaya Floodway Protection Levees. Explore options of a land exchange with USACE to simplify management.	5. Same as Alternative A.

Issues	Alternative A Current Management – (No Action)	Alternative B Optimize Biological and Visitor Services – (Proposed Alternative)	Alternative C Maximize Public Use
Oil and Gas Operations	6. Manage existing oil and gas operations to ensure proper maintenance and upkeep of facilities and infrastructure.	6. Same as Alternative A. Also ensure minimum impact to refuge resources, to ensure proper mitigation and compensation for lost or damaged refuge resources, and to ensure proper maintenance and upkeep of facilities and infrastructure. Conduct periodic monitoring and site inspections in cooperation with applicable state agency personnel to ensure compliance with state and federal regulations and to detect potential problem areas with equipment and facilities.	6. Same as Alternative A and utilize mitigation funds on areas of high public use; hide or separate oil and gas activities from other public uses.

Goal 5. Work with partners to secure and enhance staffing, funding, infrastructure, and facilities to maintain the long-term integrity of the habitat and wildlife resources to fulfill the purposes of the refuge.

Issues	Alternative A Current Management – (No Action)	Alternative B Optimize Biological and Visitor Services – (Proposed Alternative)	Alternative C
Partnerships	1. Continue current partnership with LDWF through the Cooperative Agreement.	1. Same as Alternative A, but explore opportunities for new partnerships.	1. Same as Alternative B, except focus partnership opportunities on visitor service driven projects.
Maintain Facilities and Capitalized Equipment for the Refuge Complex	2. Maintain existing equipment used as a part of refuge management	2. Same as Alternative A, plus within 6 years of CCP approval, develop an equipment maintenance plan for heavy equipment and water craft. Explore possibility to partner with the LDWF and USACE to develop the Complex visitor center and develop new public use facilities in the Happytown area of the refuge to create a “destination” for non-consumptive priority public uses.	2. Same as Alternative B.

Issues	Alternative A Current Management – (No Action)	Alternative B Optimize Biological and Visitor Services – (Proposed Alternative)	Alternative C
Budget/Personnel	3. Maintain current staffing and budget structure. Staff dedicated to refuge includes, all collateral: refuge manager, park ranger, forester, biologist, and law enforcement officer.	3. Work with the Regional Office to identify critical staffing and budget needs that are realistically possible within the next 10 - 15 years. Develop short- and long-term staffing plan with the Regional Office. Add a visitor services specialist, assistant manager, biological technician, forestry technician, maintenance worker, and law enforcement officer to the staff.	3. Only implement staffing that adds to visitor service opportunities and general facility maintenance.

ALTERNATIVES CONSIDERED BUT ELIMINATED FROM FURTHER ANALYSIS

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

Alternative D – Maximize Resource Management with Minimum Public Use
Alternative E – Maximize Biological Management

In Alternative D the focus would be placed on maximizing wildlife and habitat management. All funding and staffing support would be channeled towards this goal and all public use facilities and programs would cease to be maintained or encouraged. The inclusion of this alternative into the NEPA process was eliminated from further consideration because it was not compatible with one of the refuge's purposes, which dictates the need to provide fish- and wildlife-related public use opportunities. Additionally, this alternative would not be able to provide wildlife-compatible recreational opportunities as required by the Improvement Act.

In Alternative E, much like Alternative D, the focus would have been placed on maximizing the wildlife and habitat management. The difference, however, would be that the visitor services opportunities that are currently offered in Alternative A would be maintained. The inclusion of this alternative into the NEPA process was eliminated from further consideration because it was too similar to Alternative B, and analysis of alternatives with the same or lesser effects to the environment is not a requirement of NEPA.

IV. Environmental Consequences

OVERVIEW

This section analyzes and discusses the potential environmental effects or consequences that can be reasonably expected by the implementation of each of the three alternatives described in Chapter III of this EA. For each alternative, the expected outcomes are portrayed through the 15-year life of the final CCP.

The planning team selected the following effect topics (whose effects are expected to vary depending on the alternative chosen) for analysis: water quality effects from soil disturbance and use of herbicides; wildlife disturbance; vegetation disturbance; user group conflicts; and, effects on adjacent landowners, air quality, socioeconomics, public use opportunities, climate change, cultural resources, and native wildlife and their habitats. Table 13 includes the effects that could occur from implementing each alternative to the issues raised during the scoping process. For each comparison, Alternative A does not propose any change in the present management direction. Therefore, Alternative A serves as the baseline for comparing the other alternatives.

EFFECTS COMMON TO ALL ALTERNATIVES

A few potential effects will be the same under each alternative and are summarized under the following categories: public health and safety, environmental justice, climate change, regulatory effects, land acquisition, cultural resources, refuge revenue-sharing, visitor services, refuge administration, other management, and other effects.

PUBLIC HEALTH AND SAFETY

None of the three alternatives would have a significant effect on public health and safety. All three alternatives involve potential safety problems from accidents occurring during recreational use of the refuge, but no more than the public encounters elsewhere. Potential effects of smoke from wildland fires will be mitigated using the same methods under the three alternatives. Fire management on the refuge consists only of wildland fire suppression.

ENVIRONMENTAL JUSTICE

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

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

CLIMATE CHANGE

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

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

The land is a tremendous force in carbon sequestration. Terrestrial biomes of all sorts - grasslands, forests, wetlands, tundra, perpetual ice, and desert - are effective both in preventing carbon emissions and in acting as a biological "scrubber" of atmospheric carbon dioxide. The conclusions of the Department of Energy's report noted that ecosystem protection is important to carbon sequestration and may reduce or prevent the loss of carbon currently stored in the terrestrial biosphere.

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

REGULATORY EFFECTS

Treaties, laws, administrative guidelines, and policy guidelines assist the refuge manager in making decisions pertaining to soil, water, air, flora, fauna, and other natural resources; historical and cultural resources; research and recreation on refuge lands; and provide a framework for cooperation between Atchafalaya NWR and other partners, such as the Louisiana Department of Wildlife and Fisheries, National Park Service, Audubon Society, Friends of Louisiana Wildlife Refuges, Army Corps of Engineers, corporations, and private landowners, etc.

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

LAND ACQUISITION

In addition to implementing a final CCP, Atchafalaya NWR will be moving forward with a major expansion of its acquisition boundary. If a major expansion is approved, lands within the newly approved acquisition boundary of the refuge that provide important habitat resource and public use values would be acquired from willing sellers by: fee title purchase, donation, mitigation purchase and transfer, or other viable means. Funding for land acquisition from willing sellers would come from the Land and Water Conservation Fund; the Migratory Bird Conservation Fund, Corps of Engineers mitigation programs, carbon sequestration programs, or donations from conservation and private organizations. Conservation easements and leases can be used to obtain the minimum interests necessary to satisfy refuge objectives if the refuge staff can adequately manage uses of the areas for the benefit of wildlife. The Service can negotiate management agreements with local, state, and federal agencies, and accept conservation easements. Some tracts within the refuge acquisition boundary may be owned by other public or private conservation organizations. The Service would work with interested organizations to identify additional areas needing protection and provide technical assistance if needed. The acquisition of private lands is entirely contingent on the landowners and their willingness to participate.

CULTURAL RESOURCES

All alternatives afford additional land protection and low levels of development, thereby producing little negative effect on the refuge's cultural and historic resources. No formal archaeological investigations have been performed on refuge lands; however, if cultural resources are discovered during the process of habitat management activities, all work will be stopped until the regional archaeologist has addressed the discovery and surveyed the area.

The Service's acquisition of land with known or potential archaeological or historical sites provides two major types of protection for these resources: protection from damage by federal activity and protection from vandalism or theft. The National Historic Preservation Act requires that any actions by a federal agency which may affect archaeological or historical resources be reviewed by the State Historic Preservation Office, and that the identified effects must be avoided or mitigated. The Service's policy is to preserve these cultural, historical, and archaeological resources in the public trust, and avoid any adverse effects wherever possible.

Although systematic archaeological and historic investigations have not been performed on Atchafalaya NWR, the refuge follows procedures to protect any cultural/historic legacy that may potentially occur on the refuge. Whenever construction work is undertaken that involves any excavation with heavy earth-moving equipment like tractors, graders, and bulldozers, such as for the development of moist-soil units, the refuge contracts with a qualified archaeologist/cultural resources expert to conduct an archaeological survey of the subject property. The results of this survey are submitted to the Service's regional archaeologist, and (as mandated by Section 106 of the National Historic Preservation Act) to the Louisiana State Historic Preservation Office (SHPO), which in Louisiana is an agency within the Department of Culture, Recreation and Tourism, Office of Cultural Development, Division of Historic Preservation (Louisiana Department of Culture, Recreation and Tourism 2009). Therefore, the determination of whether a particular action within an alternative has the potential to affect cultural resources is an on-going process that would occur during the planning stages of every project.

Land acquisition, within the expanded acquisition boundary, by the Service would provide some degree of protection to significant cultural and historic resources. If acquisition of private lands does not occur and these lands remain under private ownership, the landowner would be responsible for

protecting and preserving cultural resources. Development of off-refuge lands has the potential to destroy archaeological artifacts and other historical resources, thereby decreasing opportunities for cultural resource interpretation and research.

REFUGE REVENUE SHARING

Annual refuge revenue-sharing payments to St. Martin and Iberville Parishes would continue at similar rates under each alternative. If lands are acquired and added to the refuge, the payments would increase accordingly.

VISITOR SERVICES

Under each of the alternatives, the Service would consult with local and state officials and the public during detailed planning for and construction of any new facilities. Each of the action alternatives is anticipated to positively affect visitor services. As the refuge's visitor services program is developed, the staff would continue to assess the program and its potential effect on refuge resources. Changes in the program would be implemented as needed to address any effects identified and to respond to anticipated wildlife population increases. To ensure a quality wildlife-dependent recreation experience while achieving the "wildlife first" mandate, the number of users and conflicts among users may be limited by the following: (1) limited permits; (2) designated roads, trails, and sites for specific kinds of wildlife-dependent recreational use; and (3) permitted uses at certain times of the year.

There are a number of purposes for which future refuge closures or restrictions on access may be warranted. Examples of these situations include, but are not limited to, the following: protecting endangered species; protecting nesting birds; restricting recreational activities to achieve specific wildlife population objectives; improving the quality of hunting experiences; minimizing conflicts with other refuge management programs; and limiting activities due to inadequate resources to administer uses.

REFUGE ADMINISTRATION

The maintenance and operation of the refuge's administrative facilities would continue, regardless of the alternative selected. Periodic updating of facilities is necessary for safety, accessibility, and to support staff and management needs. Funding needs have been identified for several projects, including providing additional facilities and equipment to support refuge operations, visitor services, and maintenance.

OTHER MANAGEMENT

All management activities that could affect the refuge's natural resources, including subsurface mineral reservations, utility lines and easements, soils, water and air, and historical and archaeological resources, would comply with all laws and regulations. In particular, any existing and future oil and gas exploration, extraction, and transport operations on the refuge would be managed identically under each of the alternatives. Thus, the effects would be the same in each of the three management alternatives.

OTHER EFFECTS

Each of the alternatives would have similar effects or minimal to negligible effects on soils, water quality and quantity, aesthetics, and socioeconomics, as discussed below:

- *Soils* -- All alternatives are anticipated to positively affect soil formation processes on lands the refuge acquires and manages. Some disturbances to surface soils and topography would occur at those locations selected for administrative, maintenance, and visitor facilities, as well as in areas targeted for forest management or exotic and invasive species removal and eradication. However, these limited effects would be at discrete sites. Best management practices would be utilized to ensure that sediment stays onsite and does not enter streams.
- *Water quality, wetlands, and flood plains* -- All alternatives are anticipated to positively affect water quality. Positive effects are anticipated from protecting groundwater recharge, preventing runoff, retaining sediment, and minimizing nonpoint source pollution in select areas. The management alternatives are not anticipated to have any adverse effects on the area's wetlands, pursuant to Executive Orders 11990 and 11988. Further, the refuge provides protection to lands and waters that might otherwise be developed into commercial and/or residential uses in the future.
- *Aesthetics* -- Each alternative would protect the aesthetic characteristics associated with natural habitats. Minor, short-term, discrete negative aesthetic effects may result from forest and habitat management, habitat restoration, and facility development activities, but these are short-lived and are offset by refuge management and resultant native habitat improvements.
- *Socioeconomic environment* -- Each of the alternatives is anticipated to positively affect socioeconomic factors of the community. Although the refuge does occupy lands that might provide income to the local tax base, those lost tax revenues are offset by enhanced property values on adjacent lands and by improved aesthetics related to conservation lands and green space. Further, the refuge does provide St. Martin and Iberville Parishes with refuge revenue sharing act payments in lieu of property tax income. And, conservation lands require less expenditure of local taxes to fund infrastructure and other services than required by developed lands.

SUMMARY OF EFFECTS BY ALTERNATIVE

The following section describes the environmental consequences of adopting each refuge management alternative. Table 12 summarizes and addresses the likely outcomes for the specific issues, and is organized by broad issue categories.

ALTERNATIVE A – CURRENT MANAGEMENT (NO ACTION)

The No Action Alternative would maintain the *status quo* and was developed using anticipated conditions in the area of Atchafalaya NWR over the next 15 years. It assumes that current conservation management and land protection programs and activities by the Service, federal, state, and local agencies, and private organizations would continue unchanged. This alternative is included for the purpose of comparison to the two action alternatives (Alternatives B and C) and is not considered to be the most effective management strategy for achieving the goals of the refuge. Implementing Alternative A would have either neutral or neutral to mildly beneficial effects on most management activities, programs, and projects.

Alternative A assumes little or no change in staffing or funding. Management emphasis would develop and implement a habitat management plan by 2015. This plan will focus on maintaining biological integrity of habitats found on the refuge with little change in staffing and funding. Under this alternative, the Service would protect and maintain all refuge lands, primarily focusing on the needs of threatened and endangered species, with additional emphasis on the needs of migratory birds and resident wildlife.

Maintaining the *status quo* would limit the refuges' ability to significantly address and respond to issues identified by the planning team. For example, Alternative A does not address anticipated management issues related to climate change and its effects on the biotic and abiotic resources of the refuges.

Staff would continue habitat management of existing the greentree reservoir, wetlands, bayous, forested habitats, scrub-shrub habitat, levees, and wildlife openings. All impoundments, levees, moist-soil water management units, and water control structures would continue to be maintained to provide critical habitat for threatened and endangered species and waterfowl and wetland-dependent birds. Current water quality information would be addressed only on an as-needed basis. All other habitat management programs would remain unchanged. Current programs would meet with limited success in achieving refuge goals with regard to habitat and wildlife populations, primarily because of limited ability to actively manage habitats (such as habitat for neotropical migratory birds and the Louisiana black bear).

The Service would continue mandated activities for protection of federally listed species. Conservation of federally listed threatened and endangered species would be continued through limited habitat management and monitoring programs accomplished primarily through established partnership and research projects.

Current management of migratory birds would continue to provide suitable habitat for waterfowl. Surveying, monitoring, and managing migratory and resident birds would continue, with no additional management.

Mostly opportunistic monitoring and managing of resident wildlife would occur under Alternative A. The main objective for game species management would be to sustain healthy populations through the hunting program. Little baseline biological information would be gathered on non-managed species or groups of species.

Minimal control of invasive and exotic plant species would continue to be performed by staff on a limited, opportunistic, and intermittent basis, putting native habitats and wildlife at possible risk. Efforts to control/remove invasive, exotic and/or nuisance wildlife on the refuge would continue to be managed by the take of these animals as part of hunting programs and opportunistically by staff.

Staff would develop a visitor services plan that could be implemented by 2015. In the interim, the refuge would not achieve its potential for providing needed educational and wildlife-dependent recreational activities. Visitor services programs would be restricted on the refuge due to the small number of designated staff and the distance staff would need to travel daily from the refuge headquarters. Therefore, interpretation and environmental education opportunities would remain limited. However, staff would maintain the current facilities and activities for a wide range of hunting opportunities and year-round fishing. Hunting and fishing opportunities on refuge lands would continue to be managed by LDWF as part of the Sherburne WMA.

Alternative A includes protection of all archaeological and historical sites on the refuge from illegal take or damage, maintenance of marked refuge boundary and directional signs, visitor safety, resource protection, and acquisition of lands from willing sellers within the refuge’s acquisition boundary.

The refuge staff would continue to include five shared staff members including: refuge manager, forester, wildlife biologist, park ranger, and law enforcement officer who manage the refuge as a collateral duty. The current staffing level limits the refuge's ability to meet its waterfowl and habitat management objectives, public use and safety objectives, and law enforcement objectives.

ALTERNATIVE B – OPTIMIZE BIOLOGICAL AND VISITOR SERVICES (PROPOSED ALTERNATIVE)

Of the three alternatives, the proposed action (Alternative B) best accomplishes the vision, goals, and purposes of the refuge – given the constraints of limited capital resources. This alternative was developed based on public input and the best professional judgment of the planning team. Alternative B would require an increase in the refuge budget and staff to improve management of wildlife and habitat, provide expanded visitor services, ensure public safety and resource protection, and maintain equipment and facilities. Administration plans (e.g., habitat management plan and visitor services plan) would stress the need for increased focus on biological integrity of habitats found on the refuge, maintenance of existing infrastructure, and construction of new facilities. Funding for new construction projects would be balanced between habitat management and public use needs. Additional staff would be required to accomplish the goals of this alternative. Personnel priorities would include employing a park ranger (e.g., visitor services, environmental educator/volunteer coordinator) and a forestry technician.

This alternative would focus on augmenting wildlife and habitat management to identify, conserve, and restore populations of native fish and wildlife species with an emphasis on migratory birds and threatened and endangered species. This objective would partially be accomplished by increased monitoring of woodcocks, waterfowl, and other migratory and resident birds. Information gaps would be addressed by the initiation of baseline surveys, periodic monitoring, and ultimately the addition of adaptive habitat management. A comprehensive inventorying and monitoring program for reptiles and amphibians, fisheries, nongame mammals, and plants would be established.

Invasive and exotic plant species would be more aggressively managed by implementing a management plan, completing a baseline inventory, supporting research, and controlling with strategic mechanical and chemical means. The management plan would also integrate efforts to control/remove invasive, exotic and/or nuisance wildlife on the refuge in multiple ways, including by contract, by special use permit, or by staff.

With this alternative, a habitat management plan would be developed by 2015. Habitat management programs for impoundments, greentree reservoir, wetlands, bayous, forested habitats, scrub-shrub habitats, levees, and wildlife openings would be reevaluated, and step-down management plans would be developed to meet the foraging, nesting, and breeding requirements of priority species. Managed moist-soil habitats and bottomland hardwoods would be expanded to meet the NAWMP. A natural area control site would be established. Additionally, monitoring and adaptive habitat management would be implemented to potentially counteract the effects associated with long-term climate change.

Alternative B would enhance visitor service opportunities by developing and implementing a visitor services management plan that includes adding a visitor services specialist to develop refuge-specific environmental education materials and outreach opportunities. The specialist would develop and implement an environmental education program component that utilizes volunteers and local schools as partners. Volunteer programs and friends groups would be expanded to enhance all aspects of management and to increase resource availability. Personal interpretive opportunities and wildlife viewing and photography opportunities would be enhanced with new trails, wetland boardwalks, kiosks, wayside

trail signs, new blinds, and additional observational areas. The quality of fishing opportunities would be improved by building a fishing pier/observation deck at Bayou Manuel and by creating an “Improving Water Quality” brochure. Staff would work with partners to improve programs to welcome and orient visitors, by improving access to the refuge (paving Highway 975 and updating signs) and developing a plan for a Complex visitor center in the Happytown area that includes a law enforcement office, a maintenance facility for heavy equipment, and an attached visitor contact station.

In addition to the enforcement of all federal and state laws applicable to the refuge to protect archaeological and historical sites, the refuge would conduct an archaeological survey and identify and develop a plan to protect all known sites. The development of an onsite office for law enforcement officers would not only better provide security for these resources, but would also ensure visitor safety and public compliance with refuge regulations. Staff would conduct periodic monitoring and site inspections with state personnel at oil and gas operation sites to ensure compliance with all federal and state regulations.

Alternative B would develop a proposal to expand the refuge’s acquisition boundary to include all lands bounded by Highway 190, Interstate 10, and the Atchafalaya River floodway protection levees and would explore land exchanges with USACE. This expansion would improve access, management capabilities, and would be beneficial to wildlife.

ALTERNATIVE C – MAXIMIZE PUBLIC USE

Under Alternative C, the active management of the refuge resources would be employed to optimize public use opportunities. Staff and resources would be dedicated to increasing the public use activities of fishing, hunting, wildlife observation, wildlife photography, outreach, and environmental education and interpretation. As in Alternative A, all purposes of the refuge and mandated monitoring of federal trust species and archaeological resources would continue; but, under Alternative C, wildlife and habitat management would focus on and prioritize species and activities of public interest. Administration plans (e.g., habitat management plan and visitor services plan) would stress the need for increased maintenance of existing infrastructure and construction of new facilities that would benefit public use activities. Additional staff and funding would be required to provide increased visitor service opportunities and improve general facility maintenance and construction activities.

Wetlands, the greentree reservoir, and the moist-soil unit would be maintained to facilitate public use opportunities, such as hunting and wildlife observation. Forest habitat in high public use areas would be managed while all other areas would have little management intervention. Forest opening demonstration sites would be implemented to serve as educational opportunities for public and private land managers. The control of invasive and exotic plant species would be more aggressively managed in public use areas; and, the public would be provided more opportunity to control nuisance animals by allowing extended days and permits for hunting and trapping.

As in Alternatives A and B, staff would develop a visitor services plan that could be implemented by 2015. Easier access to the refuge and increased wildlife observation and wildlife photography and interpretation opportunities would result from road improvements, the construction of an on-site visitor center, boardwalk, canoe and birding tours, kiosks, trail signs, and a self-guided auto tour. Concessionaire opportunities would be evaluated and guides would be solicited for providing wildlife observation and photography tours. Additionally, waterfowl and wildlife monitoring would be conducted periodically to identify high-use areas for the visiting public to observe. Environmental education would be expanded by addressing a wide range of local environmental concerns and would be offered to a broader range of student groups and schools through teacher workshops. A new onsite environmental education facility would be developed to better facilitate the new

environmental education programs and workshops. New information brochures, tear sheets, interactive DVD's, and website postings would be published to increase public outreach and to promote public use and recreational opportunities. Volunteer and friends group programs would be much the same as Alternative B; however, the development of resident recreational vehicle work camper pads at the state maintenance facility would allow the hosting of volunteer work campers.

The wide range of hunting opportunities would be the same as in Alternative A. In addition to providing the enhanced fishing opportunities and facilities in Alternative B, game fish would be stocked in appropriate popular areas.

Alternative C includes protection of all archaeological and historical sites on the refuge from illegal take or damage, maintenance of marked refuge boundary and directional signs, visitor safety, resource protection, and acquiring lands from willing sellers within the refuge's acquisition boundary. The determination of land acquisitions activities (outlined in Alternative B) would be based on the importance of the habitat for public use.

Table 13. Summary of environmental effects by alternative, Atchafalaya NWR

Goal 1. Protect, manage, enhance, and restore healthy and viable populations of migratory birds, resident wildlife, fish, and native plants, including all federal and state threatened and endangered species found within the Atchafalaya Basin in a manner that supports national and international treaties, plans, and initiatives.

Issues	Alternative A Current Management – (No Action)	Alternative B Optimize Biological and Visitor Services – (Proposed Alternative)	Alternative C Maximize Public Use
Populations – Waterfowl	1. In coordination with state, continue to monitor effects of waterfowl response through harvest surveys. Also, continue to use self-clearing permits to determine harvest and species composition of harvest. **Neutral** **Current management provides a stable habitat base for migrating and wintering waterfowl.**	1. Same as Alternative A and by year 2015, increase monitoring of waterfowl in order to assess and adapt habitat management strategies/actions by conducting bi-monthly waterfowl ground counts in all suitable habitats (Oct.-Mar.). **Positive** **Increased information facilitates adaptive management leading to more efficient and effective management; thus, supporting or increasing our contributions toward regional and national goals.**	1. Same as Alternative A and provide updated information to public. **Neutral** **Current management provides a stable habitat base for migrating and wintering waterfowl.**

Issues	Alternative A Current Management – (No Action)	Alternative B Optimize Biological and Visitor Services – (Proposed Alternative)	Alternative C Maximize Public Use
Populations - Wood duck	2. Participate in regional wood duck banding to determine regional population trends. Install, maintain, and monitor 57 wood duck nesting boxes. Also, continue to use self-clearing permits to determine harvest and trends. **Neutral to Positive** **Continue current research and monitoring programs, but no expansion. Maintain wood duck habitat to support declining populations.**	2. Same as Alternative A, by continuing to participate in regional wood duck banding and monitor monthly from Jan-May to determine regional population trends and increase wood duck nest boxes. **Positive** **Increased information leads to adaptive management which may support our contribution towards regional and national goals.**	2. Discontinue wood duck banding program and install nest boxes for interpretation and observation opportunities. **Negative** **Elimination of monitoring program would have potential to decrease wood duck populations due to increased nest predation and lack of active habitat management for this species.**

Issues	Alternative A Current Management – (No Action)	Alternative B Optimize Biological and Visitor Services – (Proposed Alternative)	Alternative C Maximize Public Use
Populations – Woodcocks	3. Continue to rely on state to monitor harvest of woodcock through use of self-clearing permits. **Neutral to Negative** **Results of active management are not captured through surveys, which leads to no adaptive habitat management.**	3. Develop a comprehensive woodcock surveying and monitoring program. **Positive** **Increased information leads to adaptive management, which may support our contribution towards regional and national goals.**	3. Same as Alternative A and provide updated information to public. **Neutral to Negative** **Results of active management are not captured through surveys, which leads to no adaptive habitat management.**
Populations – Forest Breeding Birds	4. Continue MAPS long-term monitoring stations in coordination with LDWF. Opportunistically survey and monitor forest breeding bird populations. Continue annual breeding bird survey. **Neutral to Positive** **Continue current research and monitoring programs, but no expansion. No change in habitat to support populations.**	4. Same as Alternative A, and within 5 years expand where applicable seasonal monitoring to reveal population trends and responses of forest breeding birds to management actions. **Positive** **Increased information leads to adaptive management, which may support our contribution towards regional and national goals.**	4. Utilize birding groups to conduct CBC, annual breeding bird surveys, and MAPS station. Provide public with updated bird information and sightings for observational opportunities. **Neutral to Negative** **Uses birding groups to conduct research and monitoring, but habitat changes will be driven by public wants.**

Issues	Alternative A Current Management – (No Action)	Alternative B Optimize Biological and Visitor Services – (Proposed Alternative)	Alternative C Maximize Public Use
Populations – Forest Breeding Birds - Swallow-tailed and Mississippi kites	5. Continue to monitor kite relative abundance and nest locations and productivity. **Neutral to Positive** **Continue current monitoring programs, but no expansion. No change in habitat to support populations.**	5. Same as Alternative A, and within 15 years enhance forest habitats to improve conditions for kites. Continue to monitor kite relative abundance and nest locations and productivity. Coordinate research efforts with scientists and the research community to benefit forest breeding birds. **Positive** **Increased information leads to adaptive management, which may support our contribution towards regional and national goals.**	5. Same as Alternative A, but only to provide public viewing opportunities of kite nests and access for education. **Neutral to Negative** **Continue current monitoring programs, but no expansion. Habitat changes would be driven by public wants.**
Populations – Colonial Waterbirds/Wading Birds	6. Opportunistically survey water bird and wading bird populations. **Neutral to Negative** **Little active management and/or adaptive habitat management for these species.**	6. Same as Alternative A, and also identify colonial waterbird and wading birds rookeries. **Positive** **Increased information leads to adaptive management, which may support our contribution towards regional and national goals.**	6. Same as Alternative A, but only to provide public viewing opportunities of rookeries and access for education, minimizing disturbance. **Neutral to Negative** **Little active management and/or adaptive habitat management for these species. Habitat changes would be driven by public wants.**

Issues	Alternative A Current Management – (No Action)	Alternative B Optimize Biological and Visitor Services – (Proposed Alternative)	Alternative C Maximize Public Use
Populations – Threatened and Endangered Species	7. Monitor populations of Louisiana black bear, American alligator, and state special concern species sufficient to discern population trends and effects of habitat management. **Neutral to Positive** **Continue current monitoring programs, but no expansion.**	7. Save as Alternative A, and within the 15-year life of the CCP, expand management and research activities which contribute to the recovery of any T&E species as indicated by a recovery plan. **Positive** **Increased information leads to adaptive management, which may support our contribution towards regional and national goals.**	7. Same as Alternative A. **Neutral to Positive** **Continue current monitoring programs, but no expansion. No change in habitat to support populations.**

Issues	Alternative A Current Management – (No Action)	Alternative B Optimize Biological and Visitor Services – (Proposed Alternative)	Alternative C Maximize Public Use
Populations - Reptiles and Amphibians	8. In cooperation with partners, continue to conduct surveys of reptile and amphibian populations. **Neutral to Negative** **Little to no information concerning the effects of active management and/or adaptive habitat management for these species.**	8. Same as Alternative A and over the 15-year life of the CCP develop a comprehensive reptile and amphibian species list. **Positive** **Increased information leads to adaptive management, which may support our contribution towards regional and national goals.**	8. Develop reptile and amphibian brochure, then discontinue surveys. **Negative** **Increased information leads to adaptive management, which may support our contribution towards regional and national goals. However, gaining knowledge on populations and then not supporting those populations through adaptive habitat management would not positively support populations.**

Issues	Alternative A Current Management – (No Action)	Alternative B Optimize Biological and Visitor Services – (Proposed Alternative)	Alternative C Maximize Public Use
Populations – Small and Big Game Species	9. In cooperation with partners, continue to conduct deer browse surveys, harvest surveys, deer health herd checks, and wild turkey survey. **Neutral** **Current management provides a stable habitat base for small and big game species.**	9. Same as Alternative A, but also conduct deer health checks every 3-5 years and monitor habitat conditions with browse surveys to determine health and population of deer on the refuge. Assess self-clearing harvest cards to monitor trends in small game harvest and use data to assist in setting hunting season dates. **Positive** **Increased information leads to adaptive management, which may support our contribution towards regional and national goals.**	9. Same as Alternative A. **Neutral** **Current management provides a stable habitat base for small and big game species.**

Issues	Alternative A Current Management – (No Action)	Alternative B Optimize Biological and Visitor Services – (Proposed Alternative)	Alternative C Maximize Public Use
Populations – Other Fish, Wildlife, and Plants	10. Opportunistically monitor other wildlife and plants as appropriate. **Neutral to Negative** **Little to no information concerning the effects of active management and/or adaptive habitat management for these species.**	10. Establish a comprehensive inventorying and monitoring program for fisheries, nongame mammals, and plants. Work with partners (LDWF and State Wildlife Grants, Universities, USGS) to conduct non-game mammal surveys to document species occurrence. Address species occurrence and relative abundance by habitat type and in response to management through time, as opportunities allow. **Positive** **Increased information leads to adaptive management, which may support our contribution towards regional and national goals.**	10. Periodically monitor fisheries to provide public use optimal opportunities. **Neutral to Negative** **Little to no information concerning the effects of active management and/or adaptive habitat management for these species.**

Issues	Alternative A Current Management – (No Action)	Alternative B Optimize Biological and Visitor Services – (Proposed Alternative)	Alternative C Maximize Public Use
Populations - Exotic and Nuisance Animal Species	11. With available funding and in cooperation with partners opportunistically control exotic and nuisance animal species. **Negative** **This management offers minimal control or removal of these species, which could be detrimental to wildlife populations and habitats.**	11. Integrate exotic and nuisance animal removal into all refuge resource management programs through multiple control methods. Remove feral hogs found on the refuge. Control may be by contract, special use permit, or by staff. **Positive** **This management option offers both expanded monitoring and removal.**	11. In coordination with law enforcement, the State, and the USACE, provide enhanced opportunities for the public to control nuisance animals, such as allowing more days, permits, etc., for hunting and trapping. **Negative** **This management offers minimal control or removal of these species, which could be detrimental to wildlife populations and habitat.**
Populations Management - Climate Change/Sea Level Rise	12. No comprehensive monitoring. **Negative** **Without increased information refuge may not be able to effectively respond to climate change effects.**	12. Continually assess wildlife and plant population changes over the life of the CCP in order to assess potential effects from global climate change. **Positive** **Increased information and research would enable adaptive management to better respond to climate change effects.**	12. Same as Alternative B. Interpret climate change effects on the refuge to the public. **Positive** **Increased information and research would enable adaptive management to better respond to climate change effects.**

Goal 2. Protect, manage, enhance, and where appropriate, restore suitable habitat for the conservation of migratory birds, resident wildlife, fish, and native plants, including all federal and state threatened and endangered species endemic to the Atchafalaya Basin.

Issues	Alternative A Current Management – (No Action)	Alternative B Optimize Biological and Visitor Services – (Proposed Alternative)	Alternative C Maximize Public Use
Habitat Management Plan	1. Develop and implement a habitat management plan by 2015. **Positive** **New plan would provide additional guidance for management of habitats for trust species and species of concern.**	1. Same as Alternative A. **Positive** **New plan would provide additional guidance for management of habitats for trust species and species of concern.**	1. Same as Alternative A. **Positive** **New plan would provide additional guidance for management of habitats for trust species and species of concern.**
Moist-Soil Habitat Management	2. Maintain the existing infrastructure to actively manage 15 acres of moist-soil unit. **Neutral** **Active management of this habitat. Stable acres of moist-soil habitat.**	2. Same as Alternative A and where possible expand the existing infrastructure to actively manage moist-soil habitat over the 100-acre unit. **Positive** **The improvement of habitat and resources would increase and support wildlife populations.**	2. Develop moist-soil unit adjacent to public use viewing area. **Positive** **The improvement of habitat and resources would increase and support wildlife populations.**

Issues	Alternative A Current Management – (No Action)	Alternative B Optimize Biological and Visitor Services – (Proposed Alternative)	Alternative C Maximize Public Use
Green Tree Reservoir	3. Continue to flood unit two out of three years when possible. **Neutral** **Active management of this habitat. Stable acres of greentree reservoir habitat.**	3. Enhance management to achieve a sustainable wetland forest that provides forage for waterfowl, migratory birds, mammals, reptiles, amphibians, and fish. Water management in the greentree reservoir should be modified to provide late-season flooding of low areas to improve nesting and brood rearing success for resident birds. **Positive** **The improvement of habitat and resources would increase and support wildlife populations.**	3. Same as Alternative A. **Neutral** **Active management of this habitat. Stable acres of greentree reservoir habitat.**

Issues	Alternative A Current Management – (No Action)	Alternative B Optimize Biological and Visitor Services – (Proposed Alternative)	Alternative C Maximize Public Use
Habitat Management - Waterfowl	4. No active habitat management. **Neutral to Negative** **Minimal active management to provide current acreage of suitable habitat for waterfowl.**	4. Provide habitats sufficient to meet the habitat and population goals of the North American Waterfowl Management Plan as stepped down through the Lower Mississippi Valley Joint Venture by control of invasive plants and increase of hard mast for food. **Positive** **The provision of more diverse habitat and resources will increase and support bird populations.**	4. Provide habitat improvement projects adjacent to public use viewing area for interpretation and demonstration opportunities. **Positive** **The provision of more diverse habitat and resources will increase and support bird populations.**
Habitat Management – Forest openings	5. Continue plowing and planting cool season food plots or manage as mowed or fallow fields. **Positive** **Active management of this habitat. Stable acres of forest opening habitat.**	5. Same as Alternative A, provide and maintain forest openings for the benefit for resident and migratory species while limiting negative effects from brown-headed cowbirds. **Positive** **Active management of this habitat. Stable acres of forest opening habitat.**	5. Develop habitat demonstration sites to serve as educational opportunities for public and private land managers. **Neutral to Positive** **Active management of this habitat. May increase acres of forest opening habitat.**

Issues	Alternative A Current Management – (No Action)	Alternative B Optimize Biological and Visitor Services – (Proposed Alternative)	Alternative C Maximize Public Use
Forest Management	6. Opportunistically manage forests through invasive species control and limited timber harvest. **Neutral to Negative** **Minimal active management has little effect on wildlife habitat.**	6. Expand current management to provide a diverse forested habitat to meet the various needs of many wildlife species including waterfowl, neotropical migratory songbirds, and resident wildlife, as well as the threatened Louisiana black bear. Establish a natural area in coordination with partners that would provide a control site that is passively managed. Develop a monitoring schedule to assess the potential effects of forest management activities on habitat conditions. **Positive** **Increased partnerships and habitat improvements should increase populations that thrive in forested habitats.**	6. Prioritize forest management activities to benefit public and expand use. **Positive to Negative** **The effect on the habitat would vary based on the areas managed and the featured public use. Increased management of this habitat, but only in areas of public interest.**

Issues	Alternative A Current Management – (No Action)	Alternative B Optimize Biological and Visitor Services – (Proposed Alternative)	Alternative C Maximize Public Use
Invasive and Exotic Plant Species	7. Opportunistically control invasive plant species when resources allow. **Negative** **This management offers minimal control or removal of these species, which could be detrimental to wildlife populations and habitat.**	7. Expand current management by integrating exotic plant removal into all refuge resource management programs to control Chinese tallow, mimosa, privet, Chinaberry, and other exotic invasive plants on the refuge through mechanical and chemical control methods. Hire a forestry technician to develop a forest habitat management plan to address control of exotic plants, and seek advanced ways to control invasive and exotic plants through specialized herbicides, timber sale contracts, or grants. **Positive** **This management option offers both expanded monitoring and removal.**	7. Same as Alternative A. **Negative** **This management offers minimal control or removal of these species, which could be detrimental to wildlife populations and habitat.**

Issues	Alternative A Current Management – (No Action)	Alternative B Optimize Biological and Visitor Services – (Proposed Alternative)	Alternative C Maximize Public Use
Habitat Management - Climate Change/Sea Level Rise	8. No Active Management. **Negative** **Without increased information refuge may not be able to effectively respond to climate change effects.**	8. Implement adaptive habitat management and monitor for global warming induced plant species shifts. **Positive** **Increased information and research would enable adaptive management to better respond to climate change effects.**	8. Same as Alternative B. **Positive** **Increased information and research would enable adaptive management to better respond to climate change effects.**

Goal 3. Provide compatible environmental education and interpretation, wildlife observation and photography, hunting, and fishing. Public use will provide visitors a greater understanding and enjoyment of fish, wildlife, and their habitats on the refuge and in the Atchafalaya Basin.

Issues	Alternative A Current Management – (No Action)	Alternative B Optimize Biological and Visitor Services – (Proposed Alternative)	Alternative C Maximize Public Use
Visitor Services Plan	1. Develop and implement a visitor services management plan by 2015. **Positive** **New plan would provide guidance for management of expanded visitor service opportunities.**	1. Same as Alternative A. **Positive** **New plan would provide guidance for management of expanded visitor service opportunities.**	1. Same as Alternative A. **Positive** **New plan would provide guidance for management of expanded visitor service opportunities.**

Issues	Alternative A Current Management – (No Action)	Alternative B Optimize Biological and Visitor Services – (Proposed Alternative)	Alternative C Maximize Public Use
Interpretation	2. Maintain current limited slate of interpretive opportunities, primarily non-personal interpretation (panels, kiosks). The primary interpretive themes and messages on the refuge are about the refuge system, kites, Big Alabama Bayou, watching wildlife, fish caught at the refuge, wading birds, bottomland hardwood forests, be a better boater, cypress swamp, and waterfowl. **Neutral** **Stable interpretive programs.**	2. Same as Alternative A, plus where possible expand interpretive opportunities by developing new trails with interpretive panels. Develop and install new kiosks, waysides, and trail signs with appropriate interpretive panels/messages. Also offer staff-led interpretive opportunities. **Positive** **Expanded interpretive programs.**	2. Same as Alternative B and add increased staff-led interpretive opportunities and activities where compatible and evaluate concessionaire opportunities. **Positive to Negative** **Expanded interpretive programs; however adaptive habitat management based public use desires could have negative effects on wildlife populations and habitats.**

Issues	Alternative A Current Management – (No Action)	Alternative B Optimize Biological and Visitor Services – (Proposed Alternative)	Alternative C Maximize Public Use
Environmental Education (EE)	3. Opportunistically provide EE opportunities as staff is available. **Neutral** **Continue with limited but stable program.**	3. Expand EE opportunities by hiring a visitor services specialist to be stationed at refuge. Develop/adapt EE materials specific to Atchafalaya NWR and post them on the refuge website for teachers to download. Spend 1-2 weeks per year using staff, interns, and volunteers from Refuge Complex to do refuge programs in the local schools – either onsite or offsite. **Positive** **Increased EE programs allow for more participation and understanding of the need for conservation.**	3. Same as Alternative B, plus develop multiple teacher workshops to showcase array of EE programs specific to Atchafalaya NWR, geared towards differing age groups; and build an onsite environmental education facility where programs and workshops would be held. **Positive** **Increased EE programs allow for more participation and understanding of the need for conservation.**

Issues	Alternative A Current Management – (No Action)	Alternative B Optimize Biological and Visitor Services – (Proposed Alternative)	Alternative C Maximize Public Use
Wildlife Observation and Photography	4. Continue to encourage and provide wildlife observation and photography opportunities. Maintain observation decks. **Neutral** **Stable facilities and opportunities.**	4. Same as Alternative A, plus where possible expand walking, driving, and boating access for wildlife observation and photography by developing photography and observation blinds and the addition of a boardwalk in the wetlands. Also, develop new and maintain current public use facilities in the Happytown area of the refuge to create a "destination" for non-consumptive priority public uses, where the state would reduce hunting opportunities. **Positive** **Increased wildlife viewing and photography opportunities.**	4. Same as Alternative B and create an auto tour loop with accompanying self guided audio CD; radio and web site updates on birding conditions; and solicit guides in applying for special use non-consumptive guiding permits. **Positive to Negative** **Increased wildlife viewing and photography opportunities; however, adaptive habitat management based on public use desires could have negative effects on wildlife populations and habitats.**

Issues	Alternative A Current Management – (No Action)	Alternative B Optimize Biological and Visitor Services – (Proposed Alternative)	Alternative C Maximize Public Use
Fishing	5. Fishing is open year-round in conjunction with Louisiana fishing regulations and anglers are allowed to fish many miles of bayous such as Little Alabama and Big Alabama, both of which provide public boat launch/ramps. Anglers have opportunities to catch largemouth bass, crappie, catfish, and sunfish, as well as recreational crawfishing. **Neutral** **Stable active management of fishing and facilities.**	5. Same as Alternative A, plus where possible improve fishing opportunities on the refuge by developing a fishing pier/observation deck at Bayou Manuel parking area #1, creating a fishing brochure and improving water quality on the refuge. **Neutral to Positive** **Increased facilities, habitats and management (e.g., water quality, education, and fishing opportunities).**	5. Same as Alternative B, plus stock game fish in appropriate areas, evaluate the addition of boat launches, and create more bank fishing opportunities. **Positive to Negative** **Increased facilities, habitats and management (e.g., water quality, education, and fishing opportunities). However increased public use could have negative effects on wildlife populations and habitats.**

Issues	Alternative A Current Management – (No Action)	Alternative B Optimize Biological and Visitor Services – (Proposed Alternative)	Alternative C Maximize Public Use
Hunting	6. Atchafalaya NWR offers the public a wide range of hunting opportunities for those using archery, primitive firearms, and modern firearms as well as special opportunities for youth and mobility-impaired hunters with access available to most portions of the refuge. Hunters have the opportunity to hunt squirrel, rabbit, woodcock, mourning dove, waterfowl, white-tailed deer, raccoon, bobcat, turkey, and feral hogs. The refuge is well-known for providing hunters opportunities for migratory woodcock as well as waterfowl hunting in the bayous and flooded bottomlands. **Neutral** **No change to existing program. Stable harvest.**	6. Same as Alternative A. Maintain current hunting opportunities. **Neutral** **No change to existing program. Stable harvest.**	6. Same as Alternative A and maximize hunting opportunities. **Neutral to Negative** **Explores the possibility of increasing hunting opportunities provided on refuge, which could have negative effects on wildlife populations and habitats.**

Issues	Alternative A Current Management – (No Action)	Alternative B Optimize Biological and Visitor Services – (Proposed Alternative)	Alternative C Maximize Public Use
Volunteer Program and Friends Group	7. The refuge generally has no volunteers beyond those that assist with the annual Step Outside Day during May. The LDWF and USACE use volunteers infrequently for special projects. **Negative** **The refuge does not currently have a stable volunteer group.**	7. Develop an active volunteer program to enhance all aspects of refuge management including resident interns, friends, and local volunteers. Identify possible volunteer opportunities and develop descriptions of some jobs that volunteers could do at Atchafalaya NWR. Coordinate these activities with new visitor services specialist. Partner with various groups to support projects on the refuge. **Positive** **Establishing a volunteer work force provides for habitat and environmental projects.**	7. Same as Alternative B; develop friends group specific to Atchafalaya NWR and explore options for partnering with state, local volunteer groups, birders, etc., to develop resident recreational vehicle work camper pads at the state maintenance facility to host volunteer work campers. **Positive** **Establishing a volunteer work force provides for habitat and environmental projects.**

Issues	Alternative A Current Management – (No Action)	Alternative B Optimize Biological and Visitor Services – (Proposed Alternative)	Alternative C Maximize Public Use
Outreach	8. Continue current outreach activities including participating in Step Outside Day and Atchafalaya Basin Program meetings; development of the general and birding brochures; and working with the Butte Larose Welcome Center in bringing visitors to the refuge. **Neutral** **Maintain current outreach.**	8. Same as Alternative A, plus where possible increase public outreach to emphasize resource management practices and promote public use opportunities. Evaluate opportunities to participate in additional special events. **Positive** **Increased outreach.**	8. Same as Alternative B and create an Explore the Basin interactive DVD and presentations for local non-profits, businesses, and others interested in Atchafalaya NWR. **Positive** **Increased outreach.**

Issues	Alternative A Current Management – (No Action)	Alternative B Optimize Biological and Visitor Services – (Proposed Alternative)	Alternative C Maximize Public Use
Welcome and Orient Visitors	9. Maintain current status of program to welcome and orient visitors to the refuge through design and upkeep of facilities, websites, and the provision of brochures regarding programs and facilities. **Neutral** **No change to existing program.**	9. Same as A, plus where possible improve program to welcome and orient visitors to the refuge through design and upkeep of facilities, websites, the provision of brochures, and the installation of guide signage. This may be accomplished by partnering with the state to have the "Duck Stamp" accepted as an entrance pass for the WMA/Refuge; working with Department of Transportation and Development to improve/pave Highway 975, especially the section from Highway 190 to the Sherburne WMA maintenance area; the installation of kiosks to welcome and orient visitors; developing new partnerships; developing a law enforcement office and maintenance facility with attached small visitor contact station; and by updating signs and exhibits. **Positive** **Increased information and facilities.**	Same as Alternative B, plus develop new roads, looping auto tour route, connect section 120 to double gate road, and build a refuge-specific complex visitor center. **Positive** **Increased information and facilities.**

Goal 4. Identify, conserve, and protect natural and cultural resources through partnerships, land protection programs, and law enforcement. Ensure a safe and secure environment for the visiting public and personnel.

Issues	Alternative A Current Management – (No Action)	Alternative B Optimize Biological and Visitor Services – (Proposed Alternative)	Alternative C Maximize Public Use
Archaeological and Historical Site Protection	1. Enforce all federal and state laws applicable to the refuge. Protect all archaeological sites on the refuge from illegal take or damage in compliance with the Archaeological Resources Protection Act, the Native American Graves Protection and Repatriation Act, and the National Historic Preservation Act. **Neutral to Negative** **Potential for damage, theft, and vandalism due to limited resources is remote.**	1. Same as Alternative A, plus conduct archaeological survey on refuge and implement law enforcement patrols on all sites to inspect for disturbances and illegal digging and or looting. **Positive** **Increases protection.**	1. Same as Alternative A. **Neutral to Negative** **Potential for damage, theft, and vandalism due to limited resources is remote.**

Issues	Alternative A Current Management – (No Action)	Alternative B Optimize Biological and Visitor Services – (Proposed Alternative)	Alternative C Maximize Public Use
Maintain Marked Refuge Boundary	2. Maintain marked refuge boundary and other directional signs. **Neutral** **No change in level of maintenance of boundary and directional signs.**	2. Same as A, plus evaluate all entrance signs on an annual basis and make required repairs, changes, updates, or upgrades. Evaluate, add, and replace signs as needed. Attempt to inspect and replace boundary signs on a rotational basis. **Positive** **Increase maintenance of boundary signs.**	2. Same as Alternative B. **Positive** **Increase maintenance of boundary signs.**

Issues	Alternative A Current Management – (No Action)	Alternative B Optimize Biological and Visitor Services – (Proposed Alternative)	Alternative C Maximize Public Use
Provide Visitor Safety, Protect Resources and Ensure Public Compliance with Refuge Regulations	3. Provide visitor safety, protect resources, and ensure public compliance with refuge regulations. **Neutral to Negative** **Potential for increased violations due to limited staff.**	3. Same as Alternative A, plus develop and work cooperatively with local, state, and other federal law enforcement agencies to supplement resource protection, update law enforcement plan, and provide educational and outreach programs in local communities as part of preventive law enforcement effort to encourage voluntary compliance. **Neutral to Positive** **Possible increased in resource protection and visitor safety.**	3. Same as Alternative B. **Neutral to Positive** **Possible increased in resource protection and visitor safety.**

Issues	Alternative A Current Management – (No Action)	Alternative B Optimize Biological and Visitor Services – (Proposed Alternative)	Alternative C Maximize Public Use
Land Acquisition	4. Acquire lands from willing sellers through fee title purchase within current acquisition boundary. **Positive** **Opportunistically increase refuge lands within current acquisition boundary.**	4. Same as Alternative A, acquire lands that provide resource and public use values from willing sellers by: fee title purchase, donation, mitigation purchase and transfer, or other viable means. Develop a proposal to expand the acquisition boundary to include 17,164 acres of lands bounded by Highway 190, Interstate 10, and Atchafalaya Floodway Protection Levees. Explore options of a land exchange with USACE to simplify management. **Positive** **Work with partners to strategically increase refuge lands and complete major acquisition boundary planning.**	4. Same as Alternative B. **Positive** **Work with partners to strategically increase refuge lands and complete minor acquisition boundary request.**

Issues	Alternative A Current Management – (No Action)	Alternative B Optimize Biological and Visitor Services – (Proposed Alternative)	Alternative C Maximize Public Use
Oil and Gas Operations	5. Manage existing oil and gas operations to ensure proper maintenance and upkeep of facilities and infrastructure. **Neutral to Positive** **Actively managing and holding oil and gas companies accountable for maintaining facilities.**	5. Same as Alternative A. Also ensure minimum effects to refuge resources, to ensure proper mitigation and compensation for lost or damaged refuge resources, and to ensure proper maintenance and upkeep of facilities and infrastructure. Conduct periodic monitoring and site inspections in cooperation with applicable state agency personnel to ensure compliance with state and federal regulations and to detect potential problem areas with equipment and facilities. **Positive** **Actively managing and holding oil and gas companies accountable for maintaining facilities.**	5. Same as Alternative A and utilize mitigation funds on areas of high public use; hide or separate oil and gas activities from other public uses. **Positive** **Actively managing and holding oil and gas companies accountable for maintaining facilities.**

Goal 5. Work with partners to secure and enhance staffing, funding, infrastructure, and facilities to maintain the long-term integrity of the habitat and wildlife resources to fulfill the purposes of the refuge.

Issues	Alternative A Current Management – (No Action)	Alternative B Optimize Biological and Visitor Services – (Proposed Alternative)	Alternative C Maximize Public Use
Partnerships	1. Continue current partnership with LDWF through the cooperative agreement. **Neutral to Positive** **Actively maintain current level of partnerships.**	1. Same as Alternative A, but explore opportunities for new partnerships. **Positive** **Increases partnership coordination and has the potential to improve habitats.**	1. Same as Alternative B, except focus partnership opportunities on visitor service driven projects. **Positive to Negative** **Increases partnership coordination, but only focuses on visitor service projects. This focus could take away support for wildlife populations and habitats efforts.**

Issues	Alternative A Current Management – (No Action)	Alternative B Optimize Biological and Visitor Services – (Proposed Alternative)	Alternative C Maximize Public Use
Maintain Facilities and Capitalized Equipment for the Refuge Complex	2. Maintain existing equipment used as a part of refuge management. **Neutral** **No change in the levels of operations and maintenance of existing facilities and equipment.**	2. Same as Alternative A, plus within 6 years of CCP approval, develop an equipment maintenance plan for heavy equipment and water craft. Explore possibility to partner with the LDWF and USACE to develop the Complex visitor center and develop new public use facilities in the Happytown area of the refuge to create a "destination" for non-consumptive priority public uses. **Neutral to Positive** **Improvement in the levels of operations and maintenance of existing facilities and equipment.**	2. Same as Alternative B. **Neutral to Positive** **Improvement in the levels of operations and maintenance of existing facilities and equipment.**

Issues	Alternative A Current Management – (No Action)	Alternative B Optimize Biological and Visitor Services – (Proposed Alternative)	Alternative C Maximize Public Use
Budget/Personnel	3. Maintain current staffing and budget structure. Staff dedicated to refuge includes all collateral: refuge manager, park ranger, forester, biologist, and law enforcement officer. **Neutral** **No change in staffing levels.**	3. Work with the Regional Office to identify critical staffing and budget needs that are realistically possible within the next 10 - 15 years. Develop short- and long-term staffing plan with the Regional Office. Add a visitor services specialist, wildlife biological technician, assistant manager, law enforcement officer, maintenance worker, and a forestry technician to the staff. **Positive** **Increase in staff. Enhanced information, habitat management, and visitor services.**	3. Only implement staffing that adds to visitor service opportunities and general facility maintenance. **Neutral to Positive** **Minimal increase in staffing levels.**

UNAVOIDABLE EFFECTS AND MITIGATION MEASURES

Under Alternative A – Current Management (No Action), there are a few unavoidable effects, including law enforcement that is not adequate for protecting significant visitor uses - especially unauthorized and illegal activities; continued degradation of the biological functions of native plant communities and wildlife habitat due to the invasion of exotic plants and nuisance animals; and a continued decrease in biodiversity. Without funding and staffing to support needed programs and to provide protection for the resources, Alternative A provides the least support for long-term productivity and sustainability of the refuge. Over time, if these issues are not addressed, they would continue to effect refuge resources.

Under Alternative B – Optimize Biological and Visitor Services (Proposed Action), there are also some unavoidable effects. These effects are expected to be minor and/or short-term in duration. However, the refuge would attempt to minimize these effects whenever possible. The following sections describe the measures the refuge would employ to mitigate and minimize the potential effects that would result from implementation of the proposed alternative. However, none of these effects rises to the level of significance. All would be mitigated, so there would in fact be no significant unavoidable adverse effects under any of the alternatives.

WATER QUALITY FROM SOIL DISTURBANCE AND USE OF HERBICIDES

Soil disturbance and siltation due to water and forest management activities resulting from road and levee maintenance; the construction of fishing pier, observation deck, wetlands boardwalks, boat ramps, visitor contact center, and law enforcement and equipment maintenance facility are expected to be minor and of short duration. To further reduce potential effects, the refuge would use best management practices to minimize the erosion of soils into water bodies.

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

Long-term herbicide use to control exotic plants could result in reduction in numbers of non-target plant species if not applied according to label directions and under the right conditions. Proper application of select herbicides and adjuvants appropriate to site-specific conditions would result in control of exotic plants and would benefit the environmental health and integrity of the refuge. The use of site-appropriate herbicides is a proven, standard methodology to control and manage exotic plant infestations presently degrading native plant and wildlife habitats, and proper application following label requirements greatly reduces risks to water quality. Every effort would be employed to ensure proper and appropriate application of herbicides to control noxious weeds throughout the refuge. Through the proper application of herbicides, there may be minor effects on the environment, with the benefit of reducing or eliminating exotic plant infestations.

WILDLIFE DISTURBANCE

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

The known and anticipated levels of disturbance from the proposed alternative are not considered to be significant. Nevertheless, the refuge would manage public use activities to reduce effects. General wildlife observation may result in minimal disturbance to wildlife. If the refuge determines that effects from the expected additional visitor uses are above the levels that are anticipated, those uses would be discontinued, restricted, or rerouted to other less sensitive areas. Providing access for fishing opportunities allows the use of a renewable natural resource without adversely affecting other resources. Hunting would also be managed with restrictions that ensure minimal effect on other resources.

VEGETATION DISTURBANCE

Negative effects could result from the creation, extension, and maintenance of trails that require the clearing of non-sensitive vegetation along their length. This is expected to be a minor short-term effect. By necessity, effects to vegetation would occur during forest management and removal of timber or control of exotic plant species; however, long-term effects of forest management would likely benefit wildlife and the environment far more than any possible short-term negative effects.

Increased visitor use may increase the potential for the introduction of new exotic species into areas when visitors do not comply with boating regulations at the boat ramps and other access points, or with requests to stay on trails. The refuge would minimize this effect by enforcing the regulations for access to the refuge's water bodies, and by installing informational signs that request users to stay on the trails.

USER GROUP CONFLICTS

The demand for non-consumptive wildlife-dependent use on Atchafalaya NWR is expected to be high. As public use increases, unanticipated conflicts between different (hunters vs. non-consumptive) user groups could occur. If this should happen, the refuge would adjust its programs, as needed, to minimize any public use issues. The refuge would use methods that have proven to be effective in reducing or eliminating public use conflicts. These methods include establishing separate use areas, different use periods, and limits on the numbers of users in order to provide safe, quality, appropriate, and compatible wildlife-dependent recreational opportunities. Restrictions on hunting methods (for example, restricting dog use during turkey, dove, and deer seasons to ensure conflicts do not arise) and restrictions on hunting near designated public use facilities and trails would aid in reducing potential conflicts. Should serious conflicts arise; considerations would be given to chronological and spatial scheduling and/or zoning, even to include limiting users through a lottery permit system, if necessary.

Sport fishing and hunting activities would overlap to some degree. No conflicts of consequence are expected between sport fishermen and deer and game hunters. Conflicts between sport fishermen and migratory bird hunters may arise, but are expected to be minimal due to the dissimilar nature of these activities and the areas of the refuge where these activities may be expected to occur. It is expected that the majority of waterfowl hunting would occur in shallow waters and at times of the year when the refuge is less likely to be used by sport fishermen.

EFFECTS ON ADJACENT LANDOWNERS

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

However, some negative effects that may occur include a higher frequency of trespass onto adjacent private lands, and noise associated with increased traffic. To minimize these potential effects, the refuge would provide informational signs that clearly mark refuge boundaries, maintain the refuge's existing parking facilities, use law enforcement, and provide increased visitor educational efforts.

LAND OWNERSHIP AND SITE DEVELOPMENT

Land acquisition efforts by the Service could lead to changes in land use and recreational use patterns. However, much of the non-refuge land within the refuge's approved acquisition boundary is undeveloped. If lands are acquired as additions to the refuge, they would be maintained in a natural state, managed for native wildlife populations, and opened to wildlife-compatible public uses, where feasible. Alternative A proposes to acquire from willing sellers lands within the refuge's original acquisition boundary. Alternative B (Proposed Alternative) seeks to expand the refuge's acquisition boundary to include lands bounded by Highway 190, Interstate 10, and the Atchafalaya Floodway Protection Levee, as well as exploring land exchanges with the USACE. The commitment of resources to acquire and maintain these lands would be small compared to the benefits derived from the increased biodiversity – with the acquired lands providing nesting, foraging, and migrating habitat for migratory bird species of conservation concern. These lands would also benefit refuge visitors by providing wildlife observation.

Potential development of the refuge's buildings, trails, and other improvements could lead to minor short-term negative effects on plants, soils, and some wildlife species. Efforts would be made to use recycled products and environmentally sensitive construction methods. The proposed visitor center would be constructed to be aesthetically pleasing to the community and to avoid any additional effects to native plant communities. All construction activities would comply with the requirements of Section 404 of the Clean Water Act; the National Historic Preservation Act; Executive Order 11988, Floodplain Management; and other applicable regulatory requirements.

CUMULATIVE EFFECTS

A cumulative effect is defined as an effect on the natural or human environment, which results from the incremental effect of the proposed action when added to other past, present, and reasonably foreseeable future actions regardless of which agency (federal or non-federal) or person undertakes such other actions whether on same lands or nearby lands (40 Code of Federal Regulations, 1508.7).

Cumulative effects are the overall, net effects on a resource that arise from multiple minor actions. Effects can "accumulate" spatially, when different actions affect different areas of the same resource. They can also accumulate over the course of time, from actions in the past, the present, and the future. A series of seemingly minor effects could accumulate to create major problems over a period of time. Occasionally, different actions counterbalance one another, partially canceling out each other's effect on a resource. But more typically, multiple effects add up, with each additional action contributing an incremental effect on the resource. In addition, sometimes the overall effect is greater than merely the sum of the individual effects, such as effects to a "keystone species" or when a reduction in a population crosses a threshold of reproductive sustainability, threatening to extinguish the population.

A thorough analysis of effects always considers their cumulative aspects, because actions do not take place in a vacuum: there are virtually always some other actions that have affected that resource in some way in the past, or are affecting it in the present, or will affect it in the reasonably foreseeable future. So any assessment of a specific action's effects must in fact be made with consideration of what else has happened to that resource, what else is happening, or what else could likely happen to it.

The staff is not aware of any past, present, or future planned actions that would result in a significant cumulative effect when added to the refuge's proposed actions, as outlined in the proposed alternative. The management activities in the proposed action are intended to maintain or improve the area's biological resources, protecting the biological integrity of the refuge. Benefits are anticipated for migratory birds; native wildlife and habitat diversity, including the minimization of negative effects associated with exotic, invasive, and nuisance species. The management activities in the proposed action would not have significant adverse effects on climate change. Further, the management activities in the proposed action are not expected to have significant adverse effects on the cultural resources of the area, instead providing enhanced protection of these resources. Nor are significant adverse effects expected from the proposed action regarding the local economy. Instead the proposed management activities are anticipated to support area property values and aesthetics. A few activities in the proposed action are anticipated to have negligible or minimal cumulative effects, including recreational hunting and fishing effects on biological resources, increased visitation disturbance effects on wildlife, construction effects on hydrology and water quality, and the effects of forest management and exotic plant control.

- All alternatives attempt to improve or at least maintain biological resources on the refuge. The combination of refuge management actions with other organizations (e.g., USACE, LDWF) could result in significant, beneficial cumulative effects by: (1) increasing conservation and management for native and threatened and endangered species; (2) improving habitats, especially those for migratory birds, (e.g., moist-soil habitats, bottomland hardwoods, wetlands, and greentree reservoir that are regionally declining); and, (3) preventing the spread of or reducing invasive plants and animals.

- Recreational hunting and fishing have been identified in the Improvement Act as priority public uses, provided they are compatible with the purposes for which the refuge was established.

  All hunts fall within the framework of Louisiana's open seasons and follow state regulations. Refuge-specific regulations are reviewed annually and incorporated as part of the Sherburne Complex regulations. The entire refuge is open to hunting with the exception of areas posted with "No Hunting Zone" signs. Small game animal populations on the refuge are capable of sustaining harvest because of their short reproduction cycles. Hunting regulations for both endemic and migratory game species are based on specific statewide and nationwide harvest objectives. Migratory bird regulations are established at the federal level each year following a series of meetings involving both state and federal biologists. Harvest guidelines are based on population survey and habitat condition data. Refuge hunting programs are always within these regulations. As currently proposed, the known and anticipated levels of disturbance of allowing hunting are considered minimal and well within the tolerance level of known wildlife species and populations present on the refuge.

  All hunting and fishing activities would be conducted within the constraints of sound biological principles and refuge-specific regulations established to restrict illegal or questionable activities. The benefits that hunting and fishing bring to each refuge improves the entire Refuge System's available habitat and native wildlife populations and thus provides the public generally with more valuable and diverse refuge recreational opportunities of all kinds. Monitoring activities through wildlife inventories and assessments of public use levels and activities would be utilized, and public use programs would be adjusted as needed to limit disturbance. Implementation of an effective law enforcement program and development of site-specific refuge regulations that are reviewed annually should minimize most incidental take problems. Any negative cumulative effects of fishing (a consumptive resource use) are anticipated to be minimal. Fishing is not anticipated to cause any significant adverse

cumulative effects. Fishing is popular in the refuge -- as well as on adjacent lands and waters. On the refuge, fishing would be limited to areas that minimize any associated wildlife disturbance effects.

- The negative cumulative effects of increased visitation are anticipated to be minimal. Although non-consumptive users can affect wildlife through disturbance, the effects of the proposed alternative are not considered significant and well within the tolerance level of known wildlife species and populations present in the visited areas. As public use levels expand across time, unanticipated conflicts between user groups may occur. Experience has proven that chronological and spatial zoning (e.g., establishment of separate use areas, use periods, and restrictions on the number of users) is an effective tool in eliminating conflicts between user groups.

- There would be no significant adverse cumulative effects to hydrology or water quality under any of the alternatives. On the refuge, best management practices including erosion and sediment control measures would be used during the construction of roads, trails, and structures, as well as during forest management and noxious weed control to ensure effects are minimized. These onsite projects would be widely dispersed over the large area of the refuge and over long periods of time so their local effects would not be additive.

- Proposed exotic plant control activities are not expected to have significant adverse cumulative effects. These activities involve mechanical removal, application of approved herbicides, or a combination of these activities. Herbicides used for exotic plant control are used and managed to target specific exotic plants or infestations, are approved for use in natural areas to control exotic plants, and generally do not have long-lasting residual effects to the environment as their chemical nature provides for relatively quick break down of the product after application. Further, use of herbicides is inherently limited based on label rates and approved application practices on refuge lands further minimizing any negative effects. All exotic plant chemical applications would be conducted in accordance with Service policy and under an approved refuge-specific Integrated Pest Management Plan.

DIRECT AND INDIRECT EFFECTS

Direct effects are caused by an action and occur at the same time as the action. Indirect effects are caused by an action but are manifested later in time or further removed in distance, but still reasonably foreseeable.

The actions that would be implemented with the proposed alternative include facility development, wildlife and population management, resource protection, public use, and administrative programs. These actions would result in both direct and indirect effects. Facility development, for example, would most likely lead to increased public use, a direct effect; and it, in turn, would lead to indirect effects such as increased littering, noise, and vehicular traffic.

EFFECTS OF PROPOSED ALTERNATIVE ON WILDLIFE AND HABITAT

While managed hunting opportunities result in both short-term (direct) and long-term (indirect) effects to individual animals, effects on the population level are usually negligible. Effects of the proposed alternative on wildlife and habitat are given below.

- Effects to Hunted Wildlife – Hunting regulations for both endemic and migratory game species are based on specific statewide and nationwide harvest objectives. Harvest guidelines are based on population survey and habitat condition data. Refuge hunting programs are always within these regulations. As currently proposed, the known and anticipated levels of disturbance of allowing hunting are considered minimal and well within the tolerance level of known wildlife species and populations present on the refuge. All hunting activities would be conducted with the constraints of sound biological principles and refuge-specific regulations established to restrict illegal or questionable 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. Implementation of an effective law enforcement program and development of site-specific refuge regulations that are reviewed annually should minimize most incidental take problems.

  The mortality of individual hunted animals that would occur under this alternative is estimated by the refuge to be a maximum of 200 deer, 200 ducks and coots, and 500 squirrels annually. Estimates for other hunted species including turkey, woodcock, snipe, rabbit, rail, gallinule, quail, and raccoon would be less than 20 individuals per species based on observations from law enforcement compliance checks. Most waterfowl (see below) in the area migrate to the neighboring Bayou Des Ourses area. Hunting would cause some disturbance to not only the species being hunted but other game species as well. However, refuge regulations would minimize incidental disturbance. Hunting of deer and raccoon would help maintain their populations at or below carrying-capacity. The likelihood of starvation and diseases, such as bluetongue and Epizootic Hemorrhagic Disease (EHD) in deer and distemper and rabies in raccoon, would be decreased as would deer-vehicle collisions.

  - Deer -- White-tailed deer are present refuge wide. Numbers have been sufficient in this area to support hunting by local residents and hunting club members, even prior to the establishment of the refuge, and have been sufficient to sustain a hunting program while meeting refuge objectives. Deer hunting on the refuge would not affect the regional population due to the presence of a restricted home range for deer. The average home range of a male deer is only 1,511 ± 571 hectares. (Mott et al. 1985). Locally, harvest and survey data confirm that decades of deer hunting on surrounding private lands (using bait and a longer season) have had no cumulative adverse effect on the deer population. LDWF estimates 209,200 deer were harvested throughout the state in 2005/06. The average annual statewide harvest since 1995 is 234,000 deer. The refuge estimates an additional maximum of 25 deer would be harvested under the proposed action, representing only 0.01 percent of the long-term average state harvest. In addition, restrictions on methods of harvest (e.g., archery, muzzleloader, and gun) and seasons aid in maintaining sustainable populations. Since refuge hunting of deer under the hunting plan is less than hunting allowed on surrounding private lands, the cumulative effects would be negligible.

    Competition between white-tailed deer and other species could potentially occur if population levels are allowed to expand beyond the carrying capacity of the available habitat. The hunting program should keep deer populations within acceptable levels. If deer numbers increase beyond acceptable levels, other harvest methods would be considered.

  - Feral Hogs -- Feral hogs are an extremely invasive, introduced, non-native species. They are not considered a game species by the State of Louisiana. Hunting of feral hogs provides the refuge with a management tool in reducing this detrimental species, and at

the same time, provides an activity that local hunters enjoy. No bag limits are established for feral hogs. Cumulative effects to an exotic, invasive species is not of concern because the refuge seeks to extirpate this species from refuge lands. Hunting of hogs is not considered detrimental to the biological integrity of the refuge, is not likely to create conflict with other public uses and is within the wildlife-dependent public uses to be given priority consideration. Hogs are exotic and because of their cumulative negative effects on other refuge biota they are a priority species for eradication. They are a popular game species, and the public interest would best be served by allowing this activity on the refuge. However, even with hunting, feral hogs are likely to always be present because they are prolific breeders. Since competition exists between deer and feral hogs on the refuge for available food resources, the taking of feral hogs is permitted during the proposed hunting season in an effort to reduce and limit numbers of hogs present on the refuge. If feral hog numbers increase beyond acceptable levels, other control methods would be considered.

- Small Upland Game -- Gray squirrels, fox squirrels, eastern cottontails, and swamp rabbits are prolific breeders and their populations have never been threatened by hunting in Louisiana even prior to the passing of hunting regulations as we know them today. Numbers have been sufficient in the area to support hunting by local residents and hunting club members, even prior to the establishment of the refuge, and their numbers have been sufficient to sustain a hunting program while meeting refuge objectives. Small game animal populations are capable of sustaining harvests because of their short reproduction cycles, and as such both short- and long-term effects to individual animals and effects at the population level are usually negligible. Furthermore, several studies both within and outside Louisiana, have shown that small game are not affected by hunting, but rather are limited by food resources. Squirrel, rabbit, quail, and raccoon cannot be affected regionally by refuge hunting because of their limited home ranges. Locally, hunting of small wildlife species (e.g., squirrel, turkey, dove, rabbit, raccoon, and quail) on the refuge would have negligible adverse effects. Both LDWF and Service estimates show that less than 0.01 percent of rabbits taken in Louisiana would be taken from the refuge under this alternative.

  Raccoons are present refuge wide. Raccoons are known predators of nesting birds, including wood ducks and mottled ducks, small mammals, and reptiles and amphibians. In large numbers they have significant effects on populations of other wildlife species. Numbers on the refuge are sufficient to sustain a harvestable surplus and hunting helps regulate raccoon populations. Under Alternative B, hunting would be allowed and managed to reduce populations of raccoons and still maintain sustainable populations -- while also meeting refuge objectives for protection of other wildlife species and refuge programs. Restrictions on hunting methods of harvest and seasons would aid in maintaining sustainable populations. However, unless the popularity of raccoon hunting increases, their numbers will always be higher than desired. When these species become extremely overabundant, diseases such as distemper and rabies reduce their populations. However, waiting for a disease outbreak to regulate their numbers could be a human health hazard. Cumulative adverse effects of managed raccoon hunting would be unlikely, considering they reproduce quickly, are difficult to hunt due to their nocturnal habits, and are not as popular for hunting as other game species.

- Effects to Migratory Game Birds – Under the proposed action, Atchafalaya NWR estimates a maximum of 400 waterfowl would be harvested each year. This harvest effect represents 0.1 percent and <0.03 percent, respectively, of Louisiana's 4-year average harvest of 921,990 ducks, and 72,611 white-fronted geese. Migratory bird regulations are established at the federal level each year following a series of meetings involving both state and federal

biologists. The Service undertakes a number of surveys throughout the year in conjunction with the Canadian Wildlife Service, state and provincial wildlife-management agencies, and others. To determine the appropriate frameworks for each species, the Service considers factors such as population size and trend, geographical distribution, annual breeding effort, the condition of breeding and wintering habitat, the number of hunters, and the anticipated harvest. After frameworks are established for season lengths, bag limits, and areas for migratory game bird hunting, migratory game bird management becomes a cooperative effort of state and federal governments. After Service establishment of final frameworks for hunting seasons, the states may select season dates, bag limits, and other regulatory options for the hunting seasons. Season dates and bag limits for national wildlife refuges open to hunting are never longer or larger than the state regulations. At Atchafalaya NWR, season length is more restrictive for waterfowl than the state allows and hunting of doves is not allowed.

Although woodcock are showing declines in numbers on their breeding grounds, habitat loss is considered to be the culprit, not hunting – a recent U.S. Geological Survey study indicated no significant differences in woodcock survival between hunted and non-hunted areas (McAuley et al. 2005). An estimated 24,000 woodcock were harvested in the 2005/06 season in the State of Louisiana. Louisiana's harvest of 24,000 woodcock represented 0.5 percent of the estimated 4.6 million North American woodcock population. Limited woodcock habitat exists during most of the hunting season because flooding inundates the refuge. During extremely dry years, when more woodcock habitat becomes available, they may experience higher harvest rates. With such relatively few woodcock being currently harvested on the refuge, the opening to hunting as stated in the proposed action should have no adverse cumulative effects on their local, regional, or flyway populations.

- Effects to Habitat – The biological integrity of the refuge would be protected under this alternative, and the refuge purpose of conserving wetlands for wildlife would be achieved. The hunting of white-tailed deer, migratory game birds (e.g., waterfowl, coots, woodcock, and snipe), and upland game (e.g., squirrel, rabbit, rail, gallinule, quail, and raccoon) would positively affect wildlife habitat by promoting plant health and diversity, reducing overpopulation, which destroys vegetation and compacts soils and increases tree seedling survival. The refuge would be utilized more by the public (i.e., hunters) than previously, which might cause increased disturbance and trampling of vegetation. Effects to vegetation should be minor. Hunter density is estimated to be an average of 1 hunter/1,000 acres throughout the hunting season. Refuge-regulations would not permit the use of ATVs off of designated trails. Vehicles would be confined to existing roads and parking lots.

- Effects to Non-hunted Wildlife – Non-hunted wildlife would include non-hunted migratory birds such as songbirds, wading birds, raptors, and woodpeckers; small mammals such as voles, moles, mice, shrews, and bats; reptiles and amphibians such as snakes, skinks, turtles, lizards, salamanders, frogs and toads; and invertebrates such as butterflies, moths, other insects and spiders. Except for migratory birds and some species of migratory bats, butterflies and moths, these species have very limited home ranges and hunting could not affect their populations regionally; thus, only local effects will be discussed.

  Cumulative disturbance to non-hunted wildlife would be negligible. Significant disturbance would be unlikely for the following reasons. Hunting seasons would not coincide with nesting season of non-hunted migratory birds. Small mammals are inactive during winter when hunting season occurs and they are nocturnal, which together make hunter interactions with small mammals very rare. Hibernation or torpor by cold-blood reptiles and amphibians also limits their activity during the hunting season when temperatures are low. Given the low

refuge hunter density, hunters would rarely encounter reptiles and amphibians during most of the hunting season. Invertebrates are also not active during cold weather and would have few interactions with hunters during the hunting season. Refuge regulations further mitigate possible disturbance by hunters to non-hunted wildlife. Vehicles are restricted to roads and the harassment or taking of any wildlife other than the game species legal for the season is not permitted. Disturbance to the daily wintering activities, such as feeding and resting, of birds might occur, but would be transitory as hunters traverse habitat. Disturbance to birds by hunters would probably be commensurate with that caused by non-consumptive users. In addition, populations of non-hunted wildlife predators would be decreased through hunting under this alternative, resulting in decreased depredation rates on songbirds, small mammals, amphibians and reptiles, and their nests. Further, under Alternative B, feral hog populations would be reduced thereby decreasing predation of deer fawns, turkeys, and small mammals.

- Effects on Wildlife-dependent Recreation – Conflicts between hunters and non-consumptive users might occur but would be mitigated. The refuge would focus non-consumptive uses, mainly bird watching and other wildlife viewing, in the small but high public use areas that are closed to hunting. By chronological (non-hunting season) and spatial zoning, the public would have an increased environmental awareness of Atchafalaya NWR and the Refuge System and at the same time public demand for more hunting would be met. Hunters would have the opportunity to harvest a renewable resource in a traditional manner, which is culturally important to the local community, and the refuge would be promoting a wildlife-dependent recreational opportunity that is compatible with the purpose for which the refuge was established. This alternative would also allow the public to enjoy hunting at no or little cost in a region where private land is leased for hunting, often costing a person $300-$2000/year for membership. This alternative would allow youth the opportunity to experience wildlife-dependent recreation; instill an appreciation for and understanding of wildlife, the natural world, and the environment; and promote a land ethic and environmental awareness.

Other indirect effects that may result from implementing the proposed alternative include minor effects from siltation due to the disturbance of soils and vegetation while expanding or creating new foot trails; constructing a visitor center and law enforcement and equipment maintenance facility; forest management and noxious weed reduction; and providing greater visitor access through improvements to the boat ramps, fishing piers, observation decks, wetlands boardwalks, etc. These effects are expected to be minor and of short duration.

None of the proposed management activities would lead, directly or indirectly, to a violation of federal, state, or local laws imposed for the protection of the environment; and, none of the direct or indirect effects are anticipated to be significant. Adaptive management is a key component of Alternative B. As such, the actions outlined would not establish a precedent for future actions with significant effects nor represent a decision in principle about future considerations. Refuge management activities would constantly be adapted as new research, data, and information become available to protect resources and minimize effects.

SHORT-TERM USES VERSUS LONG-TERM PRODUCTIVITY

All of the alternatives strive to maintain or enhance the long-term productivity and sustainability of natural resources on the refuge. The habitat protection and management actions mentioned in Alternative B, the proposed alternative, would maintain long-term productivity of refuge habitats. The benefits of this plan for long-term productivity far outweigh any effects from short-term actions, such as road improvements, the construction of a visitor center, or creation of new trails. The dedication of certain areas for roads, trails, visitor facilities, etc., on the refuge represents a loss of long-term

productivity on localized areas, but would not be considered significant given the comparative refuge land base. Likewise, while invasive exotic plant removal, forest management, or prescribed burning would produce unsightly results for a time, they would also provide long-term benefits to the refuge. In addition, while these activities would cause short-term negative effects, the educational values and understanding of ecological processes and associated public support gained from the improved visitor experience would produce long-term benefits for the refuge.

The key to protecting and ensuring the refuge's long-term productivity is to find the threshold where public uses do not degrade or interfere with the refuge's natural resources. The plans proposed have been carefully conceived to achieve that threshold. Therefore, implementing the proposed alternative would lead to long-term benefits for wildlife protection and land conservation that far outweigh any short-term effects. In summary, all alternatives would contribute positively to maintaining or enhancing the long-term productivity of the refuge.

V. Consultation and Coordination

OVERVIEW

This chapter summarizes the consultation and coordination that has occurred to date in identifying the issues, alternatives, and proposed alternative, which are presented in this EA. It lists the various agencies, organizations, and individuals who were consulted in the preparation of this Draft CCP/EA.

Development of Atchafalaya NWR's Draft CCP/EA was initiated in October 2008. The core planning team responsible for its development included natural resource management professionals representing the Southeast Louisiana NWR Complex. The Service established a biological review team, with representatives from Service's local and Regional Office, and state and federal agencies, which conducted on-site evaluations and completed a biological review report. A visitor service review team was also established, which presented recommendations to the refuge staff and prepared a visitor services review report.

Public input into the development of this Draft CCP/EA was obtained, in part, through a public scoping meeting held in the vicinity of the refuge. A notice of intent to prepare this Draft CCP/EA was published in the *Federal Register* on January 9, 2009. The public was notified in the local newspapers and various media outlets of the public scoping meeting held on January 29, 2009. Approximately 25 members of the public attended the public scoping meeting. During the public scoping process, both written and verbal comments were received.

In identifying key issues to be addressed during the planning process, the planning team considered recommendations from the biological review and visitor services review reports; comments received through the public scoping meeting; and input from open planning team meetings, comment packets, and personal contacts of planning team members. In addition, the team considered opportunities for coordination with other relevant regional conservation plans and initiatives; applicable legal mandates; the purposes of all national wildlife refuges, as well as the mission, goals, and policies of the Refuge System; and evaluations and documentation required by Service procedures for refuge planning.

CORE PLANNING TEAM

The core planning team, which obtained input from the public and governmental and non-governmental partners, was the primary decision-making team for this Draft CCP/EA. The key tasks of this group involved defining and refining the vision; identifying, reviewing, and filtering the issues; defining the goals; outlining the alternatives; and providing a conceptual framework (i.e., objectives and strategies to accomplish the vision). The following individuals served on the Core Planning Team:

Core Team	**Organization**
Ken Litzenberger	Southeast Louisiana NWR Complex, Project Leader
Tina Chouinard	Fish and Wildlife Service, Planning Team Leader
Pon Dixson	Southeast Louisiana NWR Complex, Deputy Project Leader
Daniel Breaux	Atchafalaya NWR, Refuge Manager
Neil Lalonde	Atchafalaya NWR, Biologist
Tony Vidrine	Louisiana Department of Wildlife and Fisheries, Program Manager
Jody DeMeyere	Atchafalaya NWR, Park Ranger, Visitor Services

Scotty Boudreaux	Atchafalaya NWR, Park Ranger, Law Enforcement
Chevales Williams	Tennessee Valley Authority, Contractor

Interdisciplinary Team	**Organization**
Bob Stader	Fish and Wildlife Service, St. Cathrine Creek NWR, Project Leader
Janet Ertel	Fish and Wildlife Service, Regional Biologist
John Simpson	Fish and Wildlife Service, Bayou Cocodrie NWR, Forester
James Harris	Southeast Louisiana NWR Complex, Oil and Gas Manager
Kenny Ribeck	Louisiana Department of Wildlife and Fisheries, Biologist/Forester
David Walther	Fish and Wildlife Service, Ecological Services, Biologist
Chuck Hunter	Fish and Wildlife Service, Natural Resources and Planning Chief
Rick Kanaski	Fish and Wildlife Service, Regional Archaeologist
Evelyn Nelson	Fish and Wildlife Service, Writer/Editor
Randy Musgraves	Fish and Wildlife Service, Graphics and Print Coordination
Rosamond Hopp	Fish and Wildlife Service, Regional Planning Coordinator

BIOLOGICAL REVIEW TEAM

The biological review team, an interdisciplinary team, was responsible for determining the status, trends, and condition of the refuge's biological resources. The biological review for Atchafalaya NWR took place on April 15-16, 2008, resulting in a report dated September 2008 (Strader and Chouinard 2008). The following individuals serve on the biological review team:

Daniel Breaux	Fish and Wildlife Service
Richard Hines	Fish and Wildlife Service
Tina Chouinard	Fish and Wildlife Service
Tony Vidrine	Louisiana Department of Wildlife and Fisheries
James Harris	Fish and Wildlife Service
Scotty Boudreaux	Fish and Wildlife Service
John Simpson	Fish and Wildlife Service
Kenny Ribbeck	Louisiana Department of Wildlife and Fisheries
Fred Kimmel	Louisiana Department of Wildlife and Fisheries
David Walther	Fish and Wildlife Service
Neil Lalonde	Army Corps of Engineers
Janet Ertel	Fish and Wildlife Service
Bob Strader	Fish and Wildlife Service
Dave Telesco	Black Bear Conservation Committee
Maria Davidson	Louisiana Department of Wildlife and Fisheries
Ken Litzenberger	Fish and Wildlife Service

VISITOR SERVICES REVIEW TEAM

The visitors services review team was responsible for determining the status, trends, and condition of the refuge's visitor resources and facilities. The visitor services review for Atchafalaya NWR took place in 2008, and resulted in a report dated May 2008 (USFWS 2008b). The following individuals served on the visitor services review team:

Garry Tucker	Visitor Services and Outreach
Deborah Jerome	Visitor Services and Outreach
Doug Hunt	Park Ranger, Mississippi Sandhill Crane NWR
Kathy Whaley	Deputy Refuge Manager, Merritt Island NW

Appendix A. Glossary

Adaptive Management: Refers to a process in which policy decisions are implemented within a framework of scientifically driven experiments to test predictions and assumptions inherent in a management plan. Analysis of results helps managers determine whether current management should continue as is or whether it should be modified to achieve desired conditions.

Alluvial: Sediment transported and deposited in a delta or riverbed by flowing water.

Alternative: 1. A reasonable way to fix the identified problem or satisfy the stated need (40 CFR 1500.2). 2. Alternatives are different sets of objectives and strategies or means of achieving refuge purposes and goals, helping fulfill the Refuge System mission, and resolving issues (Service Manual 602 FW 1.6B).

Anadromous: Migratory fishes that spend most of their lives in the sea and migrate to fresh water to breed.

Anoxic Without oxygen, as in water containing no dissolved oxygen.

Atmospheric Deposition The process whereby substances, such as mercury, are carried in the atmosphere across potentially multiple watershed boundaries, deposited through both wet and dry atmospheric processes, and possibly biologically magnified through the food web.

Biological Diversity: The variety of life and its processes, including the variety of living organisms, the genetic differences among them, and the communities and ecosystems in which they occur (Service Manual 052 FW 1. 12B). The System's focus is on indigenous species, biotic communities, and ecological processes. Also referred to as biodiversity.

Carbon Sequestration The capture and secure storage of carbon that would otherwise be emitted to or remain in the atmosphere.

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

Categorical Exclusion: A category of actions that does not individually or cumulatively have a significant effect on the human environment and have been found to have no such effect in procedures adopted by a federal agency pursuant to the National Environmental Policy Act (40 CFR 1508.4).

CFR: Code of Federal Regulations.

Compatible Use: A proposed or existing wildlife-dependent recreational use or any other use of a national wildlife refuge that, based on sound professional judgment, will not materially interfere with or detract from the fulfillment of the National Wildlife Refuge System mission or the purpose(s) of the national wildlife refuge [50 CFR 25.12 (a)]. A compatibility determination supports the selection of compatible uses and identifies stipulations or limits necessary to ensure compatibility.

Comprehensive Conservation Plan: A document that describes the desired future conditions of a refuge or planning unit and provides long-range guidance and management direction to achieve the purposes of the refuge; helps fulfill the mission of the Refuge System; maintains and, where appropriate, restores the ecological integrity of each refuge and the Refuge System; helps achieve the goals of the National Wilderness Preservation System; and meets other mandates (Service Manual 602 FW 1.6 E).

Concern: See Issue

Cover Type: The present vegetation of an area.

Cultural Resource Inventory: A professionally conducted study designed to locate and evaluate evidence of cultural resources present within a defined geographic area. Inventories may involve various levels, including background literature search, comprehensive field examination to identify all exposed physical manifestations of cultural resources, or sample inventory to project site distribution and density over a larger area. Evaluation of identified cultural resources to determine eligibility for the National Register follows the criteria found in 36 CFR 60.4 (Service Manual 614 FW 1.7).

Cultural Resource Overview: A comprehensive document prepared for a field office that discusses, among other things, its prehistory and cultural history, the nature and extent of known cultural resources, previous research, management objectives, resource management conflicts or issues, and a general statement on how program objectives should be met and conflicts resolved. An overview should reference or incorporate information from a field office's background or literature search described in Section VIII of the Cultural Resource Management Handbook (Service Manual 614 FW 1.7).

Cultural Resources: The remains of sites, structures, or objects used by people in the past.

Designated Wilderness Area: An area designated by the U.S. Congress to be managed as part of the National Wilderness Preservation System (Draft Service Manual 610 FW 1.5).

Disturbance: Significant alteration of habitat structure or composition. May be natural (e.g., fire) or human-caused events (e.g., aircraft overflight).

Ecosystem:	A dynamic and interrelating complex of plant and animal communities and their associated non-living environment.
Ecosystem Management:	Management of natural resources using system-wide concepts to ensure that all plants and animals in ecosystems are maintained at viable levels in native habitats and basic ecosystem processes are perpetuated indefinitely.
Endangered Species (Federal):	A plant or animal species listed under the Endangered Species Act that is in danger of extinction throughout all or a significant portion of its range.
Endangered Species (State):	A plant or animal species in danger of becoming extinct or extirpated in the state within the near future if factors contributing to its decline continue. Populations of these species are at critically low levels or their habitats have been degraded or depleted to a significant degree.
Environmental Assessment (EA):	A concise public document, prepared in compliance with the National Environmental Policy Act, that briefly discusses the purpose and need for an action, alternatives to such action, and provides sufficient evidence and analysis of impacts to determine whether to prepare an environmental impact statement or finding of no significant impact (40 CFR 1508.9).
Environmental Impact Statement (EIS):	A detailed written statement required by section 102(2)(C) of the National Environmental Policy Act, analyzing the environmental impacts of a proposed action, adverse effects of the project that cannot be avoided, alternative courses of action, short-term uses of the environment versus the maintenance and enhancement of long-term productivity, and any irreversible and irretrievable commitment of resources (40 CFR 1508.11).
Estuary:	The wide lower course of a river into which the tides flow. The area where the tide meets a river current.
Finding of No Significant Impact (FONSI):	A document prepared in compliance with the National Environmental Policy Act, supported by an environmental assessment, that briefly presents why a federal action will have no significant effect on the human environment and for which an environmental impact statement, therefore, will not be prepared (40 CFR 1508.13).
Geomorphological Processes	Natural mechanisms of weathering, erosion, and deposition that result in the modification of the materials and landforms at the earth's surface.
Goal:	Descriptive, open-ended, and often broad statement of desired future conditions that conveys a purpose but does not define measurable units (Service Manual 620 FW 1.6J).

Habitat:	Suite of existing environmental conditions required by an organism for survival and reproduction. The place where an organism typically lives.
Habitat Restoration:	Management emphasis designed to move ecosystems to desired conditions and processes, and/or to healthy ecosystems.
Habitat Type:	See Vegetation Type.
Hydrologic System	The Hydrologic System is the entire cycle of water movement, also known as the water cycle, whereby rainwater infiltrates the soil and then the water is absorbed by plants, evaporates, or runs off into other surface waters.
Improvement Act:	The National Wildlife Refuge System Improvement Act of 1997.
Informed Consent:	The grudging willingness of opponents to “go along” with a course of action that they actually oppose (Bleiker).
Issue:	Any unsettled matter that requires a management decision [e.g., an initiative, opportunity, resource management problem, threat to the resources of the unit, conflict in uses, public concern, or other presence of an undesirable resource condition (Service Manual 602 FW 1.6K)].
Management Alternative:	See Alternative
Management Concern:	See Issue
Management Opportunity:	See Issue
Migration:	The seasonal movement from one area to another and back.
Mission Statement:	Succinct statement of the unit’s purpose and reason for being.
Monitoring:	The process of collecting information to track changes of selected parameters over time.
National Environmental Policy Act of 1969 (NEPA):	Requires all agencies, including the Service, to examine the environmental impacts of their actions, incorporate environmental information, and use public participation in the planning and implementation of all actions. Federal agencies must integrate NEPA with other planning requirements, and prepare appropriate NEPA documents to facilitate better environmental decision-making (40 CFR 1500).

National Wildlife Refuge System Improvement Act of 1997 (Public Law 105-57):	Under the Refuge Improvement Act, the Fish and Wildlife Service is required to develop 15-year comprehensive conservation plans for all national wildlife refuges outside Alaska. The Act also describes the six public uses given priority status within the Refuge System (i.e., hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation).
National Wildlife Refuge System Mission:	The mission is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.
National Wildlife Refuge System:	Various categories of areas administered by the Secretary of the Interior for the conservation of fish and wildlife, including species threatened with extinction; all lands, waters, and interests therein administered by the Secretary as wildlife refuges; areas for the protection and conservation of fish and wildlife that are threatened with extinction; wildlife ranges; game ranges; wildlife management areas; or waterfowl production areas.
National Wildlife Refuge:	A designated area of land, water, or an interest in land or water within the Refuge System.
Native Species:	Species that normally live and thrive in a particular ecosystem.
Noxious Weed:	A plant species designated by federal or state law as generally possessing one or more of the following characteristics: aggressive or difficult to manage; parasitic; a carrier or host of serious insect or disease; or non-native, new, or not common to the United States. According to the Federal Noxious Weed Act (P.L. 93-639), a noxious weed is one that causes disease or had adverse effects on man or his environment and therefore is detrimental to the agriculture and commerce of the United States and to the public health.
Objective:	A concise statement of what we want to achieve, how much we want to achieve, when and where we want to achieve it, and who is responsible for the work. Objectives derive from goals and provide the basis for determining strategies, monitoring refuge accomplishments, and evaluating the success of strategies. Making objectives attainable, time-specific, and measurable (Service Manual 602 FW 1.6N).
Plant Association:	A classification of plant communities based on the similarity in dominants of all layers of vascular species in a climax community.

Plant Community:	An assemblage of plant species unique in its composition; occurs in particular locations under particular influences; a reflection or integration of the environmental influences on the site such as soils, temperature, elevation, solar radiation, slope, aspect, and rainfall; denotes a general kind of climax plant community.
Preferred Alternative:	This is the alternative determined (by the decision-maker) to best achieve the refuge purpose, vision, and goals; contributes to the Refuge System mission, addresses the significant issues; and is consistent with principles of sound fish and wildlife management.
Prescribed Fire:	The application of fire to wildland fuels to achieve identified land use objectives (Service Manual 621 FW 1.7). May occur from natural ignition or intentional ignition.
Priority Species:	Fish and wildlife species that require protective measures and/or management guidelines to ensure their perpetuation. Priority species include the following: (1) State-listed and candidate species; (2) species or groups of animals susceptible to significant population declines within a specific area or statewide by virtue of their inclination to aggregate (e.g., seabird colonies); and (3) species of recreation, commercial, and/or tribal importance.
Public Involvement Plan:	Broad long-term guidance for involving the public in the comprehensive conservation planning process.
Public Involvement:	A process that offers impacted and interested individuals and organizations an opportunity to become informed about, and to express their opinions on Service actions and policies. In the process, these views are studied thoroughly and thoughtful consideration of public views is given in shaping decisions for refuge management.
Public:	Individuals, organizations, and groups; officials of federal, state, and local government agencies; Indian tribes; and foreign nations. It may include anyone outside the core planning team. It includes those who may or may not have indicated an interest in service issues and those who do or do not realize that Service decisions may affect them.
Purposes of the Refuge:	"The purposes specified in or derived from the law, proclamation, executive order, agreement, public land order, donation document, or administrative memorandum establishing, authorizing, or expanding a refuge, refuge unit, or refuge sub-unit." For refuges that encompass congressionally designated wilderness, the purposes of the Wilderness Act are additional purposes of the refuge (Service Manual 602 FW 106 S).
Recharge	Re-supplying of water to the aquifer, by deep drainage or deep percolation to the groundwater, usually from storm water runoff or snowmelt; also known as groundwater recharge.

Recommended Wilderness:	Areas studied and found suitable for wilderness designation by both the Director of the Fish and Wildlife Service and the Secretary of the Department of the Interior, and recommended for designation by the President to Congress. These areas await only legislative action by Congress in order to become part of the Wilderness System. Such areas are also referred to as "pending in Congress" (Draft Service Manual 610 FW 1.5).
Record of Decision (ROD):	A concise public record of decision prepared by the federal agency, pursuant to NEPA, that contains a statement of the decision, identification of all alternatives considered, identification of the environmentally preferable alternative, a statement as to whether all practical means to avoid or minimize environmental harm from the alternative selected have been adopted (and if not, why they were not), and a summary of monitoring and enforcement where applicable for any mitigation (40 CFR 1505.2).
Refuge Goal:	See Goal
Refuge Purposes:	See Purposes of the Refuge
Songbirds: (Also Passerines)	A category of birds that is medium to small, perching landbirds. Most are territorial singers and migratory.
Step-down Management Plan:	A plan that provides specific guidance on management subjects (e.g., habitat, public use, fire, and safety) or groups of related subjects. It describes strategies and implementation schedules for meeting CCP goals and objectives (Service Manual 602 FW 1.6 U).
Strategy:	A specific action, tool, technique, or combination of actions, tools, and techniques used to meet unit objectives (Service Manual 602 FW 1.6 U).
Study Area:	The area reviewed in detail for wildlife, habitat, and public use potential. For purposes of this CCP, the study area includes the lands within the currently approved refuge boundary and potential refuge expansion areas.
Taxonomic Classification System	The classification of organisms in an ordered system that indicates natural relationships.
Threatened Species (Federal):	Species listed under the Endangered Species Act that are likely to become endangered within the foreseeable future throughout all or a significant portion of their range.
Threatened Species (State):	A plant or animal species likely to become endangered in the state within the near future if factors contributing to population decline or habitat degradation or loss continue.

Tiering: The coverage of general matters in broader environmental impact statements with subsequent narrower statements of environmental analysis, incorporating by reference, the general discussions and concentrating on specific issues (40 CFR 1508.28).

U.S. Fish and Wildlife Service Mission: The mission of the U.S. Fish and Wildlife Service is working with others to conserve, protect, and enhance fish and wildlife and their habitats for the continuing benefit of the American people.

Unit Objective: See Objective

Vegetation Type, Habitat Type, Forest Cover Type: A land classification system based upon the concept of distinct plant associations.

Vision Statement: A concise statement of what the planning unit should be, or what we hope to do, based primarily upon the Refuge System mission and specific refuge purposes, and other mandates. We will tie the vision statement for the refuge to the mission of the Refuge System; the purpose(s) of the refuge; the maintenance or restoration of the ecological integrity of each refuge and the Refuge System; and other mandates (Service Manual 602 FW 1.6 Z).

Wilderness Study Areas: Lands and waters identified through inventory as meeting the definition of wilderness and undergoing evaluation for recommendation for inclusion in the Wilderness System. A study area must meet the following criteria:

- Generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable;
- Has outstanding opportunities for solitude or a primitive and unconfined type of recreation; and
- Has at least 5,000 contiguous roadless acres or is sufficient in size as to make practicable its preservation and use in an unimpaired condition (Draft Service Manual 610 FW 1.5).

Wilderness: See Designated Wilderness

Wildfire: A free-burning fire requiring a suppression response; all fire other than prescribed fire that occurs on wildlands (Service Manual 621 FW 1.7).

Wildland Fire: Every wildland fire is either a wildfire or a prescribed fire (Service Manual 621 FW 1.3

ACRONYMS AND ABBREVIATIONS

ABI	Atchafalaya Basin Program
ABFS	Atchafalaya Basin Floodway System
AIRFA	American Indian Religious Freedom Act
AQI	Air Quality Index
ARPA	Archeological Resources Protection Act
BBCC	Black Bear Conservation Committee
BCC	Birds of Conservation Concern
BRT	Biological Review Team
CAA	Clean Air Act
CCP	Comprehensive Conservation Plan
CFR	Code of Federal Regulations
cfs	cubic feet per second
CWCS	Comprehensive Wildlife Conservation Strategy
DNR	Department of Natural Resources
DOI	Department of the Interior
DU	Ducks Unlimited
EA	Environmental Assessment
EE	environmental education
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
FR	Federal Register
FTE	full-time equivalent
FY	Fiscal Year
GCRASA	Gulf Coast Regional Aquifer System Analysis
GIS	Global Information System
LDEQ	Louisiana Department of Environmental Quality
LDWF	Louisiana Department of Wildlife and Fisheries
LE	Law Enforcement
LMRE	Lower Mississippi River Ecosystem Plan
LMV	Lower Mississippi Valley
LMVJV	Lower Mississippi Valley Joint Venture
MAPS	Monitoring Avian Productivity and Survival
MAV	Mississippi Alluvial Valley
MCL	maximum containment level
NAAQS	National Ambient Air Quality Standards
NABCI	North American Bird Conservation Initiative
NAGPRA	Native American Graves Protection and Repatriation Act
NASA	National Aeronautics and Space Administration
NAWCP	North American Waterbird Conservation Plan
NAWMP	North American Waterfowl Management Plan
NBCI	Northern Bobwhite Conservation Initiative
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NOAA	National Oceanic and Atmospheric Administration
NRHP	National Register of Historic Places
NWR	National Wildlife Refuge
NWRS	National Wildlife Refuge System
PFT	Permanent Full Time

PIF	Partners In Flight
ppm	parts per million
PUNA	Public Use Natural Area
RAPP	Refuge Annual Performance Planning
RM	Refuge Manual
RNA	Research Natural Area
ROD	Record of Decision
RONS	Refuge Operating Needs System
RRP	Refuge Roads Program
SARP	Southeast Aquatic Resources Partnership
SELA	Southeast Louisiana
SLRC	Southeast Louisiana Refuge Complex
FWS	U.S. Fish and Wildlife Service (also Service or USFWS)
T&E	Threatened and Endangered
TFT	Temporary Full Time
USACE	U.S. Army Corps of Engineers
USC	United States Code
USFWS	U.S. Fish and Wildlife Service
USSCP	U.S. Shorebird Conservation Plan

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Appendix C. Relevant Legal Mandates and Executive Orders

STATUTE	DESCRIPTION
Administrative Procedures Act (1946)	Outlines administrative procedures to be followed by federal agencies with respect to identification of information to be made public; publication of material in the Federal Register; maintenance of records; attendance and notification requirements for specific meetings and hearings; issuance of licenses; and review of agency actions.
American Antiquities Act of 1906	Provides penalties for unauthorized collection, excavation, or destruction of historic or prehistoric ruins, monuments, or objects of antiquity on lands owned or controlled by the United States. The Act authorizes the President to designate as national monuments objects or areas of historic or scientific interest on lands owned or controlled by the Unites States.
American Indian Religious Freedom Act of 1978	Protects the inherent right of Native Americans to believe, express, and exercise their traditional religions, including access to important sites, use and possession of sacred objects, and the freedom to worship through ceremonial and traditional rites.
Americans With Disabilities Act of 1990	Intended to prevent discrimination of and make American society more accessible to people with disabilities. The Act requires reasonable accommodations to be made in employment, public services, public accommodations, and telecommunications for persons with disabilities.
Anadromous Fish Conservation Act of 1965, as amended	Authorizes the Secretaries of Interior and Commerce to enter into cooperative agreements with states and other non-federal interests for conservation, development, and enhancement of anadromous fish and contribute up to 50 percent as the federal share of the cost of carrying out such agreements. Reclamation construction programs for water resource projects needed solely for such fish are also authorized.
Archaeological Resources Protection Act of 1979, as amended.	This Act strengthens and expands the protective provisions of the Antiquities Act of 1906 regarding archaeological resources. It also revised the permitting process for archaeological research.
Architectural Barriers Act of 1968	Requires that buildings and facilities designed, constructed, or altered with federal funds, or leased by a federal agency, must comply with standards for physical accessibility.
Bald and Golden Eagle Protection Act of 1940, as amended	Prohibits the possession, sale or transport of any bald or golden eagle, alive or dead, or part, nest, or egg except as permitted by the Secretary of the Interior for scientific or exhibition purposes, or for the religious purposes of Indians.

STATUTE	DESCRIPTION
Bankhead-Jones Farm Tenant Act of 1937	Directs the Secretary of Agriculture to develop a program of land conservation and utilization in order to correct maladjustments in land use and thus assist in such things as control of soil erosion, reforestation, conservation of natural resources and protection of fish and wildlife. Some early refuges and hatcheries were established under authority of this Act.
Cave Resources Protection Act of 1988	Established requirements for the management and protection of caves and their resources on federal lands, including allowing the land managing agencies to withhold the location of caves from the public, and requiring permits for any removal or collecting activities in caves on federal lands.
Clean Air Act of 1970	Regulates air emissions from area, stationary, and mobile sources. This Act and its amendments charge federal land managers with direct responsibility to protect the "air quality and related values" of land under their control. These values include fish, wildlife, and their habitats.
Clean Water Act of 1974, as amended	This Act and its amendments have as its objective the restoration and maintenance of the chemical, physical, and biological integrity of the Nation's waters. Section 401 of the Act requires that federally permitted activities comply with the Clean Water Act standards, state water quality laws, and any other appropriate state laws. Section 404 charges the U.S. Army Corps of Engineers with regulating discharge of dredge or fill materials into waters of the United States, including wetlands.
Coastal Barrier Resources Act of 1982 (CBRA)	Identifies undeveloped coastal barriers along the Atlantic and Gulf Coasts and included them in the John H. Chafee Coastal Barrier Resources System (CBRS). The objectives of the act are to minimize loss of human life, reduce wasteful federal expenditures, and minimize the damage to natural resources by restricting most federal expenditures that encourage development within the CBRS.
Coastal Barrier Improvement Act of 1990	Reauthorized the Coastal Barrier Resources Act (CBRA), expanded the CBRS to include undeveloped coastal barriers along the Great Lakes and in the Caribbean, and established "Otherwise Protected Areas (OPAs)." The Service is responsible for maintaining official maps, consulting with federal agencies that propose spending federal funds within the CBRS and OPAs, and making recommendations to Congress about proposed boundary revisions.
Coastal Wetlands Planning, Protection, and Restoration (1990)	Authorizes the Director of the Fish and Wildlife Service to participate in the development of a Louisiana coastal wetlands restoration program, participate in the development and oversight of a coastal wetlands conservation program, and lead in the implementation and administration of a national coastal wetlands grant program.

STATUTE	DESCRIPTION
Coastal Zone Management Act of 1972, as amended	Established a voluntary national program within the Department of Commerce to encourage coastal states to develop and implement coastal zone management plans and requires that “any federal activity within or outside of the coastal zone that affects any land or water use or natural resource of the coastal zone” shall be “consistent to the maximum extent practicable with the enforceable policies” of a state’s coastal zone management plan. The law includes an Enhancement Grants Program for protecting, restoring, or enhancing existing coastal wetlands or creating new coastal wetlands. It also established the National Estuarine Research Reserve System, guidelines for estuarine research, and financial assistance for land acquisition.
Emergency Wetlands Resources Act of 1986	This Act authorized the purchase of wetlands from Land and Water Conservation Fund moneys, removing a prior prohibition on such acquisitions. The Act requires the Secretary to establish a National Wetlands Priority Conservation Plan, required the states to include wetlands in their Comprehensive Outdoor Recreation Plans, and transfers to the Migratory Bird Conservation Fund amounts equal to import duties on arms and ammunition. It also established entrance fees at national wildlife refuges.
Endangered Species Act of 1973, as amended	Provides for the conservation of threatened and endangered species of fish, wildlife, and plants by federal action and by encouraging the establishment of state programs. It provides for the determination and listing of threatened and endangered species and the designation of critical habitats. Section 7 requires refuge managers to perform internal consultation before initiating projects that affect or may affect endangered species.
Environmental Education Act of 1990	This Act established the Office of Environmental Education within the U.S. Environmental Protection Agency to develop and administer a federal environmental education program in consultation with other federal natural resource management agencies, including the Fish and Wildlife Service.
Estuary Protection Act of 1968	Authorized the Secretary of the Interior, in cooperation with other federal agencies and the states, to study and inventory estuaries of the United States, including land and water of the Great Lakes, and to determine whether such areas should be acquired for protection. The Secretary is also required to encourage state and local governments to consider the importance of estuaries in their planning activities relative to federal natural resource grants. In approving any state grants for acquisition of estuaries, the Secretary was required to establish conditions to ensure the permanent protection of estuaries.

STATUTE	DESCRIPTION
Estuaries and Clean Waters Act of 2000	This law creates a federal interagency council that includes the Director of the Fish and Wildlife Service, the Secretary of the Army for Civil Works, the Secretary of Agriculture, the Administrator of the Environmental Protection Agency and the Administrator for the National Oceanic and Atmospheric Administration. The council is charged with developing a national estuary habitat restoration strategy and providing grants to entities to restore and protect estuary habitat to promote the strategy.
Food Security Act of 1985, as amended (Farm Bill)	The Act contains several provisions that contribute to wetland conservation. The Swampbuster provisions state that farmers who convert wetlands for the purpose of planting after enactment of the law are ineligible for most farmer program subsidies. It also established the Wetland Reserve Program to restore and protect wetlands through easements and restoration of the functions and values of wetlands on such easement areas.
Farmland Protection Policy Act of 1981, as amended	The purpose of this law is to minimize the extent to which federal programs contribute to the unnecessary conversion of farmland to nonagricultural uses. Federal programs include construction projects and the management of federal lands.
Federal Advisory Committee Act (1972), as amended	Governs the establishment of and procedures for committees that provide advice to the federal government. Advisory committees may be established only if they will serve a necessary, nonduplicative function. Committees must be strictly advisory unless otherwise specified and meetings must be open to the public.
Federal Coal Leasing Amendment Act of 1976	Provided that nothing in the Mining Act, the Mineral Leasing Act, or the Mineral Leasing Act for Acquired Lands authorized mining coal on refuges.
Federal-Aid Highways Act of 1968	Established requirements for approval of federal highways through national wildlife refuges and other designated areas to preserve the natural beauty of such areas. The Secretary of Transportation is directed to consult with the Secretary of the Interior and other federal agencies before approving any program or project requiring the use of land under their jurisdiction.
Federal Noxious Weed Act of 1990, as amended	The Secretary of Agriculture was given the authority to designate plants as noxious weeds and to cooperate with other federal, State and local agencies, farmers' associations, and private individuals in measures to control, eradicate, prevent, or retard the spread of such weeds. The Act requires each Federal land-managing agency, including the Fish and Wildlife Service, to designate an office or person to coordinate a program to control such plants on the agency's land and implement cooperative agreements with the states, including integrated management systems to control undesirable plants.

STATUTE	DESCRIPTION
Fish and Wildlife Act of 1956	Establishes a comprehensive national fish, shellfish, and wildlife resources policy with emphasis on the commercial fishing industry but also includes the inherent right of every citizen and resident to fish for pleasure, enjoyment, and betterment and to maintain and increase public opportunities for recreational use of fish and wildlife resources. Among other things, it authorizes the Secretary of the Interior to take such steps as may be required for the development, advancement, management, conservation, and protection of fish and wildlife resources including, but not limited to, research, development of existing facilities, and acquisition by purchase or exchange of land and water or interests therein.
Fish and Wildlife Conservation Act of 1980, as amended	Requires the Service to monitor non-gamebird species, identify species of management concern, and implement conservation measures to preclude the need for listing under the Endangered Species Act.
Fish and Wildlife Coordination Act of 1958	Promotes equal consideration and coordination of wildlife conservation with other water resource development programs by requiring consultation with the Fish and Wildlife Service and the state fish and wildlife agencies where the "waters of a stream or other body of water are proposed or authorized, permitted or licensed to be impounded, diverted…or otherwise controlled or modified" by any agency under federal permit or license.
Improvement Act of 1978	This act was passed to improve the administration of fish and wildlife programs and amends several earlier laws, including the Refuge Recreation Act, the National Wildlife Refuge System Administration Act, and the Fish and Wildlife Act of 1956. It authorizes the Secretary to accept gifts and bequests of real and personal property on behalf of the United States. It also authorizes the use of volunteers on Service projects and appropriations to carry out volunteer programs.
Fishery (Magnuson) Conservation and Management Act of 1976	Established Regional Fishery Management Councils comprised of federal and state officials, including the Fish and Wildlife Service. It provides for regulation of foreign fishing and vessel fishing permits.
Freedom of Information Act, 1966	Requires all federal agencies to make available to the public for inspection and copying administrative staff manuals and staff instructions; official, published and unpublished policy statements; final orders deciding case adjudication; and other documents. Special exemptions have been reserved for nine categories of privileged material. The Act requires the party seeking the information to pay reasonable search and duplication costs.
Geothermal Steam Act of 1970, as amended	Authorizes and governs the lease of geothermal steam and related resources on public lands. Section 15 c of the Act prohibits issuing geothermal leases on virtually all Service-administrative lands.

STATUTE	DESCRIPTION
Lacey Act of 1900, as amended	Originally designed to help states protect their native game animals and to safeguard U.S. crop production from harmful foreign species, this Act prohibits interstate and international transport and commerce of fish, wildlife or plants taken in violation of domestic or foreign laws. It regulates the introduction to America of foreign species.
Land and Water Conservation Fund Act of 1948	This Act provides funding through receipts from the sale of surplus federal land, appropriations from oil and gas receipts from the outer continental shelf, and other sources for land acquisition under several authorities. Appropriations from the fund may be used for matching grants to states for outdoor recreation projects and for land acquisition by various federal agencies, including the Fish and Wildlife Service.
Marine Mammal Protection Act of 1972, as amended	The 1972 Marine Mammal Protection Act established a federal responsibility to conserve marine mammals with management vested in the Department of the Interior for sea otter, walrus, polar bear, dugong, and manatee. The Department of Commerce is responsible for cetaceans and pinnipeds, other than the walrus. With certain specified exceptions, the Act establishes a moratorium on the taking and importation of marine mammals, as well as products taken from them.
Migratory Bird Conservation Act of 1929	Established a Migratory Bird Conservation Commission to approve areas recommended by the Secretary of the Interior for acquisition with Migratory Bird Conservation Funds. The role of the commission was expanded by the North American Wetland Conservation Act to include approving wetlands acquisition, restoration, and enhancement proposals recommended by the North American Wetlands Conservation Council.
Migratory Bird Hunting and Conservation Stamp Act of 1934	Also commonly referred to as the “Duck Stamp Act,” requires waterfowl hunters 16 years of age or older to possess a valid federal hunting stamp. Receipts from the sale of the stamp are deposited into the Migratory Bird Conservation Fund for the acquisition of migratory bird refuges.
Migratory Bird Treaty Act of 1918, as amended	This Act implements various treaties and conventions between the United States and Canada, Japan, Mexico, and the former Soviet Union for the protection of migratory birds. Except as allowed by special regulations, this Act makes it unlawful to pursue, hunt, kill, capture, possess, buy, sell, purchase, barter, export or import any migratory bird, part, nest, egg, or product.
Mineral Leasing Act for Acquired Lands (1947), as amended	Authorizes and governs mineral leasing on acquired public lands.

STATUTE	DESCRIPTION
Minerals Leasing Act of 1920, as amended	Authorizes and governs leasing of public lands for development of deposits of coal, oil, gas, and other hydrocarbons; sulphur; phosphate; potassium; and sodium. Section 185 of this title contains provisions relating to granting rights-of-way over federal lands for pipelines.
Mining Act of 1872, as amended	Authorizes and governs prospecting and mining for the so-called "hardrock" minerals (i.e., gold and silver) on public lands.
National and Community Service Act of 1990	Authorizes several programs to engage citizens of the U.S. in full- and/or part-time projects designed to combat illiteracy and poverty, provide job skills, enhance educational skills, and fulfill environmental needs. Among other things, this law establishes the American Conservation and Youth Service Corps to engage young adults in approved human and natural resource projects, which will benefit the public or are carried out on federal or Indian lands.
National Environmental Policy Act of 1969	Requires analysis, public comment, and reporting for environmental impacts of federal actions. It stipulates the factors to be considered in environmental impact statements, and requires that federal agencies employ an interdisciplinary approach in related decision-making and develop means to ensure that unqualified environmental values are given appropriate consideration, along with economic and technical considerations.
National Historic Preservation Act of 1966, as amended	It establishes a National Register of Historic Places and a program of matching grants for preservation of significant historical features. Federal agencies are directed to take into account the effects of their actions on items or sites listed or eligible for listing in the National Register.
National Trails System Act (1968), as amended	Established the National Trails System to protect the recreational, scenic, and historic values of some important trails. National recreation trails may be established by the Secretaries of Interior or Agriculture on land wholly or partly within their jurisdiction, with the consent of the involved state(s), and other land managing agencies, if any. National scenic and national historic trails may only be designated by Congress. Several national trails cross units of the National Wildlife Refuge System.
National Wildlife Refuge System Administration Act of 1966	Prior to 1966, there was no single federal law that governed the administration of the various national wildlife refuges that had been established. This Act defines the National Wildlife Refuge System and authorizes the Secretary of the Interior to permit any use of a refuge provided such use is compatible with the major purposes(s) for which the refuge was established.

STATUTE	DESCRIPTION
National Wildlife Refuge System Improvement Act of 1997	This Act amends the National Wildlife Refuge System Administration Act of 1966. This Act defines the mission of the National Wildlife Refuge System, establishes the legitimacy and appropriateness of six priority wildlife-dependent public uses, establishes a formal process for determining compatible uses of Refuge System lands, identifies the Secretary of the Interior as responsible for managing and protecting the Refuge System, and requires the development of a comprehensive conservation plan for all refuges outside of Alaska.
Native American Graves Protection and Repatriation Act of 1990	Requires federal agencies and museums to inventory, determine ownership of, and repatriate certain cultural items and human remains under their control or possession. The Act also addresses the repatriation of cultural items inadvertently discovered by construction activities on lands managed by the agency.
Neotropical Migratory Bird Conservation Act of 2000	Establishes a matching grant program to fund projects that promote the conservation of neotropical migratory birds in the united States, Latin America, and the Caribbean.
North American Wetlands Conservation Act of 1989	Provides funding and administrative direction for implementation of the North American Waterfowl Management Plan and the Tripartite Agreement on wetlands between Canada, the United States, and Mexico. The North American Wetlands Conservation Council was created to recommend projects to be funded under the Act to the Migratory Bird Conservation Commission. Available funds may be expended for up to 50 percent of the United States' share cost of wetlands conservation projects in Canada, Mexico, or the United States (or 100 percent of the cost of projects on federal lands).
Refuge Recreation Act of 1962, as amended	This Act authorizes the Secretary of the Interior to administer refuges, hatcheries, and other conservation areas for recreational use, when such uses do not interfere with the area's primary purposes. It authorizes construction and maintenance of recreational facilities and the acquisition of land for incidental fish and wildlife-oriented recreational development or protection of natural resources. It also authorizes the charging of fees for public uses.
Partnerships for Wildlife Act of 1992	Establishes a Wildlife Conservation and Appreciation Fund to receive appropriated funds and donations from the National Fish and Wildlife Foundation and other private sources to assist the state fish and game agencies in carrying out their responsibilities for conservation of non-game species. The funding formula is no more that 1/3 federal funds, at least 1/3 foundation funds, and at least 1/3 state funds.

STATUTE	DESCRIPTION
Refuge Revenue Sharing Act of 1935, as amended	Provided for payments to counties in lieu of taxes from areas administered by the Fish and Wildlife Service. Counties are required to pass payments along to other units of local government within the county, which suffer losses in tax revenues due to the establishment of Service areas.
Rehabilitation Act of 1973	Requires nondiscrimination in the employment practices of federal agencies of the executive branch and contractors. It also requires all federally assisted programs, services, and activities to be available to people with disabilities.
Rivers and Harbors Appropriations Act of 1899, as amended	Requires the authorization by the U.S. Army Corps of Engineers prior to any work in, on, over, or under a navigable water of the United States. The Fish and Wildlife Coordination Act provides authority for the Service to review and comment on the effects on fish and wildlife activities proposed to be undertaken or permitted by the Corps of Engineers. Service concerns include contaminated sediments associated with dredge or fill projects in navigable waters.
Sikes Act (1960), as amended	Provides for the cooperation by the Departments of Interior and Defense with state agencies in planning, development, and maintenance of fish and wildlife resources and outdoor recreation facilities on military reservations throughout the United States. It requires the Secretary of each military department to use trained professionals to manage the wildlife and fishery resource under his jurisdiction, and requires that federal and state fish and wildlife agencies be given priority in management of fish and wildlife activities on military reservations.
Transfer of Certain Real Property for Wildlife Conservation Purposes Act of 1948	This Act provides that upon determination by the Administrator of the General Services Administration, real property no longer needed by a federal agency can be transferred, without reimbursement, to the Secretary of the Interior if the land has particular value for migratory birds, or to a state agency for other wildlife conservation purposes.
Transportation Equity Act for the 21st Century (1998)	Established the Refuge Roads Program, requires transportation planning that includes public involvement, and provides funding for approved public use roads and trails and associated parking lots, comfort stations, and bicycle/pedestrian facilities.
Uniform Relocation and Assistance and Real Property Acquisition Policies Act (1970), as amended	Provides for uniform and equitable treatment of persons who sell their homes, businesses, or farms to the Service. The Act requires that any purchase offer be no less than the fair market value of the property.

STATUTE	DESCRIPTION
Water Resources Planning Act of 1965	Established Water Resources Council to be composed of Cabinet representatives including the Secretary of the Interior. The Council reviews river basin plans with respect to agricultural, urban, energy, industrial, recreational and fish and wildlife needs. The act also established a grant program to assist States in participating in the development of related comprehensive water and land use plans.
Wild and Scenic Rivers Act of 1968, as amended	This Act selects certain rivers of the nation possessing remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values; preserves them in a free-flowing condition; and protects their local environments.
Wilderness Act of 1964, as amended	This Act directs the Secretary of the Interior to review every roadless area of 5,000 acres or more and every roadless island regardless of size within the National Wildlife Refuge System and to recommend suitability of each such area. The Act permits certain activities within designated wilderness areas that do not alter natural processes. Wilderness values are preserved through a “minimum tool” management approach, which requires refuge managers to use the least intrusive methods, equipment, and facilities necessary for administering the areas.
Youth Conservation Corps Act of 1970	Established a permanent Youth Conservation Corps (YCC) program within the Departments of Interior and Agriculture. Within the Service, YCC participants perform many tasks on refuges, fish hatcheries, and research stations.

EXECUTIVE ORDERS	DESCRIPTIONS
EO 11593, Protection and Enhancement of the Cultural Environment (1971)	States that if the Service proposes any development activities that may affect the archaeological or historic sites, the Service will consult with Federal and State Historic Preservation Officers to comply with Section 106 of the National Historic Preservation Act of 1966, as amended.
EO 11644, Use of Off-road Vehicles on Public Land (1972)	Established policies and procedures to ensure that the use of off-road vehicles on public lands will be controlled and directed so as to protect the resources of those lands, to promote the safety of all users of those lands, and to minimize conflicts among the various uses of those lands.
EO 11988, Floodplain Management (1977)	The purpose of this Executive Order is to prevent federal agencies from contributing to the “adverse impacts associated with occupancy and modification of floodplains” and the “direct or indirect support of floodplain development.” In the course of fulfilling their respective authorities, federal agencies “shall take action to reduce the risk of flood loss, to minimize the impact of floods on human safety, health and welfare, and to restore and preserve the natural and beneficial values served by floodplains.”
EO 11989 (1977), Amends Section 2 of EO 11644	Directs agencies to close areas negatively impacted by off-road vehicles.
EO 11990, Protection of Wetlands (1977)	Federal agencies are directed to provide leadership and take action to minimize the destruction, loss of degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands.
EO 12372, Intergovernmental Review of Federal Programs (1982)	Seeks to foster intergovernmental partnerships by requiring federal agencies to use the state process to determine and address concerns of state and local elected officials with proposed federal assistance and development programs.
EO 12898, Environmental Justice (1994)	Requires federal agencies to identify and address disproportionately high and adverse effects of its programs, policies, and activities on minority and low-income populations.

EXECUTIVE ORDERS	DESCRIPTIONS
EO 12906, Coordinating Geographical Data Acquisition and Access (1994), Amended by EO 13286 (2003). Amendment of EOs and other actions in connection with transfer of certain functions to Secretary of DHS.	Recommended that the executive branch develop, in cooperation with state, local, and tribal governments, and the private sector, a coordinated National Spatial Data Infrastructure to support public and private sector applications of geospatial data. Of particular importance to comprehensive conservation planning is the National Vegetation Classification System (NVCS), which is the adopted standard for vegetation mapping. Using NVCS facilitates the compilation of regional and national summaries, which in turn, can provide an ecosystem context for individual refuges.
EO 12962, Recreational Fisheries (1995)	Federal agencies are directed to improve the quantity, function, sustainable productivity, and distribution of U.S. aquatic resources for increased recreational fishing opportunities in cooperation with states and tribes.
EO 13007, Native American Religious Practices (1996)	Provides for access to, and ceremonial use of, Indian sacred sites on federal lands used by Indian religious practitioners and direction to avoid adversely affecting the physical integrity of such sites.
EO 13061, Federal Support of Community Efforts Along American Heritage Rivers (1997)	Established the American Heritage Rivers initiative for the purpose of natural resource and environmental protection, economic revitalization, and historic and cultural preservation. The Act directs Federal agencies to preserve, protect, and restore rivers and their associated resources important to our history, culture, and natural heritage.
EO 13084, Consultation and Coordination With Indian Tribal Governments (2000)	Provides a mechanism for establishing regular and meaningful consultation and collaboration with tribal officials in the development of federal policies that have tribal implications.
EO 13112, Invasive Species (1999)	Federal agencies are directed to prevent the introduction of invasive species, detect and respond rapidly to and control populations of such species in a cost effective and environmentally sound manner, accurately monitor invasive species, provide for restoration of native species and habitat conditions, conduct research to prevent introductions and to control invasive species, and promote public education on invasive species and the means to address them. This EO replaces and rescinds EO 11987, Exotic Organisms (1977).

EXECUTIVE ORDERS	DESCRIPTIONS
EO 13186, Responsibilities of Federal Agencies to Protect Migratory Birds. (2001)	Instructs federal agencies to conserve migratory birds by several means, including the incorporation of strategies and recommendations found in Partners in Flight Bird Conservation plans, the North American Waterfowl Plan, the North American Waterbird Conservation Plan, and the United States Shorebird Conservation Plan, into agency management plans and guidance documents.

Appendix D. Public Involvement

SUMMARY OF PUBLIC SCOPING COMMENTS

In accordance with Service guidelines and NEPA recommendations, public involvement has been a crucial factor throughout the development of this Draft CCP/EA for Atchafalaya NWR. This Draft CCP/EA has been written with input and assistance from interested citizens, conservation organizations, and employees of local and state agencies. The participation of these stakeholders and their ideas has been of great value in setting the management direction for Atchafalaya NWR. The Service, as a whole, and the refuge staff, in particular, are very grateful to each one who has contributed time, expertise, and ideas to the planning process.

The development of this Draft CCP/EA was executed in accordance with refuge planning policy [602 FW 3.4C(1)] and NEPA. The development was initiated in October 2008, with the establishment of the core planning team. Through the planning process, and with input from local, state, and federal agencies, the public, and conservation associations, the planning team identified issues and concerns that were relevant to the current and future conservation and management of the refuge.

On April 15-16, 2008, a biological review was conducted at Atchafalaya NWR that assessed the status of biological resources and programs currently in place on the refuge, resulting in a report published in September 2008. The review was conducted as part of a planning process for the refuge, as required by the Improvement Act. Recommendations provided in this report were developed within the established purposes of this refuge by a diverse group of biologists and specialists representing various offices and agencies. These recommendations were used to guide management of the refuge and were designed to be used in development of the preferred alternative in the final CCP.

In 2008, a visitor services review was conducted to evaluate the status of the existing public use programs, facilities, and opportunities, resulting in a report published in May 2008. This review provided guidance for short, intermediate, and long-term recommendations for improving the quality of public use and educational services.

Public involvement and input into the development of this Draft CCP/EA was initiated by the submission of a notice of intent (NOI). The NOI summarizing the intent of the refuge to begin the CCP process was published in the *Federal Register* on January 9, 2009. A public scoping meeting was held January 29, 2009, to allow stakeholders the opportunity for their concerns to be considered in the refuge's future management. Approximately 25 members of the public attended the public scoping meeting. Eight members of the public offered their comments at the public meeting. In addition, four other comments were received from the general public.

Comments received include the following.

- *Internally*: Increase forest management actions by adding a permanent entry level forester position to Atchafalaya NWR; increase forest management activities by inventorying at least 1,500 acres each year and propose treatment on at least 100 acres annually to increase forest diversity and offset minimized forest management by state and no management by USACE; manage oil and gas producers closely through annually/monthly monitoring of all producing sites consistently through special use permit, providing for restoration and mitigation measures; develop a research natural area in coordination with the state and USACE; coordinate with Atchafalaya Levee Board to delay mowing of the levee until after the

neotropical migratory breeding season; delay mowing of fields and roadsides until after May; plant or partner with other agencies to plant pipe line and power line rights of ways with desirable cover crops; purchase a power unit with a 500-gallon fuel tank to have more management capability to flood the moist-soil unit; control exotic species, concentrating with seed producers near high access areas.

- *State*: The Louisiana Department of Wildlife and Fisheries is in agreement and supports the efforts of refuge management. The state had chosen to participate actively in the CCP process by appointing one employee to the core planning team.

- *Tribes*: Letters were provided to representatives of Tunica-Biloxi Indians of Louisiana, Caddo Nation of Oklahoma, and the Quapaw Tribe requesting issues they would like to see addressed in the CCP and inviting them to participate in the process. No responses were received.

- *Partners*: Included above under Internal and state headings.

- *Public*: The following comments were received from the public either at the public forum or in correspondence:

Fish and Wildlife Population Management	• No comments.
Habitat Management	• Logging of cypress trees in Basin was wrong and illegal but does not necessarily apply to NWR. • Would like to see no management areas and non-disturbance of birding habitat. • Concerned about logging operations and commercial operations and wants to promote old growth forests. There are other ways to selectively provide specific habitats for certain species. • Insofar as possible, natural progression of habitat should be used instead of artificial harvesting of resources, so that a variety of habitat is always available. Human introduced invasive species should be controlled, when possible, using selective, minimum-impact techniques. • Coordination and communication of policies among cooperating agencies should be a high priority in site management.
Resource Protection	• No comments.
Visitor Services	• Interest to allow commercial guiding for bird watching

	and bird photography. • Suggestion to exclude commercial enterprises from the refuge—they are not compatible in relation to the size of the refuge. • Canoeing should be re-worded to paddle sports—should be a priority public use activity. Interest in allowing recreational paddling on the refuge. • A commercial activity such as National Geographic or other select outdoor use groups should be allowed to use refuge. • Regulate commercial activity. • Would not like to see any organization to be emphasized or called out in CCP such as National Geographic. • Also would like facilities, boardwalks, and trails to birding areas. • Basin airboat use is very disruptive. • Litter is a very big problem on the refuge. • It is important that all organizations be treated fairly in the granting of access requests to the NWR. Designating specific media organizations based on perceived public influence is not an acceptable criterion. Any commercial entity should be offered the same access options if they agree to conform to the stated rules of the refuge. • Commercial users should be required to obtain special use permits so that refuge impact can be monitored for organized groups. Individual users are less likely to create problems and/or to impact wildlife than are groups. It is also reasonable to impose more restrictions on larger groups than on small ones. • Local tour guides who display good behavior on the refuge should be issued longer term use permits in order to simplify access and stimulate responsible refuge usage. • I am opposed to any full-time commercial ventures in the NWR. I accept the special permit procedure as a necessary evil. • My contention is that the Basin is so large and NWR so small that prohibiting commercial ventures in the NWR "does not" unfairly penalize anyone wanting to run "for profit trips." There is a lot of non-NWR basin out there. • My remark about "paddling" being an addition to the priority public uses (being considered the seventh use) is based on the fact that while the NWR management certainly recognizes paddling as a recreational activity in NWR, it does not exactly promote it. • Provide something like the Corps "Paddling Trails on

	Indian Bayou" brochure would be especially welcome. Having the brochure information on the NWR website would also be a huge "stroke" in the right direction. That brochure is available at the Atchafalaya Basin welcome center. • Dow donated 40,000 acres to this preserve. Did Dow donate polluted, contaminated 40,000 acres? Did anybody check the land to see if it was polluted before it was accepted? Some toxic chemical companies try to get rid of the land they polluted. Our government has to watch for that. Did you test it before you accepted the 40,000 acres? • Hunting should be banned in the area. The lead shot is a real health deterrent we need to get out of all national land. Keep the hunters out of the area totally. Wildlife watchers outspend these hunting enthusiasts 40 to 1, so it is time to make these areas economically profitable for all and peaceful for all life.
Refuge Administration	• No comments.

Appendix E. Appropriate Use Determinations

ATCHAFALAYA NATIONAL WILDLIFE REFUGE APPROPRIATE USE DETERMINATIONS

An appropriate use determination is the initial decision process a refuge manager follows when first considering whether or not to allow a proposed use on a refuge. The refuge manager must find that a use is appropriate before undertaking a compatibility review of the use. This process clarifies and expands on the compatibility determination process by describing when refuge managers should deny a proposed use without determining compatibility. If a proposed use is not appropriate, it will not be allowed and a compatibility determination will not be undertaken.

Except for the uses noted below, the refuge manager must decide if a new or existing use is an appropriate refuge use. If an existing use is not appropriate, the refuge manager will eliminate or modify the use as expeditiously as practicable. If a new use is not appropriate, the refuge manager will deny the use without determining compatibility. Uses that have been administratively determined to be appropriate are listed below.

The six priority wildlife-dependent recreational uses as defined by the Improvement Act (e.g., hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation) are determined to be appropriate. However, the refuge manager must still determine if these uses are compatible.

States have regulations concerning take of wildlife that includes hunting, fishing, and trapping. The Service considers take of wildlife under such regulations appropriate. However, the refuge manager must determine if the activity is compatible before allowing it on a refuge.

Statutory Authorities for this policy:

National Wildlife Refuge System Administration Act of 1966, as amended by the National Wildlife Refuge System Improvement Act of 1997, 16 U.S.C. 668dd-668ee. This law provides the authority for establishing policies and regulations governing refuge uses, including the authority to prohibit certain harmful activities. The Act does not authorize any particular use, but rather authorizes the Secretary of the Interior to allow uses only when they are compatible and “under such regulations as he may prescribe.” This law specifically identifies certain public uses that, when compatible, are legitimate and appropriate uses within the Refuge System. The law states “. . . it is the policy of the United States that . . .compatible wildlife-dependent recreation is a legitimate and appropriate general public use of the System . . .compatible wildlife-dependent recreational uses are the priority general public uses of the System and shall receive priority consideration in refuge planning and management; and . . . when the Secretary determines that a proposed wildlife-dependent recreational use is a compatible use within a refuge, that activity should be facilitated . . . the Secretary shall . . . ensure that priority general public uses of the System receive enhanced consideration over other general public uses in planning and management within the System . . . .” The law also states “in administering the System, the Secretary is authorized to take the following actions: . . . issue regulations to carry out this Act.” This policy implements the standards set in the Act by providing enhanced consideration of priority general public uses and ensuring other public uses do not interfere with our ability to provide quality, wildlife-dependent recreational uses.

Refuge Recreation Act of 1962, 16 U.S.C. 460k. The Act authorizes the Secretary of the Interior to administer refuges, hatcheries, and other conservation areas for recreational use, when such uses do not interfere with the area's primary purposes. It authorizes construction and maintenance of recreational facilities and the acquisition of land for incidental fish and wildlife oriented recreational development or protection of natural resources. It also authorizes the charging of fees for public uses.

Other Statutes that Establish Refuges, including the Alaska National Interest Lands Conservation Act of 1980 (ANILCA) (16 U.S.C. §410hh - 410hh-5, 460 mm - 460mm-4, 539-539e, and 3101 - 3233; 43 U.S.C. 1631 et seq.).

Executive Orders. The Service must comply with Executive Order 11644 when allowing use of off-highway vehicles on refuges. This order requires the designation of areas as open or closed to off-highway vehicles in order to protect refuge resources, promote safety, and minimize conflict among the various refuge users; monitor the effects of these uses once they are allowed; and amend or rescind any area designation as necessary based on the information gathered. Furthermore, Executive Order 11989 requires the Service to close areas to off-highway vehicles when it is determined that the use causes or will cause considerable adverse effects on the soil, vegetation, wildlife, habitat, or cultural or historic resources. Statutes, such as ANILCA, take precedence over executive orders.

Definitions:

Appropriate Use
A proposed or existing use on a refuge that meets at least one of the following four conditions.

1) The use is a wildlife-dependent recreational use as identified in the Improvement Act.
2) The use contributes to fulfilling the refuge purpose(s), the Refuge System mission, or goals or objectives described in a refuge management plan approved after October 9, 1997, the date the Improvement Act was signed into law.
3) The use involves the take of fish and wildlife under state regulations.
4) The use has been found to be appropriate as specified in section 1.11.

*Native American***.** American Indians in the conterminous United States and Alaska Natives (including Aleuts, Eskimos, and Indians) who are members of federally recognized tribes.

Priority General Public Use. A compatible wildlife-dependent recreational use of a refuge involving hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation.

Quality. The criteria used to determine a quality recreational experience include:

- Promotes safety of participants, other visitors, and facilities.
- Promotes compliance with applicable laws and regulations and responsible behavior.
- Minimizes or eliminates conflicts with fish and wildlife population or habitat goals or objectives in a plan approved after 1997.
- Minimizes or eliminates conflicts with other compatible wildlife-dependent recreation.
- Minimizes conflicts with neighboring landowners.
- Promotes accessibility and availability to a broad spectrum of the American people.
- Promotes resource stewardship and conservation.
- Promotes public understanding and increases public appreciation of America's natural resources and the Service's role in managing and protecting these resources.

- Provides reliable/reasonable opportunities to experience wildlife.
- Uses facilities that are accessible and blend into the natural setting.
- Uses visitor satisfaction to help define and evaluate programs.

Wildlife-Dependent Recreational Use. As defined by the Improvement Act, a use of a refuge involving hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation.

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Atchafalaya NWR

Use: Walking, Hiking, and Jogging

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	YES	NO
(a) Do we have jurisdiction over the use?	x	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	x	
(c) Is the use consistent with applicable Executive orders and Department and USFWS policies?	x	
(d) Is the use consistent with public safety?	x	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	x	
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	x	
(g) Is the use manageable within available budget and staff?	x	
(h) Will this be manageable in the future within existing resources?	x	
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?	x	
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?	x	

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ("no" to (b), (c), or (d)) may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. **Yes _x_ No ___**

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate_____ **Appropriate _x_**

Refuge Manager:_____ Date:_____

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.
If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.
If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor:_____ Date:_____

A compatibility determination is required before the use may be allowed.

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Atchafalaya NWR

Use: All-terrain Vehicles

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	YES	NO
(a) Do we have jurisdiction over the use?	x	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	x	
(c) Is the use consistent with applicable Executive orders and Department and USFWS policies?	x	
(d) Is the use consistent with public safety?	x	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	x	
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	x	
(g) Is the use manageable within available budget and staff?	x	
(h) Will this be manageable in the future within existing resources?	x	
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?	x	
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?	x	

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ("no" to (b), (c), or (d)) may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. **Yes** _x_ **No** ___

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate_____ **Appropriate** _x_

Refuge Manager:_____ Date:_____

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.
If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.
If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor:_____ Date:_____

A compatibility determination is required before the use may be allowed.

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Atchafalaya NWR

Use: Boating

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	YES	NO
(a) Do we have jurisdiction over the use?	x	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	x	
(c) Is the use consistent with applicable Executive orders and Department and USFWS policies?	x	
(d) Is the use consistent with public safety?	x	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	x	
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	x	
(g) Is the use manageable within available budget and staff?	x	
(h) Will this be manageable in the future within existing resources?	x	
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?	x	
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?	x	

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ("no" to (b), (c), or (d)) may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. **Yes** _x__ **No** ___

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate_____ **Appropriate** _x_

Refuge Manager:_____ Date:_____

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.
If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.
If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor:_____ Date:_____

A compatibility determination is required before the use may be allowed.

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Atchafalaya NWR

Use: Bicycling

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	YES	NO
(a) Do we have jurisdiction over the use?	x	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	x	
(c) Is the use consistent with applicable Executive orders and Department and USFWS policies?	x	
(d) Is the use consistent with public safety?	x	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	x	
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	x	
(g) Is the use manageable within available budget and staff?	x	
(h) Will this be manageable in the future within existing resources?	x	
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?	x	
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?	x	

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ("no" to (b), (c), or (d)) may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. **Yes** _x__ **No** ___

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate_____ **Appropriate** _x_

Refuge Manager:_____ Date:_____

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.
If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.
If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor:_____ Date:_____

A compatibility determination is required before the use may be allowed.

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Atchafalaya NWR

Use: Forest Management

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	YES	NO
(a) Do we have jurisdiction over the use?	x	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	x	
(c) Is the use consistent with applicable Executive orders and Department and USFWS policies?	x	
(d) Is the use consistent with public safety?	x	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	x	
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	x	
(g) Is the use manageable within available budget and staff?	x	
(h) Will this be manageable in the future within existing resources?	x	
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?	x	
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?	x	

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ("no" to (b), (c), or (d)) may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. **Yes** _x__ **No** ___

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate_____ **Appropriate** __x_

Refuge Manager:_____ Date:_____

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.
If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.
If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor:_____ Date:_____

A compatibility determination is required before the use may be allowed.

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Atchafalaya NWR

Use: Scientific Research

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	YES	NO
(a) Do we have jurisdiction over the use?	x	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	x	
(c) Is the use consistent with applicable Executive orders and Department and USFWS policies?	x	
(d) Is the use consistent with public safety?	x	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	x	
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	x	
(g) Is the use manageable within available budget and staff?	x	
(h) Will this be manageable in the future within existing resources?	x	
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?	x	
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?	x	

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ("no" to (b), (c), or (d)) may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. **Yes** _x__ **No** ___

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate_____ **Appropriate** _x__

Refuge Manager:_____ Date:_____

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.
If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.
If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor:_____ Date:_____

A compatibility determination is required before the use may be allowed.

Appendix F. Compatibility Determinations

Atchafalaya National Wildlife Refuge

Uses: The following uses were considered for compatibility determination:

1) Wildlife observation/photography
2) Recreational fishing
3) Recreational hunting
4) Environmental education and interpretation activities
5) Walking, hiking, and jogging
6) Forest management
7) Scientific research
8) Kayaking and canoeing
9) All-terrain vehicle use
10) Bicycling
11) Boating

A description and the anticipated biological effects for each use are addressed separately in this Compatibility Determination.

Refuge Name: Atchafalaya National Wildlife Refuge

Date Established: 1986

Establishing and Acquisition Authorities: On October 26, 1984, Congress authorized the establishment of Atchafalaya NWR (Public Law 98-548) and Fish and Wildlife Act of 1956.

Refuge Purpose: (1) to provide for the conservation and management of fish and wildlife within the refuge; (2) to fulfill the international treaty obligations of the United States with respect to fish and wildlife; and (3) to provide opportunities for scientific research, environmental education, and fish and wildlife-oriented recreation, including hunting, fishing, and trapping, bird watching, nature photography, and others. 98 Stat. 2776, dated Oct. 26, 1984. "for the development, advancement, management, conservation, and protection of fish and wildlife resources" 16 U.S.C. 742f(a)(4) "for the benefit of the United States Fish and Wildlife Service, in performing its activities and services. Such acceptance may be subject to the terms of any restrictive or affirmative covenant, or condition of servitude" 16 U.S.C. 742f(b)(1) (Fish and Wildlife Act of 1956)

National Wildlife Refuge System Mission:

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

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

Other Applicable Laws, Regulations, and Policies:

Antiquities Act of 1906 (34 Stat. 225)
Migratory Bird Treaty Act of 1918 (15 U.S.C. 703-711; 40 Stat. 755)
Migratory Bird Conservation Act of 1929 (16 U.S.C. 715r; 45 Stat. 1222)
Migratory Bird Hunting Stamp Act of 1934 (16 U.S.C. 718-178h; 48 Stat. 451)
Criminal Code Provisions of 1940 (18 U.S.C. 41)
Bald and Golden Eagle Protection Act (16 U.S.C. 668-668d; 54 Stat. 250)
Refuge Trespass Act of June 25, 1948 (18 U.S.C. 41; 62 Stat. 686)
Fish and Wildlife Act of 1956 (16 U.S.C. 742a-742j; 70 Stat.1119)
Refuge Recreation Act of 1962 (16 U.S.C. 460k-460k-4; 76 Stat. 653)
Wilderness Act (16 U.S.C. 1131; 78 Stat. 890)
Land and Water Conservation Fund Act of 1965
National Historic Preservation Act of 1966, as amended (16 U.S.C. 470, et seq.; 80 Stat. 915)
National Wildlife Refuge System Administration Act of 1966 (16 U.S.C. 668dd, 668ee; 80 Stat. 927)
National Environmental Policy Act of 1969, NEPA (42 U.S.C. 4321, et seq; 83 Stat. 852)
Use of Off-Road Vehicles on Public Lands (Executive Order 11644, as amended by Executive Order 10989)
Endangered Species Act of 1973 (16 U.S.C. 1531 et seq; 87 Stat. 884)
Refuge Revenue Sharing Act of 1935, as amended in 1978 (16 U.S.C. 715s; 92 Stat. 1319)
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 1, Section 8
The National Wildlife Refuge System Improvement Act of 1997 (Public Law 105-57, USC668dd)
Executive Order 12996: Management and General Public Use of the National Wildlife Refuge System, March 25, 1996
Title 50, Code of Federal Regulations, Parts 25-33
Archaeological Resources Protection Act of 1979
Native American Graves Protection and Repatriation Act of 1990

Compatibility determinations for each description listed are considered separately. Although, for brevity, the preceding sections from “Uses” through “Other Applicable Laws, Regulations and Policies” are only written once within the CCP, they are part of each descriptive use and become part of that compatibility determination if considered outside of the CCP.

(1) Description of Use: Wildlife observation/photography

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

Wildlife photography, including other image-capturing activities, such as videography, has occurred on the refuge. There are no blinds or platforms on the refuge specifically for photography and none are proposed at this time. However, opportunities exist for photography on the refuge. Commercial photography or videography, if allowed, would require a special use permit by the refuge and would

include specific restrictions. Often, the public offers copies of exceptional pictures for refuge use in publications and reports.

The general public could participate in wildlife observation and photography year-round from sunrise to sunset on the refuge. Wildlife observation and photography could be accomplished while driving or walking on refuge roads open to public vehicular traffic. Also, these public uses could be accomplished by walking trails or by boating.

Availability of Resources: The refuge would normally incur no expense except administrative costs for issuance of a special use permit in the case of commercial photography or videography, and staff time to conduct compliance checks.

Anticipated Effects of the Use: Activities associated with wildlife observation and both commercial and personal photography have shown no measurable environmental effects to the refuge, its habitats, or wildlife species. The uses can cause temporary minor disturbance to wildlife. However, use is expected to remain at levels causing only random, limited, and temporary disturbance. Any malicious or unreasonable harassment of wildlife would be grounds for the manager to restrict the uses.

Photography can increase visitors' knowledge and appreciation of fish and wildlife and their habitats on the refuge, and lead to greater understanding of the Refuge System's public stewardship mission. Quality photographs taken on refuge lands and provided to refuge staff can enhance the refuge's outreach and public use programs.

Public Review and Comment: This compatibility determination is part of the Draft Comprehensive Conservation Plan and Environmental Assessment (Draft CCP/EA) for Atchafalaya NWR. The availability of the Draft CCP/EA for a 30-day public review and comment period will be announced in the *Federal Register* and in the local media.

Determination (check one below):

_____ Use is Not Compatible

__X__ Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility:

- All wildlife observation and photography activities would be conducted with the refuge's primary objectives, habitat management requirements, and goals as the guiding principles.
- Modes and times of uses would be limited to legal means and times according to refuge regulations on access available to the general public.
- All commercial photographers that access areas normally closed to the public must have a special use permit that specifies access stipulations to prevent excessive disturbance to wildlife, damage to habitat, or conflicts with other public uses or management activities. The special use permit would stipulate that imagery produced on refuge lands be made available to the refuge for use in outreach, interpretation, internal documents, or other suitable uses.

- The commercial photography use must demonstrate a means to extend public appreciation and understanding of wildlife, natural habitats, enhance education, appreciation and/or understating of the Refuge System, or further outreach and education goals of the refuge.
- Commercial products must include appropriate credits to the refuge and to the Service.

Justification: Wildlife observation and photography are priority public uses on Refuge System lands as identified in the Improvement Act of 1997. By facilitating these uses on the refuge, we will increase visitors' knowledge and appreciation of fish, wildlife, and their habitats, which, in turn, will lead to increased public stewardship. Increased stewardship supports and complements the refuge's purposes and the mission of the Refuge System.

NEPA Compliance for Refuge Use Decision (check one below):

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

Mandatory 15-year Re-evaluation Date:

(2) Description of Use: Recreational Fishing

Fishing was a traditional recreational use of the land and waters prior to their inclusion in the Refuge System and continues to be a popular recreational pursuit. Fishing is a wildlife-dependent recreational pursuit and has been identified in the National Wildlife Refuge System Improvement Act of 1997 as a priority public use provided it is compatible with the purpose for which the refuge was established.

Fishing is permitted year-round in all refuge waters subject to regulations established by the Louisiana Department of Wildlife and Fisheries and the general regulations governing fishing on national wildlife refuges set forth in the Code of Federal Regulations. Fishing is permitted to provide fishable waters to the public and to utilize a sustainable natural resource.

Availability of Resources: Funding for the fishing program is borne by annual operation and maintenance funds. Costs include administration, maintenance of boat ramps and docks, and monitoring the activity.

Anticipated Effects of the Use: Minor, short-term effects to the environment from recreational fishing include litter and the possible contamination of refuge waters from oil and gas leaking from boat motors. Because the fish population is a sustainable natural resource and local fish habitat is vast, no long-term effects are expected.

Public Review and Comment: This compatibility determination is part of the Draft Comprehensive Conservation Plan and Environmental Assessment (Draft CCP/EA) for Atchafalaya NWR. The availability of the Draft CCP/EA for a 30-day public review and comment period will be announced in the *Federal Register* and in the local media.

Determination (check one below):

_____ Use is Not Compatible

__X__ Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility:

- Recreational fishing is permitted year-round in accordance with state regulations.
- Recreational crawfishing is allowed from Aril 1 – July 31.
- Commercial fishing is prohibited.
- A Self-Clearing permit is required for fishing on the refuge.

Justification: The Improvement Act identified fishing as one of the priority public uses on national wildlife refuges, where compatible with refuge purposes. This use is legitimate and appropriate, and is dependent upon healthy fish populations. Offering recreational fishing is in compliance with refuge goals, is a management objective for Atchafalaya NWR, and furthers the goals and missions of the Refuge System.

NEPA Compliance for Refuge Use Decision (check one below):

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

Mandatory 15-year Re-evaluation Date:

(3) Description of Use: Recreational Hunting

Recreational hunting, a wildlife-dependent activity, has been identified in the National Wildlife Refuge System Improvement Act of 1997 as a priority public use, provided it is compatible with the purpose for which the refuge was established.

Atchafalaya NWR offers the public a wide range of hunting opportunities for those using archery, primitive firearms, and modern gun, as well as special opportunities for youth and mobility impaired hunters with access available to most portions of the refuge. Hunters have the opportunity to hunt squirrel, rabbit, woodcock, mourning dove, waterfowl, deer, raccoon, turkey, and wild hogs. The refuge is well known for providing hunters opportunities for migratory woodcock as well as waterfowl hunting in the bayous and flooded bottomlands. Hunting for deer, squirrel, and woodcock may be rated as good, while rabbit hunting is rated as fair. Waterfowl hunting can be seasonal, depending on many factors, but the opportunities to hunt waterfowl are excellent. Turkey hunting is very good on this bottomland hardwood area; in fact, the refuge supports the highest population and success for wild turkeys across the state.

All hunting seasons on the refuge coincide with the managing agencies within the Sherburne Complex. Due to the numerous boundaries and multi-ownership, all hunting and fishing regulations are set within the Sherburne Complex, making it easier from not only a law enforcement standpoint but also to provide the public maximum opportunities. Certain areas of the refuge are closed to all hunting and closed to waterfowl hunting. Hunters should check with the wildlife management area headquarters for a map of these areas.

A self-clearing permit is required for all activities on the management area, which requires daily check-in, check-out, and bag reports. All hunters are required to check in/out at selected checkpoints and complete a harvest report card for all hunts. To date hunter compliance is 95 percent. The permits are available at kiosks along the entrance roads to the area. All persons older than 16 or younger than 60 using wildlife management areas including the refuge for any reason must purchase a Wild Louisiana Stamp, hunting, or fishing license from the LDWF or other local supplier of licenses. Hunters may enter no earlier than 3 a.m. and exit no later than two hours after sunset.

Hunts offered include deer (open and lottery; archery, muzzleloader, and gun); turkey (open and lottery); fox and grey squirrel; rabbit; raccoon; waterfowl, snipe, rail, and gallinules; woodcock, and mourning dove. The take of outlaw quadrupeds and birds (coyote, armadillo, crows, blackbirds, starlings, and beaver) on wildlife management areas (WMAs) is restricted to the hunting seasons on WMAs and only by properly licensed hunters with guns or archery equipment legal for the season in progress. Opportunities for handicapped (wheelchair bound) hunters are available that include marked ATV trails and deer and waterfowl hunting areas that include wheelchair accessible blinds. In addition, youth hunts are offered for deer (lottery), waterfowl (lottery), and squirrel each year.

A shooting range on the Sherburne WMA near the camping area and area headquarters has accommodations for shooters to sharpen their marksmanship skills. The shooting range complex consists of rifle, handgun, skeet/trap, and archery ranges. The rifle range has targets at 25, 50, and 100 yards, and the handgun range has targets at 10, 25, and 50 yards. There are two skeet ranges with one having a trap bunker. The archery range has targets at 10, 20, 30, and 40 yards. There is also a 15-foot tower on the archery range which can be used to shoot at 3-D targets. The rifle, pistol, and archery ranges are open daily from official sunrise to official sunset. The skeet/trap range has set days and hours of operation.

A bird dog training area on Complex lands adjacent to the refuge provides opportunity for hunters to work and train their dogs.

Availability of Resources: Funding for the hunt program is supported by annual operation and maintenance funds. Costs include permit printing, administration, monitoring the activity, and maintaining access points with safe parking areas.

Anticipated Effects of the Use: While managed hunting opportunities result in both short- and long-term effects to individual animals, effects at the population level are usually negligible. Small game animal populations are capable of sustaining harvest because of their short reproduction cycles. Hunting regulations for both endemic and migratory game species are based on specific statewide and nationwide harvest objectives. Migratory bird regulations are established at the federal level each year following a series of meetings involving both state and federal biologists. Harvest guidelines are based on population survey and habitat condition data. Refuge hunting programs are always within these regulations. As currently proposed, the known and anticipated levels of disturbance of allowing hunting are considered minimal and well within the tolerance level of known wildlife species and populations present on the refuge. All hunting activities would be conducted within the constraints of sound biological principles and refuge-specific regulations established to restrict illegal or questionable

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. Implementation of an effective law enforcement program and development of site-specific refuge regulations that are reviewed annually should minimize most incidental take problems.

Public Review and Comment: This compatibility determination is part of the Draft Comprehensive Conservation Plan and Environmental Assessment (Draft CCP/EA) for Atchafalaya NWR. The availability of the Draft CCP/EA for a 30-day public review and comment period will be announced in the *Federal Register* and in the local media.

Determination (check one below):

_____ Use is Not Compatible

__X__ Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility:

- Hunting seasons and bag limits are established annually as agreed upon during the annual hunt coordination meeting with Louisiana Department of Wildlife and Fisheries personnel.
- A self-clearing permit is required for hunting on the refuge.
- State hunting regulations apply unless otherwise listed.

Justification: The Improvement Act of 1997 identified hunting as one of the priority public uses on national wildlife refuges, where compatible with refuge purposes. This use is legitimate and appropriate, and is dependent upon healthy wildlife populations. Offering recreational hunting is in compliance with refuge goals, is a management objective for Atchafalaya NWR, and furthers the goals and missions of the Refuge System.

NEPA Compliance for Refuge Use Decision (check one below):

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

Mandatory 15-year Re-evaluation Date:

(4) Description of Use: Environmental education and interpretation activities

Environmental education and interpretation have been identified in the National Wildlife Refuge System Improvement Act of 1997 as priority public uses, provided they are compatible with the purpose for which the refuge was established. Environmental education and interpretation consist of public outreach and onsite activities conducted by refuge staff, volunteers, teachers, friends' group members, conservation partners, university professors, and others. Most activities occur during daylight hours with exceptions for night events such as owl and bat viewing, and tours using light from a full moon. Activities include educational programs and teacher workshops carried out on nature trails, canoe trips, and at refuge observation towers, refuge areas of interest, and other areas

suitable for teaching environmental science. Interpretation occurs when information is explained for the public by refuge staff or others using exhibits, displays, signs, kiosks, facilities, and brochures. Refuge facilities and lands may be used as outdoor classrooms by groups of students with a teacher and a formalized plan of environmental study, by members of organizations, or by other members of the public with approval of the refuge manager.

Environmental education and interpretation activities can occur throughout the year and are conducted with the refuge's primary goals, objectives, and habitat management requirements as the guiding principles. Activities conducted under these restrictions allow the refuge to accomplish its management goals and also provide for the safety of visitors.

Environmental education and interpretation are utilized to encourage understanding in citizens of all ages to develop land ethics, foster public support, increase visibility of the Refuge System, and improve the public's knowledge of the Service.

Availability of Resources: Funding for these activities is with annual operation and maintenance funds. Existing facilities exist off-site at the Bayou Lacombe Centre on the Complex headquarters.

Anticipated Effects of the Use: Minimal effects, such as temporary disturbance to wildlife species and possibly some trampling of vegetation in the immediate vicinity of the activity, are expected. Most activities would take place on existing roads, trails, and facilities, with no additional disturbance. Environmental education and interpretation activities are not expected to indirectly or cumulatively affect refuge resources.

Public Review and Comment: This compatibility determination is part of the Draft Comprehensive Conservation Plan and Environmental Assessment (Draft CCP/EA) for Atchafalaya NWR. The availability of the Draft CCP/EA for a 30-day public review and comment period will be announced in the *Federal Register* and in the local media.

Determination (check one below):

_____ Use is Not Compatible

__X__ Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility:

- Adequate precautions would be taken to ensure that permanent facilities are sited an adequate distance from sensitive wildlife areas.
- Evaluations of sites and programs would be conducted periodically to assess if objectives are being met and that natural resources are not being degraded.

Justification: The Improvement Act of 1997 identified environmental education and interpretation as priority public uses on national wildlife refuges, where compatible with refuge purposes. Offering environmental education and interpretation is in compliance with refuge goals, is a management objective for Atchafalaya NWR, and furthers the goals and missions of the Refuge System. Environmental education and interpretation encourage understanding of ecological and biological principles and refuge-specific issues, and develop support for refuges.

NEPA Compliance for Refuge Use Decision (check one below):

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

Mandatory 15-year Re-evaluation Date:

(5) Description of Use: Walking, hiking, and jogging

More than 7.1 miles of refuge roads, and 14.5 miles of levees and developed trails are used by many visitors for walking, hiking, and jogging.

Availability of Resources: The roads and levees are maintained for refuge purposes and therefore do not constitute additional cost for these activities, with the exceptions of the interpretive trails, which are maintained by a combination of volunteers and refuge staff.

Anticipated Effects of the Use: Effects from these activities could include littering, vegetation trampling, and wildlife disturbance.

Public Review Comment: This compatibility determination is part of the Draft Comprehensive Conservation Plan and Environmental Assessment (Draft CCP/EA) for Atchafalaya NWR. The availability of the Draft CCP/EA for a 30-day public review and comment period will be announced in the *Federal Register* and in the local media.

Determination (check one below):

_____ Use is Not Compatible

__X__ Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility: Hiking, jogging, and walking are restricted to daylight hours. Certain areas of the refuge may be restricted seasonally for breeding or nesting purposes or to protect habitat. Pets must be kept on a leash at all times.

Justification: These activities are low impact and considered to be wildlife-dependent. Observation of wildlife is enhanced by using the many trails offered at the refuge.

NEPA Compliance for Refuge Use Decision (check one below):
_____ Categorical Exclusion without Environmental Action Statement
_____ Categorical Exclusion and Environmental Action Statement
__X___ Environmental Assessment and Finding of No Significant Impact
_____ Environmental Impact Statement and Record of Decision

Mandatory 10-year Re-evaluation Date:

(6) Description of Use: Forest Management

Forest management, via timber harvest, is the only realistic tool that is available to enable the refuge to achieve wildlife habitat objectives. The forests of Atchafalaya NWR require significant management at a level that cannot be achieved without incorporating silvicultural techniques. In order to facilitate timber removal from the refuge, forest management packages are offered for bid to the general public, which allow harvest of trees in excess of what is needed to promote optimal wildlife habitat. The excess value of the trees in relation to the cost of the entire management package will be the amount paid to the government and placed in the general fund. Forest management is conducted to benefit wildlife and further the refuge purpose. It is not based on current or future economic gain from timber harvest.

Where would the use be conducted?

The refuge forester and manager would decide where forest management is needed. Designated areas would be marked with tree marking paint and timber sale boundaries would be displayed on a map.

When would the use be conducted?

Timber harvest would occur when forest management is needed, when soil conditions are appropriate, and when the bidding process is complete and a contract is awarded.

How would the use be conducted?

Active forest management consists of mechanical removal of commercial and non-commercial forest products by refuge personnel or contractors utilizing conventional logging equipment. The refuge is sub-divided into manageable-sized compartments, which are selected for forest management activities based on the greatest need for wildlife habitat improvement, and which are tempered with considerations for spatial, temporal, and area constraints stated in the Bottomland Hardwood Forest Habitat Management Guidelines (LMVJV 2005). Once selected, vegetative/wildlife data are collected and analyzed to determine the extent of treatment needed, which is then expressed in a document that details the specific silvicultural strategies necessary to obtain specific wildlife habitat objectives. Only those trees marked with two spots of tree marking paint would be cut. Stumps would be cut as low as possible to the ground as long as some portion of the paint remained visible on the stump. Special use permits, detailing specific environmental, fiscal, physical, and administrative constraints, are issued to contractors who have bid the highest for the forest products or through the negotiation process, if applicable. All state and federal permits, clearances, and consultations (such as State Historic Preservation Office cultural resource clearance, permits associated with the Clean Water Act and Intra-Service Section 7 consultation, only as applicable) would be obtained prior to implementing the special use permit. Timber sales require a pre-entry conference between the refuge forester and permittee before starting logging operations.

Why is this use being proposed?

Forest management is needed to improve general health, productivity, diversity, and quality of bottomland and upland forests. Forest stands often need to be gradually thinned to reduce competition, to increase diversity, to lessen the chance for epidemics of damaging insects, and to remove diseased trees. Accomplishing habitat improvement targets requires heavily utilizing the commercial sale of refuge forest products (timber sales), which is the only practical way to remove timber from the refuge.

Availability of Resources: Funding for these activities would be through annual operation and maintenance funds and would consists predominantly of administration, monitoring, and understory clearing. Equipment and maintenance costs associated with commercial activities would be carried out by the contractor.

Anticipated Effects of the Use: Forest management operations can cause adverse effects on habitat values and water quality if not carefully controlled and supervised. Restrictions and conditions, such as only operating in dry conditions, creating buffers along waterways, and minimizing damage to residual trees, must be placed on operations to minimize adverse effects from equipment. Minor, short-term effects from using equipment, such as disturbance to wildlife and trampling of understory vegetation, are expected to occur. In the long-term, forest conditions after management treatments would be more beneficial to wildlife by restoring the functions and values necessary to meet their needs.

Public Review and Comment: This compatibility determination is part of the Draft Comprehensive Conservation Plan and Environmental Assessment (Draft CCP/EA) for Atchafalaya NWR. The availability of the Draft CCP/EA for a 30-day public review and comment period will be announced in the *Federal Register* and in the local media.

Determination (check one below):

_____ Use is Not Compatible

__X__ Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility: Forest management operations may be conducted throughout the year, but only according to the guidelines detailed in a Habitat Management Plan or the special conditions section of the special use permit.

Justification: The forest management actions, proposed in the comprehensive conservation plan, are in accordance with Service guidelines for the protection, management, and enhancement of habitats for wildlife populations on refuges. The Habitat Management Plan, a step-down plan, details how forest management actions promote the enhancement of habitats for threatened or endangered species, migratory birds, and resident wildlife species; promote habitat restoration; protect cultural resources; and provide opportunities for public recreation and environmental education. This use furthers the goals and missions of the Refuge System and Atchafalaya NWR.

NEPA Compliance for Refuge Use Decision (check one below):

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

Mandatory 10-year Re-evaluation Date:

(7) Description of Use: Scientific research

This activity will allow university students and professors, non-governmental researchers, and governmental scientists access to the refuge's natural environment to conduct both short- and long-term research projects. The outcome of this research will result in better knowledge of our natural resources and improved methods to manage, monitor, and protect refuge resources. The refuge will support Service and U.S. Geological Survey research of neotropical migratory birds, waterfowl, bottomland hardwood restoration, fisheries, amphibians and reptiles, and other wildlife species. Efforts will be made to expand partnerships with Louisiana State University and other universities.

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

Anticipated Effects of the Use: There should be no significant negative effects from scientific research on the refuge. The knowledge gained from the research will provide information to improve management techniques and better meet the needs of trust resource species. Effects, such as trampling vegetation and temporary disturbance to wildlife, will occur but should not be significant. A small number of individual plants or animals may be collected for further study. These collections will have an insignificant effect on refuge plant and animal populations.

Stipulations Necessary to Ensure Compatibility: Each request for use of the refuge for research will be examined on its individual merit. Questions of who, what, when, where, and why will be asked to determine if requested research contributed to the refuge purposes and could best be conducted on the refuge without significantly affecting the resources. If so, the researcher will be issued a special use permit. Progress will be monitored and the researcher will be required to submit annual progress reports and copies of all publications derived from the research.

Justification: The benefits derived from sound research provide a better understanding of species and the environmental communities present on the refuge. These benefits far outweigh any short-term disturbance or loss of individual plants and animals that might occur.

Public Review and Comment: This compatibility determination is part of the Draft Comprehensive Conservation Plan and Environmental Assessment (Draft CCP/EA) for Atchafalaya NWR. The availability of the Draft CCP/EA for a 30-day public review and comment period will be announced in the *Federal Register* and in the local media.

Determination (check one below):

_____ Use is Not Compatible

__X__ Use is Compatible with Following Stipulations

NEPA Compliance for Refuge Use Decision (check one below):

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

Mandatory 10-year Re-evaluation Date:

(8) Description of Use: Kayaking and canoeing

Kayaking and canoeing allows the general public access through and around the refuge's waterways for wildlife observation, wildlife photography, and recreation. Access to the refuge will be allowed anytime of the year during daylight hours when the refuge is open to the public, or after dark, on a case-by-case basis, as authorized by the refuge manager. Kayaks and canoes used by the general public for these recreational purposes can be transported through the refuge's designated travel routes on motorized vehicles that do not exceed the weight and size limits for the roads. Access through or entry on all or portions of individual areas may be temporarily suspended, by posting, upon occasions of unusual or critical conditions affecting land, water, vegetation, wildlife/plant populations, or public safety.

Availability of Resources: Portions of the refuge have been opened to the public since they were acquired. Thus, roads, access trails, parking lots, signs, and other infrastructure, as well as staff to enforce regulations and maintain these facilities have been provided by the Service.

Designated launch and recovery sites for kayaks and canoes, and other facilities, as well as educational/interpretive signs in these areas, are being addressed in the comprehensive conservation plan. Through the comprehensive conservation planning process, the Service recognizes these needs and recommends solutions to improve public access opportunities.

Anticipated Effects of the Use: Access to the refuge for the purpose of launching non-commercial kayaks and canoes on designated roads of travel will cause minimal effects to plant and wildlife species. Access for kayaking and canoeing is typically by individuals or small groups. On average they transport one to four kayaks or one to two canoes on top of their motorized vehicles or tow them on small trailers. Within the non-restricted areas of the refuge, the designated routes of travel end in established parking lot areas, which, in turn, have strategically placed barriers that prevent vehicles from driving onto the foot trails. Based on biological data, conservation management plans, unreasonable harassment of wildlife, or destruction of the habitat, the refuge manager may restrict the use or close some areas from this and other public use, if it is determined that they could have negative effects on the resources, and bird nesting and/or other wildlife activities.

Damage to habitat by walking or dragging a kayak/canoe to and from the launch sites is minimal and temporary. Damage to vegetation by individuals paddling through the areas is minimal and temporary. There is some temporary disturbance to wildlife due to human activity on the land and on the water (e.g., flushing wildlife from cover); however, the public access for kayaking and canoeing should not create unreasonable impacts.

Public Review and Comment: This compatibility determination is part of the Draft Comprehensive Conservation Plan and Environmental Assessment (Draft CCP/EA) for Atchafalaya NWR. The availability of the Draft CCP/EA for a 30-day public review and comment period will be announced in the *Federal Register* and in the local media.

Determination (check one below):
_____ Use is Not Compatible

__X__ Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility: (1) Harassment of wildlife and excessive damage to vegetation is prohibited; (2) Driving, camping, and building fires on the refuge is prohibited; (3) Access by motorized vehicles is only authorized on public roads and parking lots; (4) No kayaks, canoes, or related equipment may be left overnight on the refuge; (5) Any overnight use requires a special use permit

issued by the refuge; (6) Rented or owned kayaks/canoes brought by the visitors onto the refuge for their use is permitted; and (7) Providing outfitting or commercial services on the refuge requires a special use permit issued by the refuge.

Justification: This use has been determined compatible because allowing the general public access through the Atchafalaya NWR to use kayaks and canoes for wildlife observation, wildlife photography, and recreation will not interfere with the Service's work to protect and conserve natural resources. The level of use for these activities is moderate on the refuge. The associated disturbance to wildlife is temporary and minor. Although recreational kayaking and canoeing are not priority public uses, under the conditions described above, they are not detrimental activities. Access for wildlife observation and photography, which are priority uses, allows visitors to enjoy the outdoors and wild lands. Designated launch and recovery sites also provide the Service with specific areas in which to place educational/interpretive signs, highlighting natural resources and their conservation needs. These uses also help fulfill the mission of the Refuge System.

NEPA Compliance for Refuge Use Decision (check one below):

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

Mandatory 10-Year Re-evaluation Date:

(9) Description of Use: All-Terrain Vehicle Use

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 and fishing, users have historically utilized all-terrain vehicles throughout the area resulting in a fairly limited system of trails distributed to most areas of the refuge.

Considering the topography of the area and its remoteness, the need for limited use of all-terrain vehicles by certain 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.

Service policy pertaining to all-terrain vehicle use requires such use be in conjunction with wildlife-dependent activities only, and be confined to designated areas or trails identified for such use; all off-road/off-trail use is restricted to foot travel only. Approximately 6.3 miles of all-terrain trails are currently available for seasonal use for hunting and fishing access. All-terrain vehicle trails are shown on refuge brochure maps and designated for public use by signs. 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. These trails were historically accessed by conventional vehicles prior to refuge establishment, but were restricted to all-terrain vehicles after refuge establishment in an effort to minimize environmental damage associated with vehicle travel during wet conditions. Upgrading these former roads/trails by adding gravel and culverts will allow conventional vehicular access to a segment of the public that currently has virtually no access to major portions of the refuge.

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 will be needed contingent on future refuge land acquisition to develop appropriate trails in order to provide initial public access to newly acquired lands.

Anticipated Effects of the Use: Designated all-terrain vehicle trails will be open seasonally to support hunting- and fishing-related public use. All-terrain vehicle trails are located on former dirt field and woods roads that existed when the refuge was established. These trails have crown to provide drainage from the trail surface and are maintained by bush hogging two to three times per year. All-terrain vehicle use causes trampling of the mowed vegetation, but rutting and associated soil erosion is very minimal. Some wildlife disturbance may occur adjacent to the trails, but is believed to be minimal and is restricted to primarily the fall and winter months. Any disturbance from all-terrain vehicles is comparable to regular vehicles traveling refuge roads. All-terrain vehicles are restricted to designated and marked trails. Therefore any impacts are restricted to a very small portion of the refuge.

Public Review and Comment: This compatibility determination is part of the Draft Comprehensive Conservation Plan and Environmental Assessment (Draft CCP/EA) for Atchafalaya NWR. The availability of the Draft CCP/EA for a 30-day public review and comment period will be announced in the *Federal Register* and in the local media.

Determination (check one below):

_____ Use is Not Compatible

__X__ Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility: All-terrain vehicle use is permitted in support of hunting and fishing activities where adequate access is not available by maintained vehicular roads. Persons under 16 years of age are not allowed to operate an all-terrain vehicle on the refuge. All-terrain vehicle use is restricted to designated and maintained all-terrain vehicle trails. No off-trail use of all-terrain vehicles is permitted. All-terrain vehicles used on the refuge must have low ground pressure tires with a manufacturer's maximum allowable tire pressure of 7 pounds per-square-inch and may not have tire lug depths greater than one inch. All weapons transported on all-terrain vehicles must be fully unloaded.

Justification: Hunting and fishing are identified in the Improvement Act as priority wildlife-dependent recreational activities that should be promoted and expanded on refuges. There is very limited vehicular access to most portions of the refuge. To facilitate hunting and fishing use, a limited system of all-terrain vehicle trails is required to provide access to major portions of the refuge. Without these trails, the public will not be able to access major portions of the refuge. Prior to refuge ownership, these areas were accessed by 4-wheel-drive trucks, which created significant damage to the natural environment through severe rutting of dirt trails. Following refuge establishment, these trails were converted to all-terrain vehicle use only, as a means of providing public access, while minimizing any damage to the natural environment.

NEPA Compliance for Refuge Use Decision (check one below):

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

Mandatory 10-year Re-evaluation Date:

(10) Description of Use: Bicycling

Bicycling is not a priority public use designated by the Improvement Act; however, it can occur on the refuge provided it is compatible with the purpose for which the refuge was established. Requests to ride bicycles on refuge roads not open to public vehicular traffic have been made. These requests have been made in association with wildlife-dependent recreational uses, such as hunting, photography, and bird observation. The only areas available for bike riding are the 6.7 miles of graveled roads and maintained levees on the refuge

Availability of Resources: Funding for this program will be from annual operation and maintenance funds, but little to no cost is associated with this activity. No special equipment, facilities, or improvements are necessary to support the use.

Anticipated Effects of the Use: Since only non-motorized bicycles will be allowed on two dirt and gravel refuge trails, little disturbance to wildlife and habitat will occur. As long as bike riders are courteous, no conflict should occur between hikers, who can also access these trails.

Public Review and Comment: This compatibility determination is part of the Draft Comprehensive Conservation Plan and Environmental Assessment (Draft CCP/EA) for Atchafalaya NWR. The availability of the Draft CCP/EA for a 30-day public review and comment period will be announced in the *Federal Register* and in the local media.

Determination (check one below):

____ Use is Not Compatible

__x__ Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility: Bicycling is only allowed on graveled roads and maintained levees during daylight hours.

Justification: At the present level, few bicyclists use graveled roads and levees for hunting, photography, and wildlife observation. Bicycling is not detrimental to the environment if only allowed on these levees and graveled roads and requires no added expenses to regulate. This use is in compliance with the comprehensive conservation plan and furthers the goals and missions of the Refuge System and Atchafalaya NWR.

NEPA Compliance for Refuge Use Decision (check one below):

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

Mandatory 10-year Re-evaluation Date:

(10) Description of Use: Boating

A large portion of the refuge is only accessible by boat due to no roads to most parts of the refuge. In order to disperse hunters and access remote areas for hunting and fishing, users have historically utilized boats in order to access these areas. Boating is allowed on most portions of the refuge along the main bayous and other areas, year-round, in accordance with refuge and state regulations.

Considering the remoteness of the area and the fact that much of the refuge is accessible by water, the need for use of motorized boats by certain users is apparently evident. It will be impossible to develop an effective public use program that provides optimum consumptive use opportunities without providing for motorized boats.

Recreational boating that is connected with other public use activities, such as hunting, fishing, and wildlife observation and photography over and adjacent to refuge-owned water bottoms, is permitted.

Availability of Resources: Funding for boating is supported by annual operation and maintenance funds. Costs include administrating and monitoring the activity.

Anticipated Effects of the Use: Boating is motorized use of motorized boats over refuge waters for regulated public use activities in accordance with permit regulations and should not have any significant adverse biological effects. As currently proposed, the known and anticipated levels of disturbance from allowing boat fishing or access for hunting is considered minimal and well within the tolerance level of known fish and wildlife species and populations present on the refuge. Implementation of an effective law enforcement program and development of site-specific refuge regulations that are reviewed annually should minimize most problems.

Boating is restricted to the bayous and their tributaries and backwaters. Access is typically by a couple of individuals per boat. Some motor boating occurs and could cause minor disturbance to wading bird colonies. Disturbance may affect nest abandonment, predation on young, or subject young birds to environmental stress. Boating activity can also disturb wildlife, especially birds, because it disrupts feeding activity and can affect large areas in a short period of time. The disturbance can result in increased energy expenditures from avoidance flights and decreased energy intake due to interference with feeding activity. This is important to survival especially with wintering waterfowl. However, there are species-specific differences in response to boating activities and speed and approach of boats can influence wildlife response.

Zoning of visitor activities by time and space, clustering public use facilities, proper monitoring, educating visitors, and enforcement will ensure compatibility with the purposes of the refuge and mission of the Refuge System. Through periodic evaluation of boating effects on wildlife, the visitor

services program will assess resource effects. If future human effects are determined through evaluation to be detrimental to important natural resources, actions will be taken to reduce or eliminate those effects. Continued monitoring for significant disturbance during critical times or with large groups of birds will allow the refuge to determine if additional regulations are needed if use increases. Any unreasonable harassment would be grounds for the refuge manager to close the area to these uses or restrict the uses to minimize harm. The use of motorized and human powered boats will not adversely affect refuge purposes. The biggest problem with this use is littering and will continue to be handled with law enforcement and refuge staff for cleanup.

Public Review and Comment: This compatibility determination is part of the Draft Comprehensive Conservation Plan and Environmental Assessment (Draft CCP/EA) for Atchafalaya NWR. The availability of the Draft CCP/EA for a 30-day public review and comment period will be announced in the *Federal Register* and in the local media.

Determination (check one below):

_____ Use is Not Compatible

__X__ Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility: House boats are prohibited on the refuge waters.

Justification: The Improvement Act identified hunting, fishing, wildlife observation, and wildlife photography as priority public uses on national wildlife refuges, where compatible with refuge purposes. Boating can facilitate these priority public uses and is the only way to access the refuge due to its remote location. This use is legitimate and appropriate. Offering recreational boating is in compliance with refuge goals, is a management objective for Atchafalaya NWR, and furthers the mission of the Refuge System.

NEPA Compliance for Refuge Use Decision (check one below):

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

Mandatory 10-year Re-evaluation Date:

Approval of Compatibility Determinations

The signature of approval is for all compatibility determinations considered within the CCP for Atchafalaya NWR. If one of the descriptive uses is considered for compatibility outside of the CCP, this approval signature becomes part of that determination.

Refuge Manager: _____
(Signature/Date)

Regional Compatibility Coordinator: _____
(Signature/Date)

Refuge Supervisor: _____
(Signature/Date)

Regional Chief, National Wildlife Refuge System, Southeast Region: _____
(Signature/Date)

Appendix G. Intra-Service Section 7 Biological Evaluation

SOUTHEAST REGION
INTRA-SERVICE SECTION 7
BIOLOGICAL EVALUATION FORM
[Federally endangered, threatened, and candidate species]

Originating Person: Ken Litzenberger
Telephone Number: 985-882-5365 **E-Mail:** Kenneth_Litzenberger@fws.gov
Date: 09-20-2010

PROJECT NAME (Grant Title/Number): Comprehensive Conservation Plan for Atchafalaya NWR

I. Service Program:
___ **Ecological Services**
___ **Federal Aid**
- ___ **Clean Vessel Act**
- ___ **Coastal Wetlands**
- ___ **Endangered Species Section 6**
- ___ **Partners for Fish and Wildlife**
- ___ **Sport Fish Restoration**
- ___ **Wildlife Restoration**

___ **Fisheries**
_X_ **Refuges/Wildlife**

II. State/Agency: Louisiana/USFWS

III. Station Name: Atchafalaya NWR

IV. Description of Proposed Action (attach additional pages as needed):
Implement the Comprehensive Conservation Plan for Atchafalaya NWR by adopting the proposed alternative. This plan directs the management of the refuge for the next 15 years.

V. Pertinent Species and Habitat:

A. Include species/habitat occurrence map: Louisiana black bears have been known to traverse the refuge and area. Pallid sturgeon historically occurred in waters surrounding Atchafalaya NWR. Sprague's pipit has not been documented on the refuge, but the refuge occurs within historical range of this species.

B. Complete the following table:

Table 1. Listed/proposed species/critical habitat that occur or may occur within the project area:

SPECIES/CRITICAL HABITAT	STATUS[1]
Pallid Sturgeon	E
Louisiana Black Bear	T
Louisiana Black Bear	CH
Sprague's Pipit	C

[1]*STATUS: E=endangered, T=threatened, PE=proposed endangered, PT=proposed threatened, CH=critical habitat, PCH=proposed critical habitat, C=candidate species*

VI. Location (attach map):

A. Ecoregion Number and Name: Mississippi Alluvial Valley

B. County and State: Iberville Parish, LA and St Martin Parish, LA

C. Section, township, and range (or latitude and longitude): T7S, R8E, St Helena Meridian; See Figure 1 CCP

D. Distance (miles) and direction to nearest town: 10 Miles

E. Species/habitat occurrence:
Not applicable

VII. Determination of Effects:

A. Explanation of effects of the action on species and critical habitats in item

Table 2. Project impacts to listed/proposed species/critical habitat.

SPECIES/ CRITICAL HABITAT	IMPACTS TO SPECIES/CRITICAL HABITAT
Pallid Sturgeon	No expected adverse impact
Louisiana Black Bear	No expected adverse impact
Louisiana Black Bear CH	No expected adverse impact
Sprague's Pipit	No expected adverse impact

There is no critical habitat designation for pallid sturgeon or Sprague's pipit on Atchafalaya NWR. The entire refuge is critical habitat for Louisiana black bears.

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

Table 3. Conservation measures proposed to minimize or eliminate adverse impacts to proposed/listed species, critical habitat.

SPECIES/ CRITICAL HABITAT	ACTIONS TO MITIGATE/MINIMIZE IMPACTS
Pallid Sturgeon	No expected adverse impact
Sprague's Pipit	No expected adverse impact
Louisiana Black Bear	No expected adverse impact
Louisiana Black Bear CH	No expected adverse impact

VIII. Effect Determination and Response Requested:

Table 4. The effect determination and response requested for impacts to each proposed/listed species/critical habitat.

SPECIES/ CRITICAL HABITAT	DETERMINATION[1]			RESPONSE[1] REQUESTED
	NE	NA	AA	
Pallid Sturgeon	X			Concurrence
Sprague's Pipit	X			Concurrence
Louisiana Black Bear		X		Concurrence
Louisiana Black Bear Critical Habitat		X		Concurrence

[1]

DETERMINATION/RESPONSE REQUESTED:

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

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

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

_____ _____

Signature (originating station) **date**

_____

Title

If the project description changes or incidental take exceeds that which has been exempted under section 9 of the Act, then the Ecological Services Field Office must be contacted.

IX. Reviewing Ecological Services Office Evaluation:

A. Concurrence _____ Non-concurrence _____

B. Formal consultation required _____

C. Conference required _____

D. Informal conference required _____

E. Remarks (attach additional pages as needed):

_____ _____
Signature **Date**

_____
Title/Office

_____

Appendix H. Wilderness Review

The Wilderness Act of 1964 defines a wilderness area as an area of federal land that retains its primeval character and influence, without permanent improvements or human inhabitation, and is managed so as to preserve its natural conditions and which:

1. generally appears to have been influenced primarily by the forces of nature, with the imprint of man's work substantially unnoticeable;

2. has outstanding opportunities for solitude or primitive and unconfined types of recreation;

3. has at least 5,000 contiguous roadless acres or is of sufficient size to make practicable its preservation and use in an unimpeded condition; or is a roadless island, regardless of size;

4. does not substantially exhibit the effects of logging, farming, grazing, or other extensive development or alteration of the landscape, or its wilderness character could be restored through appropriate management at the time of review; and

5. may contain ecological, geological, or other features of scientific, educational, scenic, or historic value.

The lands within Atchafalaya NWR were reviewed for their suitability in meeting the criteria for wilderness, as defined by the Wilderness Act of 1964.

No lands in the refuge were found to meet these criteria. Therefore, the suitability of refuge lands for wilderness designation is not further analyzed in this plan.

Appendix I. Refuge Biota

BIRDS

This list contains those species of birds thought to occur on Atchafalaya NWR according to various literature sources, surveys, and observations.

Grebes

Pied-billed Grebe (*Podilymbus podiceps)*

Cormorants and Anhingas

Double-crested Cormorant (*Phalacrocorax auritus)*
Anhinga (*Anhinga anhinga)*

Herons and Egrets

Great Blue Heron (*Ardea herodias)*
Great Egret (*Ardea alba)*
Snowy Egret (*Egretta thula)*
Little Blue Heron (*Efretta caerulea)*
Tricolored Heron (*Egretta tricolor)*
Cattle Egret (*Bubulcus ibis)*
Green Heron (*Butoroides virescens)*
Black-crowned Night-heron (*Nycticorax nycticorax)*
Yellow-crowned Night-heron (*Nyctanassa violacea)*

Ibises, Spoonbills, and Storks

White Ibis (*Eudocimis albus)*
Glossy Ibis (*Plegadis falcinellas*)
White-faced Ibis (*Plegadis chihi*)
Roseate Spoonbill *(Ajaia ajaja)*
Wood Stork (*Mycteria americana)*

American Vultures

Black Vulture (*Coragyps atratus)*
Turkey Vulture (*Cathartes aura)*

Waterfowl

Greater White-fronted Goose *(Anser albifrons)*
Snow (Blue) Goose (*Chen caerulescens)*
Ross's Goose (*Chen rossii*)
Wood Duck (*Aix sponsa)*
Gadwall (*Anas strepera)*
American Wigeon (*Anas americana)*
Mallard (*Anas platyrhynchos)*
Blue-winged Teal *(Anas discors)*
Northern Shoveler (*Anas clypeata)*
Northern Pintail (*Anas acuta)*
Green-winged Teal (*Anas crecca)*
Canvasback (*Aythya valisineria)*
Redhead (*Aythya americana)*
Ring-necked Duck (*Aythya collaris)*
Lesser Scaup (*Aythya affinis)*
Bufflehead (*Bucephala albeola)*
Hooded Merganser (*Lophodytes cucullatus)*
Red-breasted Merganser (*Mergus serrator)*
Ruddy Duck (*Oxyura jamaicensis)*
Black-bellied Whistling Duck (*Dendrocygna autumnalis*)
American White Pelican (*Pelecanus erythrorhynchos*)
Ring-billed Gull (*Larus delawarensis*)

Falcons

American Kestrel (*Falco sparverius)*
Merlin (*Falco columbarius*)
Peregrine Falcon (*Falco peregrinus)*

Hawks and Kites

Osprey (*Pandion haliaetus)*
Swallow-tailed Kite *(Elanoides Jorficatus forficatus)*
Mississippi Kite (*Ictinia mississippiensis)*
Bald Eagle (*Haliaeetus leucocephalus)*
Northern Harrier (*Circus cyaneus)*
Sharp-shinned Hawk (*Accipiter striatus)*
Cooper's Hawk (*Accipiter cooperii)*
Red-shouldered Hawk (*Buteo lineatus)*
Broad-winged Hawk (*Buteo platypterus)*
Red-tailed Hawk (*Buteo jamaicensis)*

Turkeys

Wild Turkey (*Meleagris gallopavo)*

Rails, Gallinules, Coots, and Cranes

King Rail (*Rallus elegans)*
Virginia Rail (*Rallus limicola)*
Sora (*Porzana carolina)*
Purple Gallinule (*Porphyrio martinica*)
Common Moorhen (*Gallinula chloropus*)
American Coot (*Fulica americana)*

Plovers

Black-bellied Plover (*Pluvialis squatarola)*
Semipalmated Plover (*Charadrius semipalmatus*)
Killdeer (*Charadrius vociferous)*

Stilts

Black-necked Stilt (*Himantopus himantopus mexicanus)*

Sandpipers

Greater Yellowlegs (*Tringa melanoleuca)*
Lesser Yellowlegs (*Tringa flavipes)*
Solitary Sandpiper (*Tringa solitaria)*
Spotted Sandpiper (*Actitis macularia)*
Semipalmated Sandpiper (*Calidris pusilla)*
Western Sandpiper (*Calidris mauri)*
Least Sandpiper (*Calidris minutilla)*
Pectoral Sandpiper (*Caladris melanotos)*
Upland Sandpiper (*Bartramia longicauda*)
Dunlin (*Calidris alpina)*
Stilt Sandpiper (*Micropalama himantopus)*
Wilson's/Common Snipe (*Gallinago gallinago)*
American Woodcock (*Scolopax minor)*
Long-billed Dowitcher (*Limnodromus scolopaceus)*

Doves

Rock Pigeon (*Columba livia)*
Eurasian Collared-dove (*Streptopelia decaocto)*
Mourning Dove (*Zenaida macroura)*

Cuckoos

Black-billed Cuckoo (*Coccyzus erythropthalmus)*
Yellow-billed Cuckoo (*Coccyzus americanus)*

Owls

Eastern Screech-Owl (*Otus asio)*
Great Horned Owl (*Bubo virginianus)*
Barred Owl (*Strix varia)*

Nightjars

Common Nighthawk (*Chordeiles minor)*
Chuck-will's-widow (*Caprimulgus carolinensis)*
Whip-poor-will (*Caprimulgus vociferous)*

Swifts

Chimney Swift (*Chaeura pelagica)*

Hummingbirds

Ruby-throated hummingbird (*Archilochus colubris)*
Rufous Hummingbird *(Selasphorus rufus*)
Black-chinned Hummingbird (*Archilochus alexandri*)

Kingfishers

Belted Kingfisher (*Ceryle alcyon)*

Woodpeckers

Red-headed Woodpecker (*Melanerpes erythrocephalus)*
Red-bellied Woodpecker (*Melanerpes carolinus)*
Yellow-bellied Sapsucker (*Sphyrapicus varius)*
Downy Woodpecker (*Picoides pubescens)*
Hairy Woodpecker (*Picoides villosus)*
Northern Flicker (*Colaptes auratus)*
Pileated Woodpecker (*Dryocopus pileatus)*

Flycatchers

Olive-sided Flycatcher (*Contopus cooperi)*
Eastern Wood-Pewee (*Contopus virens)*
Yellow-bellied Flycatcher (*Empidonax flaviventris)*
Acadian Flycatcher (*Empidonax virescens)*
Alder Flycatcher (*Empidonax alnorum)*
Least Flycatcher (*Empidonax minimus)*
Eastern Phoebe (*Sayornis phoebe)*
Vermilion Flycatcher (*Pyrocephalus rubinus)*
Great Crested Flycatcher (*Myiarchus crinitus)*
Eastern Kingbird (*Tyrannus tyrannus)*
Scissor-tailed Flycatcher

Vireos

White eyed Vireo (*Vireo griseus)*
Yellow throated Vireo (*Vireo flavifrons)*
Blue headed/Solitary Vireo (*Vireo solitarius)*
Warbling Vireo (*Vireo gilvus)*
Philadelphia Vireo (*Vireo philadephicus)*
Red-eyed Vireo (*Vireo olivaceus)*

Jays and Crows

Blue Jay (*Cyanocitta cristata)*
American Crow (*Corvus brachyrhynchos)*
Fish Crow (*Corvus ossigragus)*

Martins and Swallows

Purple Martin (*Progne subis)*
Tree Swallow (*Tachycineta bicolor)*
N. Rough-winged Swallow (*Stelgidopteryx serripennis)*
Bank Swallow (*Riparia riparia)*
Cliff Swallow (*Petrochelidon pyrrhonota*)
Barn Swallow (*Hirundo rustica)*

Chickadees and Titmice

Carolina Chickadee (*Poecile carolinensis)*
Tufted Titmouse (*Baeolophus bicolor)*

Nuthatches

Red-breasted Nuthatch (*Sitta canadensis)*
White-breasted Nuthatch (*Sitta carolinensis*)

Creepers

Brown Creeper (*Certhia americana)*

Wrens

Carolina Wren (*Thryothorus ludovicianus)*
House Wren (*Troglodytes aedon)*
Winter Wren (*Troglodytes troglodytes)*
Sedge Wren (*Cistothorus platensis*)

Kinglets and Gnatcatchers

Golden-crowned Kinglet (*Regulus satrapa)*
Ruby-crowned Kinglet (*Regulus calendula)*
Blue-gray Gnatcatcher (*Polioptila caerulea)*

Thrushes

Eastern Bluebird (*Sialia sialis)*
Veery (*Catharus fuscescens)*
Gray-cheeked thrush (*Catharus minimus)*
Swainson's Thrush (*Catharus ustulatus)*
Hermit Thrush (*Catharus guttatus)*
Wood Thrush (*Hylocichla mustelina)*
American Robin (*Turdus migratorius)*

Shrikes

Loggerhead Shrike (*Lanius ludovicianus)*

Mockingbirds and Thrashers

Gray Catbird (*Dumetella carolinensis)*
Northern Mockingbird (*Mimus polyglottos)*
Brown Thrasher (*Toxostoma rufum)*

Starlings

European Starling (exotic) (*Sturnus vulgaris*)

Pipits

American Pipit (*Anthus rubescens)*

Waxwings

Cedar Waxwing (*Bombycilla garrulus)*

Wood Warblers

Blue-winged warbler (*Vermivora pinus)*
Golden-winged Warbler (*Vermivora chrysoptera)*
Tennessee Warbler (*Vermivora peregrine)*
Orange-crowned Warbler (*Vermivora celata)*
Nashville Warbler (*Vermivora ruficapilla)*
Northern Parula (*Parula americana)*
Yellow Warbler (*Dendroica petechia)*
Yellow-throated Warbler (*Dendroica dominica)*
Chestnut-sided Warbler (*Dendroica pensylvanica*)
Magnolia Warbler (*Dendroica magnolia)*
Yellow-rumped Warbler (*Dendroica coronata)*
Black-throated Green Warbler (*Dendroica virens)*
Blackburnian Warbler (*Dendroica fusca)*
Pine Warbler (*Dendroica pinus)*
Prairie Warbler (*Dendroica discolor)*
Palm Warbler (*Dendroica palmarum)*
Bay-breasted Warbler (*Dendroica castanea)*
Cerulean Warbler (*Dendroica cerulea)*

Black-and-white Warbler (*Mniotilta varia)*
American Redstart (*Setophaga ruticilla)*
Prothonotary Warbler (*Protonotaria citrea)*
Worm-eating Warbler (*Helmitheros vermivorus)*
Swainson's warbler (*Limnothlypsis swainsonii)*
Ovenbird (*Seiurus aurocapillus)*
Northern Waterthrush (*Seiurus noveboracensis)*
Louisiana Waterthrush (*Seiurus motacilla)*
Kentucky Warbler (*Oporornis formosus)*
Mourning Warbler (*Oporornis philadelphia)*
Common Yellowthroat (*Geothlypis trichas)*
Hooded Warbler (*Wilsonia citrine)*
Wilson's Warbler (*Wilsonia pusilla)*
Canada Warbler (*Wilsonia canadensis)*
Yellow-breasted Chat (*Icteria virens)*

Tanagers

Summer Tanager (*Piranga rubra)*
Scarlet Tanager (*Piranga olivacea)*

Sparrows

Eastern/Rufous-sided Towhee (*Pipilo erythrophthalmus)*
Fox Sparrow (*Passerella iliaca)*
Song Sparrow (*Melospiza melodia)*
Lincoln's Sparrow (*Melospiza lincolnii)*
Swamp Sparrow (*Melospiza georgiana)*
White-throated Sparrow (*Zonotrichia albicollis)*
White-crowned Sparrow (*Zonotrichia leucophrys)*
Dark-eyed Junco (*Junco hyemalis)*
Chipping Sparrow (*Spizella passerine*)
Field Sparrow (*Spizella pusilla*)
Savannah Sparrow (*Passerculus sandwichensis*)
Le Conte's Sparrow (*Ammodramus leconteii*)
House Sparrow (*Passer domesticus*)

New World Finches, Grosbeaks and Buntings

Northern Cardinal (*Cardinalis cardinalis)*
Rose-breasted Grosbeak (*Pheucticus ludovicianus)*
Blue Grosbeak (*Passerina caerulea)*
Indigo Bunting (*Passerina cyanea)*
Painted Bunting (*Passerina ciris)*
Dickcissel (*Spiza americana)*

Blackbirds and Orioles

Bobolink *(Dolichonyx oryzivorus)*
Red-winged Blackbird (*Agelaius phoeniceus)*
Eastern Meadowlark (*Sturnella magna)*
Rusty Blackbird (*Euphagus carolinus)*
Brewer's Blackbird (*(Euphagus cyanocephalus*)
Horned Lark (*Eremophila alpestris*)
Common Grackle (*Quiscalus quiscula)*
Brown-headed Cowbird (*Molothrus ater)*
Orchard Oriole (*Icterus spurious)*
Baltimore Oriole (*Icterus galbula)*

Old World Finches and House Sparrow

Purple Finch (*Carpodacus purpureus)*
House Finch (*Carpodacus mexicanus*)
American Goldfinch (*Carduelis tristis)*

MAMMALS

This list contains those species of mammals with a high probability of occurrence on Atchafalaya NWR according to various literature sources, surveys, and observations.
[Species with a * need USFWS confirmation]
Sources: (USFWS 2006c, Lowery 1974, and USFWS 2006a)

Didelphiidae (Opossums)
- Opossum (*Dedelphis marsupialis*)

Soricidae (Shrews)
- Short-tailed Shrew (*Blarina brevicauda*)
- Least Shrew (*Cryptotis parva*)

Talpidae (Moles)
- Eastern Mole (*Scalopus aquaticus*)*

Bats (Chiroptera)
- Southeastern Myotis (*Myotis austroriparius*)
- Eastern Pipistrel (*Pipistrellus subflavus*)
- Big Brown Bat (*Eptesicus fuscus*)*
- Red Bat (*Lasiurus borealis*)
- Seminole Bat (*Lasiurus seminolus*)
- Hoary Bat (*Lasiurus cinereus*)
- Northern Yellow Bat *(Lasiurus intermedius)*
- Evening Bat (*Nycticeius humeralis*)
- Rafinesque's Big-eared Bat (*Coryrhincus rafinesquii*)
- Brazilian Free-tailed Bat (*Tadarida brasiliensis*)*

Dasypodidae (Armadillos)
- Nine-banded Armadillo (*Dasypus novemcinctus*)

Leporidae (Hares Rabbits)
- Eastern Cottontail (*Sylvilagus floridanus*)
- Swamp Rabbit (*Sylvilagus aquaticus*)

Sciuridae (Squirrels)
- Eastern Gray Squirrel (*Sciurus carolinensis*)
- Fox Squirrel (*Sciurus niger*)
- Southern Flying Squirrel (*Glaucomys volans*)*

Geomyidae (Pocket Gophers)
- Plains Pocket Gopher (*Geomys bursarius*)*

Castoridae (Beaver)
- Beaver (*Castor canadensis*)

Cricetidae (Mice, Rats, Lemmings, Voles)
- Marsh Rice Rat (*Oryzomys palustris*)
- Fulvous Harvest Mouse (*Reithrodontomys fulvescens*)
- Deer Mouse *(Peromyscus maniculatus)*
- White-footed Mouse (*Peromyscus luecopus*)*
- Cotton Mouse (*Peromyscus gossypinus*)*
- Golden Mouse (*Peromyscus nuttalli*)*
- Hispid Cotton Rat (*Sigmodon hispidus*)
- Eastern Woodrat (*Neotoma floridana*)
- Pine (Woodland) Vole (*Pitymys pinetorum*)
- Muskrat (*Ondatra zibethica*)

Muridae (Old World Rats and Mice)
- Roof Rat (*Rattus rattus*)*
- Norway Rat (*Rattus norvegicus*)
- House Mouse (*Mus musculus*)

Capromyidae (Nutria)
Nutria (*Myocastor coypus*)*
Canidae (Dogs, Wolves, Foxes)
Coyote (*Canis latrans*)
Red Fox (*Vulpes fulva*)
Gray Fox (*Urocyon cinereoargenteus*)
Ursidae (Bears)
Black Bear (*Ursus americanus*)
Procyonidae (Racoons)
Raccoon (*Procyon lotor*)
Mustelidae (Weasels, Skunks)
Long-tailed Weasel (*Mustela frenata*)
Mink (*Mustela vison*)
Striped Skunk (*Mephitis mephitis*)
River Otter (*Lutra canadensis*)
Felidae (Cats)
Bobcat (*Lynx rufus*)
Suidae (Hogs)
Feral Hog (*Sus scrofa*)*
Cervidae (Deer)
White-tailed Deer (*Odocoileus virginianus*)

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* -- Invasive, non-native species

REPTILES AND AMPHIBIANS

This list contains those species of reptiles and amphibians with a high probability of occurrence on Atchafalaya NWR according to various literature sources, surveys, and observations.
Sources: (Boundy 2005, USFWS 2006a)

Alligatoridae (Alligators)
American Alligator (*Alligator mississippiensis*)
Chelydridae (Snapping Turtles)
Common Snapping Turtle (*Chelydra serpentina*)
Alligator Snapping Turtle (*Macroclemys temminckii*)
Kinosternidae (Musk and Mud Turtles)
Common Musk Turtle/Stinkpot (*Sternotherus odoratus*)
Razorback Musk Turtle (*Sternotherus carinatus*)
Mississippi Mud Turtle (*Kinosternon subrubrum hippocrepis*)
Emydidae (Box and Water Turtles)
Threetoed Box Turtle (*Terrapene carolina triunguis*)
Eastern Box Turtle *(Terrapene carolina carolina)*
Mississippi Map Turtle (*Graptemys pseudogeographica kohnii*)
False Map Turtle *(Graptemys pseudogeographica)*
Ouachita Map Turtle (*Graptemys ouachitensis*)
Redeared Slider (*Trachemys scripta elegans*),
River Cooter (*Pseudemys concinna*)
Southern Painted Turtle (*Chrysemys picta dorsalis*),
Western Chicken Turtle (*Deirochelys reticularia miaria*)
Trionychidae (Softshell Turtles)
Smooth Softshell (*Apalone mutica*)
Spiny Softshell (*Apalone spinifera*)

Iguanidae (Anoles and Fence Lizards)
Green Anole (*Anolis carolinensis*)
Teiidae (Racerunners)
Sixlined Racerunner (*Cnemidophorus sexlineatus sexl*ineatus)
Scincidae (Skinks)
Ground Skink/Little Brown Skink (*Scincella lateralis*)
Fivelined Skink (*Eumeces fasciatus*)
Broadhead Skink (*Eumeces laticeps*),
Southern Coal Skink (*Eumeces anthracinus pluvialis*)
Anguidae (Glass and Alligator Lizards)
Western Slender Glass Lizard (*Ophisaurus attenuatus attenuatus*)
Colubridae (Snakes)
Mississippi Green Water Snake (*Nerodia cyclopion*)
Diamondback Water Snake (*Nerodia rhombifer rhombifer*)
Yellowbelly Water Snake (*Nerodia erythrogaster flavigaster*)
Broadbanded Water Snake (*Nerodia fasciata confluens*)
Graham's Crayfish Snake (*Regina grahamii*)
Gulf Glossy Crayfish Snake (*Regina rigida sinicola*)
Midland Brown Snake (*Storeria dekayi wrightorum*)
Florida Redbelly Snake (*Storeria occipitomaculata obscura*)
Eastern Garter Snake (*Thamnophis sirtalis sirtalis*)
Western Ribbon Snake (*Thamnophis proximus proximus*)
Western Smooth Earth Snake (*Virginia valeriae elegans*)
Rough Earth Snake (*Virginia striatula*)
Eastern Hognose Snake (*Heterodon platirhinos*)
Mississippi Ringneck Snake (*Diadophis punctatus stictogenys*)
Western Worm Snake (*Carphophis vermis*)
Western Mud Snake (*Farancia abacura reinwardtii*)
Eastern Mud Snake *(Farancia abacura abacura)*
Buttermilk Racer (*Coluber constrictor anthicus)*
Black-Masked Racer (*Coluber constrictor latrunculus)*
Eastern Coachwhip (*Masticophis flagellum flagellum*)
Rough Green Snake (*Opheodrys aestivus*)
Corn Snake (*Elaphe guttata guttata*)
Black Rat Snake (*Elaphe obsoleta obsoleta*)
Speckled King Snake (*Lampropeltis getula holbrooki*)
Louisiana Milksnake (*Lampropeltis triangulum amaura*)
Prairie King Snake (*Lampropeltis calligaster calligaster*)
Northern Scarlet Snake (*Cemophora coccinea copei*)
Flathead Snake (*Tantilla gracilis*)
Elapidae (Coral Snakes)
Texas Coral Snake (*Micrurus tener tener*)
Viperidae (Vipers & Pit Vipers)
Southern Copperhead (*Agkistrodon contortrix contortrix*)
Western Cottonmouth/Water moccasin (*Agkistrodon piscivorus leucostoma*),
Western Pygmy Rattlesnake (*Sistrurus miliarius streckeri*)
Timber Rattlesnake (*Crotalus horridus*)
Eastern diamondback *(Crotalus adamanteus)*
Proteidae (Waterdogs and Mudpuppies)
Red River Mudpuppy (*Necturus maculosus louisianensis*)
Amphiumidae (Amphiumas)
Threetoed Amphiuma (*Amphiuma tridactlyum*)

Ambystomatidae (Salamanders)

Mole Salamander (*Ambystoma talpoideum*)
Marbled Salamander (*Ambystoma opacum*)
Smallmouth Salamander (*Ambystoma texanum*)
Spotted Salamander (*Ambystoma maculatum*)

Sirenidae (Sirens)

Western Lesser Siren (*Siren intermedia nettingi*)

Salamandridae (Newts)

Central/Spotted Newt (*Notophthalmus viridescens*)

Plethodontidae (Lungless Salamanders)

Dusky Salamander (*Desmognathus spp.*)
Dwarf Salamander (*Eurycea quadridigittata*)

Bufonidae (Toads)

Fowler's Toad (*Bufo fowleri*).
Gulf Coast Toad (*Bufo valliceps valliceps*)

Hylidae (Treefrogs and Their Allies)

Northern Cricket Frog (*Acris crepitans crepitans*)
Green Treefrog (*Hyla cinerea*)
Gray Treefrog (*Hyla versicolor*)
Cope's Gray Treefrog (*Hyla chrysoscelis*)
Squirrel Treefrog (*Hyla squirella*)
Birdvoiced Treefrog (*Hyla avivoca*)
Northern Spring Peeper (*Pseudacris crucifer*)
Upland Chorus Frog (*Pseudacris feriarum*)

Microhylidae (Narrowmouth Toads)

Eastern Narrowmouth Toad (*Gastrophryne carolinensis*)

Ranidae (True Frogs)

Bullfrog (*Rana catesbeiana*)
Bronze Frog (*Rana clamitans clamitans*)
Southern Leopard Frog (*Rana sphenocephala*)
Pickerel Frog (*Rana palustris*)

COMMON FISH

This list contains those species of fish with a high probability of occurrence on Atchafalaya NWR according to various literature sources, surveys, and observations.
Source: (USFWS 2006a)

Lepisosteidae (Gars)
- Spotted Gar (*Lepisosteus oculatus*)
- Longnose Gar (*Lepisosteus osseus*)
- Shortnose Gar (*Lepisosteus platostomus*)
- Alligator Gar (*Lepisosteus spatula*)

Amiidae (Bowfin)
- Bowfin (*Amia calva*)

Cyprinidae (Minnows)
- Common Carp (*Cyprinus carpio*)

Catostomidae (Suckers)
- Smallmouth Buffalo (*Ictiobus bubalus*)
- Bigmouth Buffalo (*Ictiobus cyprinellus*)

Ictaluridae (Catfishes)
- Black Bullhead (*Ameiurus melas*)
- Blue Catfish (*Ictalurus furcatus*)
- Yellow Bullhead (*Ameiurus natalis*)
- Channel Catfish (*Ictalurus punctatus*)
- Flathead Catfish (*Pylodictis olivaris*)

Percicthyidae (Temperate Basses)
- Yellow Bass (*Morone mississippiensis*)
- Largemouth Black Bass (*Micropterus salmoides*)

Centrarchidae (Sunfishes)
- Green Sunfish (*Lepomis cyanellus*)
- Warmouth (*Lepomis gulosus*)
- Orangespotted Sunfish (*Lepomis humilis*)
- Bluegill (*Lepomis macrochirus*)
- Longear Sunfish (*Lepomis megalotis*)
- Redear Sunfish (*Lepomis microlophus*)
- Largemouth Bass (*Micropterus salmoides*)
- White Crappie (*Pomoxis annularis*)
- Black Crappie (*Pomoxis nigromaculatus*)
- White Bass (*Morone chysops)*

Sciaenidae (Drums)
- Freshwater Drum (*Aplodinotus grunniens*)

Polyodontidae (Paddlefish)
- Paddlefish (*Polyodon spathula*)

WILDLIFE SPECIES OF SPECIAL CONCERN ON ATCHAFALAYA NWR

Birds

American Swallow-tailed Kite *(Elanoides forficatus)*
Bald Eagle *(Haliaeetus leucocephalus)*
Osprey *(Pandion haliaetus)*
Roseate Spoonbill *(Platalea ajaja)*
Peregrine falcon *(Falco peregrines tundrius)*
Eskimo Curlew *(Numenius borealis)*
Bachman's Warbler *(Vermivora bachmanii)*
Ivory-billed Woodpecker *(Campephilus principalis)*

Fish

Paddlefish *(Polyodon spathula)*
Pallid Sturgeon *(Scaphirhynchus albus)*

Crustaceans

Old Prairie Crawfish *(Fallicambarus macneesei)*

Mammals

Louisiana Black Bear *(Ursus americanus luteolus)*
Eastern Harvest Mouse *(Reithrodontomys humulis)*
Florida Panther *(Puma concolor coryi)*
Red Wolf *(Canis rufus)*

Reptiles

American Alligator *(Alligator Mississippiensis)*
Alligator Snapping Turtle *(Macroclemys temminckii)*

COMMONLY OCCURRING VEGETATION ON ATCHAFALAYA NWR

Source: (USFWS 2006a)

Trees – Dominant Vegetation

- Black Willow
- Cherrybark Willow
- Cottonwood
- Bald Cypress
- Drummond Red Maple
- Elms: Winged, Water, Cedar, Green Ash
- Gum – Red, Tupelo
- Hackberry
- Oaks: Red, Overcup, Nuttall, Shumard, Water, Willow
- Pecans: Sweet and Bitter
- Red Maple
- Red Mulberry
- Swamp Cottonwood
- Sweetgum
- Sycamore

Mid-Story/Understory – Subdominant Vegetation

- Blackberry
- Black Locust
- Box Elder
- Button Bush
- Deciduous Holly
- Dew Berry
- French Mulberry
- Haws (Cretagus)
- Honey Locust
- Honeysuckle
- Hornbeam Palmetto
- Milkweed
- Persimmon
- Prickly Ash
- Smilax (Greenbriar)
- Swamp (Rough leaf) Dogwood
- Swamp Privet
- Switchcane
- Vines: Rattan, Muscadine, Poison Ivy and Poison Oak, Virginia Creeper, Pepper Vine, Trumpet Creeper, Grape and Cross Vine
- Water Hickory
- Water Locust

Wet Sites

- Pickerel-Weed
- Water Hyacinth
- Pennywort
- Duckweed
- Arrowhead
- Smartweed
- Water Primrose
- American Lotus
- Coontail
- Floating Heart
- Various Sedges and Grasses
- Iris
- Spider Lily

Lizards Tail
Marsh Mallow
Cardinal Flower
Cattail
Alligator Weed

Classification of Atchafalaya NWR Vegetation

Source: (Strader and Chouinard 2008)

Vegetative Type	Acres
Sugarberry, American elm, green ash	5,181
Black willow, bald cypress	4,273
Sycamore, sweetgum, American elm	2,061
Black willow, bald cypress, maple	1,660
Sugarberry, American elm, green ash, sycamore, sweetgum	1,380
Oaks, Pecan, black cherry, mulberry	187
Bald cypress	152
Oaks, American elm, sweetgum	98
Nuttail oak, green ash, American elm, persimmon	62
Oaks, Sycamore, bald cypress	41
Willow oak, water oak, American elm, persimmon	10
Open water	65
Open field	50
Total	**15,220**

Atchafalaya NWR Timber Volume by Species

Source: (Boykin 1990)

Tree Species	Trees per Acre	Total Trees
Ash	3.572	51,636
Cypress	3.209	46,395
Willow	3.145	45,456
Sycamore	1.237	17,878
Gum	1.115	16,111
Red Oak	1.013	14,640
Hackberry	0.843	12,179
Cottonwood	0.680	9,835
Elm	0.672	9,720
Maple	0.603	8,722
Overcup Oak	0.476	6,885
Bitter Pecan	0.241	3,484
Boxelder	0.146	2,104
Locust	0.018	260
Other	0.021	307
Total	**16.991**	**245,612**