
D'Arbonne National Wildlife Refuge

Comprehensive Conservation Plan



**U.S. Department of the Interior
Fish and Wildlife Service
Southeast Region**

October 2006

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D'ARBONNE NATIONAL WILDLIFE REFUGE

COMPREHENSIVE CONSERVATION PLAN

OUACHITA AND UNION PARISHES, LOUISIANA

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

*Southeast Region
Atlanta, Georgia*

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I. Background

INTRODUCTION

This Comprehensive Conservation Plan for D'Arbonne National Wildlife Refuge was prepared to guide management actions and direction for the refuge. The National Wildlife Refuge System Improvement Act of 1997 requires that all refuges be managed in accordance with an approved comprehensive plan. Each refuge has purposes for which it was established that are used to develop and prioritize management goals and objectives within the realm of the Refuge System mission, and guide which public uses occur on 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.

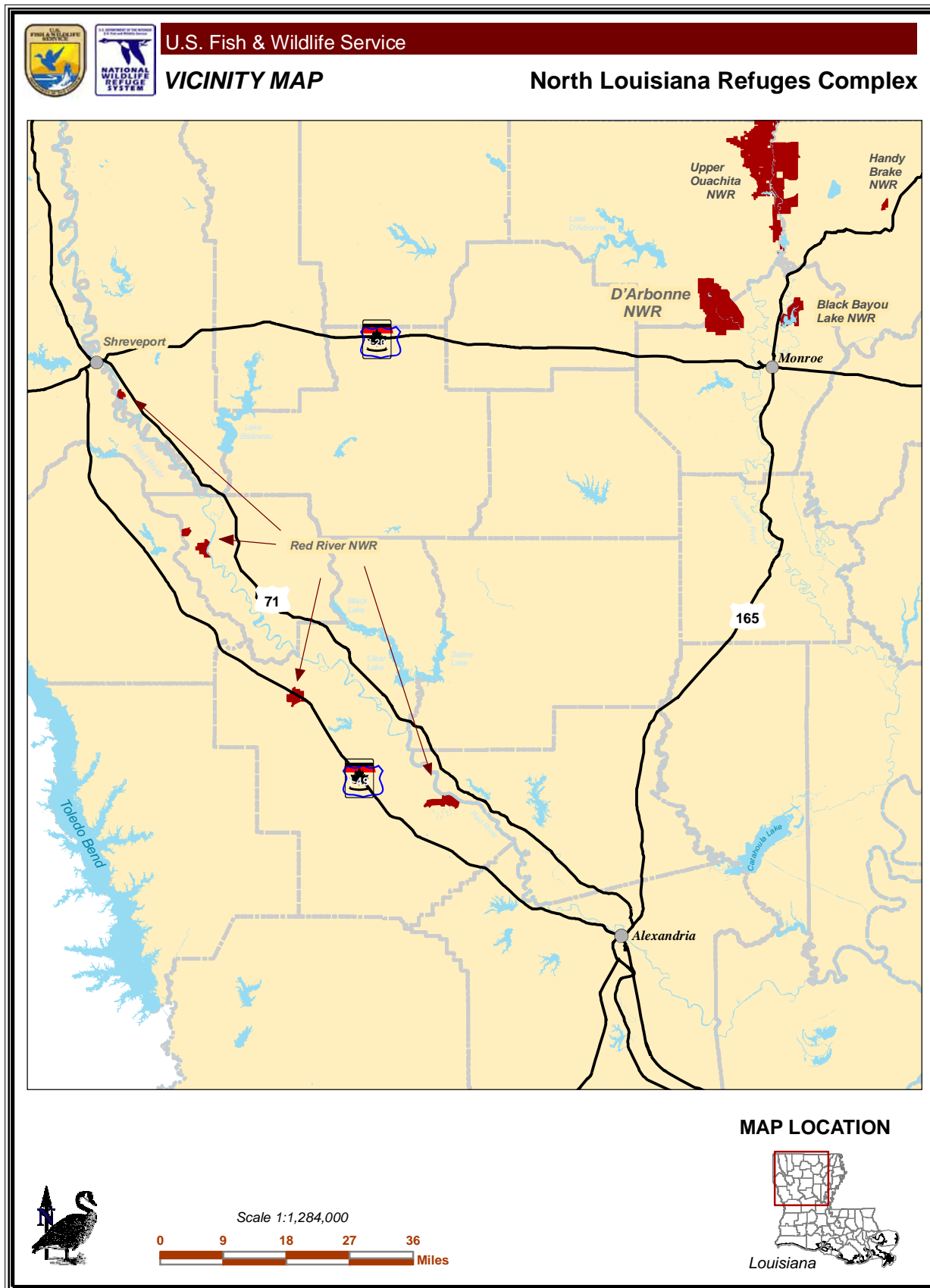
The planning process is a tool for the Service and the public to evaluate management goals and objectives for the best possible fish and wildlife conservation efforts, while providing for wildlife-dependent recreation opportunities that are compatible with the establishing purposes. A planning team developed 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. The draft of this plan and accompanying environmental assessment was made available to state and federal government agencies, conservation partners, and the general public for review and comment. The comments from each entity were considered in the development of this comprehensive conservation plan, which is the Fish and Wildlife Service's preferred plan.

The D'Arbonne National Wildlife Refuge is part of the North Louisiana National Wildlife Refuge Complex (Figure 1). This Complex includes D'Arbonne, Upper Ouachita, Black Bayou Lake, Handy Brake, and Red River refuges, and the Louisiana Wetland Management District. Each refuge has unique issues and will require separate planning efforts and public involvement (Table 1).

Table 1. Proposed schedule for completion of comprehensive conservation plans and environmental assessments for refuges in the North Louisiana National Wildlife Refuge Complex

<i>Refuge</i>	<i>Proposed Start</i>	<i>Proposed Finish</i>
D'Arbonne	January 2004	September 2006
Upper Ouachita	October 2005	March 2008
Handy Brake	October 2005	March 2008
Red River	February 2006	July 2008
Louisiana Wetland Management District	October 2008	March 2008
Black Bayou Lake	November 2008	May 2011

Figure 1. D'Arbonne National Wildlife Refuge vicinity map



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 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 National Wildlife Refuge System; and
- Provide a basis for the development of budget requests for operations, maintenance, and capital improvement needs.

D'Arbonne National Wildlife Refuge was established as mitigation for a large U.S. Army Corps of Engineers navigation project on the Ouachita River. Its legislative purpose is that the refuge "shall be administered by him [Secretary of the Interior] directly or in accordance with cooperative agreements... and in accordance with such rules and regulations for the conservation, maintenance, and management of wildlife, resources thereof, and its habitat thereon," (16 U.S.C. 664) under the authority of the Fish and Wildlife Coordination Act.

Perhaps the greatest need of the Service is communication with the public and the public's participation in carrying out the mission of the National Wildlife Refuge System. Many agencies, organizations, institutions, and businesses have developed relationships with the Service to advance the mission of national wildlife refuges.

FISH AND WILDLIFE SERVICE

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

NATIONAL WILDLIFE REFUGE SYSTEM

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

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

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

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 Atascosa (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 federal 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.

LEGAL POLICY CONTEXT

Administration of national wildlife refuges is guided by the mission and goals of the National Wildlife Refuge System, congressional legislation, Presidential executive orders, and international treaties. Policies for management options of refuges are further refined by administrative guidelines established by the Secretary of the Interior and by policy guidelines established by the Director of the Fish and Wildlife Service. Refer to Appendix C for a complete listing of relevant legal mandates.

Lands within the National Wildlife Refuge System are closed to public use unless specifically and legally opened. All programs and uses must be evaluated based on mandates set forth in the National Wildlife Refuge System Improvement Act of 1997 (16 U.S.C. 668dd-668ee). 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 (e.g., hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation) 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.

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 the local, national, international, and ecosystem levels. Conservation initiatives include broad-scale planning and cooperation between affected parties to address declining trends of natural, physical, social, and economic environments. The conservation guidance described below, along with issues, problems, and trends, was reviewed and integrated, where appropriate, into this comprehensive conservation plan.

Perhaps the greatest need of the Service is communication with the public and public agency participation in efforts to carry out the mission of the National Wildlife Refuge System. Many agencies, organizations, institutions, and businesses have developed relationships with the Service to advance the mission of national wildlife refuges. This comprehensive conservation plan supports, 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. The North American Bird Conservation Initiative is a coalition of government, private, and academic organizations, and private industry leaders addressing bird conservation. Priority lands include coastal inter-tidal habitats that provide critical wintering areas (e.g., American oystercatcher), important wintering and spring migration areas (e.g., short-billed dowitcher and dunlin), and important fall staging areas (e.g., red knot). Sizable numbers of brown pelicans and various terns breed on offshore islands, including Little Dauphin Island. Coastal areas provide important wintering, nesting, and foraging habitats for large numbers of shorebirds, waterfowl (e.g., canvasbacks and Tundra swans), and other species. Managed impoundments in coastal areas are important to migrating and wintering dabbling ducks, including the American black duck (USFWS, Division of Bird Habitat Conservation).

NORTH AMERICAN WATERFOWL MANAGEMENT PLAN. The Gulf Coast Joint Venture, a regional partnership composed of individuals, conservation organizations, and state and federal agencies, which implements the North American Waterfowl Management Plan, targets the conservation of migratory birds and their habitats along the western Gulf of Mexico from Brownsville, Texas, to Mobile Bay in Alabama. The primary goal of the joint venture is to provide wintering and stop-over habitat for scaup, canvasbacks, and numerous dabbling ducks. Three major waterfowl habitats have been targeted for Mobile Bay, including coastal marsh, submerged aquatic vegetation, and forested wetlands.

PARTNERS-IN-FLIGHT BIRD CONSERVATION PLAN. Managed as part of the Partners-in-Flight Plan, the east gulf coastal plain physiographic area represents a scientifically based land bird conservation planning effort that ensures long-term maintenance of healthy populations of native land birds, primarily 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 Service's Southeast Region include pelagic areas, marshes, forested wetlands, and barrier and sea island complexes. Fifteen species of waterbirds are federally listed, including breeding populations of wood storks, Mississippi sandhill cranes, whooping cranes, interior least terns, and Gulf coast populations of brown pelicans. A key objective of this plan is the standardization of data collection efforts to better recommend effective conservation measures.

RELATIONSHIP TO STATE WILDLIFE AGENCY

A provision of the National Wildlife Refuge System Improvement Act of 1997, and subsequent agency policy, is that the Service shall ensure timely and effective cooperation and collaboration with other state game and fish 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 sustainability of fish and wildlife species in the State of Louisiana.

LOUISIANA DEPARTMENT OF WILDLIFE AND FISHERIES

Cooperation among national wildlife refuges and state wildlife management areas provides the foundation for protection of wildlife species and habitat, and contributes to the maintenance of biological integrity and diversity of fish and wildlife in the State of Louisiana and throughout the United States

The Louisiana Department of Wildlife and Fisheries is charged with enforcement responsibilities relating to migratory birds and endangered species, as well as managing state natural resources and approximately 1.4 million acres of coastal marshes and wildlife management areas. It coordinates the state wildlife conservation program and provides public recreation opportunities on state wildlife management areas. Russell Sage, Ouachita, Union, and Bouef state wildlife management areas are within the ecosystem of D'Arbonne Refuge, and the state manages the fisheries within Bayou D'Arbonne itself. The Department of Wildlife and Fisheries has also partnered with the Service on the development of this comprehensive conservation plan through participation on the core planning team, biological review team, and through internal reviews of the document.

LOUISIANA DEPARTMENT OF NATURAL RESOURCES

The mission of the Louisiana Department of Natural Resources is to preserve and enhance the nonrenewable natural resources of the state, consisting of land, water, oil, gas, and other minerals, through conservation, regulation, and economic benefit from its asset base. The Monroe Gas Field underlies portions of Ouachita, Union, and Morehouse parishes. Mineral rights were not obtained when the refuge was acquired. The refuge works with the Department of Natural Resources to maintain current records of all active and inactive gas leases on refuge lands.

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

II. Refuge Overview

INTRODUCTION

D'Arbonne National Wildlife Refuge is in northeast Louisiana, 23 miles south of the Arkansas border and 2.5 miles north of West Monroe, Louisiana (Figure 1). The refuge encompasses 17,421 acres, with 9,535 acres in Union Parish and 7,886 acres in Ouachita Parish. Its southern boundary is at the edge of suburban sprawl of the city of West Monroe and expands north approximately 8 miles, following just west of Highway 143.

D'Arbonne National Wildlife Refuge, established in 1975, is within the Lower Mississippi River floodplain in north Louisiana. The refuge includes deep overflow swamps, bottomland hardwood forests, and upland mixed pine/hardwoods. The refuge provides habitat for thousands of wintering waterfowl; wading and water birds, such as white ibis, herons, egrets, and wood storks; and year-round habitat for nesting wood ducks. Many neotropical migratory birds breed on the refuge and use it during migration. There are also numerous species of resident game, such as squirrel and deer, amphibians, furbearers, and reptiles.

The refuge is open year-round for wildlife-related activities, such as fishing, wildlife observation, biking, nature photography, and hiking. Public use facilities include trails and boat ramps. Hunting and fishing opportunities are permitted on most areas of the refuge, according to specific refuge regulations. As required by the National Wildlife Refuge System Improvement Act of 1997, wildlife resources must be given first priority, with recreational uses available to the public as long as they are compatible with the mission of the Service and the purpose for which the refuge was established.

REFUGE HISTORY AND PURPOSE

In 1957, Congress authorized the Columbia Lock and Dam as part of the Ouachita and Black Rivers' Navigation Project. The dam was intended to increase the minimum depth of the navigation channel from 6.5 feet to 9 feet. Since this would result in the permanent flooding of some areas along lower Bayou D'Arbonne, it was necessary for the Army Corps of Engineers to acquire the land to be submerged. The Corps also was interested in purchasing areas adjacent to the permanent pool so that a national wildlife refuge could be established. At the same time, the Louisiana Department of Wildlife and Fisheries was interested in acquiring or leasing some of the same land along the lower Bayou D'Arbonne for use as a greentree reservoir.

At the request of landowners, the state sponsored a public meeting in 1965, in West Monroe so that plans for the future of the lower Bayou D'Arbonne bottomlands could be made public. Although the state proposal was supported by local sportsmen, including the local chapter of the National Wildlife Federation, the Corps' plan for the area prevailed. Eventually the local chapter of the National Wildlife Federation, other local sportsmen, and local congressmen placed their support behind the refuge concept. Partly as a result of this local support, the Rivers and Harbors Act was passed by Congress on December 31, 1970. This Act modified the Ouachita and Black Rivers' Navigation Project to provide for the establishment of national wildlife refuges in the area affected by the project.

In 1972, the Fish and Wildlife Service conducted a field investigation to recommend lands for the Corps to purchase for D'Arbonne National Wildlife Refuge. The refuge was divided into 93 tracts held by 56 owners. Five corporations owned 80.2 percent of the land, fifty private individuals owned about 19.60 percent of land, and the State of Louisiana owned 0.2 percent. On September 6, 1972, the

Corps sponsored a public meeting in West Monroe to acquaint property owners and other interested parties with the boundaries of the refuge and to explain acquisition policies. The acquisition process was initiated shortly after the date of the meeting. By 1975, most of the land was acquired, and the refuge was established under an interim management permit with the Department of the Army. Litigation on the last two tracts, however, was not completed until 1978.

Mineral rights were not acquired on any of the land included in the refuge, and the only improvements on the refuge at the time of acquisition were unpaved roads, fence lines, drainage ditches, a barn, a log storage building, two hunters' cabins, a permanent residence, gas wells, gas pipelines, and power lines. The Corps owned the refuge until 1981, when the Service finally acquired the fee title of 17,421 acres of deep overflow swamp, bottomland hardwood forest, and mixed pine/hardwood uplands. The refuge legislative purpose is for the "conservation, maintenance, and management of wildlife, resources thereof, and its habitat thereon," (16 U.S.C. 664 *Fish and Wildlife Coordination Act*). An entire history of the area of the refuge can be found in Table 2.

SPECIAL DESIGNATIONS

LOUISIANA'S NATURAL AND SCENIC RIVERS

The Louisiana Natural and Scenic River System is one of the nation's largest, oldest, most diverse and unique state river protection initiatives. It began in the early 1970s with the passage of the Louisiana Natural and Scenic River Act. The Act set certain requirements for a river to meet in order for it to be included in the system. The Act also established a regulatory program and empowered the Secretary of the Louisiana Department of Wildlife and Fisheries to administer the system through regulation and permits.

Louisiana Department of Wildlife and Fisheries designated Bayou D'Arbonne a Louisiana Natural and Scenic River from the Lake D'Arbonne dam to its entrance into the Ouachita River. This includes the 13 miles of the bayou as it traverses through the refuge. There is strong interest at the local, state, and national levels to ensure that the scenic rivers are conserved both as irreplaceable elements of Louisiana's rich natural heritage and as resources to be used and enjoyed by local residents and visitors. Therefore, certain activities, which drastically alter the natural and scenic qualities of rivers in the system, are prohibited by the State of Louisiana. These activities include channelization, channel realignment, clearing and snagging, impoundments, and commercial clear-cutting of timber within 100 feet of the low water mark.

PUBLIC USE NATURAL AREA

Designation and management of natural areas is delegated to the Director of the Fish and Wildlife Service by the National Wildlife Refuge System Administration Act of October 15, 1966. Research natural areas and public use natural areas are administratively designated, modified, or abrogated by the Director. In this comprehensive conservation plan, the refuge has proposed four public use natural areas.

Public use natural areas exemplify relatively undisturbed ecosystems that are available for public use with certain restrictions for protecting the integrity and significance of the areas. Such an area must possess exceptional value or quality in illustrating or interpreting an element of the natural heritage of the nation. This designation is fostered only by the National Wildlife Refuge System. There are two objectives for public use natural areas. These are (1) to assure the preservation of a variety of significant natural areas for public use, which, when considered together, illustrate the diversity of the National Wildlife Refuge System's natural environments; and (2) to preserve for the future valuable environments that are essentially unmodified by man.

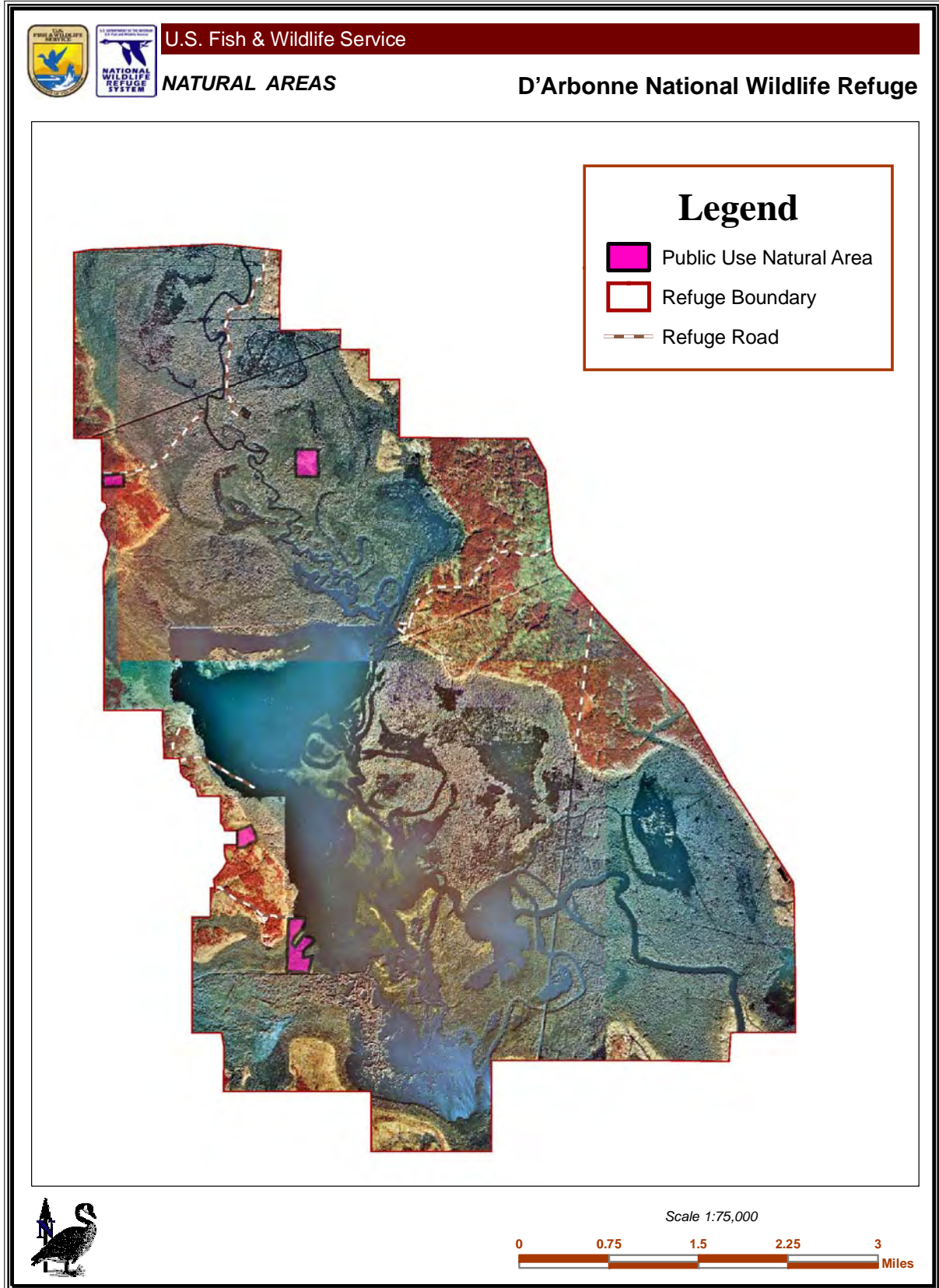
Table 2. Historical timeline of D'Arbonne National Wildlife Refuge establishment

<p><i>Before 10,000 BC-1700 AD</i> Native Americans inhabited northeastern Louisiana. At least three sites on or adjacent to refuge land were used as villages or burial grounds. One of these sites, a burial ground, was established during the period 1500-250 BC.</p>	<p><i>Late 1950s</i> The last areas of cultivated upland on the west side of the refuge were abandoned.</p>
<p><i>1700-1785</i> The region around lower Bayou D'Arbonne was inhabited by the Ouachita Indians, an agricultural people of the Caddo cultural-linguistic group. French explorers, hunters, and trappers traveled the area. One of the early explorers was a Canadian named Jean D'Herbanne. The name of the Bayou is presumably an alteration of his name.</p>	<p><i>1964</i> Construction began on the Columbia Lock and Dam.</p>
<p><i>1785-1803</i> A Spanish military post was established 6.5 miles southeast of the refuge. A small settlement developed and two land grants during this period included part of what is now refuge.</p>	<p><i>1966-1967</i> The baldcypress plantation plus 1,000 acres of bottomland forests were cleared and planted in soybeans. After 2-3 years of crop failures due to flooding, farming was abandoned.</p>
<p><i>1803-mid-1800s</i> The United States acquired Louisiana. American settlers established farms in the upland areas near Bayou D'Arbonne</p>	<p><i>1967</i> Part of the Bayou Choudrant in the southwestern part of the refuge was channelized to improve drainage. This was done to facilitate timber operations.</p>
<p><i>Mid-late 1800s</i> Steamboats ran Bayou D'Arbonne to transport cotton and Union Parish farm products to market.</p>	<p><i>December 31, 1970</i> Congress passed the Rivers and Harbors Act. This authorized the purchase of land for national wildlife refuges in the area affected by the Ouachita Navigation Channel Project.</p>
<p><i>1883</i> The construction of a railroad from Monroe to Ruston, Louisiana, began the demise of steamboats on Bayou D'Arbonne.</p>	<p><i>April 5, 1972</i> Following a field investigation, the Fish and Wildlife Service recommended to the Corp of Engineers the land to be purchased for D'Arbonne Refuge.</p>
<p><i>1902</i> Congress authorized a minimum 6.5-foot slack-water channel on the Ouachita River through a system of locks and dams.</p>	<p><i>June 1972</i> The level of the permanent pool behind the Columbia Lock and Dam was increased to 51 feet above MSL by the Corps.</p>
<p><i>1912-1925</i> The first extensive timber harvest occurred in the D'Arbonne bottomlands, which would include the majority of bottomland habitat of the refuge today.</p>	<p><i>September 6, 1972</i> A public meeting was held in West Monroe concerning acquisition of lands for the refuge. The attitude of those present was mixed, but strong opposition was not evident.</p>
<p><i>1925</i> The system of locks and dams providing a 6.5-foot slack-water channel on the Ouachita River was completed.</p>	<p><i>November 20, 1972</i> The Columbia Lock and Dam were completed.</p>
<p><i>1950</i> Congress authorized construction necessary to increase the depth of the Ouachita Navigation Channel to nine feet.</p>	<p><i>May 19, 1975</i> D'Arbonne Refuge was established under an Interim Management Permit with the Department of the Army.</p>
<p><i>1954-1955</i> Approximately 1,000 acres of bottomland on the west side of the refuge were cleared and planted in baldcypress, sweetgum, and water tupelo, of which the latter two did not survive.</p>	<p><i>July, 1975</i> The level of the permanent pool behind the Columbia Lock and Dam was increased to 52 feet above MSL.</p>
<p><i>1957</i> The Columbia Lock and Dam were authorized by Congress as a result of a study of the Ouachita Navigation Channel Project.</p>	<p><i>December 31, 1981</i> The Service received fee title to D'Arbonne Refuge from the Corps of Engineers.</p>

The public use natural area designation was used instead of the research natural area designation when the area in question was relatively small, near areas of high public use, or on areas of great public interest. Four public use natural areas, ranging in size from 14 to 66 acres, were proposed in the following vegetation types/landforms and encompass an associated formation of geologic or hydrologic origin (D'Arbonne Master Plan 1981; Forest Habitat Management Plan 1983; Figure 2):

- Choudrant Brake: This 66-acre proposed public use natural area is on the north side of the Bayou Choudrant drainage channel comprised of bottomland forest types of baldcypress-water tupelo, overcup oak-water hickory, and sweetgum-willow oak.
- Upland-Bottomland Hardwood Transition: This area is 14 acres on a steep hillside having an Eocene-aged soil of coarse "ironstone" concretions. The slope is dissected by a deep v-shaped gully and several smaller, intermittent gullies. This upland area supports a number of trees, including white oak, southern red oak, post oak, blackgum, loblolly pine, sweetgum, white ash, water oak, mockernut hickory, and black cherry, with red maple, flowering dogwood, redbud, eastern hophornbeam, and mulberry in the midstory. Among the plants found in the understory are American beautyberry, red buckeye, tree sparkleberry, and poison-ivy. Toward the lower portion of the slope the grade levels off, and converts to bottomland species, such as willow oak and American elm, with some water hickory and baldcypress. One specimen of morel, considered to be on the extreme southern limits of its range, was discovered in this area.
- Possaw Island: This proposed public use natural area is 40 acres encompassing a high hummock of coarse diluvium rising to over 80 feet in elevation above the surrounding first bottom flat at less than 60 feet in elevation. The higher ground supports upland species, such as loblolly pine, southern red oak, blackgum, mockernut hickory, water oak, tree sparkleberry, flowering dogwood, two-wing silverbell, mulberry, American beautyberry, and red buckeye, as well as sweetgum, willow oak, overcup oak, water hickory, common persimmon, and greenbrier. The surrounding flats are dominated by willow oak, sweetgum, overcup oak, and water hickory, with some common persimmon, hawthorn, American snowbell, possumhaw, and baldcypress. There is a small sump area on the eastern side of the island where swamp species, such as baldcypress, planertree, waterlocust, and common buttonbush, predominate.
- Beech Seep: This 36-acre proposed public use natural area partially encompasses two upland drainage basins supporting a botanically rich beech-sweetbay forest. The sandy "ironstone" soil is presumed to have its origins in the Eocene epoch. The southern portion is locally known as Hinton Hollow, and popular with squirrel hunters because of the favorable habitat provided by the hollow beech trees. This area also supports loblolly pine, southern red oak, sweetgum, post oak, mockernut hickory, water oak, white oak, white ash, blackgum, black cherry, and willow oak, as well as red maple, American holly, eastern hophornbeam, American hornbeam, flowering dogwood, and mulberry. Among the shrub species are American beautyberry, wild azalea, tree sparkleberry, witch-hazel, and red buckeye. Common woody vines present are poison-ivy, Virginia creeper, Alabama supplejack, grape, and greenbrier. The northern unit, where the soil is maintained moist by a perennial spring at the headwaters, supports an especially rich flora. In addition to all the previous species, sweetbay is prominent along the meandering streamcourse, while eastern red cedar is common on the higher, drier sites. Several species of ferns and numerous herbaceous plants are also common here, such as jack-in-the-pulpit and twayblade.

Figure 2. D'Arbonne National Wildlife Refuge proposed Public Use Natural Area designations



ECOSYSTEM CONTEXT

LOWER MISSISSIPPI RIVER ECOSYSTEM

The Lower Mississippi River Ecosystem includes the alluvial plain of the Mississippi River downstream of its confluence with the Ohio River and the delta plain and associated marshes and swamps created by the meanderings of the Mississippi River and its tributaries (FWS 2002). The drainage basins and tributaries of the Ouachita River, which include D'Arbonne Refuge, are part of the West Gulf Coastal Plain upland section of the Lower Mississippi River Ecosystem (Figure 3).

D'Arbonne Refuge is in the heart of protected bottomland hardwoods and wetlands of north Louisiana. Five national wildlife refuges (D'Arbonne, Upper Ouachita, Black Bayou Lake, Handy Brake and Tensas River), and thirty-six state wildlife management areas are focused on conservation, enhancement, and restoration of bottomland hardwoods; moist-soil management; endangered species management; environmental education; and compatible wildlife-dependent recreation in the Lower Mississippi River Ecosystem. The ecosystem guides Fish and Wildlife Service efforts to enhance, restore, and conserve the natural functional processes and habitat types, while maintaining economic productivity and recreational opportunities.

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

The following eight goals were developed for the ecosystem that this comprehensive conservation plan will consider and promote to ensure the refuge continues its contribution to ecosystem conservation and integrity.

- 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 threatened, endangered, 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.
- 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.

Immediate priorities established for the ecosystem in 2004, to which the refuge contributes and will continue to foster include:

- Continue working closely with state fish and wildlife agencies, other conservation entities, and private landowners to provide seasonal flooding of harvested crop lands, set-aside lands, and moist-soil habitats to benefit waterfowl, shorebirds, and wading birds on federal, state and private lands.

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- Consider all grant programs available to the ecosystem team and Service partners and work to improve internal coordination to assure that the contribution of these programs to the resource is maximized.
 - Support environmental education efforts underway by the Service to enhance and expand knowledge, awareness, and appreciation of trust resources. Encourage the development of new programs with these objectives. Support environmental education funding initiatives throughout the ecosystem.
 - Continue efforts to combat the spread of invasive species throughout the ecosystem utilizing biological, chemical, and/or mechanical means. Partnerships with state and local governments, as well as federal sources, will be sought.

An area encompassing D'Arbonne Refuge and its southeast border has also been delineated within the Mississippi Alluvial Valley as a Forest Bird Conservation Region (Mueller et al., 1996). Forest Bird Conservation Regions were delineated based on extant forest area and configuration, location of public land holdings, historic forest distribution, political and physiographic boundaries, and "expert" opinion regarding the likelihood of reforestation (Mueller et al., 1996). Twedt & Uihlein (1999) then prioritized these regions for reforestation opportunities based on the benefit that the restoration would provide to forest breeding landbirds. D'Arbonne Refuge has over 4,000 acres that ranked out with moderate to highest restoration priority (Twedt & Uihlein 1999).

West Gulf Coastal Plain Bird Conservation Region

The Lower Mississippi River Ecosystem is covered primarily by two bird conservation regions: Mississippi Alluvial Valley and West Gulf Coastal Plain (Figure 3). The West Gulf Coastal Plain includes D'Arbonne Refuge because it reaches to the northwestern most portion of the Mississippi Alluvial Basin. This section of the region is primarily mixed pine/hardwood types with bottomland hardwood forest species in the more mesic areas and on slopes. These forests are of high conservation priority for conserving the natural communities and the bird populations within these habitats. The primary threats to these forests include reservoir construction; stream modifications; destructive timber harvesting practices; and conversion to pine plantations, pastures, and other land uses (Neal, <http://www.lmvjv.org/wgcp>). This plan will define conservation strategies to foster support for the West Gulf Coastal Plain priorities.

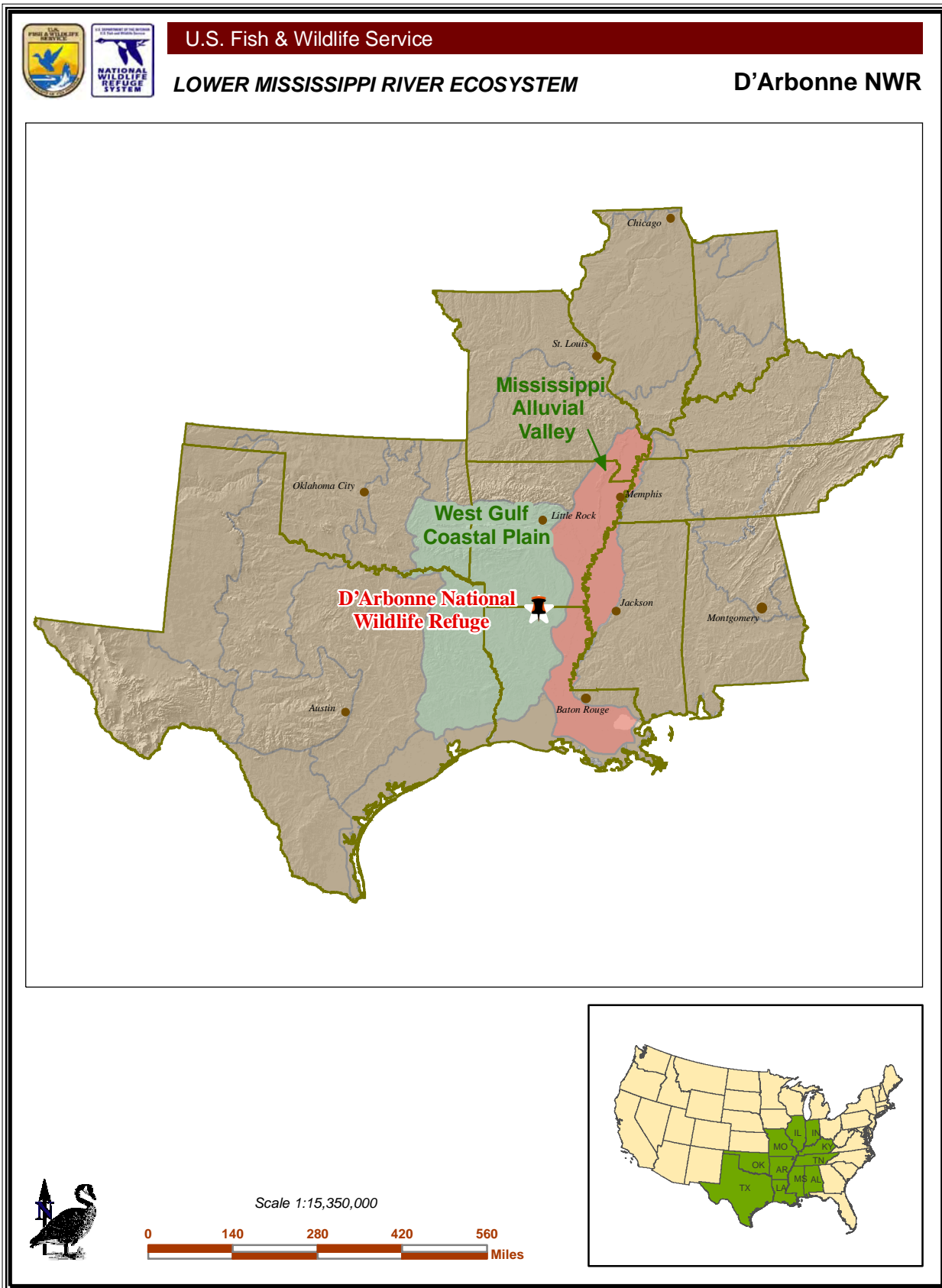
REGIONAL CONSERVATION PLANS AND INITIATIVES

NORTHERN BOBWHITE CONSERVATION INITIATIVE

The initiative's goal is "to restore northern bobwhite populations range wide to an average density equivalent to that which existed on improvable acres in 1980 [58,857,000]." The population objective for the West Gulf Coastal Plain Bird Conservation Region is to add 131,033 new coveys, 21,833 of these in Louisiana. Habitat management is the primary vehicle for accomplishing this goal with three specific objectives, which the refuge has considered in this comprehensive conservation plan. These are:

- Increase the amount and enhance the quality of agricultural lands for nesting, brood-rearing, and roosting by bobwhites and other grassland species by adding native warm season grasses and other conservation plantings, such as shrubs and forbs.

Figure 3. Lower Mississippi River Ecosystem



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- Enhance the management practices on pinelands and mixed pine/hardwoods by thinning, controlled burning, and site preparation in a fashion that benefits bobwhites and other wildlife, and increase acreage devoted to longleaf pine where it is ecologically feasible.
 - Conserve and enhance the quality of rangelands by utilizing vegetation management practices and grazing regimes that favor the retention and improvement of native plant communities beneficial to bobwhites and other wildlife.

AMERICAN WOODCOCK MANAGEMENT PLAN

The American Woodcock Management Plan was developed by the Service in 1990 to “guide the conservation of woodcock in the United States.” The plan gives general guidance for habitat and population management at the national level. Though habitat for woodcock is limited on D’Arbonne Refuge, habitat practices that benefit woodcock have been considered in this comprehensive conservation plan.

RED-COCKADED WOODPECKER RECOVERY PLAN

The red-cockaded woodpecker population on D’Arbonne Refuge is considered an important support population, but is not identified in the recovery criteria (USFWS 2003). This comprehensive conservation plan evaluates resource and management needs for red-cockaded woodpecker management under the guidelines for critically small populations, as defined in the Red-cockaded Woodpecker Recovery Plan.

ECOLOGICAL THREATS AND PROBLEMS

LOSS OF BOTTOMLAND HARDWOODS AND FRAGMENTATION

The entire 25-million-acre Lower Mississippi Valley was once a floodplain forest of primarily oak-gum-cypress cover types with overcup, willow, Nuttall, water, swamp chestnut and cherrybark oaks, as well as sweetgum, water tupelo, water hickory, willow, cottonwood, sycamore, sugarberry, red maple, box elder, baldcypress, and green ash. Only about 23 percent remains in forest with the rest primarily lost to cropland conversion and hydrological changes associated with flood control. This unique ecosystem is important to hundreds of wildlife species and native plant communities. Bottomland hardwoods and associated wetlands support substantial wintering populations of a number of waterfowl species, mainly mallards, and breeding and wintering wood ducks, and are a primary migration corridor for significant numbers of other dabbling ducks. Bottomland hardwoods are also a high priority for nesting habitat for neotropical migratory birds, breeding habitat for area-sensitive birds, and necessary stopover habitat for spring migratory birds upon completion of their Gulf of Mexico crossing. The alluvial valley supports a highly productive freshwater fishery and habitat for resident, terrestrial wildlife species endemic to southern forests. Because the remaining bottomland forest is so fragmented, conservation often focuses on retention or restoration of blocks of forest of sufficient size to support healthy populations of the suite of bottomland hardwood forest birds. The refuge maintains more than 11,000 acres of bottomland forest as a critical component to maintaining a forested corridor in the Ouachita River drainage. The refuge provides important stop-over habitat for neotropical migratory birds following the Ouachita River during migration, as well as area-sensitive breeding migratory birds that are dependent on bottomland hardwood forests to nest. More than 10,000 wading birds utilize the refuge’s bottomland hardwood forests during late summer and then post-breeding dispersal occurs.

ENCROACHMENT OF INVASIVES

Non-native or invasive plants can alter the function of ecosystems by degrading wildlife habitat, displacing of native species, changing of carrying capacity by reducing native forage production, lowering plant diversity, and increasing soil erosion and soil sedimentation. Invasives are at a critical junction on the North Louisiana National Wildlife Refuge Complex (Figure 4). Until recently, invasive species were considered a minor nuisance. Meanwhile, two new invasive plants, Japanese climbing fern and Chinese tallow tree, moved northward into this area and threaten to disrupt the entire ecosystem both on and off the refuge.

CONTAMINANTS

The Monroe Gas Field, one of the largest known gas fields in the United States (Figure 5), underlies approximately 5,000 acres of the 17,420-acre refuge. Until the 1970s, economics generally restricted wells to one per 40 acres. However, tax laws and a dramatic, though short-lived, increase in natural gas prices combined to spur a rash of drilling, which lasted until about 1986. During this period, the number of wells in the Monroe Gas Field more than doubled. In some instances, wells were drilled within 600 feet of each other. This rapidly depleted the gas reserves, reduced the average gas pressure, and caused production at many wells to cease.

Mineral rights were not obtained when the refuge was acquired. Since all the subsurface mineral rights within the refuge are held by private interests, mineral exploration and production activities can occur anywhere on the refuge. Natural gas exploration and production activities involve a number of operations, including, but not restricted to, seismic testing; surveying; site clearing; well drilling; road and pipeline construction; maintenance of wells, pipelines, and other above-ground facilities; periodic meter reading and inspections; and well-plugging operations (USFWS 1985). These actions have produced five main problems with refuge management:

1. Habitat/wildlife disturbance; clearings for well sites, pipelines, and access roads result in loss of wildlife habitat and fragment the remaining forest into smaller patches. Fragmentation has been shown to have negative effects on nesting migratory birds from increases in nest depredation and cowbird parasitism; clearing potential nesting and foraging trees within red-cockaded woodpecker clusters and drilling during nesting season; potential for further damage by erosion, siltation, flooding, and contamination by brine or other harmful substances.
2. Improperly covered mud pits; prior to 1990, there were no regulations relating to pit closure and often soil was pushed into mud pits, leaving several feet of mud under a thin shell of soil. Such pits were quagmires and became hazardous for people, wildlife, vehicles, or heavy equipment. Once the soil layer is broken, it's possible to sink to the bottom of the pit, which can be a distance of up to 7 feet.
3. Abandoned/poorly maintained wells and facilities; equipment parts, survey marking tape, littering, and all man-made items used in or resulting from gas well operations are supposed to be removed from the area when they are no longer functional or needed, or when the well is vacated for reasons such as completion of the well or following repair projects.

Figure 4. Distribution of invasive plants on D'Arbonne National Wildlife Refuge

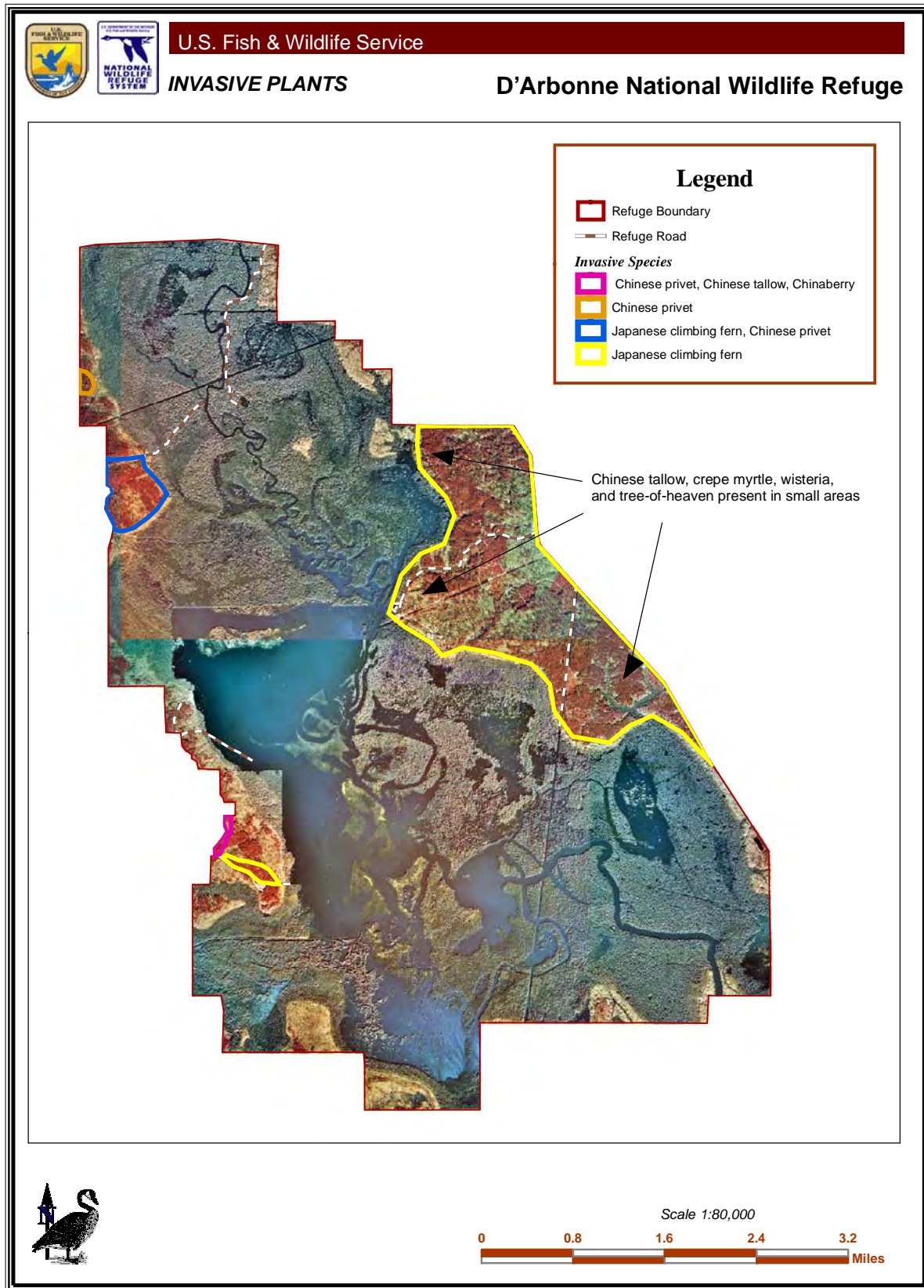
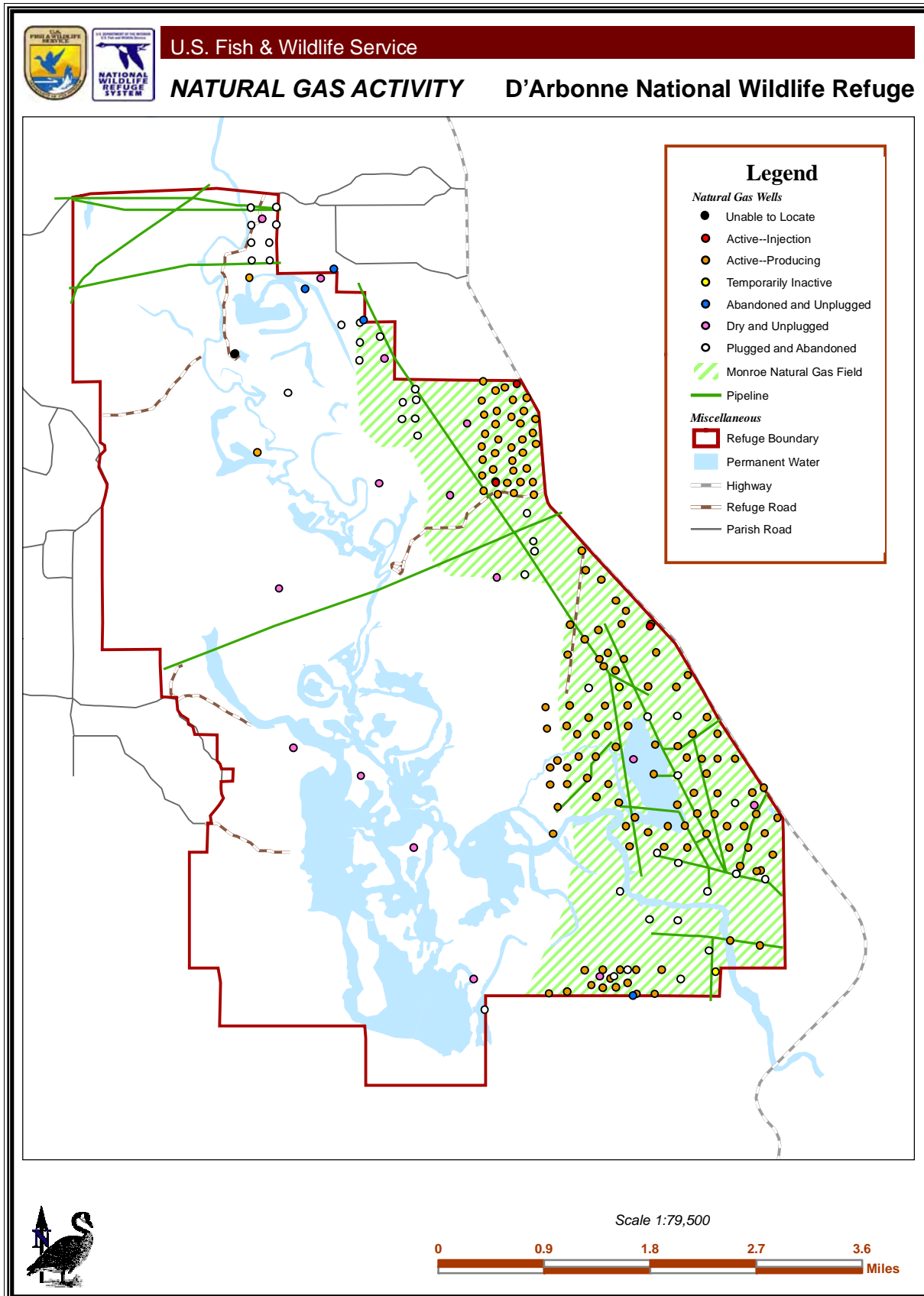


Figure 5. Natural gas activity on D'Arbonne National Wildlife Refuge



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4. Mercury contamination; Until the 1970s, most meters used to measure gas production contained mercury, which was carelessly handled and resulted in significant amounts of mercury being found in the soil below the meter itself. Meters have been replaced with non-mercury types and all known spill sites have been remediated. The primary source of environmental exposure to mercury is through the consumption of fish. There have been mercury advisories in the past for the waters of Bayou D'Arbonne. In 1997, all waters on D'Arbonne Refuge were for catch and release only due to a mercury advisory (USFWS 1997). Earlier advisories were to limit largemouth bass consumption to two meals per month with no limit on other species. High levels of mercury can collect in the human body over long periods of time. These high levels can cause health problems, especially for pregnant and breastfeeding women, children less than 7 years of age, people with compromised immune systems, and others at high-risk. The advisories do not mean that people should stop eating fish. Consumers can still get the health benefits of fish and avoid harmful levels of mercury by following the advisories for the amount consumed. The refuge must monitor for advisories and provide the information to anglers who use refuge waters.
 5. Saltwater contamination of soil and water; saltwater contamination of soil and water was once a serious problem on the refuge. Saltwater is produced as a by-product of natural gas production and was formerly stored in open pits that were subject to leaks and seasonal flooding. Brine pollution has a severe and long-lasting impact on soils and their ability to support vegetation. Concentrated brine kills all herbaceous and woody vegetation in the contaminated area. Brine is not biodegradable and the resulting damage is very difficult to remediate. Presently, brine from refuge wells is pumped back into the subterranean strata through injection wells. The potential for brine damage is still high due to poor condition of pipelines, wellheads, and other facilities and the lack of proper maintenance in many cases.

PHYSICAL RESOURCES

CLIMATE

Temperatures normally range between 20°F to 70°F during winter and 70°F to 95°F during the summer. The average annual growing season is 237 days. Mean annual precipitation is 49.6 inches. Thirty percent of the total occurs in the wettest months of February through April, and 15.7 percent in the driest months of August through October. Snowfall and ice storms are uncommon occurrences.

GEOLOGY AND TOPOGRAPHY

The refuge is a convoluted system of bayous, sloughs, and lakes separated by upland mix of pine and hardwood woodlands and bottomland hardwood forests. Bayou D'Arbonne meanders through a 2- to 4-mile-wide floodplain characterized by alluvial soils deposited during the last 11,000 years. In the center of the eastern side of the refuge an alluvial terrace, only slightly older than the adjacent floodplain, gradually rises to an elevation of 90 feet above mean sea level (MSL). A bluff along the southern boundary of the refuge marks the edge of another alluvial terrace, which rises to 130 feet above MSL. This terrace was formed during the Pleistocene epoch, some 11,000 – 2,000,000 years ago.

A far older upland area is located on the western and northeastern sides of the refuge. This is the eastern edge of the north Louisiana hill country. Its underlying structure was formed beneath and at the shores of seas during the Eocene epoch about 50,000,000 years ago. These western hills rise to elevations of 160 and 170 feet above MSL inside refuge boundaries. These same Eocene deposits also underlie the alluvial section of the refuge at depths of 50-100 feet.

SOILS

Nine soil series are found on the refuge, five of which are subject to flooding. Alluvial soils of the refuge are primarily clays and silt loams. They range from moderately acid to very acid. The upland soils are mainly acid sandy loams with a sandy clay and sandy clay loam subsoil.

HYDROLOGY

D'Arbonne Refuge is in northeast Louisiana approximately 23 miles south of the Arkansas border, 5 miles north of West Monroe, Louisiana, and 70 miles west of the Mississippi River (Figure 6). The central physical feature of the refuge is the Bayou D'Arbonne and includes an extensive system of bayous, sloughs, and lakes separated by woodlands and cleared bottomlands. At the point where the bayou flows into the refuge on its northern boundary, the bottom of the main channel is 38.5 feet above MSL. The bayou travels a 13.2-mile course through the refuge and the channel bottom gradually decreases in elevation until it is 35.5 feet above MSL at a point one mile below the southern boundary. The permanent water pool is at 52 feet above MSL, but may rise as high as 82 feet above MSL during flooding.

The Corp of Engineers manipulates the water level to minimize flooding while maintaining navigable river stages. Permanent pool level is 52 feet MSL and results from backwater flooding from Columbia Lock and Dam No.19 on the Ouachita River (about 30 miles below the refuge) with a possible 30-foot rise/fall per year depending on annual rains. The permanent pool is comprised of Bayou D'Arbonne, Eagle Lake Impoundment, Jones Lake, Wolf Brake Beaver Pond, Lake Drain Slough, Long Slough, Bayou Choudrant, and Cross Bayou, for a total of 2,532 acres of permanent open water on the refuge (Figure 7). The Corps has the right to permanently flood those lands lying below 65 feet above MSL and to flood on a seasonal basis any land lying between 65 feet above MSL and 70 feet above MSL. Average seasonal flooding is at 65-70 feet MSL in the growing season (March to November). Duration of growing season flooding varies from one to five months. Flooding may begin as early as November but in some years may not occur until January or February. Floodwaters may persist until July, but usually recede in June. Thus the flood season is basically January through June. The maximum recorded water level is 82 feet MSL. Water levels of Bayou D'Arbonne are measured indirectly through the Monroe Gauge reading of the Ouachita River collected by the Corps of Engineers.

WATER QUALITY

The affected environment of the refuge with respect to water quality includes the entire Bayou D'Arbonne watershed above the southern boundary of the refuge. It also includes that portion of the channel and floodplain of Bayou D'Arbonne below the refuge and that portion of the Ouachita River from its confluence with the Bayou D'Arbonne to the Columbia Lock and Dam. Any part of this stretch of the Ouachita River floodplain, which is not protected by levees, is also in the affected environment.

The Bayou D'Arbonne watershed extends into Union, Ouachita, Claiborne, Lincoln, Jackson, and Bienville Parishes in Louisiana, and into Union and Columbia Counties in Arkansas. Approximately two miles below the southern boundary of the refuge, Bayou D'Arbonne joins the Ouachita River. The latter flows into the Black River, which flows into the Red River, and which flows into the

Figure 6. Bayou D'Arbonne watershed

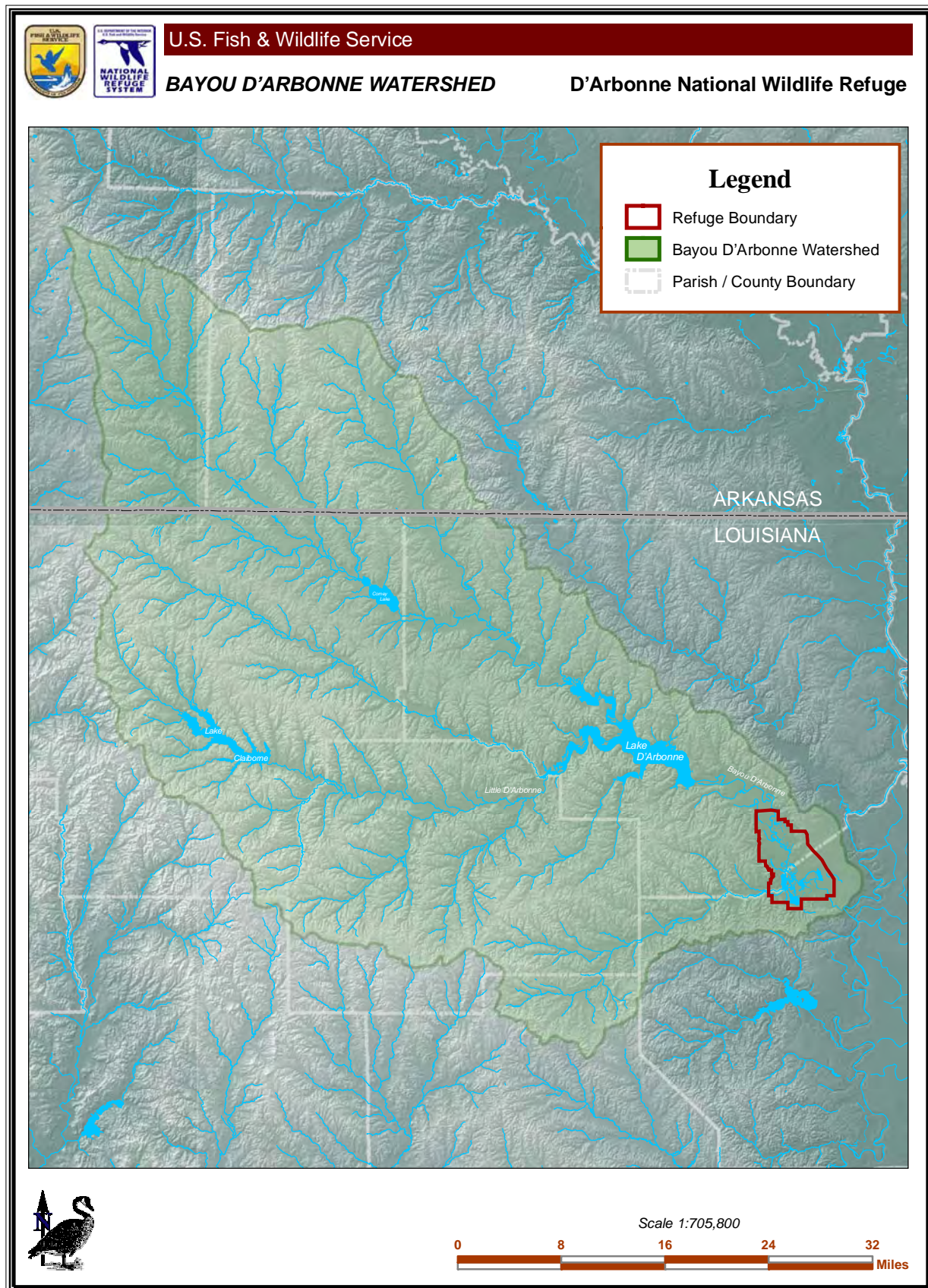
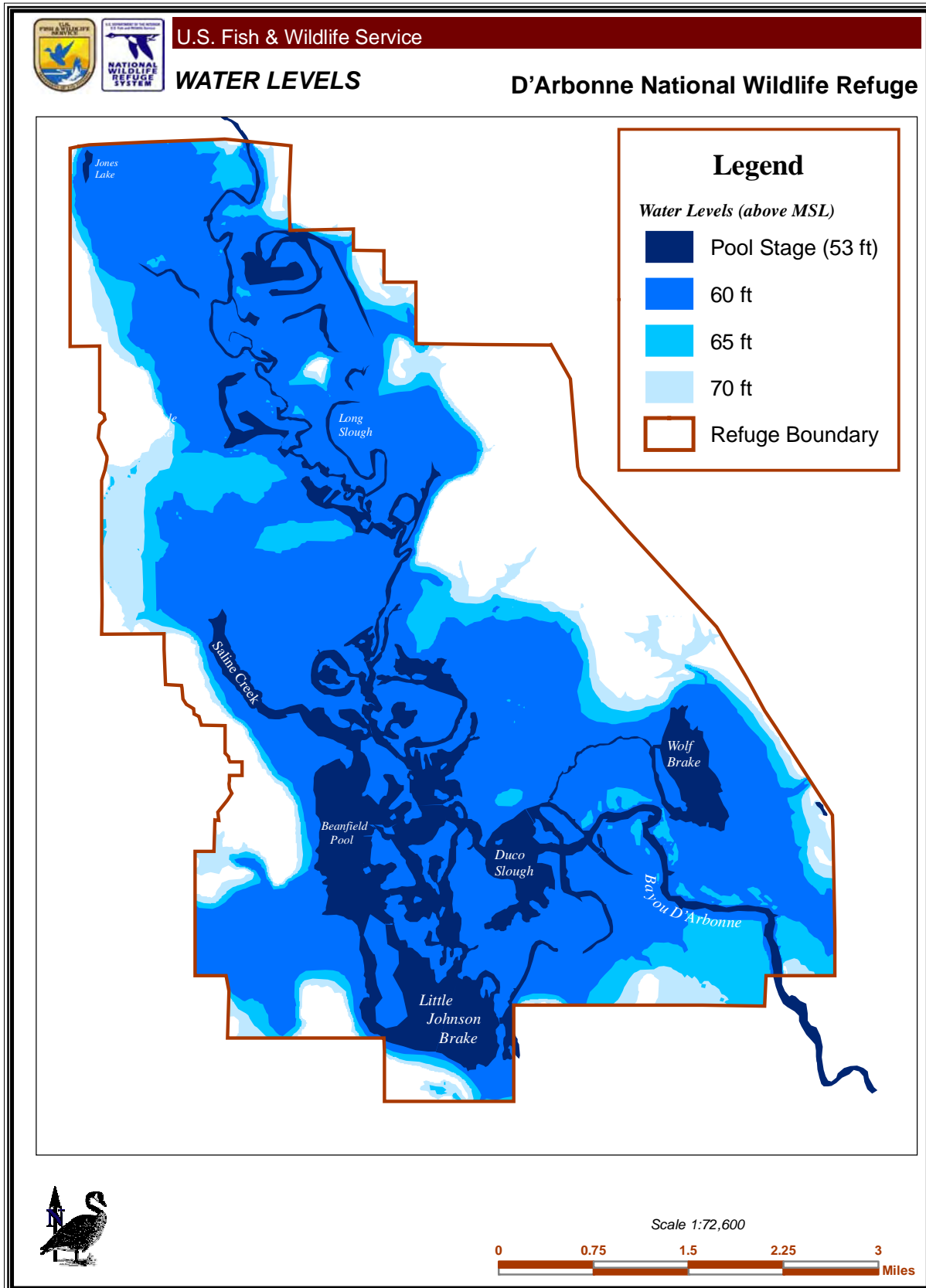


Figure 7. Area on D'Arbonne National Wildlife Refuge covered in water as flooding increases from permanent pool of 52' MSL to 70' MSL



Atchafalaya River. This system eventually empties into Atchafalaya Bay and the Gulf of Mexico. For all practical purposes, however, refuge management will not have a serious effect on downstream water quality below the Columbia Lock and Dam. There are two reasons for this: 1) The only major pollutants which originate on the refuge are brine from gas wells and silt and clay particles in surface runoff, which tend to settle on the bottom behind dams; and 2) by the time water from Bayou D'Arbonne reaches the dam, it is diluted by inflow from other streams.

The Louisiana Department of Environmental Quality created watershed surveys to collect a range of biological, physical, and chemical data to assess the impaired waterbodies of Louisiana. Bayou D'Arbonne and the section of the confluence with the Ouachita River were listed for an intensive survey based on initial findings of lead, mercury, and suspended solids (<http://www.deq.state.la.us>). These areas were sampled in 1974. The samplings indicated that the streams were calcium bicarbonate and sodium chloride type waters with periods of high chloride and dissolved solids concentrations (U.S. Army Corp of Engineers 1974). The quality of surface water in the Ouachita River Basin is influenced by agricultural, primary metals, petroleum, and paper manufacturing activities in the area. Reduced water quality is also due to increased chemical content resulting from the use of fertilizers, pesticides, and herbicides in agricultural activities and from chemical concentrations released by the manufacturing interests of the area. Ouachita Parish was ranked number 7 from 12 facilities for 461,108 pounds and Union Parish was ranked number 4 from 2 facilities for 861,474 pounds released into the waters (Louisiana Department of Environmental Quality 2004).

It is the policy of the State of Louisiana that all state waters should be protected for recreational uses and for the preservation and propagation of desirable species of aquatic biota and indigenous species of wildlife. There are seven water uses designated for surface waters in Louisiana: primary contact recreation, secondary contact recreation, fish and wildlife propagation, drinking water supply, oyster propagation, agriculture, and outstanding natural resource waters. The subsegment of the Ouachita River Basin that includes Bayou D'Arbonne meets the state standards and designated for primary contact recreation, secondary contact recreation, propagation of fish and wildlife, and drinking water supply (Louisiana Department of Environmental Quality Water Quality Standards 2002).

AIR QUALITY

Air quality receives protection under several provisions of the Clean Air Act, including the national ambient air quality standards and the prevention of significant deterioration program. Particulate matter (PM10) is a measure of tiny liquid or solid particles in the air that is respirable in the lungs. In the area of the refuge, dust associated with dirt from roadways, fields and construction sites, paper industry, utilities, other combustion sources, and soot from open burning may all contribute to particulate matter. Other air pollutants are lead, nitrogen dioxide, ozone, and sulfur dioxide.

Since initially setting standards in the early 1970s, the Environmental Protection Agency (EPA) changed the standards in 1979, 1987, and most recently in 1997. Under the most recent review, the EPA concluded that the current primary standards for ozone and particulate matter were not adequate to protect the public from adverse health effects. Therefore, the EPA proposed a new revision of the ozone and particulate matter standards. These new standards became effective September 16, 1997. The EPA is requiring states to continue implementation of current standards while working toward achieving the old standards (<http://www.deq.state.la.us>).

Louisiana operates a statewide air monitoring network of 44 monitoring sites. Monitoring sites are selected based on minimum federal requirements, usually driven by historical conditions in the area. Monitoring data are used to demonstrate that a geographical subdivision's (e.g., parish, city, or town) ambient air is within the criteria pollutant standards (i.e., in attainment), or if it exceeds one of

these standards (i.e., in nonattainment). Louisiana’s ambient air quality standards are more stringent and comprehensive than 47 other states. Air quality in Louisiana has improved over the last 20 years. There was only one 5-parish non-attainment area in 2004, as opposed to 20 in 1984. Ouachita and Union Parishes have always achieved attainment.

The annual burn program for the North Louisiana National Wildlife Refuge Complex does not affect air quality on a regional scale. At this time, Louisiana has no legal mandates restricting the volume of smoke produced within a given area; however, voluntary smoke management guidelines issued by the Louisiana Department of Agriculture and Forestry are closely followed. The primary concern related to air quality and smoke management is visual impairment from smoke drifting onto public roads, and is handled with safety devices and traffic control personnel.

Industries are also monitored for toxic emissions and air pollutants throughout the state. Industries report chemicals that are manufactured, processed, or otherwise used above threshold limits. Industries report estimated quantities of chemicals released into the air, water, underground injection wells, and land environments. Table 3 illustrates the amount of total releases and air releases alone for both parishes of the refuge and their associated rank in the state to other parishes (Louisiana Department of Environmental Quality 2004).

Table 3. Toxic emissions released in pounds for each parish associated with D’Arbonne National Wildlife Refuge in 2002

Parish	# Facilities	Total Releases ¹		Air Releases	
		Pounds	Rank	Pounds	Rank
Ouachita	12	8,991,111 ²	6	1,334,486 ³	13
Union	2	959,497	21	98,023	29

¹ Estimated quantities of chemicals released into the air, water, underground injection wells and land environments.

² 7,398,978 pounds all from one chemical facility in Ouachita Parish that was ranked number 4 among the top 25 facilities for total pounds released.

³ 1,001,922 pounds all from one paper industry in Ouachita Parish that was ranked number 16 among the top 25 facilities for pounds released into the air.

BIOLOGICAL RESOURCES

HABITAT

The refuge is situated on the western edge of the Mississippi River Delta. In this region, hydrology plays a very important role in determining the composition and character of floodplain plant communities because each species has a different level of tolerance to flooding. D’Arbonne Refuge is predominately mature bottomland hardwood forest. The typical gradient of forest species relative to flooding in response to elevation is seen in Figures 8 and 9. As one moves from permanent water up and out of the terraces to uplands, it turns to a baldcypress/tupelo, to overcup oak-water hickory, to willow oak, to upland pines mixed with hardwoods. Management and restoration of these communities require an understanding of how long species can be inundated and whether flooding should occur during the growing season or dormant season.

Figure 8. Elevation of D'Arbonne National Wildlife Refuge

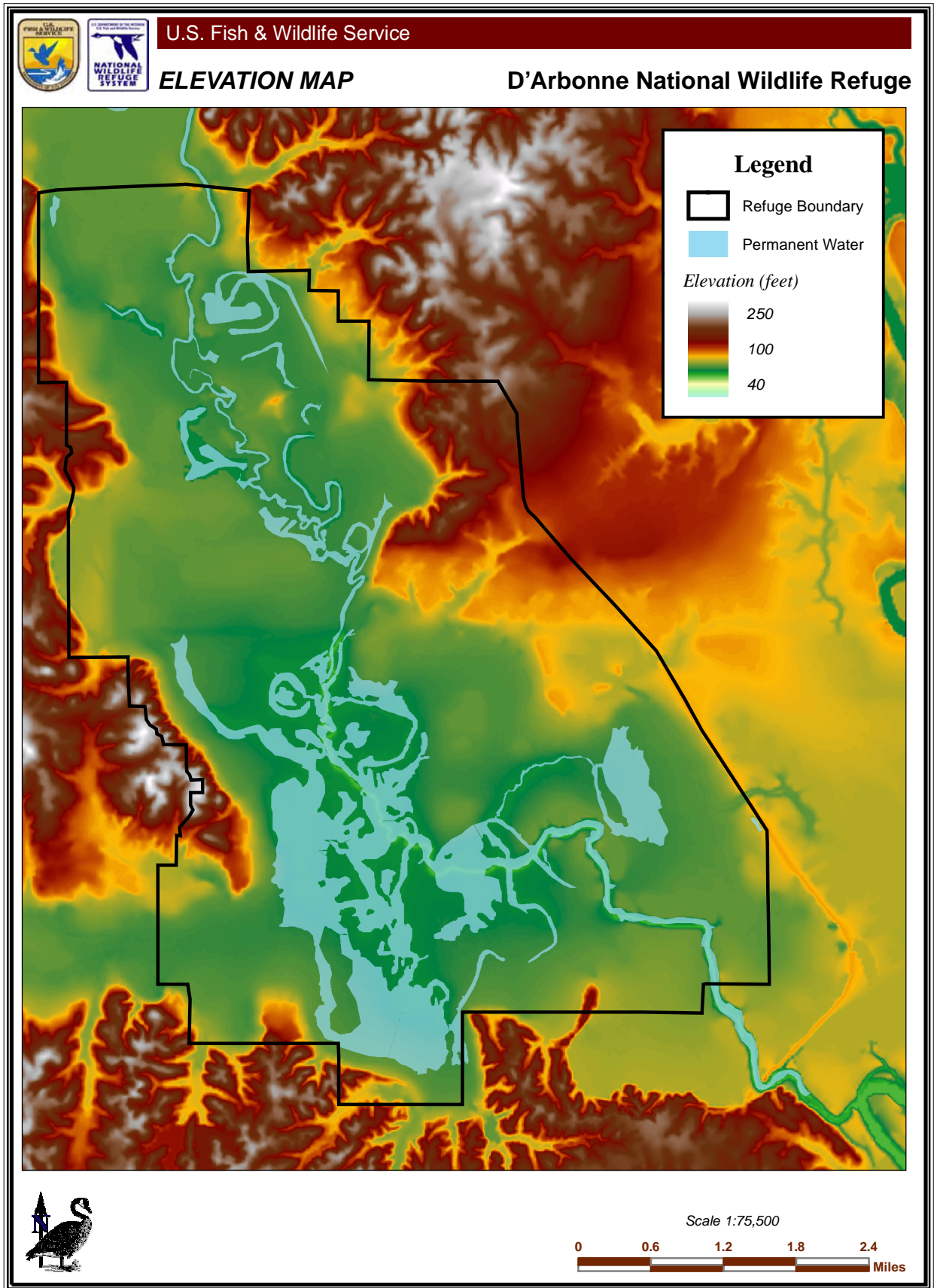
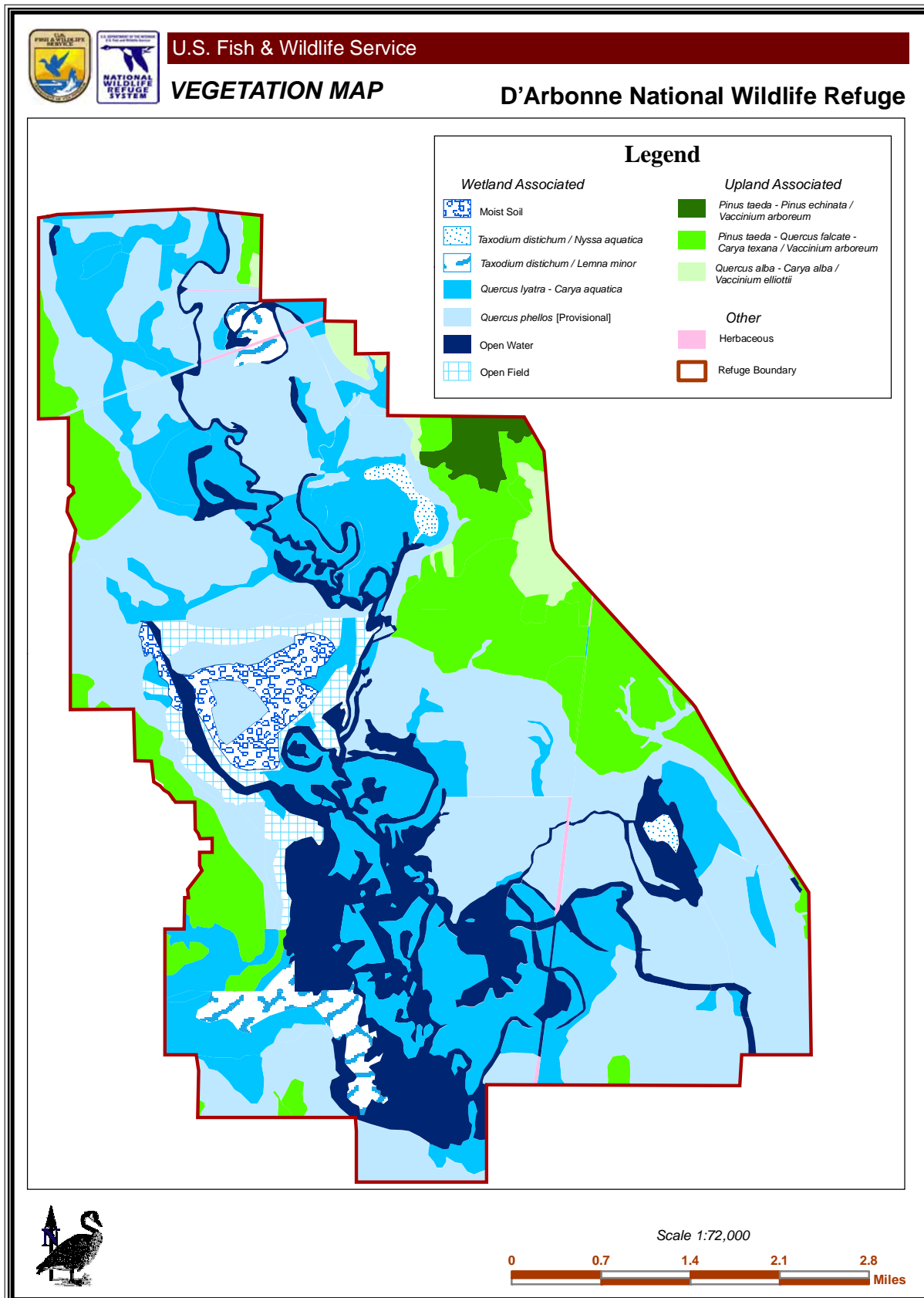


Figure 9. Vegetation coverage of D'Arbonne National Wildlife Refuge



Bottomland Hardwoods

Bottomland hardwoods account for the majority of refuge land cover and can be classified into four primary habitat types: 1) Baldcypress-Water Tupelo; 2) Overcup Oak-Water Hickory; 3) Sweetgum-Willow Oak; and 4) Swamp Chestnut Oak-Cherrybark Oak.

Baldcypress-Water Tupelo

Baldcypress and water tupelo together make up the majority of stocking in this forest type, which occurs in swamps, deep sloughs, and very low, poorly drained flats. The sites are always very wet, and surface water stands well into or throughout the growing season. Soils are generally mucks, clays, or fine sand. Common trees associated with this type are black willow, water locust, overcup oak, green ash, and persimmon. Among the shrub species are swamp privet, buttonbush, and planertree. Woody vines include red vine. A variety of herbaceous plants will be commonly seen and take the form of flotants, emergents, and submergents. Frequently, a variety of mosses and lichens adorn the exposed tree trunks, and the crowns may be draped with Spanish moss.

Overcup Oak- Water Hickory

This type usually occurs in low, poorly drained flats and sloughs with tight clay or silty clay soils. These sites are the lowest within the first bottoms and are subject to late spring inundations. Overcup oak and water hickory together constitute the majority. Associates include willow oak, Nuttall oak, cedar elm, green ash, and water locust. Minor associates include black willow, persimmon, and sweetgum. Common shrub species include swamp privet, hawthorn, buttonbush, planertree, and possumhaw. Woody vine species often associated include redvine, peppervine, trumpet-creeper, dewberry, and possibly greenbrier. Panicums, asters, annual grasses, and cocklebur may occur in openings within the stand.

Sweetgum-Willow Oak

The low ridges in the broad slackwater areas of the first bottom are typically occupied by this forest type. Willow oak and sweetgum comprise the largest proportion of the stocking in stands of this type. There are extensive areas of this type on the poorly drained willow oak flats on the refuge. These stands are strongly dominated by willow oak because of the heavy clay soils. Sweetgum often forms only a minor proportion of the stocking. A major associate on higher clay ridges and flats is nuttall oak, which may represent 30 - 50 percent of the composition. Other trees associated with this forest type are sugarberry, green ash, overcup oak, water oak, water hickory, cedar elm, persimmon, and sometimes baldcypress. Common shrubs include swamp privet, American snowbell, possumhaw, hawthorn, and dull-leaf indigo. Woody vines occasionally present are greenbrier, peppervine, and redvine.

Swamp Chestnut Oak- Cherrybark Oak

This forest type occurs on the best, most mature, fine sandy loam soils on the highest of the first bottom ridges and hammocks, and on the second bottoms or terraces down from the ridges. These well-drained sites are seldom covered with standing water and only rarely overflow. Species composition of this habitat type varies widely, though cherrybark oak will most likely be much more common than swamp chestnut oak. Many other species contribute to a well-stocked stand: white oak, post oak, sweetgum, blackgum, hickory, willow oak, water oak, southern red oak, winged elm, sassafras, delta post oak, slippery elm, shumard oak, black oak, black cherry, white ash, green ash, red maple, and loblolly and shortleaf pines. Common midstory plants include: eastern redbud, flowering dogwood, American holly, red mulberry, American hornbeam, eastern hophornbeam, and witch-hazel. Shrub species usually include red buckeye, devil's walkingstick, sweetleaf,

and *Virburnum spp.* Often included in this habitat type are grape vines, Alabama supplejack, Carolina jessamine, trumpet creeper, and greenbrier.

Mixed Pine and Hardwood Uplands

Loblolly Pine

Loblolly pine forest type can be found on almost all soil types above 70 feet in elevation in the general locale of the refuge. It is found mostly on sites with abundant soil moisture, which also promotes the development of rich undergrowth. This forest type is dominated by loblolly pine as the overstory with sweetgum associated, as well as shortleaf pine, southern red oak, and post oak. On moderately to poorly drained sites, common associates include red maple, blackgum, and water oak. Midstory trees include flowering dogwood, American holly, black cherry, hawthorn, eastern hophornbeam, sassafras, and red mulberry. Common woody vines include Carolina jessamine, Alabama supplejack, greenbrier, grape, Japanese honeysuckle, and blackberry. Among the shrubs associated with this type are American beautyberry and *Virburnum spp.*

Loblolly Pine/Hardwood

Hardwoods are predominant in this type with loblolly pine making up at least 20 percent of the stocking. On wet sites, loblolly pine is associated with sweetbay, blackgum, sweetgum, water oak, willow oak, red maple, and American elm. Species associated on drier sites are southern red oak, white oak, post oak, hickory, shortleaf pine, and persimmon. Generally, many of the same shrub, vine, and herb species found with the loblolly pine type are also common associates in stands of the loblolly pine/hardwood type.

Loblolly-Shortleaf Pine

Loblolly pine and shortleaf pine together comprise a majority of the stocking. This type is usually found on sites higher and drier than those where loblolly pine alone prevails, because shortleaf pine does not tolerate very wet soils and loblolly pine is less thrifty on dry, thin soil. Common overstory associates are sweetgum, blackgum, southern red oak, post oak, white oak, and mockernut hickory. Tree species in the midstory include flowering dogwood, persimmon, eastern redcedar, and hawthorn. Shrub species commonly associated with this type are American beautyberry, red buckeye, rusty blackhaw, and sumac. Among the common species of woody vines are greenbrier, Carolina jessamine, blackberry, Japanese honeysuckle, and poison ivy.

Open Field (moist-soil, mowed, and reverting to forest)

Prior to refuge acquisition, 1,026 acres of bottomland hardwoods were cleared for agriculture. This area is an open field, known locally as the “beanfield” (Figure 9), and is composed of three areas: 1) 374-acre moist-soil impoundment; 2) 420 acres of mowed fields; and 3) 240 acres that are being restored to forest. The entire area provides a short window of exceptional waterfowl habitat and then flooding occurs making it too deep for waterfowl foraging. The moist-soil impoundment is at 55 feet above MSL and is flooded naturally from rainwater and when Bayou D’Arbonne overflows its banks. Three structures are in place to draw water off during the spring after the bayou is at pool stage. Water can be pumped from permanent water south of the impoundment. Pumping equipment has failed recently restricting management options. The mowed fields are the herbaceous lands surrounding the impoundment up to the tree line. These fields, as well as the impoundment, are mowed every 2 to 3 years to maintain vigorous herbaceous habitat for waterfowl foraging. The areas of regeneration have had mowing and burning discontinued to allow woody vegetation to establish. Regeneration in this area consists of persimmon, willow oak, overcup oak, buttonbush, and baldcypress.

Invasives

Until recently, invasive plants have not been a large problem on the refuge. As a routine part of general forest management, foresters eliminated scattered clumps of Chinese privet, mimosa, tree-of-heaven, etc. Two species that have moved northward into this area and are of primary concern are Chinese tallow and Japanese climbing fern. Japanese climbing fern is well established on the refuge and may be beyond the point of control, much less eradication. This invasive fern can increase in cover to form mats, smothering shrubs and trees (Miller 2003). The second problem species, Chinese tallow tree, is increasing exponentially and is an imminent threat to wetland and upland habitats. This species causes large-scale ecosystem disruption by replacing native vegetation, which reduces native species diversity, which in turn has a negative impact on wildlife. Tallow can quickly become the dominant plant in disturbed areas and invade bottomland forests, such that it earned a spot on the “America’s Least Wanted-The Dirty Dozen” list of The Nature Conservancy (Flack and Furlow 1996). Other invasive plants that have been found on the refuge include princess tree and chinaberry. Chemicals such as Garlon and Roundup have been used in the past to kill invasives on an opportunistic basis. No formal monitoring program has been established.

Fire Regime

Fire is a natural phenomenon that has played a critical role in the ecosystem dynamics of the natural communities within north Louisiana. Before wildfire suppression strategies were implemented, naturally caused and anthropogenic fires likely burned thousands of acres of mostly upland habitat across northern Louisiana each year. Low intensity fires occurred on average in 3- to 5-year intervals. With differences in elevation and moisture gradients, these frequent fires maintained a mosaic of vigorous and diverse plant communities in various stages of post-fire succession and provided a wide variety of habitat types and conditions for wildlife. Higher elevations of the bottomland hardwood forests on the refuge have experienced some low-intensity fire events during extended drought conditions. These occurrences were probably rare and played little, if any, long-term role in affecting plant species composition. In general, fire is viewed as detrimental to hardwood forest communities.

Prior to refuge establishment, wildfires occurred on refuge lands every 7-12 months based on Louisiana Office of Forestry records (USFWS 2001). After refuge establishment, wildfires occurred on refuge lands every 22 to 74 months. Most wildfires occurred in October-December and averaged 5 to 17 acres.

Prescribed fire has been used as a cost-effective method of controlling mid-story hardwoods in the pine and mixed pine/hardwood habitat types beginning in 1987. There have been 112 management-ignited burns for a total of 6,435 acres with an average size of 58 acres. These burns were conducted to comply with management guidelines for red-cockaded woodpeckers. Prescribed fire interrupts succession of pine stands toward more hardwoods and increased mid-story. Management for the red-cockaded woodpecker has driven the prescribed fire program on the refuge. Moderate- to high-intensity spring burns on a 3- to 5-year cycle were used to control small diameter hardwoods, increase the amount of grasses, and promote other vegetative growth by increasing the amount of sunlight that reaches the forest floor. The annual growing season burns significantly reduced or eliminated hardwoods over time and promoted production of grasses.

Fire management is administrated by the refuge forester as collateral duties, with ultimate responsibility placed on the project leader. Wildfire suppression is handled by the Louisiana Office of Forestry. Refuge resources are not used for initial attack, but will pre-position equipment to shorten response time should fire threaten refuge lands.

WILDLIFE

Migratory Birds

Waterfowl

The refuge provides important wintering habitat for at least 14 species of migratory waterfowl: mallard, gadwall, American wigeon, green-winged teal, blue-winged teal, northern shoveler, northern pintail, wood duck, hooded merganser, ring-necked duck, canvasback, and lesser scaup. Other species that utilize the refuge less frequently include: bufflehead, redhead, common merganser, red-breasted merganser, greater scaup, ruddy duck, common goldeneye, and American black duck.

Mid-winter waterfowl surveys are flown annually (Table 4). Though mallards and ring-necks are abundant, wood ducks probably are the most abundant wintering duck on the refuge. Wood duck numbers, as well as hooded merganser, are under-represented when using traditional survey methods (aerial) because ducks are not detected well in the flooded timber.

The presence and distribution of wintering waterfowl on the refuge depends primarily on water levels and mast crops. Low-water levels favor dabblers, not only because low water is attractive for feeding, but also because off-refuge areas are usually dry during the period, causing the birds to seek the permanently flooded areas and low, flooded fields on the refuge. As water levels increase and the backwater floods the uplands, mallards and other dabblers begin using the flooded timber. When open water in the open field and moist-soil unit areas become more deeply flooded, diving ducks are attracted to the invertebrate food source on the submergent vegetation.

Waterfowl use of the refuge during the breeding season is limited due to the southern latitude. Wood ducks nest using the many natural cavities available in bottomland hardwood forests and in the dead pine trees on the refuge quite regularly. In addition, wood duck nest boxes are located throughout the refuge to provide additional nesting habitat. In the past, hooded mergansers have nested in wood duck boxes on the refuge on rare occasions. Mergansers probably nest in natural cavities within the refuge, but they are rarely seen.

Water and Marsh Birds

Great blue heron, great egret, snowy egret, cattle egret, little blue heron, white ibis, green heron, yellow and black-crowned night-herons, and American bitterns use the refuge's sloughs, bayous, flooded timber, scrub/shrub, and the open field at different times of the year, depending upon the water levels. When water is coming off the refuge in late spring, wading bird concentrations are high as they capitalize on trapped fish and crayfish. Glossy ibis, roseate spoonbills, wood storks, and tri-colored herons are seen irregularly, usually during post-breeding dispersal in late summer. Least bitterns most likely migrate through the refuge. No major rookeries are known to occur on the refuge.

Large concentrations of double-crested cormorants utilize the refuge during winter, and anhingas are found along the bayou during the summer. American white pelicans are sometimes seen in the open field in late summer and during migration.

Marsh bird habitat of emergent vegetation, such as cattails or bulrush, is not available on the refuge, but Virginia rails, clapper rails, and sora rails probably migrate through the refuge. King rails may breed irregularly in the open field if water levels are suitable. Coots are present year-round and are especially abundant in winter. Although common moorhens and purple gallinules are supposed to breed in this area, there are no records of them nesting on the refuge, and they are rarely seen.

Table 4. Annual mid-winter waterfowl surveys* for D'Arbonne National Wildlife Refuge

Year	Mallard	G-w Teal	Pintail	Wood Duck	Canvasback	Ring-neck	Other Spp. ¹	Total Ducks
1990	7550	0	0	100	22	1900	34	9606
1991	1400	0	0	400	100	1200	10	3110
1992	500	0	0	0	400	600	500	2000
1993	1200	700	300	400	0	0	0	2600
1994**	1100	200	600	270	0	800	180	3150
1997	200	0	0	0	50	150	0	400
1998	1000	0	0	50	200	400	0	1650
1999	325	125	0	0	0	0	50	500
2000	1000	700	0	0	0	0	700	2400
2001 ²	800	0	30	750	50	150	120	1900
2002	305	0	0	20	70	2000	200	2595
2003	889	0	0	20	50	700	0	1659
2004 ²	4500	0	250	200	0	0	250	5200
2005	1020	0	0	80	100	5	455	1660

* Surveys conducted first week of January from airplane

**Mid-winter waterfowl surveys were not conducted in 1995 and 1996.

¹ Other species may include unidentified ducks, scaup, shoveler, and gadwall.

² Ground survey.

Shorebirds

Mudflats for shorebird habitat are scarce on the refuge. The open field is too quickly vegetated when water levels drop making mudflats largely unavailable. Occasionally, pectoral sandpipers, yellowlegs, and peeps will use the area during spring migration if water levels drop early. Common snipe use the open field in winter when the fields are shallowly flooded. Spotted and solitary sandpipers are often seen on the edges of bayous during migration. Killdeer is the most numerous species of shorebird.

Killdeer are common all over the country in all kinds of habitat. They often nest on the levees, gravel roads, and parking lots.

Neotropical Migratory Songbirds

Breeding landbird surveys conducted on the refuge detect the red-eyed vireo, blue-gray gnatcatcher, prothonotary warbler, summer tanager, yellow-billed cuckoo, and Acadian flycatcher as among the ten most abundant. Red-eyed vireos, blue-gray gnatcatchers, and tanagers occur throughout the refuge, while the cuckoo and flycatcher will be seen usually in the bottomland hardwoods and yellow-breasted chat in the upland underbrush and scrub/shrub. Hooded and Kentucky warblers nest in the upland pine areas where dense undergrowth often occurs. Bachman's sparrows, species of management concern,

winter on the refuge in small numbers in the upland pine habitat. Bachman's sparrows have not been detected during the breeding landbird surveys, but there may be a few individuals that nest on the refuge. Swainson's warbler and worm-eating warbler, also species of management concern, are detected only very irregularly on the refuge in the bottomland hardwoods. Louisiana waterthrush is more common but not detected with any consistency. These three species can also be found in upland areas, too, because the flooding on the refuge forces them into the thick understory on higher ground.

Eastern bluebirds, Carolina wrens, brown-headed nuthatches, and tufted titmice are cavity nesters that utilize natural cavities and 23 bluebird nest boxes on the refuge.

Resident Landbirds

Resident landbirds nesting on the refuge include: northern cardinal, Carolina chickadee, tufted titmouse, blue jays, eastern bluebirds, Carolina wren, American crow, and pine warbler. Brown-headed cowbirds are also numerous on the refuge.

Woodcock are found in damp, brushy woods and courtship displays are in grassy areas nearby (Sibley 2000). Although most woodcock are present on the refuge only during the winter, a brood of woodcock was seen on the refuge in April 2001. Wintering woodcock arrive in the area usually when the open field and bottomland hardwoods are already completely flooded. Consequently, they are pushed into the upland pine/hardwood habitat. There are no data of how abundant woodcock are on the refuge with the limited habitat. This game species provides limited hunting opportunities, but hunting is allowed on the refuge.

Wild turkey declined from over-hunting in the early 1900s in this area. In the mid-1980s, biologists stocked turkeys captured from Tensas River Refuge onto this refuge. Today, turkeys utilize the mixed upland pine/hardwood areas of the refuge, though that type of habitat is limited (i.e., 1,250 acres). No hunting is allowed on the refuge due to the low estimate of turkeys that result from limited habitat and variable reproductive success due to fluctuating water levels during the spring.

Only a few northern bobwhite quail are found on the refuge, again, because of limited upland habitat. Reproduction does occur on the east side of the refuge where coveys have been seen.

Resident Wildlife

Mammals

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

Furbearers found on the refuge include Virginia opossum, raccoon, striped skunk, river otter, beaver, mink, nutria, and muskrat. Coyotes and bobcats are present also. Both eastern cottontail and swamp rabbits inhabit the refuge. Fox and gray squirrels are found on the refuge, with fox squirrels in the more open woods and gray squirrels inhabiting the dense forests.

Gooding and Langford (2000) reported bats utilizing bottomland hardwoods on the refuge from mist-net capture of Rafinesque's big-eared bat, southeastern myotis, big brown bat, eastern red bat, Seminole bat, and evening bat. Other bats that most likely use the refuge, but were not seen or captured during the study, are free-tailed bat, eastern pipistrelle, and during migration, the hoary bat. Two bat houses are on the refuge, but no bats have been seen using them.

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

Reptiles and Amphibians

Over seventy species of reptiles and amphibians are likely to occur on the refuge (Appendix VI). Frog and toad surveys have confirmed eleven species on the refuge: Northern cricket frog, upland chorus frog, spring peeper, common gray treefrog, cope's gray treefrog, green treefrog, leopard frog, bronze frog, bullfrog, narrow-mouthed toad, and Fowler's toad. Pickeral frogs have not been recorded during the call surveys, but have been heard calling on the refuge during the middle of the day.

Amphibian malformations have been occurring across the country. The U.S. Geological Survey and the Service have been conducting studies to try to determine the extent and cause of these malformations. Surveys conducted on the refuge did not find any evidence of malformations (Carr 2002).

Alligator surveys are not conducted on the refuge currently, but alligators are often seen in Bayou D'Arbonne and its tributaries.

Three-toed box turtles utilize the upland areas on the refuge. Often, red-eared sliders, musk, and map turtles are found basking on logs along the bayou.

Fisheries

Bayou D'Arbonne provides habitat for many species of freshwater fish (Appendix VI). Important game species found in refuge waters include: bluegill; redear sunfish; longear sunfish; white and black crappie; and largemouth, yellow, and white bass. Other species include blue, flathead, and channel catfish; smallmouth, bigmouth, and black buffalo; freshwater drum; longnose, shortnose, alligator, and spotted gar; bowfin; and carp. Paddlefish are common in Bayou D'Arbonne and utilize shallow areas on the refuge for spawning.

Species of Concern

One threatened species, the bald eagle, and one endangered species, the red-cockaded woodpecker, frequently occur on the refuge. Alligator snapping turtles, Rafinesque's big-eared bats, and southeastern myotis bats are species of concern that also occur on the refuge.

Red-cockaded Woodpecker

The red-cockaded woodpecker (RCW) is a cooperatively breeding species typically found in family groups that, in addition to the nesting pair, include 0-2 male offspring from previous nesting seasons, and at times may include a female. RCWs are confined to old pine stands in the southeastern United States. This species evolved in a fire-maintained ecosystem and consequently prefer open, park-like pine stands with little or no hardwood midstory and herbaceous groundcover (RCW Recovery Plan). These woodpeckers excavate only live pine trees that are 75 years or older and usually have been infected with heartwood fungus. Habitat loss from development and fire suppression are the primary cause of their endangerment (RCW Recovery Plan). Another common problem is demographic isolation. For example, when different populations are widely separated by non-pine forests (e.g., bottoms, agriculture, and cities), the isolation leads to inbreeding, which eventually destroys a population. Also, because juvenile females disperse or leave from their birth cluster to search for a male, they find themselves "lost" in a sea of hostile environments. Isolated populations also suffer from not having any immigration or new birds moving into the population to replace older birds that die.

Currently, there are three active groups of RCWs on the refuge, with a goal of five (Figure 10). When populations are this small and this isolated, any mortality of adults affects the population greatly. Any population under 10 groups is not considered viable, and preferably, a population should consist of 30 groups or more to be able to sustain itself. Management efforts on D'Arbonne Refuge are conducted to foster the RCW population; however, with only a small amount of pine habitat available, this population will most likely never be viable.

Bald Eagle

Bald eagles breed throughout the United States, and winter throughout the southern portion of its breeding range. Bald eagles have always used the refuge during the winter, and are usually seen in the open field every year. Bald eagles feed on fish, waterfowl, coots, muskrats, and nutria. For decades, bald eagles did not nest in northeast Louisiana, however, in the past 3 years nests were found near the refuge. They nest primarily in cypress snags in swamps near open water and feed in open lakes. In 2003, the first active nest ever recorded on the refuge was found near Choudrant Ditch. It successfully raised and fledged one chick. In 2004, this nest was not used again, but in 2005 the pair fledged two young.

Alligator Snapping Turtle

Alligator snapping turtles are the largest freshwater turtles in the United States. They are protected from commercial harvest in every state. Louisiana protected them from commercial harvest starting in 2004. Commercial harvest of these turtles threatens their population because alligator snapping turtles do not breed until they are approximately 15 years old, and the harvest targets adults. Nest depredation by raccoons, skunks, opossums, and fire ants also harm the population significantly. The refuge has no good estimate of the alligator snapping turtle population, though individual turtles have been seen.

Rafinesque's Big-Eared Bat

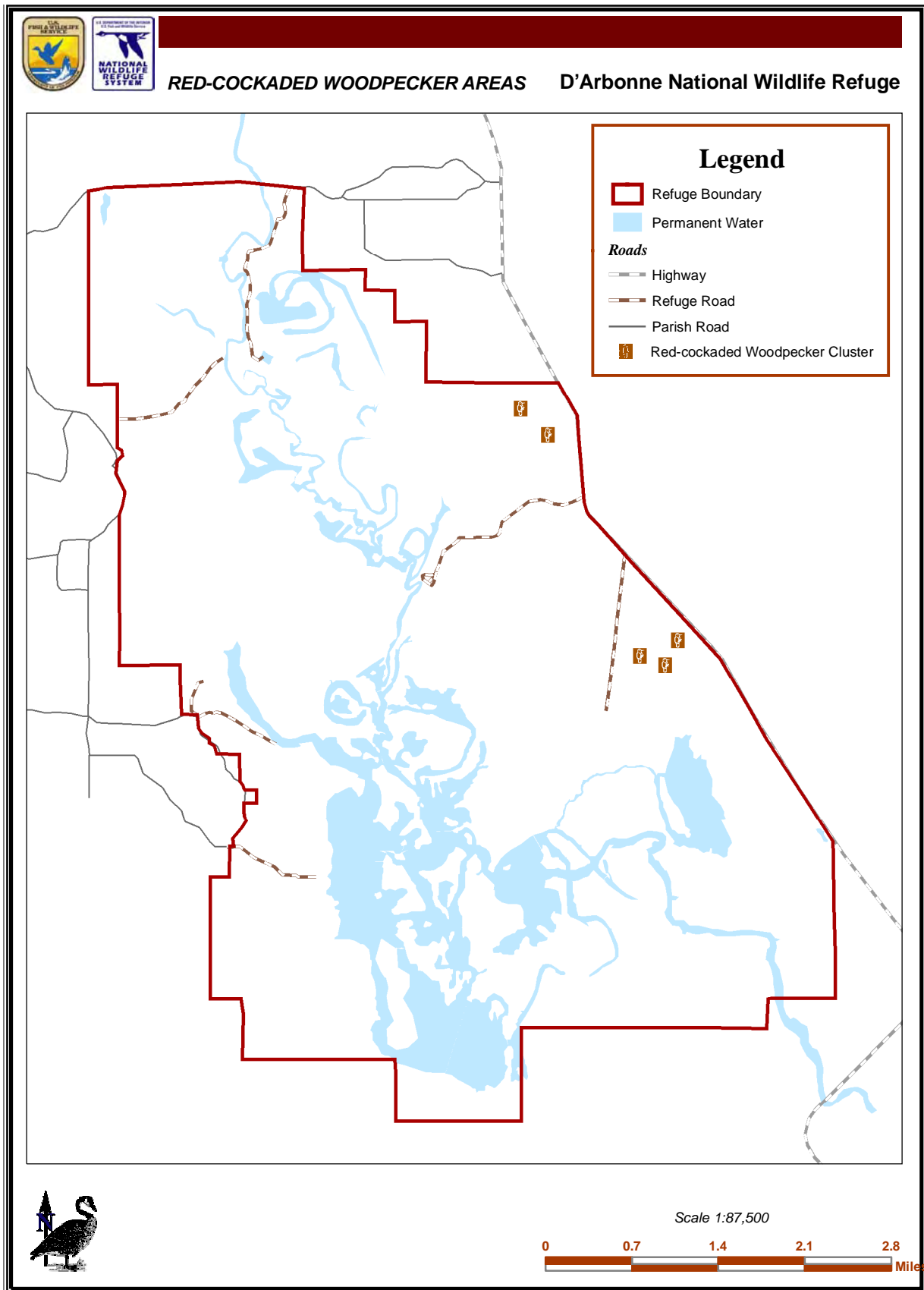
Rafinesque's big-eared bat is the least studied bat in the eastern United States (Harvey et al., 1999) and is federally designated a species of special management concern (USFWS 1999). This bat is associated with bottomland hardwoods, and since this habitat has decreased, many biologists are concerned about the status of the Rafinesque's big eared bat. Many states consider them to be either threatened or endangered; however, Louisiana has no official designation for them.

Forty-four roost trees of Rafinesque's big-eared bats were found on the refuge inside hollow water tupelo trees during the summer of 2000, as part of a larger study on bats. The roost trees are all within the same, unique tupelo stand. This unique stand is comprised of a high density of very large, old, hollow water tupelo trees mixed with large baldcypress and some water elm on the outer edges. Roosts varied from one bat one day to 50 bats the next (Gooding and Langford 2004). There also appeared to be a maternity colony that moved among roost trees (Gooding and Langford 2004). This bat roost on the refuge is an important resource that will need special management attention. Since these bats are sensitive to disturbance (Clark 1990), they have been considered in forest management decisions and habitat objectives.

Southeastern Myotis

Southeastern myotis is also associated with riparian areas or bottomland hardwoods and is listed as a federal species of special management concern. They are often captured in mist-nets more than big-eared bats, but their populations are thought to be declining as well. Southeastern myotis roost in caves (Harvey 1992) in the

Figure 10. Red-Cockaded Woodpecker areas on D'Arbonne National Wildlife Refuge



northern part of their range, but little is known about their roosting habits in areas where there are no caves, such as Louisiana. Several of these species, both male and female, were captured using mist-nets on the refuge during the summer of 2000, but only one maternity roost was found in a water tupelo tree.

CULTURAL RESOURCES

In 1982, a cultural resources reconnaissance of the refuge was conducted by the Research Institute of Northeast Louisiana University (Heartfield and Price 1982). It was primarily a survey of planned construction sites on the refuge. As a result of the survey, six prehistoric sites were identified. Two of the sites were largely destroyed; four sites needed further investigation to determine eligibility for inclusion on the National Register of Historic Places. It is very likely that more prehistoric sites exist on the refuge especially on deposits of Pleistocene age. Since the survey was conducted, artifacts have been found by members of the refuge staff on four additional sites on or adjacent to the refuge.

The National Register of Historic Places, established by Congress in 1966, is the nation's official list of significant historic properties. The National Register recognizes five basic types of historic properties: historic buildings, such as plantation houses, courthouses or log cabins; historic structures, such as old bridges, lighthouses or forts; historic districts, such as old residential or commercial neighborhoods; historic sites, such as battlefields or Indian mounds; and, historic objects, such as old steamboats or fire engines. It is important to note that not every historic site or old building or neighborhood is eligible for the National Register. Properties must have some type of significance: properties that are closely associated with an important person, event or development; buildings that are architecturally significant because they are important examples of a particular style or type, or a method of construction; and, properties that are archaeologically significant because the remains yield information about the nation's history or prehistory. Generally, properties are not placed on the Register if they are less than 50 years old; if the period of their historical significance is less than 50 years old; or if they have been significantly altered.

Each state has a historic preservation office, which is responsible for nominating buildings, sites, districts, etc., to the National Register. In Louisiana, this program is administered by the Division of Historic Preservation, which is part of the Office of Cultural Development, Department of Culture, Recreation and Tourism. None of the D'Arbonne Refuge sites are known to be eligible for inclusion on the National Register of Historic Places at this time and they will not be designated as scientific sites. Official designation as scientific sites, as part of the planning process, also carries the risk of alerting illegal artifact collectors to the location of these sites. The Archaeological Resources Protection Act of 1979 specifically prohibits making available to the general public the location of any archaeological site, if such notification may create a risk of harm to the site.

Socioeconomic Environment

The refuge is split between Union Parish and Ouachita Parish just north of the twin cities of Monroe and West Monroe in north Louisiana (Table 5). Historically, the area of the refuge was farmed on the uplands by small farmers growing cotton and corn. By the 1950s, all farming operations had been abandoned on the upland areas. The bottomlands were cleared of most merchantable timber by the 1920s. Union Parish is still rural in character with an economy based on forest products, natural gas production, agriculture, and light industry. Agriculture is dominated by cattle and chicken production, with a little row crop agriculture scattered throughout. Ouachita Parish is dominated by the urban complex of Monroe and West Monroe, often referred to as the twin cities of northeast Louisiana. The parish economy is primarily based on natural gas production, furniture, lumber, paper, the retail trade, and higher education. Yet, agriculture is also important in Ouachita Parish as well. Monroe is the home of the University of Louisiana, and houses the headquarters of CenturyTel Communications, the fifth largest telecommunications provider in the nation.

Table 5. Demographics of Ouachita and Union Parishes, Louisiana based on Census 2000 data

<i>Parish</i>	<i>Population</i>	<i>Households</i>	<i>Families</i>	<i>Population Density (indiv/sq.mi)</i>	<i>Housing Units</i>	<i>Housing Density (units/sq.mi)</i>
Ouachita	147,250	55,216	38,319	241	60,154	98
Union	22,803	8,857	6,412	26	10,873	12

REFUGE ADMINISTRATION AND MANAGEMENT

LAND PROTECTION AND CONSERVATION

All lands within the established acquisition boundary for D'Arbonne Refuge have been acquired. No in-holdings exist and there are no immediate plans to expand the acquisition boundary. Three Partners for Wildlife Projects near the refuge have been completed and opportunities for others are monitored.

VISITOR SERVICES

D'Arbonne Refuge recognizes and provides the six priority wildlife-dependent uses of hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation (Figure 11). The uses that primarily occur on the refuge are fishing, hunting, and wildlife observation, mostly birding. The remaining three priority public uses, environmental education, interpretation, and wildlife photography are allowed but participation is light. Environmental education and interpretation interests are encouraged to use Black Bayou Lake National Wildlife Refuge. Black Bayou Lake Refuge is part of the same Complex as D'Arbonne, is more accessible, and has an extensive environmental program and a staff person stationed there to administer the public use program. A few visitors participate in wildlife photography, hiking, horseback riding, bicycling, firewood cutting, and trapping.

Loose estimates of numbers of visitors to the refuge in the last 5 years are between 20,000 and 30,000 per year. There are no good tools in place to estimate the number of visitors to the refuge each year. Public use figures for fishing are abstract because boats can be launched at several sites on the refuge and can enter the refuge on Bayou D'Arbonne from nearby launches both north and south of the refuge. Vehicle counts in parking areas during hunting seasons give an approximation for hunting visits, but multiple access points make it difficult. Currently, no record of contacts at the Complex headquarters is being kept.

Orienting Visitors

The office at D'Arbonne Refuge is the headquarters for the North Louisiana National Wildlife Refuge Complex. It is located at the intersection of Louisiana Highway 143 and Holland's Bluff Road (Figure 11). It is open weekdays from 7:30 a.m. to 4:00 p.m. Refuge brochures, state hunting and fishing regulation pamphlets and other Service brochures are available in the foyer.

D'Arbonne Refuge is open year-round for permitted activities.

Fishing

Fishing is the most popular public use activity on the refuge. Thirteen miles of Bayou D'Arbonne and the many sloughs, creeks, and oxbow lakes provide a great diversity of aquatic habitat. Annual flooding greatly contributes to the productivity of the refuge waters. Largemouth bass, crappie, bluegill and other sunfish, and catfish are the most sought-after species. Gear used on the refuge includes rod and reel, cane pole, and trotlines. Commercial fishing is not allowed. However, a recreational fisherman can use certain types of hoop nets and slat traps for recreational fishing with a special use permit issued by the refuge. Forty-five of these permits were issued in 2003 and 72 in 2004.

Fishermen access the bayou from two concrete boat launches and one graveled boat launch on the refuge (Figure 11). Boats also routinely enter the refuge on Bayou D'Arbonne from nearby launches upstream and downstream, including those on the Ouachita River. The variety of access points makes it difficult to monitor the amount of use actually occurring on the refuge. Bank fishing occurs at easily accessible areas on the bayou and in the borrow pond just south of the Cross Bayou parking lot.

Outfitters and fishing tournaments or derbies are not allowed to originate on the refuge.

Hunting

D'Arbonne Refuge is open to hunting for deer, rabbit, squirrel, duck, goose, coot, quail, dove, woodcock, raccoon, opossum, feral hog, coyote, and beaver. The entire refuge is open to hunting, with some hunts limited to specific areas (Figure 11). Deer is the most pursued game species on the refuge. Archery deer season is open from October 1 through January 31, and many bowhunters utilize the refuge. The entire refuge is open to either-sex archery hunting, except during gun hunts. Bowhunters cannot hunt in the open field area (Figure 11). Most years the refuge offers three either-sex deer gun hunt weekends and a special either-sex gun hunt weekend for hunters with a Class I (wheelchair bound) permit that is issued by the state. Six hunters with disabilities participated in the special hunt in 2003 with no deer harvested. See Table 6 for data gathered from check stations since 1991. Full data sets, rather than only summary data, are available only from 1996 to present.

Squirrels are the second most popular game with hunting occurring over the entire refuge during the season. Waterfowl hunting is permitted on the refuge during the state season until noon each day. Most hunting occurs in the flooded bottomlands. The open field area is a sanctuary and closed to waterfowl hunting (Figure 11). The most commonly harvested species are wood duck, mallard, and gadwall. Hunter success varies from year-to-year as a result of many factors. Local influences include refuge water levels, acorn production, and weather.

Occasionally hunters pursue rabbit, quail, or woodcock. However, quail and woodcock habitat is limited. Quail habitat, primarily limited to upland pine ridges, may improve in the future since the refuge has switched to growing-season prescribed burns. Although the public has expressed an interest in turkey hunting, turkey habitat is limited on the refuge and currently not allowed. It is being re-evaluated in this comprehensive conservation plan.

Raccoon hunting is allowed on the refuge and is not restricted to roads and trails. With a special use permit, one can also hunt on horseback at night for raccoons. Seven nighttime permits were issued in 2003, and nineteen were issued in 2004. Raccoon hunting at night is limited to December and January.

Outfitters are not allowed.

Figure 11. Public use amenities and special hunting areas on D'Arbonne National Wildlife Refuge

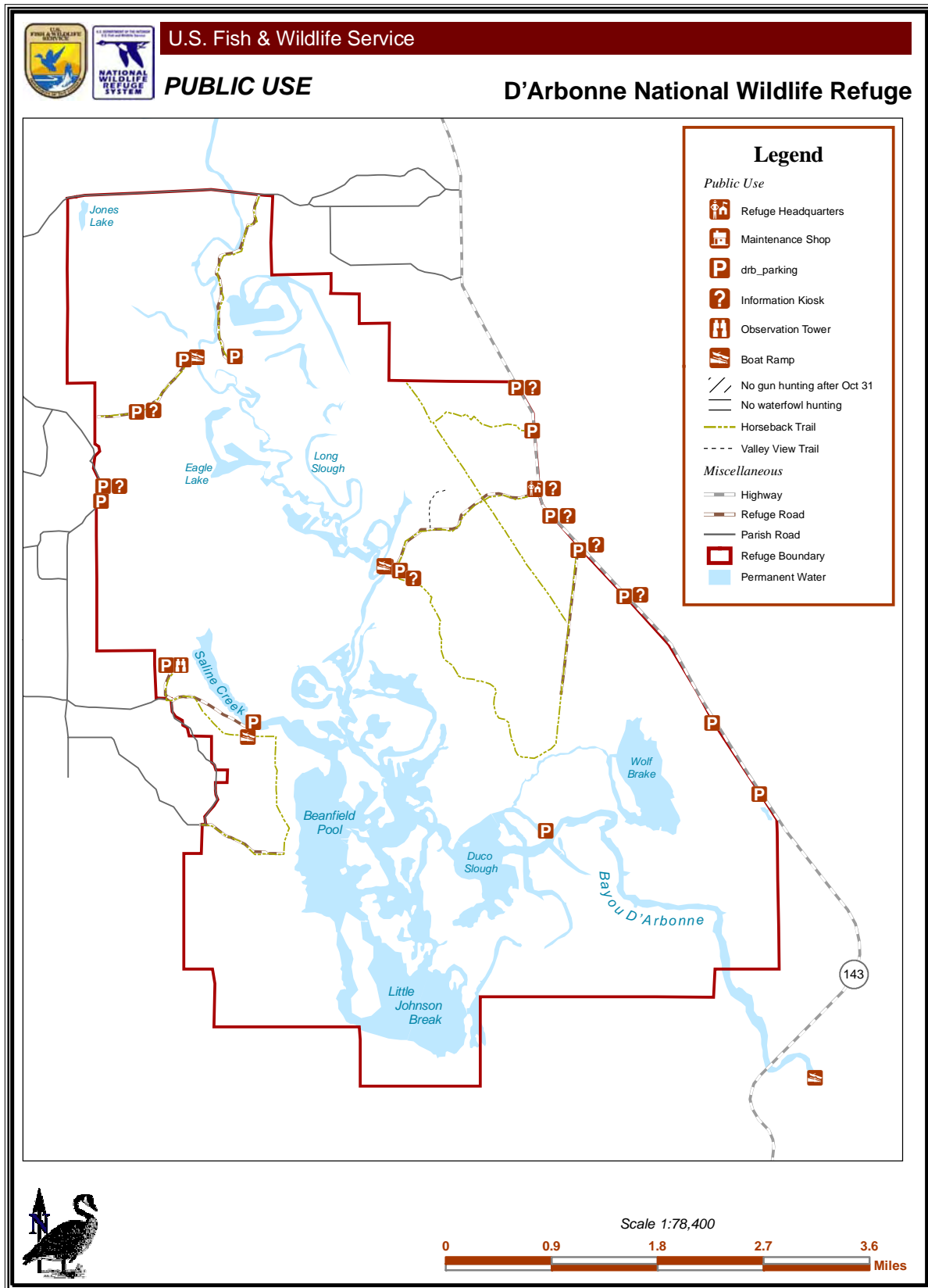


Table 6. Deer gun harvest data on D’Arbonne National Wildlife Refuge from 1991 – 2002

<i>Year</i>	<i>Total Harvested</i>	<i>Bucks Harvested</i>	<i>Does Harvested</i>	<i>Avg. Live Weight of Yearling Bucks¹</i>	<i>Lactation Rate²</i>	<i>Yearling Spike Rate³</i>
1991	64	38	26	116 lbs.	73%	53%
1992	74	34	40	131 lbs	64%	18%
1993	53	32	21	105 lbs	50%	41%
1994	69	38	31	116 lbs	39%	50%
1995	69	36	33	107 lbs	74%	82%
1996	51	27	24	130 lbs	67%	55%
1997	100	61	39	116 lbs	63%	47%
1998	105	62	43	113 lbs	78%	59%
1999	72	46	26	114 lbs	71%	38%
2000	75	48	27	113 lbs	80%	56%
2001 ^a	29	17	12	110 lbs	33%	89%
2002	72	45	27	107 lbs	67%	36%
2003	68	53	15	110 lbs	50%	56%

¹ total live weight of all yearling bucks divided by total number of yearling bucks

² number of adult does lactating divided by total number of does

³ number of yearling bucks with two antler points or less

^a check stations were only held three out of the seven hunt days, therefore, fewer samples than other years

Wildlife Observation

D’Arbonne Refuge is open to self-guided field trips. An observation platform and Valley View Nature Trail are available. The Andy Anders Memorial Observation deck for the disabled overlooks the open field area (Figure 11). It is visited year-round, but is most popular in the winter when water is held in the moist-soil unit attracting hundreds of waterfowl, wading birds, and shorebirds.

Approximately 150 birders frequent the refuge each year, with the majority of these being locals. Each year, a few birders from other areas come to the refuge to see the endangered red-cockaded woodpecker. The annual Audubon Christmas Bird Count centered on D’Arbonne Refuge usually attracts 20 or more birders who collectively sight over 100 species.

Roads and three footpaths are open to hiking, bicycling, and horseback riding for observing wildlife. The footpath, Valley View Nature Trail, is the only area formally designated as a “trail” for wildlife observation. Horseback riders must obtain a special use permit, with 19 issued in 2003 and 18 in 2004.

Access to the refuge can occur from Highway 143, Point/Rocky Branch Road, Lake Drain Road, and Wes Wilhite Road. There are 14 designated parking areas, four boat ramps, and one observation tower (Figure 11).

Wildlife Photography

Although there are no photography blinds on the refuge, visitors can photograph wildlife anywhere on the refuge. Several local wildlife photographers have provided pictures taken on the refuge for use in brochures, exhibits, and presentations. The refuge has never received requests for commercial photography or filming.

Wildlife Interpretation

Currently, D'Arbonne Refuge has one interpretive kiosk at its headquarters, and other kiosks providing refuge brochures and pamphlets (Figure 11) at a few of the parking lots and boat launch areas. One reason for the lack of interpretive signage is that locations that would best serve visitors (e.g., boat launches and trails in the bottoms) are flooded annually. The flooding normally inundates over 83 percent of the refuge. Signs that go under water become very unattractive and are hard to maintain. Interpretive signs or a brochure could be developed for the upland area along Valley View Nature Trail off of Holland's Bluff Road. These constraints for signage will be evaluated for solutions. Wildlife interpretation is provided to the public at Black Bayou Lake Refuge, another unit of the Complex. Facilities are available there and they have interpretive materials on bottomland hardwoods, invasive species, neotropical migratory birds, disappearing upland hardwoods, Rafinesque's big-eared bats, and red-cockaded woodpeckers, which are all issues at D'Arbonne Refuge as well.

Wildlife Education

D'Arbonne Refuge is located in both Union Parish and Ouachita Parish school districts. Prior to the development of the Black Bayou Lake Environmental Education Center, school groups occasionally came to the refuge. Logistical constraints for this activity include no public restrooms, no education exhibits, and no facilities on or near the refuge to shelter students in case of unexpected bad weather or for eating lunch. Access is limited. The refuge ranger for the Complex is housed at Black Bayou Lake Refuge, where the majority of wildlife education and interpretation duties occur for the Complex. Other staff members are not available to conduct education programs because of other work priorities. At least one Girl Scout group has visited the refuge for environmental education. Refuge programs are provided to teacher sororities, garden clubs, summer reading programs, and scout camps by the refuge ranger. The refuge manager accommodates requests for speakers for local civic clubs. Any request for field trips or other educational programs are handled on a case-by-case basis by the refuge ranger based on prior commitments and work duties. Inquiries are also directed to the Education Center at Black Bayou Lake Refuge where staff, facilities, and equipment are readily available.

The staff from the Complex participates in a wide array of public events, including National Hunting and Fishing Days. The Complex is a main sponsor of the regional Earth Day Celebration and contributes to the state library conference. Portable exhibits, educational materials for information booths, and personnel are utilized at special events.

Refuge brochures are posted in local sporting goods stores and at the District II Office of the Louisiana Department of Wildlife and Fisheries. General refuge brochures are distributed at the Monroe/West Monroe Visitor and Convention Bureau. Educational brochures and other materials are available at the refuge headquarters and kiosks (Figure 11). Many materials are mailed upon request.

Other Uses

Firewood cutting is a popular activity on the refuge, but occurs only in designated areas involving marked trees and after obtaining a special use permit. Trapping occurs infrequently after obtaining a

special use permit with fee. No all-terrain vehicles are allowed on the refuge except with a special use permit for persons with disabilities who are hunting.

PERSONNEL, OPERATIONS, AND MAINTENANCE

Staffing

Staffing issues are complicated since some positions are “assigned” to the Complex and those individuals provide assistance to D’Arbonne Refuge and all other refuges in the Complex. Other positions are “assigned” to specific refuges; however, all staff members coordinate and collaborate on resource issues as needed.

Refuge Complex Personnel

D’Arbonne NWR Personnel

Project Leader
 Deputy Project Leader
 Law Enforcement Officer
 Wildlife Biologist
 Office Assistant
 Office Automation Clerk
 Outdoor Recreation Specialist/Ranger
 Natural Resource Planning Biologist

Refuge Manager (same as Deputy Project Leader)
 Forester
 Maintenance Worker
 Equipment Operator

A volunteer program exists on the refuge. Currently, there are two regular volunteers who have assisted refuge staff with wood duck and blue bird box management, wildflower landscaping at the office, tree planting, migratory songbird point count surveys, and bat research. Past volunteers have staffed deer check stations, captured and banded red-cockaded woodpeckers, assisted with frog counts, and marked timber. Volunteers for the entire Complex are recognized at an annual banquet for their contributions to the refuge. The refuge has never had an organized Friend’s group.

Funding

D’Arbonne Refuge, being one of five refuges in the North Louisiana Refuge Complex, does not have its own budget. Refuge operation monies are spent among all refuges within the Complex (Table 7). Some years there are project-specific monies directed to only D’Arbonne Refuge.

Table 7. North Louisiana National Wildlife Refuge Complex funding for Fiscal Year 2004

<i>Description</i>	<i>Amount</i>
Refuge Operations	\$1,213,100
Refuge Maintenance	\$322,100
Total Refuge Complex Operating Budget	\$1,691,300

Facilities

The Complex headquarters is located on D’Arbonne Refuge. The existing office/visitor contact building was constructed in 1992, enlarged in 1997, and due to expanding land based

responsibilities, is currently too small to adequately serve the present staff. The refuge has two shop compounds, one on the east side at the headquarters site, and one on the west side (Figure 11). The shop on the east side stores and maintains vehicles and equipment for the Complex also.

All refuge roads (7.5 miles) that are open to public travel are graveled. Grading and other maintenance is conducted by refuge staff. Some roads are closed during annual flooding. Parking areas are located at 14 major access points. In 2002, all refuge roads and parking areas were graveled.

Refuge Revenue Sharing

By law, the refuge is exempt from paying property tax, and instead makes in lieu of payments to Union and Ouachita Parishes through the Refuge Revenue Sharing Act established by Congress (Table 8). This program provides a method of collecting monetary receipts from revenue generating activities on refuges within the nation, pooling them together, and paying them out to counties containing refuge lands. Payment for acquired land is computed on whichever of the following formulas is greatest: (1) three-fourths of one percent of the fair market value of the lands acquired in fee title; or (2) 25 percent of the net refuge receipt collected; or (3) 75 cents per acre of the lands acquired in fee title within the county. If the receipts generated on refuges do not meet the entitlement amount, Congress may approve additional funds to make up the shortfall.

Table 8. North Louisiana National Wildlife Refuge Complex revenue payments for Ouachita and Union Parishes, Louisiana, for the last 5 years

FY	Ouachita	Union	TOTALS
2004	\$34,798.00	\$117,127.00	\$151,925.00
2003	\$36,109.00	\$121,863.00	\$157,972.00
2002	\$37,775.00	\$114,968.00	\$152,743.00
2001	\$37,009.00	\$105,083.00	\$142,092.00
2000	\$14,816.00	\$59,396.00	\$74,212.00

III. Plan Development

PUBLIC INVOLVEMENT AND THE PLANNING PROCESS

In accordance with Service guidelines and National Environmental Policy Act recommendations, public involvement has been a crucial factor throughout the development of the Comprehensive Conservation Plan for D'Arbonne National Wildlife Refuge. This plan has been written with input and assistance from interested citizens, conservation organizations, and employees of local and state agencies. The participation of these stakeholders and their ideas has been of great value in setting the management direction for the refuge. The Service, as a whole, and the refuge staff, in particular, are very grateful to each 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 planning process consisted of a series of steps. These steps are displayed sequentially, but planning and NEPA documentation are iterative steps that occur simultaneously. An important point to make is the public input step. Even though public input is listed as a couple of steps, the Service accepted public input throughout the planning process, which consisted of the following:

1. Preplanning (formed a planning team, reviewed available data, organized efforts);
2. Initiated public involvement and scoping (public input gathered on issues);
3. Developed a draft vision and goal statements;
4. Developed and analyzed draft alternatives, including a proposed action (included developing draft objectives);
5. Prepared NEPA document and draft comprehensive conservation plan (draft document is the proposed alternative in the NEPA document);
6. Conducted internal review (Service, state and tribal partners) and gathered public input on draft plan;
7. Responded to comments;
8. Prepared and adopted final plan;

Scoping is requesting input from the public regarding management or acquisition of a refuge. The primary thrust for the planning process was to provide a forum for ideas and issues to be shared, reviewed, and evaluated among agency staff and the public. Comments were reviewed to determine the issues that the public was concerned with or were advocating for the direction of refuge management. These issues were then addressed in management plans and decision documents for acquisition and management.

In preparation for developing the plan, the refuge conducted a biological review and public use review in September 2003, and May 2004, respectively. Early in the process, the refuge identified a variety of issues, concerns, and opportunities that were provided to both review teams.

The Biological Review was held during the week of September 8, 2003. The Biological Review Team was a diverse team of experts from universities, state and federal agencies, and non-profit organizations invited to review the biological program of the refuge (see Chapter V for list of members). The Biological Review Team conducted a critical examination of all aspects of the biological program. Members of this review team then produced a report that summarized recommendations to be used when the refuge began developing the comprehensive conservation plan.

The Public Use Review Team (see Chapter V for list of members) was comprised of D'Arbonne and neighboring refuge staff and a Regional Office representative from the Visitor Services and Outreach program. The team reviewed the existing public use programs, facilities, and opportunities available. Emphasis was placed on the priority six wildlife-dependent public uses. The team prepared a Public Use Review Report that provided recommendations for the short- and long-term public use program. These recommendations were taken into consideration in the development of the comprehensive conservation plan.

Public scoping was initiated in March 2004, when the notice of intent to prepare a comprehensive conservation plan was published in the *Federal Register*. The notice provided three public involvement questions to the public and requested comments concerning management of the refuge. Scoping continued with an open house to discuss management of the refuge. The open house was held June 8, 2004, from 3 -7 p.m. at the Rocky Branch Elementary School. Announcements were made in local papers, on radio stations, and through local flyers in businesses and on the school's billboard. Unfortunately, turn-out was extremely low (one visitor) and no comments were received.

A part of the planning process also was to solicit comments on a fully developed draft comprehensive conservation plan and environmental assessment. The public review and comment period for the draft plan and environmental assessment for D'Arbonne Refuge opened on April 11, 2006, and closed on May 11, 2006, as published in the *Federal Register*. Media releases and mailings invited anyone so desiring to submit written comments on the draft document to the Service. An open house was held on Tuesday, May 2, 2006, at the Headquarters Office to answer questions regarding the documents. No one attended the open house. Written comments were submitted by one member of the general public and two organizations. No comments were submitted by other federal agencies. The Defenders of Wildlife and Animal Protection Institute was the identified organization that submitted comments. Each comment received, either in full text or summarized, is included in Appendix VII.

SUMMARY OF ISSUES, CONCERNS, AND OPPORTUNITIES

The core planning team (e.g., refuge staff) identified a number of issues, concerns, and opportunities related to fish and wildlife protection, habitat restoration, recreation, and management of threatened and endangered species (see Chapter V for list of members). Additionally, the planning team considered federal and state mandates, as well as applicable local ordinances, regulations, and plans. The team also directed the process of obtaining public input through public scoping meetings, comment packets, and personal contacts. All public comments were considered, however, some issues important to the public fall outside the scope of the decision to be made within this planning process. The team considered all issues that were raised throughout the planning process, and developed a plan that attempts to balance the competing opinions regarding important issues. The team identified those issues that, in the team's best professional judgment, are most significant to the refuge. A summary of the significant issues follows.

FISH AND WILDLIFE POPULATION MANAGEMENT

Bottomland hardwood management must deal with the beaver overpopulation. Beavers kill and damage stands of trees when lodge construction holds water in areas longer than normal and results in prolonged flooding. Without adequate control, beaver populations on the refuge will increase to a point that results in unacceptable levels of damage to the bottomland hardwood forests.

The public, in the past, has questioned the carrying capacity of the refuge in terms of management for white-tailed deer. Forest management options will be reviewed, as well as deer herd health check data, to define refuge carrying capacity for the next 15 years and associated white-tailed deer management.

In 2000, a unique biological resource was found on the refuge for management. Many Rafinesque's big-eared bats were discovered roosting in a water tupelo stand. This provides an opportunity to further define current habitat use by bats, and define available habitat and/or biological potential for suitable habitat on the refuge.

HABITAT MANAGEMENT

The open field "beanfield" on the west side of the refuge (Figure 9) is composed of an open grassy field, a moist-soil unit, and an area of reforestation. The moist-soil unit and open field provide wintering waterfowl habitat. However, ecologically, this area was naturally bottomland hardwood forest, which also provides wintering waterfowl habitat and wood duck nesting habitat. Refuge staff and others have questioned whether the open field should be maintained open or be allowed to succeed through natural progression to a forested habitat.

The refuge currently supports only three active red-cockaded woodpecker groups (Figure 10), with a present objective of supporting five family groups. Recently, much discussion has centered on the problems of trying to maintain and increase this population. There has been reduction of suitable habitat surrounding the refuge with an already low and decreasing quality of existing habitat on the refuge. This leads to little hope for maintaining even the remaining family groups for much longer, much less being able to increase the family groups. Present habitat considered potentially suitable consists of only 1,200 acres of mature pine-dominated stands concentrated on the northeast corner of the refuge. This habitat historically was, and still pushes itself to, a mixed pine and hardwood type with many more hardwoods and woody understory than what the red-cockaded woodpecker guidelines suggest. Substantial staff time and resources are devoted to managing and monitoring what is clearly a limited population in a marginal habitat situation. Experts have suggested that for the circumstances under which red-cockaded woodpeckers could persist, as a small but sustainable population, would require radically different habitat conditions on the refuge that are artificial, as well as a dramatic change to present landuse patterns adjacent to the refuge. The issue, then, is whether to continue funneling an extreme amount of resources to maintain an artificial habitat for an endangered species or allow the habitat to succeed with a natural progression to mixed pine/hardwood habitat that will conserve the biological integrity of the area, and monitor for subsequent RCW use.

A concern was noted for a loss of biological integrity of bottomland hardwoods and upland mixed pine/hardwood forests with an increase in Japanese climbing fern and Chinese tallow tree, as discussed in the above-mentioned invasives section (Figure 4).

The Service has been dealing with the conservation and management of bottomland hardwood forests throughout the Southeast Region. Constraints of burning and thinning due to logistical or hydrological (i.e., overflow flooding) problems have led to overstocking and shading out of understory species and loss of regeneration in some areas. Understory shrubs and trees are highly important to nesting and foraging neotropical migratory birds. Management activities need to be reviewed and determined as to whether they are resulting in an appropriate forest structure, composition, and associated understory for bottomland hardwood conservation when they are implemented on an overflow refuge, such as D'Arbonne. In association with this, several priority species of migratory songbirds utilize bottomland hardwoods, but it is unknown how much nesting occurs on the refuge and whether nesting attempts are successful. Since the refuge was established for migratory birds, there is an opportunity for management to direct resources toward neotropical migratory songbirds.

VISITOR SERVICES

As waterfowl numbers have receded some, yet more land has been protected, and an increase of water on the landscape has occurred, the waterfowl population has expanded its use of areas across the region. Often a result is a perception that refuge lands in sanctuary status are “holding” all the ducks from hunter access. The public has subsequently requested refuges to alternate sanctuary sites or not have any.

D’Arbonne Refuge does not currently offer turkey hunting, but the public has been requesting a hunt. Quality turkey habitat is limited on the refuge. Management will evaluate the turkey habitat on the refuge for opportunities of a safe, sustainable, quality hunt.

The public requests access for horseback riding. Currently, three trails are open to horseback riding with a special use permit (Figure 11). Special use permits are also issued for night raccoon hunting that is conducted on horseback. Issues associated with horseback riding are habitat degradation and conflict with other uses. This use is evaluated in this plan.

Deer management is often an issue with a variety of user groups. Refuges have received public comments for deer management changes going toward more or different harvest, to leave the harvest as is, or to not allow deer hunting at all. Bowhunters often want no gun hunting, or some want special muzzle-loader seasons, etc. Often, deer management comments are associated with trophy hunts, antler limits, and limitations to doe and buck days. The plan will evaluate current management and opportunities for the future. Often coinciding with deer hunting is the access issue of using all-terrain vehicles. Currently, the refuge does not allow all-terrain vehicles. Comments have been received in the past for more access with all-terrain vehicles and to maintain the existing restrictions.

REFUGE ADMINISTRATION

D’Arbonne Refuge is saturated with natural gas wells (Figure 5). Leases for resource extraction were retained with private mineral holders when refuge lands were acquired. However, gas extraction must be conducted in a manner that does not degrade the natural environment of the refuge (612 FW 2). Therefore, refuge administration must maintain oversight of gas production impacts to the refuge and coordinate for best management practices with gas companies. There are also occasional requests for new access rights-of-way that the refuge must review for compatibility. Duke Energy has requested a new right-of-way across the refuge that management has deemed not compatible. There is an existing right-of-way that the company can use. A compatibility determination in this plan will address this issue.

Wilderness Review

Refuge planning policy requires a Wilderness Review concurrent with the comprehensive conservation planning process (602 FW 3) that is consistent with provisions of the Wilderness Act, National Environmental Policy Act, National Historic Preservation Act, and other applicable legislation. Service lands were inventoried to identify whether areas met the defining wilderness criteria set forth in the Wilderness Act of 1964. These criteria are as follows: (1) generally appears to have been affected primarily by the forces of nature, with the imprint of man’s work substantially unnoticeable; (2) has outstanding opportunities for solitude or a primitive and unconfined type of recreation; (3) has at least five thousand acres of land or is of sufficient size as to make practicable its preservation and use in an unimpaired condition; and (4) may also contain ecological, geological or other features of scientific, educational, scenic or historical value. No areas on D’Arbonne Refuge meet the eligibility criteria for a wilderness study. There are no areas of 5,000 contiguous roadless acres; almost all the lands have been logged, and the imprint of man from the Columbia Lock and

Dam will remain a major impact on the landscape; and there is a substantial amount of land subject to surface and subsurface mineral exploration and development that could not be relinquished, acquired, or exchanged in the foreseeable future. Therefore, the suitability of refuge lands for wilderness designation is not analyzed further in this plan.

IV. Management Direction

INTRODUCTION

The Service manages fish and wildlife habitats considering the needs of all resources in decision-making. However, first and foremost, fish and wildlife conservation assumes priority in refuge management. A requirement of the National Wildlife Refuge System Improvement Act of 1997 is for the Service to maintain the ecological health, diversity, and integrity of refuges. 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 are: hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation. These six priority wildlife-dependent public uses will be provided at a level that is feasible and compatible.

Described below is the comprehensive conservation plan for managing the refuge over the next 15 years. This 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 in the draft comprehensive conservation plan and environmental assessment. After a public review and comment period on the draft plan, the Service chose Alternative A as the preferred management direction.

Implementing the preferred alternative will result in management based on sound science for the conservation of a structurally and species diverse bottomland hardwood habitat for migratory birds and resident wildlife. Upland habitat will be allowed to function and respond to processes mimicking the natural fire regime and disturbances to benefit migratory birds, red-cockaded woodpeckers and resident wildlife. A focused effort will be directed toward reducing invasive species, which are threatening the biological integrity of the refuge. Wintering waterfowl habitat will be maintained as important foraging habitat in the open field and forested wetlands. Baseline inventories and monitoring of management actions will be completed to gain information on a variety of species, such as reptiles, amphibians, butterflies, and several species of concern. Several cooperative projects will be conducted with universities, Louisiana Department of Wildlife and Fisheries, and other agencies and individuals to provide biological information to be used in management decisions. When compatible, the wildlife-dependent recreational opportunities for hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation will be provided, and in some instances enhanced, while achieving the refuge purpose.

VISION

D'Arbonne National Wildlife Refuge will be managed for the conservation, enhancement, and restoration of bottomland hardwood forests and important, associated upland habitats as an integral component of the Lower Mississippi River Ecosystem. These habitats will support a variety of migratory birds, species of special concern, and other associated wildlife and plants. The public will be able to enjoy opportunities for wildlife-dependent recreation, while learning about and gaining appreciation of nature. Present and future generations will benefit from partnerships with others in wildlife conservation efforts.

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, Plan Implementation, identifies the projects associated with the various strategies.

These goals, objectives, and strategies reflect the Service's commitment to achieve the mandates of the National Wildlife Refuge System Improvement Act of 1997, the mission of the National Wildlife Refuge System, and the purposes and vision of D'Arbonne National Wildlife Refuge. The Service intends to accomplish these goals, objectives, and strategies within the next 15 years.

FISH AND WILDLIFE POPULATION MANAGEMENT

Migratory Birds Goal:

Conserve, restore, and enhance the ecological diversity and abundance of migratory birds to support the national, regional, and ecosystem habitat and population goals.

Migratory Birds Objective 1- Waterfowl:

Annually monitor wintering waterfowl species abundance, use period, and habitat use on the refuge for adaptive management decisions.

Strategies:

- Implement Waterfowl Survey Protocol for Refuges in the Southeast Region twice a month from mid-September to March.
- Design and implement an estimate of waterfowl use of flooded forest.
- Fly mid-winter survey each year, and coordinate with Louisiana Department of Wildlife and Fisheries to conduct surveys in northeast Louisiana.
- Hire biologist to assist with surveys and data management.

Migratory Birds Objective 2 - Waterfowl:

Collaborate with partners to develop statistically valid estimates of wintering waterfowl abundance and distribution for the State of Louisiana.

Strategy:

- Coordinate with Louisiana Department of Wildlife and Fisheries to evaluate mid-winter waterfowl inventory data and design new protocol if necessary.

Migratory Birds Objective 3 - Waterfowl:

Maintain 4,750 acres (27 percent) of refuge as waterfowl sanctuary (Figure 11) and use adaptive management for yearly regulations, delineations, and modifications.

Strategies:

- Post sanctuary boundary and continue to enforce no waterfowl hunting in the sanctuary.
- Monitor the sanctuary for disturbance thresholds from access during the key waterfowl wintering period of September – March.
- Evaluate the sanctuary from a conservation need for size, location, and access regulations every 5 years.

Migratory Birds Objective 4 – Waterfowl:

Design and implement a protocol, within 4 years of the date of this plan, for estimating wintering waterfowl use of flooded forest.

Discussion:

D'Arbonne Refuge is located in the western edge of the Mississippi Alluvial Valley (Figure 3), which is a critical ecoregion for migrating and wintering dabbling ducks, wood ducks, and geese in North America (Reinecke et al., 1989), as well as southern breeding populations of wood ducks. North American waterfowl have seasonally dynamic life-cycle needs that are fulfilled by use of a diversity of habitats and foods throughout their annual range, which, for most species, is continental in scale in contrast to resident wildlife. Indeed, habitat (both its quantity and quality) is the primary template for ecological strategies of waterfowl (and all wildlife) and a critical determinant of their survival and productivity. Hence, sustaining viable and harvestable populations of waterfowl depends on conservation and management of habitats throughout the flyways of North America. In regards to wintering habitat, dabbling ducks need a diversity of wetlands including the following: flooded, crop land; natural wetlands; and refuge or sanctuary (Reinecke et al., 1989).

D'Arbonne Refuge provides flooded habitat in the open field area of the refuge and over 11,000 acres of natural wetlands in the bottomland hardwood forest. The remaining essential component of waterfowl wintering habitat is sanctuary. Waterfowl need sanctuary from human disturbance during the winter to prepare biologically for spring migration and reproduction (Reinecke et al., 1989). Disturbance can interrupt resting and feeding bouts resulting in a loss of energy and lowering of body weight (Henry 1980; Heitmeyer and Raveling 1988; Kahl 1991). Waterfowl are trying to put on as much energy reserves as possible in preparation for spring migrating and reproduction. Paulus (1984) found in Louisiana that increased foraging time by gadwalls was insufficient to counterbalance disturbance factors. Locally, the refuge can provide sanctuary for a portion of the waterfowl population.

Sanctuary is a priority for management of wintering waterfowl to ensure that adequate and preferred feeding habitats are available. Many of the public believe that sanctuaries affect the availability of waterfowl for the hunting season. Some believe that sanctuary holds all the ducks, or a large portion, off of public and/or private hunting lands. In contrast, it has been seen in some areas that "...creating sanctuary areas or areas with minimal human disturbance, among a diversity of habitat types that provide adequate food and cover resources is probably the most effective management tool to encourage waterfowl use over time." "Sanctuaries provide core use areas that enhance the use of adjacent areas by holding more birds closer to a hunting area." (Bias et al., 1997)

Others believe also that fewer waterfowl are coming to Louisiana than in previous years. The refuge has committed to working with the State of Louisiana through the objectives stated above to try to estimate the population of waterfowl using north Louisiana in general, the refuge, and other public lands. These data will begin to provide evidence of annual land use and waterfowl population estimates in northern Louisiana.

Strategy:

- Collaborate with Lower Mississippi Valley Joint Venture to design a valid estimation.

Migratory Birds Objective 5 – Forest Birds:

Every 3 years, determine neotropical migratory bird species relative abundance on the refuge to monitor for trends and regional comparisons.

Strategies:

- Collaborate with Lower Mississippi Valley Joint Venture office to design protocol.
- Refuge staff or volunteers conduct point-count surveys two to three times per nesting season in April – June for each major habitat type of the refuge.
- Hire biologist to assist with surveys and data management.

Migratory Birds Objective 6 – Forest Birds:

Determine nesting success of priority neotropical migratory songbirds (e.g., hooded warbler, Kentucky warbler, northern parula, Swainson's warbler, wood thrush, and prothonotary warbler) within 6 years of the date of this plan and use production data as a baseline for comparison in future years as surrounding land cover changes.

Strategies:

- Develop a research project in cooperation with Louisiana Department of Wildlife and Fisheries and a university to determine abundance and production of songbirds for a minimum of three years. Provide recommendations for best management practices that will maintain or increase production of Louisiana species of concern and maintain compliance with the Service's Avian Diversity Policy (USFWS 1990).
- Conduct point count surveys and nest searches for 3 years to establish baseline. Monitor production as land cover changes to less than 70 percent forested in surrounding landscape.
- Complete baseline study to be conducted by graduate student or temporary employee.

Migratory Birds Objective 7 – Forest Birds:

Coordinate with Lower Mississippi Valley Joint Venture Science Coordinator to design protocol within 2 years of the date of this plan for measuring migratory songbirds of concern's response to forest management activities.

Discussion:

Forest breeding birds, especially neotropical migratory birds, are declining in numbers (Robinson 1993). Less than 25 percent of bottomland hardwood forests remain in the Mississippi Alluvial Valley (Twedt and Loesch 1999), and that which remains is fragmented and isolated (Rudis 1995). Species, such as the cerulean warbler and the Swainson's warbler, depend on large blocks of bottomland hardwood forest for breeding.

Information on species presence, abundance, population trends, and productivity is needed for forest nesting birds on the refuge. Long-term monitoring will allow the refuge to identify problems and benefits associated with management practices, land-use changes surrounding the refuge, or ecosystem changes. The Louisiana Department of Wildlife and Fisheries is currently developing a conservation strategy and has outlined bird species targets in need of conservation concern. The refuge will continue to cooperate with the state and develop a nesting productivity research project, which will include as many of the state's priority forest bird species as feasible.

Long-term conservation of neotropical migratory birds cannot be achieved on a refuge alone. Refuges are not ecologically isolated from activities and conditions in surrounding areas. Population sizes, viability, and threats are determined by interactions between local habitat factors and regional or landscape features, such as total habitat area and/or land-use changes. The refuge will establish a baseline assessment of presence, abundance, and nesting productivity of high-priority forest birds and then monitor for surrounding land-use changes and how they affect songbird conservation on the refuge. This information will provide insight as to whether forest management actions need to be continued or modified to provide the optimal habitat available to neotropical migratory birds.

Strategies:

- Refuge staff will determine which information need is highest priority from forest management activities affecting migratory songbirds.
- In cooperation with Lower Mississippi Valley Joint Venture, design study to answer research questions defined from above strategy.
- Refuge staff will commit to design requirements for forest management activities and subsequent measuring of bird response.
- Hire biologist to assist with field project and data collection.

Migratory Birds Objective 8 – Wood Ducks:

Annually determine wood duck nesting success on the refuge and contribute to determining harvest and survival rates of wood ducks in Louisiana to foster wood duck sustainability in the Lower Mississippi Valley.

Discussion:

Wood ducks are year-round residents in the forest lands of the southeast, including D'Arbonne Refuge. 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. Wood ducks are cavity nesters, seeking cavities in trees within a mile of water where brood survival is higher. Due to conversion of forest lands to urban sprawl, agriculture, forestry practices, and competition for nest sites, natural cavities are considered to limit reproduction. Nest boxes are commonly used to supplement natural cavities and increase local production of wood ducks. Box programs include frequent checks and cleaning of boxes to increase use by wood ducks, and better estimate the number of broods, nest success, and productivity.

Wood ducks are fairly secretive birds and make it difficult to estimate populations and survival rates. Therefore, regional banding quotas, which are stepped down to individual states and stations to distribute banding throughout the range of the wood duck, have been established to determine harvest and survival rates.

Strategies:

- Maintain a program of well-maintained nest boxes according to "Increasing Wood Duck Productivity: Guidelines for Management and Banding" (USFWS 2003).
- Evaluate nest use and nesting success in boxes. Adjust the program accordingly to add more boxes if over 50 percent of existing boxes are used and if within the constraints of available refuge staff.
- Continue meeting or exceeding preseason wood duck banding quota.

Migratory Birds Objective 9 – Scrub/shrub Birds:

Determine species presence, relative abundance and habitat use of priority scrub/shrub species (e.g., painted bunting, Kentucky warbler, hooded warbler, prairie warbler) within 2 years of the date of this plan.

Strategies:

- Review state-listed species, refuge data, and species habitat requirements to determine which priority species to include in protocol design.
- Coordinate with Lower Mississippi Valley Joint Venture Science Coordinator to design inventory protocol.

-
- Cooperate with the Louisiana Department of Wildlife and Fisheries and local university in developing a graduate student project.

Migratory Birds Objective 10 – Scrub/shrub Birds:

Establish protocol to survey American woodcock to determine use of open field and scrub/shrub habitat of the refuge during winter and spring, within 2 years of the date of this plan.

Discussion:

Several species associated with early successional forests are often described as scrub/shrub species. American woodcock, painted bunting, and prairie warbler are among the higher priority scrub/shrub species dependent upon habitats found on the refuge. No data exist for whether these species are nesting successfully on the refuge. There are only data demonstrating that they occur on the refuge. Louisiana has these species listed as a species of conservation concern. With cooperation from the state, the refuge may be able to provide data on their abundance and habitat use that could be used in conjunction with refuge management to promote their conservation.

American woodcock, though a gamebird, also is included here, but its status at D'Arbonne Refuge would seem limited as available habitats during the winter months are usually subject to deep flooding. Some breeding does occur, but at this time there are few areas on the refuge that provide optimal breeding conditions. However, more data are needed to determine the use of the refuge by woodcock.

Strategy:

- Review literature and discuss with partners to design a valid, feasible protocol.

Migratory Birds Objective 11 – Grassland Birds:

Conduct a research project to determine how to provide the range of habitat conditions required for grassland species wintering on D'Arbonne Refuge, with emphasis on Henslow's sparrows, sedge wrens, and LeConte's sparrows within 2 years of the date of this plan.

Discussion:

The 250-acre grassy unit within the open field is considered locally important habitat for grassland species, including priority species, such as Henslow's and LeConte's sparrows. Grassy conditions may also support other priority grassland birds, including yellow rail, American woodcock, Wilson's snipe, short-eared owl, northern bobwhite, grasshopper sparrow, barn owl, and sedge wren. Many grassland birds have been declining and are a high priority for refuges to monitor for presence, abundance, and nesting productivity. Not many data are available for these species regarding to what extent they use the refuge for foraging and nesting. Baseline data are needed and can then be compared to future data to monitor for changes in trends.

Strategies:

- Conduct literature searches, contact experts, and partner with a university on how to provide habitat requirements of grassland species of concern that may winter on the refuge.
- Implement Project Prairie Bird or similar surveys to better understand habitat use by wintering species.
- Hire biologist to assist with field project and data management.

Migratory Birds Objective 12 – Nongame Waterbirds:

Determine marsh bird species presence and abundance, particularly king rails, in the open field within 5 years of the date of this plan.

Migratory Birds Objective 13 – Nongame Waterbirds:

Annually, monitor species presence, habitat use, and abundance of colonial water birds, pelicans, and long-legged waders, especially for post-breeding periods.

Discussion:

Long-legged waders of several species make good use of the refuge and are not particularly in need of targeted foraging or nesting habitat management. Generally speaking, nesting long-legged wading birds have plenty of habitat available, but the issue is how much disturbance these nesting birds can tolerate and to provide post-breeding foraging habitat in late summer and early fall. Species of conservation interest include little blue heron, wood stork, and white ibis. Transient/wintering American white pelicans are also of increasing management interest with respect to aquaculture conflicts in the Lower Mississippi Valley to the east and south of the refuge. Monitoring data (i.e., which species are using the refuge or impoundments and condition of the impoundments) will provide valuable information for adaptive management decisions to benefit a wide array of species.

Strategy:

- Conduct surveys of secretive marsh birds; locate nesting colonies; count long-legged waders; and track numbers of pelicans occurring on the refuge.

Wildlife Diversity/Resident Wildlife Goal:

Maintain and foster resident, endemic wildlife species of bottomland and associated upland habitat to maintain species diversity and support wildlife-dependent recreation in north Louisiana.

Resident Wildlife Objective 1 – Mammals:

Create a species list of mammals utilizing the refuge within 2 years of the date of this plan.

Strategies:

- Research the literature, including range maps, for species that should occur in north Louisiana.
- Implement a variety of survey techniques (e.g., small mammal traps and mist-nets for bats) to sample for presence of all potential species.

Resident Wildlife Objective 2 - Mammals:

Monitor white-tailed deer herd health and age and sex structure every 3 to 5 years for disease and conditions that relate to refuge habitat carrying capacity.

Discussion:

Many species of mammals are present on the refuge, including white-tailed deer, gray and fox squirrel, raccoon, bobcat, beaver, nutria, muskrat, otter, opossum, red and gray fox, coyote, rabbit, bat, and rodent. No research has been conducted on mammals, except for white-tailed deer, on the refuge and therefore, little information is available on their populations. Before management strategies can be developed, a basic understanding of which species use the refuge needs to be addressed. Trapping/surveying for all mammals on the refuge would be logistically time-consuming and expensive, so other alternatives, such as literature searches, will help initiate a species list. A focus can then be developed for which target species or species of concern require more intensive monitoring or research.

White-tailed deer are a popular species with the public for the wildlife-dependent uses of hunting, wildlife observation, and photography. Deer move freely across refuge boundaries making it difficult to manage for a specific number of individuals given the size of their range and seasonality of use of the refuge. However, the refuge can monitor the population size and

distribution to determine if the population is increasing beyond carrying capacity or if animals are concentrating in areas resulting in vegetation damage. By monitoring the availability, diversity, and use of understory woody and herbaceous plants used, or not used by deer, the refuge will be able to better understand the pressure being exerted on the habitat, and therefore use this additional information to make habitat and harvest recommendations.

Deer can reproduce quickly and should be monitored for having an impact on the habitat, as well as monitoring the herd itself for health issues. For example, chronic wasting disease is a transmissible spongiform encephalopathy of deer and elk. It has not been found in Louisiana to date, but the high profile of this disease makes it crucial for the Service to cooperate with the state and other federal agencies in monitoring for the disease. These management actions are necessary to support the public use program.

Strategies:

- Partner with Southeastern Disease Study Group from University of Georgia to collect deer for health checks and chronic wasting disease surveillance.
- Partner with Louisiana Department of Wildlife and Fisheries to stay abreast of occurrence of chronic wasting disease in deer in Louisiana and neighboring states.
- Improve habitat conditions with invasive plant control and forest cutting, thinning, burning, and possibly planting.
- Develop a system to estimate deer population (e.g., periodic browse surveys) on the refuge based on reviewing literature for current, valid methods and discussions with experts.
- Apply adaptive management (e.g., modify hunting seasons, use of fire, timber thinning, or invasive plant control to improve forage) to determine best practices to use in response to monitoring data on deer populations and how their habitat is being affected by refuge management.
- If deer population increases beyond carrying capacity, reduce the herd size by adjusting season length, bag limits, and methods of take.

Resident Wildlife Objective 3 – Amphibians and Reptiles:

Inventory and create a species list of reptiles and amphibians utilizing the refuge within 3 to 5 years of the date of this plan.

Resident Wildlife Objective 4 – Amphibians and Reptiles:

Monitor population trends of anurans every 2 years, with special emphasis on looking for spadefoot toads in late February to June along the sandy soils of the refuge's western boundary.

Strategies:

- Design and implement an inventory protocol including call surveys, drift fence arrays configured with pitfall and funnel traps, and cover boards with valid sampling methodologies (Heyer et al., 1994) for all major habitats throughout the year.
- If species of concern, such as Louisiana slimy salamander, alligator snapping turtle, and western worm snake, are documented on the refuge, management actions will be reviewed for benefits and impacts.

Resident Wildlife Objective 5 – Amphibians and Reptiles:

Monitor forest management impacts on amphibian and reptile species (presence and abundance) to determine the best adaptive management for long-term conservation benefits.

Strategies:

- Cooperate with a university or organization to design and implement a project that determines whether thinning provides habitat benefits to amphibian and reptile species of concern.
- Review literature for recent, relevant studies and protocols.
- Collaborate with U.S. Geological Survey for funding possibilities through Amphibian and Reptile Monitoring Initiative.

Resident Wildlife Objective 6 – Amphibians and Reptiles:

Within 1 year of the date of this plan, initiate a study to inventory the refuge for nesting habitat of alligator snapping turtles and monitor nest success for 2 to 3 years.

Discussion:

Although the prospective herpetofauna of the refuge is large, at least 80 species, the presence of relatively few have been confirmed and associated with particular habitat type. Among these are three species of special concern: Louisiana slimy salamander, alligator snapping turtle, and western worm snake. The alligator snapping turtle has been of conservation concern for some time (Pritchard 1989; Sloan and Lovich 1995), and was recently proposed for listing on Appendix III of CITES by the United States (*Federal Register* 2002) in order to monitor the growing international trade in this species. The Louisiana slimy salamander is listed by the Louisiana Natural Heritage Program. In the case of both of these species, there are historical records of these two species from nearby parishes, although none for Union Parish or D'Arbonne Refuge (Dundee and Rossman 1989). When confronted with a lack of knowledge concerning the species actually residing on refuge lands, the first step in conserving them is to determine presence, and then to the extent possible, to associate their presence with habitat type, and how forest management activities are affecting the population.

While certain aspects of the biology of the alligator snapping turtle are slowly unfolding, population dynamics are still largely unknown (Trauth et al., 1998), yet critical to managing the species for conservation. One of the most significant features of its life history that impacts any conservation effort is delayed onset of sexual maturity; 13-21 years in females and 11-21 years in males (Tucker and Sloan 1997). Given the significance of reproductive characteristics for determining population dynamics, there are relatively few studies of reproduction in the species, and several of these have relied upon meat market specimens of unknown provenance (Dobie 1971; Tucker and Sloan 1997). The only published study of nesting in alligator snapping turtles was along the Apalachicola River in the Florida panhandle (Ewert 1976; Ewert and Jackson 1994). Unpublished observations of nesting alligator snapping turtles have occurred at Black Bayou Lake National Wildlife Refuge and most likely occur on D'Arbonne Refuge (J. Carr, pers. Comm.). In cooperation with the University of Louisiana at Monroe and its herpetologist, Dr. John Carr, the refuge provides a good opportunity to further understand alligator snapping turtle nesting requirements and components of nesting successfully. These data are crucial in furthering conservation efforts of this declining species.

Strategies:

- Using the best available maps of elevation and cover for the refuge, identify 5 to 6 potential nesting sites along the shoreline (each ½ km long) that can be surveyed daily during the spring (late April-May) for nesting by *Macrochelys spp.*
- Evaluate the frequency of nest site locations along different sections of shoreline representing both natural and anthropogenically "opened" habitats.
- Evaluate nesting success, nest predators, and possible nest predator intervention strategies.

Resident Wildlife Objective 7 – Butterflies and Moths:

Inventory and create a species list and display of butterflies and moths utilizing the refuge within 3 to 5 years of the date of this plan.

Resident Wildlife Objective 8 – Mussels:

Conduct an inventory of mussels in Bayou D'Arbonne to determine whether species of concern or invasive species are present within 3 to 5 years of the date of this plan.

Resident Wildlife Objective 9 – Fish:

Inventory fish in the mainstream and backwater areas to determine whether species of concern or invasive species are present, and explore opportunities to enhance fish habitat in these areas within 3 to 5 years of the date of this plan.

Discussion:

The Service recognizes fisheries and aquatic resource management as important Service activities both on and off refuges (USFWS 1997, 1998, 1994, and 1996). Bayou D'Arbonne, the central physical feature of the refuge, meanders 13.2 miles within refuge boundaries through a 2- to 4-mile wide floodplain. Columbia Lock and Dam, established in 1972, is located downstream of the refuge. The floodgates are rarely used and periodic spillway discharges are not thought to impact refuge lands or the fishery.

There are no physical barriers or obstructions between the refuge portion of Bayou D'Arbonne and the Ouachita River. Approximately 75 percent of the refuge is subject to annual flooding, December through May. Annual water intake from a natural flood regime makes it difficult to efficiently manage a sport fishery. Typically, the bayou overflows create shallow areas, which sport fish seek for spawning. Carp, buffalo, and other fishes seek these spawning habitats as well. Although adults and young-of-the-year have the opportunity to leave the bayou with receding waters in the late spring or summer, fish are apt to remain if adequate depths are available. Wood (1979) tracked redistribution of fishes in the bayou following the impoundment of Lake D'Arbonne and implementation of the navigation project on the Ouachita River. Based on their distribution within the drainage, fish were divided into three groups: mainstream and backwater, smaller tributaries, and widely distributed species. Mostly sport species, such as bass, other sunfishes, and catfish, along with gar, were found in the main stem of the bayou. Darters were primarily found in the smaller tributaries. Fish most widely distributed were bass, darters, minnows, and sunfish. However, the navigation project caused water levels in the bayou and tributaries to be higher, causing the loss of shallow areas and subsequent loss of darters, minnow, madtoms, and mussels.

Few fisheries data have been collected on the refuge since the late 1970s. However, cooperation with Louisiana Department of Wildlife and Fisheries has occurred in the past and a strong relationship exists now for future investigations of the fishery. Both agencies see the need and the benefits of supporting the existing fisheries and maintaining a self-sustaining sport fish population.

Strategies:

- Look into cooperative possibilities with U.S. Geological Survey and universities for inventory and monitoring of the aquatic resources of Bayou D'Arbonne.
- Inventory fish with electrofishing gear, gill nets, angler surveys, seines, traps, rotenone, etc.
- Evaluate opportunities for fish habitat enhancement that does not conflict with other management strategies in those areas.

Species of Special Concern Goal:

Contribute to the long-term protection and recovery of threatened, endangered, and species of special concern populations in D'Arbonne Refuge and the Lower Mississippi River Ecosystem.

Species of Special Concern Objective 1:

Annually, around each bald eagle nest delineate the primary zone (≥ 457 meters radius from nest tree) where human activity may be restricted if disturbance is noted during the nesting period, and where partial restrictions may occur at other times. Permanent type activities may be restricted in the secondary zone (≥ 1 mile radius from nest tree) around each nest (Management Guidelines for the Bald Eagle in the Southeast Region).

Strategies:

- At the beginning of each nesting season, refuge staff will monitor past nesting areas for nesting activity.
- When bald eagle nesting activity is confirmed, human activity will be restricted according to Management Guidelines for the Bald Eagle in the Southeast Region. This will be accomplished with signing and law enforcement once disturbance is determined to be occurring that may potentially disrupt the nesting attempt.
- Maintain nest location and nest success data each year and provide to Louisiana Natural Heritage Program.
- Evaluate advantages of protection of nest sites through Louisiana Department of Wildlife and Fisheries' Natural Areas Registry Program.
- Coordinate with Louisiana Department of Wildlife and Fisheries for midwinter eagle surveys, which include non-nesting birds.

Species of Special Concern Objective 2:

Provide minimum nesting habitat for red-cockaded woodpeckers by maintaining 10 acres of habitat around each cluster site according to red-cockaded woodpecker guidelines (minimum basal area for pines ≥ 60 years in age and ≥ 14 " in dbh at 20 feet/acre; canopy hardwoods < 30 percent of number of canopy trees; no or sparse hardwood midstory; and > 40 percent of ground and midstory plants are native bunchgrasses and native, fire-tolerant, fire-dependent herbs). Provide minimum foraging habitat that consists of at least 125 acres of pine ≥ 30 years in age with 40-80 square feet of basal area and canopy hardwoods < 30 percent of overstory stem count.

Strategies:

- Use prescribed fire during growing season every 3 to 5 years to maintain herbaceous understory.
- Monitor cluster site forest condition each year for tree species composition, basal area, canopy cover, midstory cover, and ground cover.
- Initiate Intra-Service Section 7 Consultation with Ecological Services to conduct habitat management that fosters a greater hardwood species component in the canopy and midstory for that habitat outside of the 10-acre managed area around each cluster site (for specific habitat conditions see mixed pine and hardwood objectives).

Species of Special Concern Objective 3:

Annually monitor Rafinesque's big-eared and southeastern Myotis bats for abundance, roost tree use, and location on the refuge.

Species of Special Concern Objective 4:

Conduct a research project to determine roost habits, reproductive success, and wintering roost locations of Rafinesque's big-eared bats and southeastern Myotis bats on the refuge.

Discussion:

The Service is required to conduct conservation programs for listed species and to ensure that agency actions are not likely to jeopardize the continued existence of listed species or adversely

modify or destroy their critical habitat. Listed species that occur on the refuge include the threatened bald eagle and endangered red-cockaded woodpecker.

Bald eagles often winter and roost on the refuge in the winter, and there have been two nesting attempts. Neither of the nests has yet to successfully fledge young. The Southeast Regional Management Guidelines suggests that all nests should include buffer zones of restricted human activity to reduce the chance of disturbance or abandonment of nests. Bald eagles have been shown to change their behavior in response to human activity near their nests that may affect nestling survival and reproductive success (Steidl & Anthony 1999). However, the same research showed that bald eagles will habituate to disturbance (Steidl and Anthony 1999). Pairs that nest in an area that has been regularly exposed to human activity are often not disturbed and still have success in raising and fledging young. The refuge will follow the Southeast Regional Management Guidelines when a need to reduce disturbance has been demonstrated to try to maximize the chance of reproductive success.

The refuge presently supports four active red-cockaded woodpecker groups (Figure 10) equaling six-nine individuals. Available habitat will always be insufficient to support a viable population of red-cockaded woodpeckers. Current guidelines suggest the removal of hardwoods in red-cockaded woodpecker habitat. However, guidelines do allow up to 30 percent canopy trees to be in hardwood stems. Reintroducing a more historic fire regime will allow more hardwoods in some of the wetter, lower areas than presently occur; but, the red-cockaded woodpecker foraging guidelines will still be met within the ½-mile circle of each cluster by providing 125 acres of pine habitat between 40-80 square feet of basal area, which has no more than 200 feet of non-foraging habitat separating foraging habitat (Figure 12).

Strategies:

- Monitor known roost tree locations for yearly use.
- During the day, inventory other areas that could be potential roost sites, such as checking trees, bridges, and abandoned structures.
- Discuss possibilities with universities and organizations for partnering on the research project.

HABITAT MANAGEMENT

Bottomland Hardwood Habitat Goal:

Restore, enhance, and maintain healthy, deciduous bottomland habitat to support a natural diversity of plant and animal species and foster the ecological integrity of the Lower Mississippi River Ecosystem.

Bottomland Hardwood Objective 1:

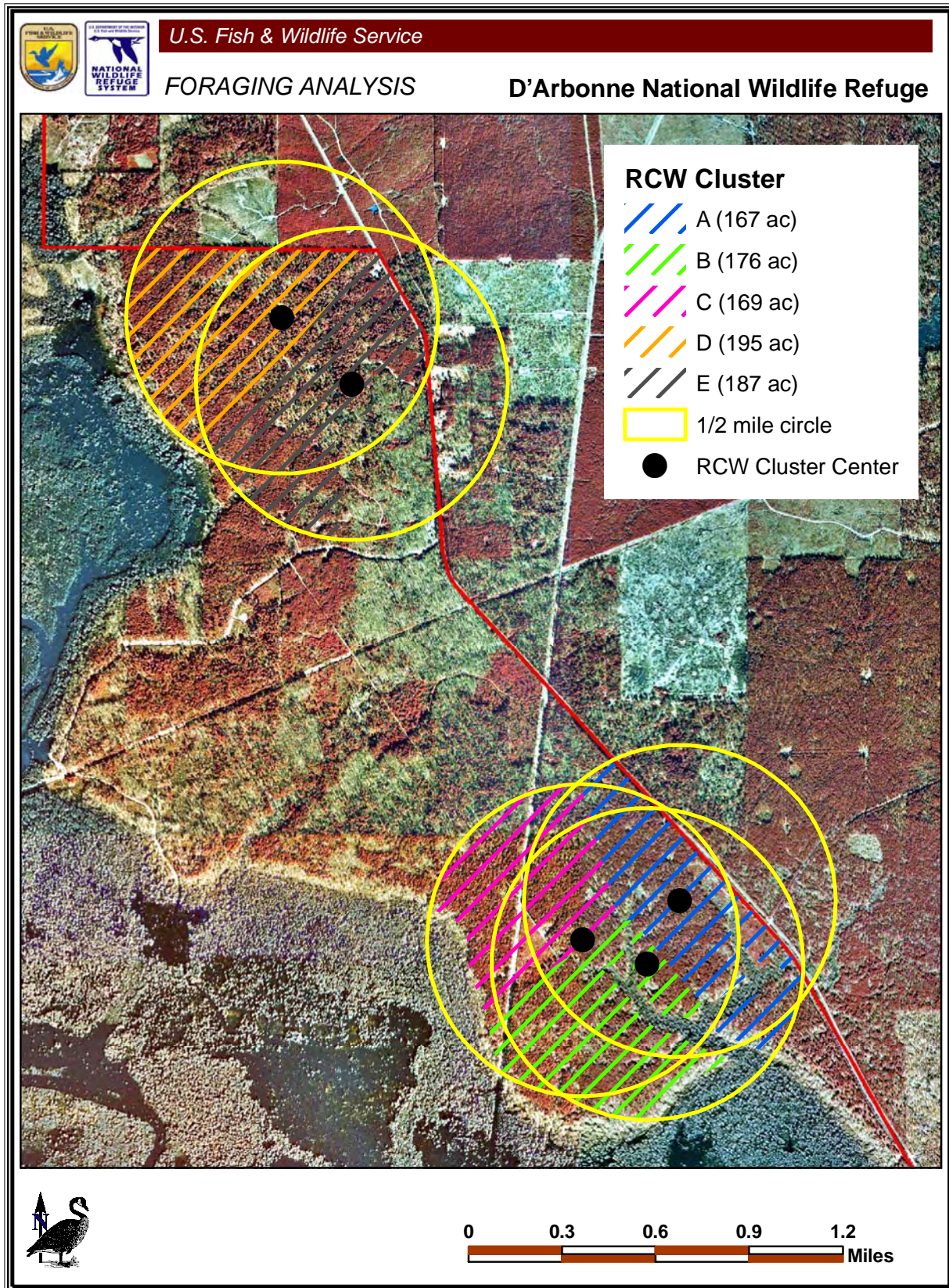
Complete a forest inventory and GIS mapping database of refuge forests within 2 years of the date of this plan to generate baseline data for development of a habitat management plan that will include a 10-year entry schedule, annual inventories by compartment, step-down prescriptions for desired conditions, and monitoring protocols.

Strategies:

- Conduct a light, 1 percent, baseline inventory using compartmental breakdown of similar habitats, and a more intense cruise (3 to 5 percent) for developing prescriptions.
- Use GIS to delineate vegetation coverage of the refuge and develop database for monitoring coverage changes every 3 years.

Hire forester to assist in gathering baseline data, mapping, developing habitat management plan, monitoring protocols, and developing management prescriptions.

Figure 12. Red-cockaded woodpecker foraging analysis on D'Arbonne National Wildlife Refuge



Bottomland Hardwood Objective 2:

Implement adaptive management to maintain 11,000 acres of bottomland hardwood forest at a basal area of 60-90 ft²/acre, for a canopy cover between 60-80 percent, 30-60 percent mid-story cover, 30-40 percent understory cover, and 20-50 percent ground cover, with regeneration of hard mast producing species (e.g., oaks and water hickory) present on 30-50 percent of inventory plots (General Guidelines for Hardwood Forest Management to Improve Wildlife Habitat).

Strategies:

- Evaluate site-specific stand conditions and develop management prescriptions according to objective guidelines, and evaluate results.
- Thin forest using silviculture treatments (e.g., single-tree and group selection cuts) to site-specific basal area needs.
- Throughout each year, periodically remove beaver dams where they impede desired water flow and could lead to damage of bottomland forests and reforestation sites.
- Comply with forest management plan and best management practices, including stream zone buffers.
- Occasionally, supplement natural regeneration with acorn and seedling plantings.

Bottomland Hardwood Objective 3:

Where regeneration is highly likely, maintain < 60 percent canopy cover on 5-10 percent of the bottomland hardwood forest to allow regeneration of shade intolerant trees (e.g., sweetgum, nuttall oak, and willow oak), and leave 4 to 6 super-emergent trees per acre as a seed source.

Strategies:

- Harvest 1- to 3-acre patches on 5 to 10 percent of stand leaving 4 to 6 large trees per acre within the small clearcuts.
- Thin to reduce basal area by 40 to 50 percent with variable rate of removal throughout stands/compartments to allow significant sunlight penetration to the understory.
- Hire forester to assist in monitoring for compliance with habitat management plan and developing management prescriptions.

Bottomland Hardwood Objective 4:

Maintain 2 to 4 logs/acre to provide coarse woody debris, 4 to 6 cavity trees >4" in dbh per acre, and 1 to 4 large den trees or "unsound cull" trees per 10 acres in bottomland hardwood forest to increase habitat for resident wildlife, such as amphibians, reptiles, bats, bears, and cavity-nesting birds.

Discussion

D'Arbonne Refuge is located in the western edge of the Mississippi Alluvial Valley, which is a critical ecoregion for migrating and wintering dabbling ducks, wood ducks, and geese in North America (Reinecke et al., 1989), as well as southern breeding populations of wood ducks. The entire 25-million-acre Lower Mississippi Valley was once a forested wetland. Only approximately 23 percent of the original bottomland hardwood forest in the Mississippi Alluvial Valley remains (Reinecke et al., 1989). It was primarily lost to cropland conversion and hydrological changes associated with flood control. Sustaining viable and harvestable populations of waterfowl depends on conservation and management of habitats, of which the refuge can contribute. The refuge needs to maintain and enhance bottomland forest habitat for wintering waterfowl, priority forest birds, game species, and for the conservation of the biological integrity of bottomland hardwood forests.

The bottomland hardwood forests on the refuge have been altered due to the installation of the Columbia Lock and Dam in the 1970s. The forests are inundated further into the growing season than occurred historically and sections of stands have not adapted to the change in hydrology. In willow oak flats some stands have died, but regeneration may be more tolerant to longer periods of inundation. Backwater overflow from the lock and dam has also created a logistical hindrance to adequate thinning. These changes have resulted in bottomland hardwood forests that have an extensive canopy cover, which has shaded out the mid- and under-story flora. The resulting forests have little understory and support few nesting birds. Current exceptions are where forest openings (1/2 to 2 acres) occur or where stands have been heavily thinned, which has allowed understory development. Aggressive thinning is considered highly desirable given the general lack of regeneration on the forest floor across the refuge. Similarly, forest openings from 1/2 to 2 acres are recommended in areas where substantial regeneration is found to increase understory habitat potential for nesting songbirds. These openings also provide important food sources for transient landbirds when understory vegetation is exposed. When flooded, these areas also provide important protective cover for the fry of spawning fish.

The refuge will create a structurally diverse forest within a heterogeneous forest canopy that has gaps where understory vegetation can increase, and create a few super emergent trees per acre. Regeneration of shade intolerant tree species for hard mast will be ensured as well. These desired forest conditions maintain and increase nesting and foraging habitat of priority forest birds, adequate mast production for wood ducks, white-tailed deer, and squirrels, and plant species diversity to maintain the biological integrity of the forest. The stands will be evaluated and monitored for forest stand conditions. As monitoring data demonstrate a forest stand condition not complying with the target threshold outlined in the objectives, management prescriptions will be developed. Monitoring provides the crucial feedback necessary to determine whether management efforts are achieving the desired outcome. This adaptive approach provides a prescriptive process rather than crisis management. Species are then better provided for in a manner that is purpose-driven, which leads to a better chance of success and use of resources.

Strategies:

- Identify specific trees to remain after firewood cutting, timber sales, or prescribed fires.
- Leave inferior trees along with marked trees to promote more snags.
- Hire forester to monitor compartments for density of snags and compliance with habitat management plan.

Bottomland Hardwood Objective 5:

Retain and enhance all baldcypress and water tupelo stands towards old-growth attributes and in mixed hardwood bottomland habitat increase baldcypress stocking 3 to 10 percent for a total of all species canopy cover of 60-80 percent (Table 9).

Discussion:

Forested wetlands in Louisiana at the time of European settlement covered 12 million acres and only 49 percent of the original acreage remained by 1974 (Turner and Craig 1980). Within that, cypress swamps were exploited such that by the 1930s, virgin cypress was extremely scarce (Devall 1998). Baldcypress grows best on deep, fine, sandy loam with moderately good drainage (Devall 1998). Sites have prolonged flooding with water up to 10 feet or more in areas with thermic and hyperthermic soil temperatures (Wilhite and Toliver 1990). Water tupelo grows on mucks and clays to silts and sands in low, wet flats or sloughs of water depths up to 20 feet for long periods of time (Devall 1998). Soils are usually moderately to strongly acidic and permeable (Johnson 1990). Regeneration of baldcypress-tupelo sites is difficult because cypress and tupelo seeds do not germinate underwater, and young seedlings cannot survive extended submergence. Drought or drawdowns are favorable for regeneration

and the refuge is limited in spots favorable for this to occur. Nutria also impede baldcypress regeneration by eating the root collar of seedlings (Devall 1998), and Chinese tallow is changing the composition of some cypress-tupelo communities. Subsequently, old growth cypress-tupelo stands are limited and the refuge can contribute to their conservation.

Table 9. Baldcypress and tupelo old-growth attributes (modified from Devall 1998)

Species	Attribute	Reference
	<u>Stand Density</u>	
Baldcypress	≥ 2.5 cm d.b.h. target 593 live trees /ha	Hall and Penfound 1939
Tupelo	> 10 cm d.b.h. target 7-12 live trees/ha	Martin and Smith 1991
	<u>d.b.h. of largest trees</u>	
Baldcypress	90-150 cm	Sargent 1965, Harlow and Harrar 1969
Tupelo	63-122 cm	Martin and Smith 1991, Sargent 1965
	<u>Stand basal area</u>	
Baldcypress	7.7 m ² /ha	Hall and Penfound 1939
Tupelo	6.7 m ² /ha	
	<u>Height</u>	
Baldcypress	30.5-36.6 m	Harlow and Harrar 1969
Tupelo	24.4-27.4 m	Harlow and Harrar 1969
	<i>Need several standing snags and downed logs of baldcypress and tupelo</i>	Martin and Smith 1991

The cypress-tupelo community is a rare habitat that is important to several migratory birds and rich in diversity of fungi, mosses, and bryophytes (Devall 1998). Birds that use the cypress tupelo forest include blue-gray gnatcatcher, tufted titmouse, red-eyed vireo, yellow-billed cuckoo, prothonotary warbler, wood duck, ruby-throated hummingbird, barred owl, and pileated woodpecker. Parula and yellow-throated warblers are also highly associated with this type of forest. Reptiles and amphibians are thought to be especially abundant and will also show declines if this distinct community is not retained. The refuge will retain as much of this community as possible and attempt to provide regeneration of sites that are amenable to management.

Strategies:

- No timber removal or management in pure baldcypress and water tupelo stands.
- Favor cypress in spots of regeneration in the willow oak die-off area.

-
- In mixed hardwood stands, conduct light thinning of small (14") cypress trees to create larger (24") trees, and select thinning of hardwoods to release cypress to grow to old, large trees.
 - Establish 2 to 4, 2-acre experimental afforestation plots of cypress/tupelo stands in the open field to promote this rare, old-growth habitat.
 - Hire forester to assist in thinning, afforestation, and monitoring for desired old growth characteristics and develop prescriptions as needed.

Bottomland Hardwood Objective 6:

Annually monitor refuge forest condition by compartment for management needs with a 10-year entry cycle and for defining management needs in forest areas needing attention sooner.

Discussion:

Monitoring forest condition is a critical component of adaptive management. Many stands have different conditions or different capabilities that mandate different or multiple management entries/actions to achieve desired conditions. Species priorities and forest management objectives for each section of forest will require evaluation on a site-by-site basis that involves the skill of a forester and biologist working together to establish the forest inventory.

Strategies:

- Design entry cycle based upon forest type productivity and management within one compartment each year.
- Develop a habitat management plan that defines current conditions, compares current condition to desired future conditions, and outlines treatments needed to accomplish future condition.
- Hire forester to assist in monitoring forest condition, defining, and implementing forest management activities.

Bottomland Hardwood Objective 7 – Open Field:

Each year, starting in mid-September, flood the 374-acre moist-soil unit (Figure 13) gradually to < 18" (Fredrickson 1991) and draw down in April/May (both treatments to the extent natural hydrology will allow) to provide wintering waterfowl habitat.

Strategies:

- Place boards in three water control structures in September to hold water inside the levee.
- Pump water in September if rainfall and backwater do not reach up to 18" of water.
- Maintain water control structures, levee, and pump.

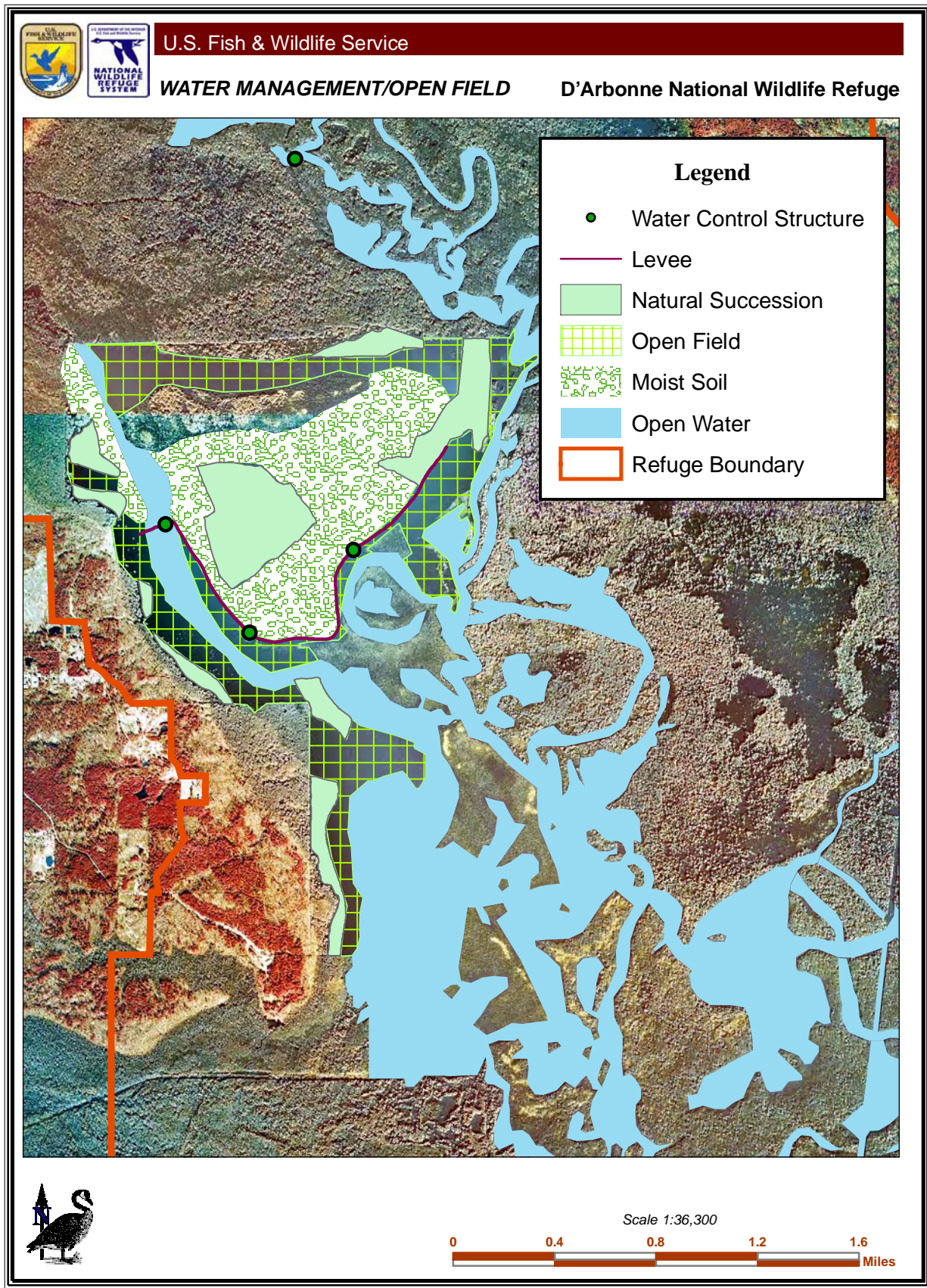
Bottomland Hardwood Objective 8 – Open Field:

Maintain and enhance 420 acres of open habitat (Figure 13) with a grass/sedge composition of 70-80 percent cover (e.g., sprangletop, panicum, millet, toothcup, smartweed, and *Carex spp.*), and keep non-desirables (e.g., coffeeweed and cocklebur) to less than 20 percent to support nesting habitat for priority grassland bird species and foraging habitat for wintering waterfowl.

Discussion:

Natural wetland habitats that waterfowl use in the Mississippi Alluvial Valley are bottomland hardwood forests (as discussed earlier) and moist-soil habitats. Moist-soil habitats are early successional grass-sedge and other herbaceous wetlands. These wetlands are critical foraging and resting habitats that are rich in high-energy natural seeds and aquatic invertebrates (Fredrickson and Taylor 1982; Checkett et al., 2002; Kaminski et al., 2003).

Figure 13. Open field and water management on D'Arbonne National Wildlife Refuge



Moist-soil habitat management generally requires active management of soil and hydrology to promote productive and diverse stands of moist-soil plants (Johnson 1975). Management actions include the timing and duration of flooding, disking, or mowing to keep units in early successional stages. Because soil moisture is often too great to enable disking on D'Arbonne, mowing will most often be the management tool available to set back succession and maximize waterfowl food production and usage. Flooding of water starting in early September will provide wetlands for migrating blue-winged teal and shorebirds (Fredrickson and Taylor 1982; Fredrickson 1991), and continues into mid-October and early November to coincide well with the first major influx of migrating and wintering waterfowl (Fredrickson and Taylor 1982; Fredrickson 1991).

The uniqueness of moist-soil sites in terms of their local hydrology, hydroperiod, seed bank, prior and recent land use, and a host of other site-specific factors results in varying responses to moist-soil management. Therefore, it is imperative that monitoring is conducted for plant and animal responses to management actions. If desired results are being achieved, the refuge will continue to funnel resources to moist-soil management of 374 acres. These acreages are in line with the need established by the Lower Mississippi Joint Venture step-down process for moist-soil habitat in this portion of Louisiana.

Strategies:

- Mow, burn, disc, and/or selectively spray approved herbicide every 2 to 3 years, as necessary, to increase seed production and reduce succession by woody plants.
- Install water level gauge in impounded area.
- Develop and implement a monitoring protocol in the habitat management plan for species composition and coverage with associated management trigger thresholds.
- Maintain management records by date for water management actions, water elevations, results of monitoring and recommendations, plant/soil disturbance actions, and wildlife response.
- Hire biologist to assist in habitat management monitoring and maintenance.

Bottomland Hardwood Objective 9 – Open Field:

Five years after plan approval, re-evaluate water levels and animal/plant responses to water manipulations and fluctuations in the open field to determine whether to maintain the area in moist-soil habitat or let the area regenerate into bottomland hardwood forest.

Discussion:

There have been suggestions to reforest the open field to conserve the biological integrity of the bottomland hardwood forests and increase the amount of core forest. Forest nesting songbirds of conservation concern are often sensitive to fragmented forests and result in decreased nesting productivity (Robinson et al., 1995) due to an increase in nest predators and cowbird parasitism coming in from the forest edge. Brown-headed cowbirds are already common on the refuge, and the refuge is surrounded by small farms feeding grain to domestic animals, which attract cowbirds. Even if the open field is reforested, the refuge will provide few acres of forest core. However, if water performance and waterfowl use is found to be low and taken in conjunction with the associated costs of maintaining moist-soil management, there may be evidence to not support moist-soil management. Subsequently, the entire moist-soil area could be allowed to naturally regenerate into a bottomland hardwood forest. This decision will be made after monitoring the situation for 5 years and an evaluation of plant and animal responses, costs, and benefits for the best management practice for this section of the refuge.

Strategies:

- Evaluate animal and plant responses to water level management relative to costs and benefits of moist-soil management.

-
- Evaluate whether the acres reforested would provide enough forest core to enhance area-sensitive species nesting requirements and protection from cowbird parasitism.
 - Hire biologist to assist with data monitoring and evaluation.

Mixed Pine and Hardwood Upland Habitat Goal:

Enhance and maintain a mixed coniferous and deciduous habitat that historically occurred on the uplands of the West Gulf Coastal Plain for indigenous migratory birds, species of concern, and other associated wildlife.

Mixed Pine and Hardwood Objective 1:

In Unit A (>100 ft MSL, Figure 14), maintain 364 acres with a 50:50 ratio of loblolly to shortleaf pine with the shortleaf on the ridges and slopes and loblolly on the toe of the ridge; with up to 15 to 30 percent of the overstory stem count in hardwoods of white oak, southern red oak, post oak, sweetgum, and mockernut hickory; with pine basal area of 60-70 square feet, hardwood basal area of 10 square feet for a total of 70 square feet \pm 10 square feet; and with an understory of largely herbaceous cover with fire-maintained plant species, such as big bluestem, little bluestem, and switchgrass.

Strategies:

- Determine present composition and canopy cover of pines and hardwoods, and percent cover and composition of understory cover.
- In those stands that need more hardwood species and coverage, and will not conflict with red-cockaded woodpecker foraging habitat management, winter burns will be used with infrequent burning until hardwoods are established and can better withstand fire.
- Once hardwood component is achieved, fire will be used every 1 to 3 years in September – October.
- Invasive species, such as tallow tree and Japanese climbing fern, will be mapped, monitored and treated, especially before burns are conducted, and following any forest management treatments to minimize an invasive response.

Mixed Pine and Hardwood Objective 2:

In Unit B (81-100 ft MSL, Figure 14), maintain 780 acres with 90:10 ratio of loblolly to shortleaf pine with hardwood species comprising 25 to 30 percent of the overstory stem count within red-cockaded woodpecker foraging habitat. Outside of this foraging habitat, hardwood species would comprise 35 percent of the total basal area. Pine basal area will be 70 square feet, hardwood basal area will be 20 square feet, and total basal area will be 90 square feet \pm 10 square feet; with an understory that is largely herbaceous with fire-maintained plant species in drier areas, and patches of wet areas that include more hardwood regeneration.

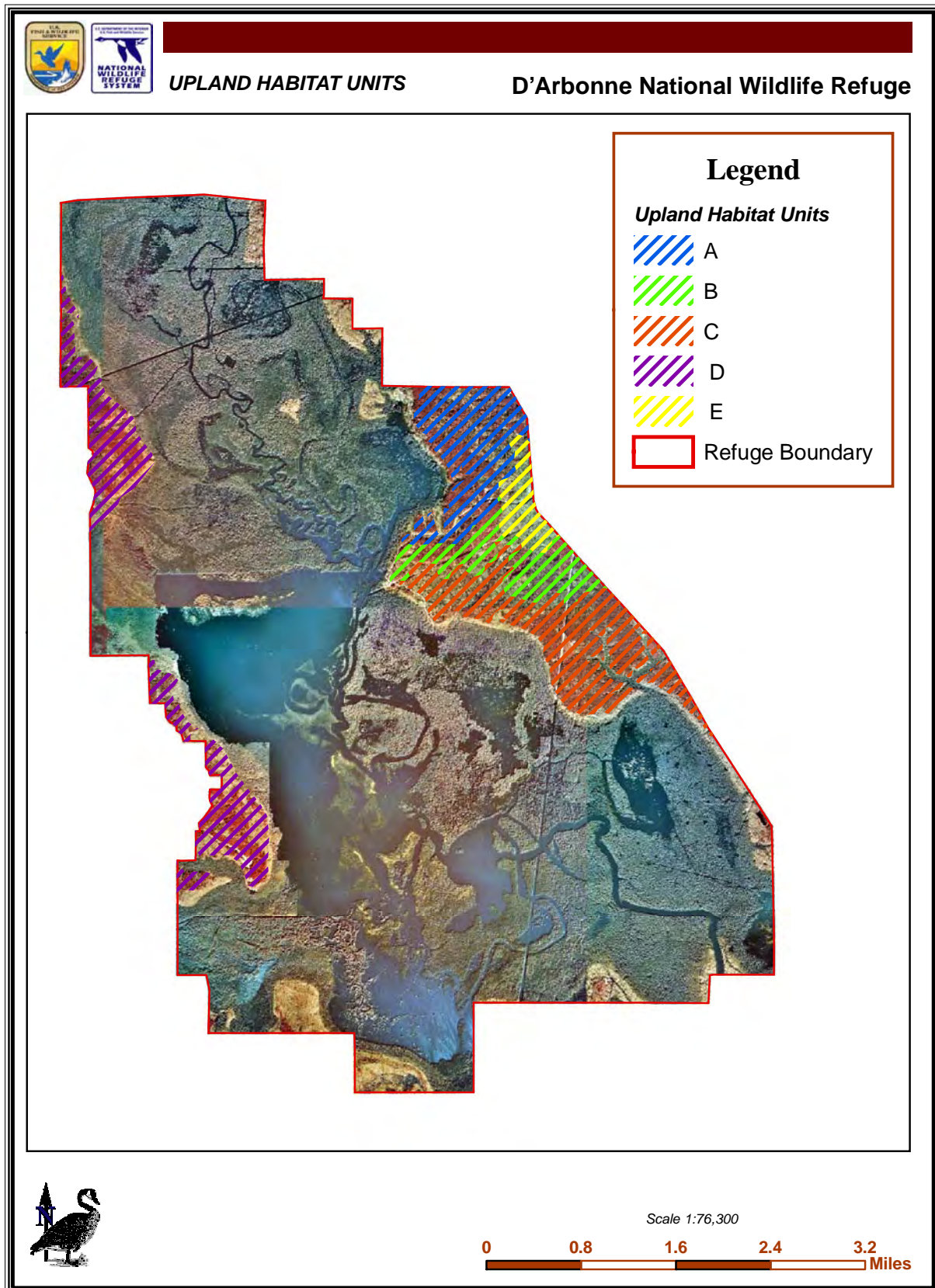
Strategies:

- Same strategies as Mixed Pine and Hardwood Objective 1, but that once the hardwood component is achieved, fire would be used every 2 to 5 years in September – October.

Mixed Pine and Hardwood Objective 3:

In Unit C (68-80 ft MSL, Figure 14), maintain 529 acres with 90:10 ratio of loblolly pine to shortleaf pine with hardwoods comprising no more than 30 percent of the overstory stem count within red-cockaded woodpecker foraging habitat. Hardwoods would comprise 35 to 50 percent of the total basal area of this foraging habitat. Hardwood species include white oak, post oak, southern red oak, sweetgum, water oak, and willow oak. Target basal area for pine will be 80 square feet, 20 square feet for hardwoods, and a total basal area of 100 square feet \pm 10 square feet; with an understory that is largely herbaceous with patches of wetter areas that include woodier shrub species.

Figure 14. Mixed pine and hardwood management units on D'Arbonne National Wildlife Refuge



Discussion:

Pine and pine/hardwood uplands constitute 2,395 acres on D'Arbonne Refuge. Of these 2,395 acres, approximately 1,672 acres are located on the east side of the refuge and 723 acres are on the west side (Figure 14). The main objective for all upland pine sites on the refuge is to restore these areas to their historical condition. The natural processes that maintained these areas historically, primarily fire, should be mimicked to the extent possible. It is important to keep in mind that historical processes, such as fire, ice-storms, tornados, etc., were the main natural factors influencing the composition and density of vegetation. If the processes are re-introduced into the pine systems, then the objective will be achieved.

The east side of the refuge is approximately 1,672 acres and consists of pine flatwoods that are located on Lake Monroe 1, Lake Monroe 2, and Intermediate Terraces. This flatwoods habitat has significantly declined in Arkansas and Louisiana to where extensive coverage is mainly left on three national wildlife refuges: Felsenthal, Upper Ouachita, and D'Arbonne. It is extremely important to manage these remnant flatwoods in a manner consistent with historical processes that produced more open canopy, loblolly/hardwood mix, fire, and grassy understory.

Flatwoods burned frequently historically, but the burns were very patchy due to soil types and moisture. For example, a loblolly/hardwood area may have experienced fire every 3 years but a given spot in that area may only have burned every 5 to 7 years due to patchiness of the burn. The wetter areas were where the fire did not burn well, loblolly and hardwoods were allowed to regenerate, and therefore, more hardwoods were maintained in those patchy areas.

To mimic the patchiness of wet and drier areas based on soil and soil moisture, the east side has been divided into three elevation categories that basically coincide with the three terrace types. Elevation dictates how wet the areas are and thus, how often they would have burned historically. Timber type has been altered by man over the past two hundred years, however, elevation has not. Therefore, three elevation categories were selected as defining criteria for management units A-D (Figure 14).

Strategies:

- Same strategies as Mixed Pine and Hardwood Objective 1, but that once the hardwood component is achieved, fire would be used every 3 to 6 years in September – October.

Mixed Pine and Hardwood Objective 4:

In Unit D (Figure 14), maintain 723 acres with 50:50 ratio of loblolly pine to shortleaf pine with hardwood species with pine comprising 20-40 square feet and hardwoods comprising 80-120 square feet of the total basal area; hardwoods should have a high species diversity, including sweetgum, blackgum, southern red oak, post oak, white oak, mockernut and black hickory; with midstory species including flowering dogwood, persimmon, eastern hophornbeam, eastern redcedar, and hawthorne; with total basal area for pine and hardwoods at 120 square feet \pm 10 square feet; and with an understory that is largely herbaceous with patches of wetter areas that include more woody shrub and vine species, such as American beautyberry, serviceberry, red buckeye, rusty blackhaw, sumac, Carolina Jessamine, blackberry, and poison ivy.

Discussion:

These uplands are tertiary uplands, not flatwoods like the east side of the refuge. They are composed of a hardwood/pine mix. The areas are well-sloped, have iron-ore clay soils, and would have burned frequently, especially on south slopes. South slopes would have had more shortleaf pine and north slopes and toe of slopes would have had loblolly. Hardwood pine mix habitats are rare in this area because timber companies take the hardwoods and push the areas toward a sustainable pine monoculture. It is important for the refuge system to provide this integral habitat type in an ecosystem where it is being rapidly lost.

Strategies:

- Pine thinned to < 30 square feet and off-site pine (slash) removed.
- If needed, underplanting of hardwood seedlings may be conducted.
- Once hardwood component is achieved, fire will be used every 2 to 5 years in October.
- Invasive species, such as tallow tree and Japanese climbing fern, will be mapped, monitored and treated, especially before burns are conducted and following any forest management treatments to minimize an invasive response.

Mixed Pine and Hardwood Objective 5: Upland Hardwoods

Maintain 165 acres of upland hardwood habitat with a basal area of 80-120 square feet/acre, canopy cover of 70 to 85 percent of a wide variety of hardwood species, and with a diverse vertical structure of midstory and understory hardwood species to conserve the biological integrity and diversity of this limited habitat type on the refuge.

Discussion:

This objective addresses a small, unique habitat type in the uplands that does not fit the category of mixed pine and hardwoods since it is mainly hardwoods. It is an upland area of acreage that has a very small pine component and therefore will not be burned regularly as the other upland pine systems. Because upland hardwood tree species are being degraded and lost as a habitat type in northern Louisiana, this area will be managed to promote the upland hardwood diversity and integrity. A vertically diverse structure will be maintained through selective thinnings. Species of hardwoods, which are found in this habitat type, include water oak, white oak, southern red oak, cherrybark oak, post oak, swamp chestnut oak, sweetgum, blackgum, hickory, eastern redbud, flowering dogwood, sweet azalea, witchhazel, sassafras, red mulberry, and American holly.

Strategies:

- Use adaptive management by conducting an inventory of current condition prior to implementing management actions to achieve desired objective outcomes.
- Forests will be thinned using silvicultural treatments (e.g., single-tree and group selection cuts) to site-specific basal area needs.
- Comply with forest management plan and best management practices including stream zone buffers.

Invasives Goal:

Conserve the integrity of native plant and animal communities, composition and function from degradation by invasive plants and animals.

Invasives Objective 1:

Develop and implement an invasives' management plan within two years of the date of this plan that identifies: 1) the extent of encroachment of Chinese tallow tree, Chinese mimosa, royal palonia, tree of heaven, Chinese privet, chinaberry, and Japanese climbing fern, 2) suitable control methods; and 3) monitoring protocols to document infestation and provide an index to effectiveness of management actions.

Strategies:

- Conduct refuge inventory and map each species location and density.
- Review literature and discuss with experts control methods and monitoring protocols.
- Develop management plan with refuge staff and partners.
- Hire forester to develop management plan and coordinate control methods and monitoring.

Invasives Objective 2:

Maintain an annual surveillance program by promoting employee alerts for new infestations in priority areas (e.g., roads, boundaries, and heavy use areas) to maintain the biological integrity of bottomland hardwood and upland pine/hardwood mix forests.

Strategies:

- Maintain research file on existing invasives and new encroaching species life history with photos and control methods to provide copies to staff.
- Forester will communicate with Louisiana Statewide Exotic Species Task Force for current information on threats to refuge system lands.

Invasives Objective 3:

Develop protocol within 1 year of the date of this plan for Chinese tallow tree control methods to be used in areas of forest management (e.g., timber sales, firewood cutting, prescribed fire, and wood gator) 1 to 3 years post-treatment for an increased native flora response.

Strategies:

- Include intensive inventory and monitoring protocols in the invasives' management plan.
- Conduct literature research and communicate with local agricultural extension specialist for most effective control method.
- Conduct manual, mechanical, and chemical control. Treat remaining stumps with herbicide application.
- Hire forester to conduct control methods and mapping of yearly infestations and control efforts on Chinese tallow tree.

Invasives Objective 4:

Cooperate with other agencies and individuals to detect and decrease Chinese tallow trees by 5-25 percent on neighboring lands within 2 years of the date of this plan.

Discussion:

The presence of exotics or non-native plant species can alter the function of ecosystems due to the loss of wildlife habitat, displacement of native species, change in carrying capacity from reducing native forage production, lower plant diversity, and increase soil erosion and soil sedimentation. These negative effects require a management strategy that identifies the extent of the problem by each species, a variety of control methods, and a monitoring program to determine the most efficient and effective control method.

Two invasive species are on the verge of significantly impacting the biological integrity of the refuge: Chinese tallow tree and Japanese climbing fern (Figure 4). Tallow tree is a small, fast-growing tree with high reproductive capability. The tree grows in a variety of habitats, is extremely invasive, and can form monoculture stands quickly. Japanese climbing fern is a fast-growing woody vine that can completely shroud everything in its path. It has the ability to kill trees directly by blocking sunlight and adds extra mass to trees acting as a sail, which causes uprooting during high winds. This species is a relatively new invader in the United States, and is now becoming widespread throughout Louisiana and the southeast. This fern is fairly dense in the uplands on the refuge and does not respond well to control methods. Both the tallow and climbing fern will not be eradicated from the refuge, but extensive measures would be made to control their spread. Other invasive species that the refuge has good opportunity to control with conventional methods are Chinese mimosa, royal palonia, tree of heaven, Chinese privet, and chinaberry.

Invasive plant control is a legal and popular issue for many national wildlife refuges, but is labor intensive and costly. Significant resources should be focused on determining the extent of each invasive species on the refuge and to controlling their spread. Successful control requires careful planning, implementation, and monitoring.

Strategy:

- Private lands biologist to develop invasives control methods, grants, in-kind services and monitoring program to use with adjacent landowners and refuge staff on neighboring lands and the refuge.

RESOURCE PROTECTION

Land Protection and Conservation Goal:

Maintain and promote partnerships between D'Arbonne Refuge and Louisiana Department of Wildlife and Fisheries, adjacent landowners, and other public and private organizations to conserve, restore, and maintain a productive Lower Mississippi River Ecosystem.

Land Protection and Conservation Objective 1:

Foster opportunities each year for developing cooperative invasives control projects with other agencies, private landowners, and corporations on neighboring lands to the refuge.

Strategies:

- Communicate and meet a minimum of once a year with the Louisiana Statewide Exotic Species Task Force for new invaders, granting opportunities, cooperation possibilities, etc.
- Refuge Complex biologists develop priority ranking of those neighboring lands posing biggest threat of encroachment of invasives onto refuge lands.
- Private lands biologist communicate with neighbors for interest in developing cooperative projects for invasives control.

Land Protection and Conservation Objective 2:

Target 2 to 5 private lands reforestation projects within West Gulf Coastal Plain Ecosystem that add to developing a contiguous area of bottomland forest that will increase the core habitat available to migratory birds.

Strategies:

- Maintain communications with energy companies for carbon sequestration funding and interested landowners.
- Annually review bottomland hardwood habitat areas ranked by Lower Mississippi Valley Joint Venture as high priority for reforestation and conservation.
- Private lands biologist to seek out interested landowners in areas of high priority for reforestation.

Land Protection and Conservation Objective 3:

Coordinate and collaborate with Louisiana Department of Wildlife and Fisheries two to four times a year regarding public use programs, biological issues, and law enforcement coordination.

Strategies:

- Refuge will participate in annual state hunt coordination meetings to discuss proposed refuge hunting programs and regulations.
- Maintain communication on hunting and fishing issues that the state may have regarding opportunities or modifications to these programs.

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- Refuge and state employees maintain communication and collaboration on biological issues, such as Louisiana black bear sightings or nuisance problems, red-cockaded woodpecker issues, etc.
 - Law enforcement will collaborate with the state on any regulatory issue that either agency needs regarding assistance or coordination.

Land Protection and Conservation Objective 4:

Conduct yearly, and as needed, discussions with Louisiana Department of Environmental Quality and Department of Natural Resources Conservation for gas well information; gas well operations; mercury warnings; and soil, water, and fish monitoring for contaminants.

Strategies:

- Refuge will maintain communications and database information on gas well leases on refuge lands.
- Maintain updates of mercury warnings in waters and fish to post regulations in informational kiosks on the refuge.
- If problems are suspected, Service will coordinate with Louisiana Department of Environmental Quality to search for funding and research opportunities to gain information on suspected contaminant problems.

Archaeological, Cultural, and Historical Resources Goal:

Identify and protect prehistoric archaeological resources on the refuge, which are eligible for or listed in the National Register of Historic Places for the benefit of present and future generations.

Archaeological and Cultural Resources Objective 1:

Each year comply with Section 106 of the National Historic Preservation Act or any other pertinent historic preservation mandate prior to the initiation of any refuge undertaking or habitat management action that will involve significant, new ground disturbance and where the land has not been substantially altered, disturbed, or created within the last 50 years.

Strategies:

- Maintain records of refuge survey data for cultural and archaeological sites.
- Monitor for vandalism and degradation to sites.
- Contact Regional Archaeologist prior to construction or significant ground disturbance projects and complete a request for Cultural Resource Review Form to determine appropriate steps necessary for compliance.
- Within five years of the date of this plan, refuge manager or designee will look into taking the Overview for Cultural Resources Management Requirements Course (WLD 2117) at the National Conservation Training Center.
- Refuge will ensure that cultural resource management and protection strategies are integrated into refuge management plans such as fire management, road maintenance, etc.
- GIS layer for archaeological and historic sites will be integrated into the refuge's GIS system. These data will be maintained as confidential as per Section 470w-3.a of the National Historic Preservation Act and Section 9 of the Archaeological Resources Protection Act.
- As archaeological and cultural resources are newly discovered, the refuge will coordinate with the Regional Archaeologist to get them cataloged and assure appropriate archival.

Archaeological and Cultural Resources Objective 2:

Develop an outreach brochure to inform the public about cultural aspects of the Refuge Complex within 5 years of the date of this plan to foster understanding of, and support for cultural resources.

Strategies:

- Integrate information regarding early historic settlement patterns, steamboat use of Bayou D'Arbonne, etc., into a brochure.
- Conduct research through literature reviews and oral histories for turn-of-century information, and Native American use of refuge sites.

Archaeological and Cultural Resources Objective 3:

Review historical cultural survey reports and develop a step-down cultural resources management plan for the Refuge Complex within eight years of the date of this plan.

Strategies:

- The Regional Archaeologist, in cooperation with the refuge staff, will develop a contract to conduct a comprehensive archaeological survey and geomorphic investigation of the refuge.
- If archaeological resources are identified, the Regional Archaeologist will determine whether they are eligible for listing on National Register of Historic Places prior to any disturbance.
- Regional Archaeologist will conduct data recovery if determined eligible.
- Regional Archaeologist will develop and implement procedures and protocol for consultation with Regional Historical Preservation Office, State Historic Preservation Office, and any interested Native American tribes.
- Regional Archaeologist will develop and forward to refuge staff for implementation procedures for inadvertent discoveries of human remains.

Archaeological and Cultural Resources Objective 4:

Develop and implement law enforcement procedures within 4 years of the date of this plan, and include them in the cultural resources management plan, to protect the refuge's cultural resources and to diminish site destruction due to looting and vandalism.

Discussion:

With the enactment of the Antiquities Act of 1906, the Federal Government recognized the importance of cultural resources to the national identity and sought to protect archaeological sites and historic structures on those lands owned, managed, or controlled by the United States. The body of historic preservation laws has grown dramatically since 1906 (Appendix IV). The preservation of historical heritage is in the public interest, and those resources on refuges can be maintained and enriched for future generations. Refuges must ensure the physical integrity of the sites yet provide educational information to the public. Providing interpretive panels and/or a refuge brochure outlining the cultural aspect of the refuge is a non-intrusive project yet encourages the public to understand and conserve these resources.

Management must also actively seek and document as many sites as possible at the refuge and develop plans that avoid as much damage as possible to the resources. This saves time and money by eliminating or modifying projects that have to be delayed, redesigned, or stopped if a cultural or historical site were uncovered during the undertaking. A cultural resources plan will re-evaluate current and new information to develop procedures and protocol for the cultural and archaeological resources of the refuge.

Strategies:

- Refuge law enforcement personnel will take Archaeological Resources Protection Act training if Refuge Complex has significant cultural resources.
- Establish and implement a protocol for site damage assessments to be included in the cultural resources management plan.

VISITOR SERVICES

Public Use and Visitor Services Goal:

Provide quality wildlife-dependent recreational and educational opportunities for persons of all abilities to support the Refuge System, enjoy the outdoors in northern Louisiana and all its associated fish, wildlife, and plants, and apply ethical outdoor behavior in a safe and compatible manner.

Discussion:

The National Wildlife Refuge System Improvement Act of 1997, the organic legislation of the Refuge System, designates six wildlife-dependent “priority public uses.” These are hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation. National refuge policy encourages refuges to offer these opportunities and to seek out additional resources when needed to do so. These activities foster an appreciation and understanding of wildlife and the outdoors.

Public Use Objective 1 – General:

Develop and implement a visitor services plan within 2 years of the date of this plan.

Strategies:

- Develop a plan that encompasses recommendations for current and future wildlife-dependent recreation and visitor services.
- The plan should reflect current legislation, Director’s orders, initiatives, policy, and the mission and purposes of the Service and refuge.

Public Use Objective 2 - General:

Enhance visitor contacts from refuge headquarters by adding one permanent employee for the Refuge Complex within 2 years of the date of this plan.

Strategies:

- Evaluate visitor demand for visitor service amenities relative to implementing the Federal Lands Recreation Enhancement Act and determine whether it is justified to charge a visitor use fee for the Refuge Complex.
- Recruit one Public Use Specialist (GS-7/9) to provide daily on-site visitor contacts, develop visitor service information, collect and report visitor service fees, develop accurate visitor counts, maintain website postings, coordinate youth turkey hunt lottery and fishing events, etc., and provide clerical and administrative support for the refuge and Refuge Complex.
- Coordinate and collaborate with Louisiana Department of Wildlife and Fisheries to conduct bowhunter certification classes.

Public Use Objective 3 - General:

Provide visitors daily with clear information of the opportunities for where they can go, what they can do, and how to safely and ethically engage in recreational and educational activities.

Strategies:

- Maintain standard entrance signs, welcome signs with map on kiosks, boundary signs, and directional signs on the refuge.
- Provide regulatory information at all kiosks.
- Maintain refuge roads open to the public.
- Prominently post visitor hours at the headquarters and provide Service brochures on activities that are allowed on the refuge.

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- Obtain and use traffic counters at boat launch areas to estimate use, and develop metal frame kiosks at parking areas and boat launches with removable information panels.

Public Use Objective 4 - General:

Build a volunteer program that uses volunteers and interns, on at least three projects a year, to assist with refuge operations and provide learning opportunities.

Discussion:

The Service provides recreational opportunities that reflect the unique qualities and features of each national wildlife refuge. Opportunities vary on each refuge for compatible wildlife-dependent recreation and must be evaluated against the compatibility standards, public desires, and other recreational opportunities in the area. A visitor services plan will evaluate the best fit for recreational opportunities in line with maintaining the biological integrity of the refuge. Visitor contact and information must be provided to allow visitors to gain the most information from their visit and provide a safe environment for wildlife and people. To maintain a visitor services program and the impacts of such, volunteers will be used to maximize wildlife-dependent recreational opportunities and do so in a manner to allow the volunteers to take away a better understanding of wildlife and their role in the environment. A visitor services program creates a greater awareness of the biological environment, a better understanding of each individual's role in the environment, and promotes a conservation ethic in refuge visitors.

Strategies:

- Explore possibility of garden club or master gardeners to help develop the wildflower garden in front of the headquarters building and develop the Valley View Nature Trail.
- Work with scouts, gifted students' programs, etc., to develop projects.
- Explore opportunities for interns or graduation requirements with local universities that involve volunteer hours for projects or research, guiding bird walks, or assisting with refuge biological program.

Public Use Objective 5 – Hunting:

Annually, allow deer, rabbit, squirrel, duck, goose, coot, quail, woodcock, raccoon, opossum, feral hog, coyotes, and beaver hunting under Louisiana Department of Wildlife and Fisheries and refuge-specific regulations to regulate resident game populations.

Strategies:

- Offer three weekends for either-sex deer hunts with guns, and a special either-sex deer gun hunt weekend for hunters with a Class I wheelchair-bound permit (issued by the state).
- Open archery deer season from October 1 through January 31 for either-sex hunting.

Public Use Objective 6 - Hunting:

Provide a special youth-only hunt for turkey, starting one year from the date of this plan to provide a unique opportunity for youth to gain an appreciation and understanding of the outdoors and wildlife.

Strategies:

- Develop a lottery system for youths to hunt turkey on the first Saturday of the season on 3,000 acres of available mixed pine/hardwood uplands on the refuge.
- Recruit volunteers and the National Wild Turkey Federation to assist with the hunt.

Public Use Objective 7 - Hunting:

Provide easily accessible information and personal contact with hunters to strive for 95 percent compliance with refuge regulations, within 5 years of the date of this plan.

Discussion:

The Service recognizes hunting as one of the six priority public uses of the Refuge System. It is a legitimate and appropriate public use of the Refuge System that is deeply rooted in American culture. Hunting can promote a unique understanding and appreciation of wildlife, their behavior, and habitat requirements.

The refuge will monitor local, huntable populations to maintain all hunt programs in a compatible manner with the purpose of the refuge. Adaptive management will be used to modify hunting regulations if needed. Only one special hunt, a youth turkey hunt, will be held due to a limited availability of turkey habitat. In addition, to having a quality hunt, overcrowding must be avoided. Since staff time is generally the limiting factor for special events, the refuge will recruit volunteers and the National Wild Turkey Federation to assist in conducting the youth turkey hunt. This will provide a good opportunity to introduce youth to turkey hunting and foster a sense of appreciation and stewardship to the refuge and its mission of protecting fish, wildlife, and plants, while still providing for wildlife-dependent uses.

Strategies:

- Develop and maintain at least four parking areas on each side (east and west) of the refuge with kiosks that provide maps, rules, and regulations and that explain wildlife-dependent recreational opportunities.
- Increase law enforcement personnel from current level to a minimum of 2.5 full-time equivalent positions.
- Increase presence in the field of law enforcement officers to contact visitors and educate and enforce ethical standards.
- Develop a step-down plan for law enforcement, including a monitoring program for compliance by refuge visitors.
- Erect appropriate signs to designate closed and restricted areas to reduce the chance of noncompliance and conflicts with non-hunters.

Public Use Objective 8 – Fishing:

Maintain and enhance fishing access annually by maintaining five concrete boat launches, and evaluate the possibility of adding one accessible fishing site to Bayou D'Arbonne that can withstand the consequences of deep overflow.

Public Use Objective 9 - Fishing:

Allow bank fishing of Bayou D'Arbonne along refuge bayou frontage and the borrow pond just south of Cross Bayou parking lot throughout the year, pending deep overflow,

Public Use Objective 10 - Fishing:

Maintain kiosks at three original boat launch areas, and add one kiosk on Deep Well Road for displaying refuge regulations and mercury warnings.

Strategies:

- Develop MMS projects for replacing gravel launches with concrete launches, and evaluating a design for whether it is feasible to build an accessible fishing site.
- Maintain developed parking areas and kiosks.
- Monitor kiosks for vandalism and supply of refuge brochures and regulations.
- Increase law enforcement coverage from current level to a minimum of 2.5 full-time equivalent positions in order to contact anglers and enforce rules and regulations.

Public Use Objective 11 - Fishing:

Provide one fishing event for youth per year, involving at least 20 participants, within 2 years of hiring a public use specialist.

Strategies:

- Work with youth programs such as Girl Scouts, Boy Scouts, and schools to encourage a broad spectrum of fishing event participation.
- Conduct the youth fishing program during National Fishing Week to attract more participants and provide more educational opportunities.
- Recruit community volunteers to help with youth fishing event.

Discussion:

Since fishing is also one of the six wildlife-dependent public uses, an effort should be made to accommodate fishing. However, it must be compatible with the purpose of the refuge. This refuge is primarily used as a crucial feeding area for wintering waterfowl in the open field area on the west side of the refuge. This area ultimately floods to provide boat access throughout the area during the winter and can be used for fishing. Adaptive management will be utilized to determine whether management modifications are needed.

D'Arbonne Refuge is part of the Ouachita River drainage basin and therefore is subject to many of the similar mercury warnings. The refuge will maintain visitor contact stations and informational kiosks for contaminant warnings, as well as fishing regulations to provide a quality fishing experience for visitors. Presently, visitors have access to five boat launches, but only three of those are concrete. Funding opportunities will be explored to upgrade the last two gravel launches to concrete to provide better access.

Promoting youth fishing is an opportunity to introduce future generations to the pleasure and excitement of fishing. Those involved not only learn how to fish successfully but ethically as well. Again, staff is limited for special events; therefore, for this objective to be implemented, a public use specialist would need to be hired first.

Public Use Objective 12 – Wildlife Observation, Wildlife Photography, and Interpretation

Enhance opportunities for wildlife observation and photography by providing public access with minimal disturbance to wildlife and habitat with one observation tower, one enhanced, interpretive nature trail (e.g., Valley View Nature Trail), and evaluate areas of wildlife use to determine if opportunities exist for developing additional viewing, photography, or educational sites.

Strategies:

- Promote wildlife observation and photography in collaboration with local groups and clubs.
- Evaluate areas of deer and migratory waterfowl use and determine whether additional viewing, photography, or educational opportunities can be developed on site.
- Develop interpretive panels for Valley View Nature Trail and evaluate other potential areas for more interpretive material.
- Expand the Valley View Nature Trail with a kiosk and 2- to 3-car parking area at the trailhead.
- Maintain access points, parking areas, and nature trail with mowing, collection of litter, and maintenance from vandalism.

Public Use Objective 13 – Environmental Education:

Increase the refuge environmental education program by developing “check out” kits for teachers, and developing a seasonal environmental education loop trail from the Observation Tower, within 2 years of hiring a public use specialist.

Discussion:

Opportunities and information are provided to visitors to enable them to pursue wildlife observation, wildlife photography, and environmental education and interpretation. Visitor interpretive trails, observation towers, etc., allow visitors to develop an understanding of and appreciation for natural resources and how to use the refuge in an appropriate and compatible manner. Providing visitors with safe, quality wildlife observation and photography opportunities fosters ethical behavior, which results in minimal disturbance to wildlife and plants.

Interpretive activities are often the visitor’s first contact with the refuge, the national wildlife refuge message, and possibly even his/her first contact with a conservation issue and wildlife. Through these contacts, visitors’ attitudes and behaviors can be influenced positively toward the Service and the Refuge System. Interpretation is limited at D’Arbonne Refuge due to annual flooding that normally inundates over 83 percent of the refuge. Signs that go under water become very unattractive and are hard to maintain. A few interpretive panels will be developed for the Valley View Nature Trail and other areas that can support a permanent display under the flooding constraints. Environmental education is one way to expose students to the outdoors without disturbing the resources themselves, whether it is with a lending library or a staff presentation. Environmental education fosters stewardship among our future caretakers. Environmental education will be increased to some degree to provide lending materials for local educators and maintain some trails for small school groups to utilize for field trips. However, it is still limited and another refuge in the Complex, Black Bayou Lake, provides an intensive interpretation and environmental education program that D’Arbonne visitors are encouraged to utilize. The Black Bayou Lake Environmental Education Center is also being developed and visitors are encouraged to use that premier facility.

Strategies:

- Meet with area schools/teachers to ascertain their information needs concerning the refuge, and determine their logistical limitations as far as participating in refuge activities and visiting the refuge.
- Develop a lending library of environmental education materials for educators.
- Maintain a mowed loop trail for school groups to utilize during field trips.
- Obtain funding for environmental education field trip supplies, such as insect nets, compasses, plant identification books, magnifying glass, etc.

Public Use Objective 14 – Special Uses:

Allow special uses (e.g., horseback riding, firewood cutting, and trapping) by permit to ensure compatibility with refuge purpose(s) and mission.

Discussion:

Permits are issued for uses that are normally not permissible by the general public. Examples of permit uses include horseback riding, firewood cutting, trapping, and research. Often, special conditions are developed that the permittee must follow to ensure compatibility. Special uses, other than horseback riding, are implemented to further refuge goals and objectives, such as forest management, species management, or, in the case of research, to gain insight into a resource issue.

Horseback riding is a use that is often requested as a means to wildlife observation and as a component of some hunting programs. This use is allowed only on designated trails and roads to minimize any impacts to wildlife habitat. Permits also allow a close evaluation of the number of persons involved to monitor for compatibility.

Strategy:

- Monitor permitted activities to ensure compliance and assess the impact of the use on the refuge resources.

REFUGE ADMINISTRATION

Refuge Administration Goal:

Maintain and enhance staffing, funding, and facilities to maintain the long-term integrity of habitats and wildlife resources of D'Arbonne Refuge in support of the achievement of the Refuge System mission.

Refuge Administration Objective 1 – Operations:

Within 3 years of the date of this plan, increase resources of the Refuge Complex by six percent to cover mandated salary increases and maintain minimum refuge management needs.

Refuge Administration Objective 2 – Operations:

Within 5 years of the date of this plan, obtain resources to hire additional staff (6.5 FTEs) in new positions to implement this plan, to fill current vacancy of administrative clerk, and to optimize refuge management for the Refuge Complex.

Discussion:

The administrative functions associated with this refuge include a wide array of activities that are critical to the mission of the National Wildlife Refuge System and the purpose of the refuge. Refuges must have appropriate staff, facilities, and equipment in order to accomplish their goals and objectives and conserve the integrity of the refuge.

Many of the proposed objectives and strategies cannot be implemented without the addition of personnel. Some work may be taken on by volunteers or interns, but generally still requires staff oversight to ensure accomplishment of objectives. If the refuge is to make a realistic impact on meeting the important biological management objectives, there is a need to add one biologist, one forester, two maintenance workers, a public use specialist, and one or two law enforcement agents. Highest priority would be to add a forester to focus more on improving the structure of bottomland forests on the refuge.

The next priority would be those positions dealing with visitors. Nationally, visitation is increasing at an annual average of 6.6 percent. Protecting the natural resources and ensuring the safety of refuge visitors are fundamental responsibilities of the refuge. Currently, the refuge has one full-time officer and two collateral duty officers who have Refuge Complex-wide responsibilities. The addition of law enforcement positions is critical with the increasing visitation and increasing public use activities. A public use specialist is required prior to implementing these objectives.

All of the staff positions referenced in this plan would be assigned to the Refuge Complex; therefore, they are not solely for D'Arbonne Refuge. These positions would maintain programs throughout the Refuge Complex.

Strategies:

- Provide equal consideration to all stations within the Refuge Complex as resources become available.
- Recruit for new positions of one biologist FTE (GS-7), two maintenance worker FTEs (WG-6-8), one forester FTE (GS-7), one public use specialist FTE (GS-7), and one and a half law enforcement FTEs.
- Provide continuing education and training opportunities to all staff to ensure a competent and motivated team.
- Provide safe and efficient equipment and vehicles for refuge operations and maintenance.

Refuge Administration Objective 3 – Operations:

Annually use volunteers to assist with maintenance, biological monitoring, and public use activities to foster implementation of this plan.

Strategies:

- Recruit volunteers through volunteer website and refuge association.
- Provide volunteer assistance through stipends and/or recreational vehicle pads.

Refuge Administration Objective 4 – Operations:

Improve Refuge Complex law enforcement program by adding 1.5 additional FTEs and partnerships within 5 years of the date of this plan.

Strategies:

- Increase law enforcement personnel from current level to a minimum of 2.5 FTEs.
- Provide current training and equipment to law enforcement officers.
- Develop Memoranda of Understanding with state and local law enforcement agencies to facilitate cooperation and assistance in law enforcement activities.
- Coordinate and communicate with Louisiana Department of Wildlife and Fisheries and Union and Ouachita Parishes' Sheriff's Offices to facilitate adequate levels of law enforcement.

Refuge Administration Objective 5 – Operations:

Reevaluate and file for Public Use Natural Areas status for the previously proposed unique areas on the refuge within 1 year of the date of this plan.

Discussion:

The Service recognizes the importance of conserving plant and animal communities in a natural state and assigns a high level of importance to maintaining for public use selected areas that are representative of the natural character of the National Wildlife Refuge System. A Public Use Natural Area is a relatively undisturbed ecosystem or subecosystem that is available for use by the public with certain restrictions for protecting the area. Such an area must possess exceptional value or quality in illustrating or interpreting an element of the natural heritage of our nation (8 RM 11.4). The designation is fostered only by the Refuge System. Public Use Natural Areas are categorized according to biological features, physical features, and management criteria (Table 10).

The public use natural areas proposed for D'Arbonne Refuge (see Special Designations section and Fig. 2) are unique because they represent examples of diverse plant communities and geological formations that are generally unprotected on a landscape scale in this region. One of the areas, Choudrant Brake, contains a grove of old-growth water tupelo that serves as roost sites for Rafinesque's big-eared bat, a species of concern. It is the only site of old water tupelo on the refuge and one of only a few in north Louisiana. Two areas, Beech Seep and

Upland/Bottomland Transition Site, represent areas of intact upland hardwoods with uncommon plant communities, a diverse ecotype that has nearly disappeared in north Louisiana as a result of ubiquitous pine monocultures. Possaw Island, a remnant, un-eroded island terrace in the middle of Bayou D'Arbonne Swamp, is unique geologically and botanically. Together these are excellent sites to protect and illustrate the diversity of natural environments in the National Wildlife Refuge System. Current public use has been found compatible in these areas and no changes to public use, at current levels, are anticipated.

Strategies:

- Review advantages and disadvantages to management of Public Use Natural Areas status.
- Reevaluate previously established unique areas on the refuge with current filing status criteria.
- Document each proposed natural area with a Natural Area Information Form and submit to the Regional and Washington offices sequentially for signature.
- Upon approval, develop a natural area management plan (8 RM 10.8H) for each natural area.
- Mark boundaries to ensure the integrity of the area and prevent potential harm resulting from inappropriate public use.
- On Public Use Natural Areas, recreation should be limited to activities that are compatible with maintenance of resource integrity and significance. The use should not interfere with the objectives of the Public Use Natural Area.
- Initiate management practices only where necessary to conserve existing ecotype and only as stated in an approved management plan.

Table 10. Categorization features of public use natural areas

Biological Features	Physical Features	Management Criteria
An ecological community significantly illustrating characteristics of a physiographic province or a biome.	Outstanding geological formations or features significantly illustrating geologic processes.	The floral and faunal sere is allowed to advance towards climax.
A biota of relative stability maintaining itself under prevailing natural conditions, such as a climax community.	Significant fossil evidence.	Vegetation succession is maintained at a desired seral stage that would otherwise advance towards climax; primary purpose dependent upon a particular successional stage.
An ecological community significantly illustrating the process or succession and restoration to a climax condition following a naturally caused disruptive change.	Any site containing significant evidence illustrating important scientific discoveries.	
A habitat supporting a vanishing, rare, or restricted species.		
A relic flora or fauna persisting from an earlier period.		
A seasonal haven for concentration of native animals or a vantage point for observing concentrated populations, such as a constricted migration route.		

Refuge Administration Objective 6 – Contaminants:

Annually, eliminate, prevent, monitor, and mitigate 50 to 75 percent of each area of contamination of aquatic and terrestrial habitats that result from sources within the refuge at the earliest possible time that logistics allow.

Strategies:

- Conduct regular surveillance of gas production facilities within the refuge and report all suspected problems to the responsible company and state regulatory agency.
- Maintain vigorous enforcement to prevent and prosecute illegal dumping within the refuge.
- Conduct periodic contaminant testing of water/fauna for selected food-chain contaminants, as well as water analyses for such contaminants as PAHs, metals, and regular water quality parameters and analyses.
- Monitor piscivores for mercury in order to mitigate or manage food-chain problems where possible and to anticipate negative effects in the various wildlife populations.

Refuge Administration Objective 7 – Contaminants:

If drilling/exploration operations recur on the refuge, the refuge will develop a plan to monitor and mitigate impacts on wildlife species and to ensure operators are in compliance with refuge rules and regulations (to the extent possible within the confines of the Caire vs. Fulton findings).

Discussion:

Contaminants in a biological system can alter, degrade, and otherwise damage its integrity and value to wildlife and humans. Contaminants can affect biological diversity, biological and aesthetic values, reproductive success, overall health through bioaccumulation of food chain contaminants, designated human uses through consumption advisories, and huntable/fishable populations. Sources of contamination on the refuge could include oil and gas production sites, naturally occurring and atmospherically deposited mercury, illegal dumping, transportation and transmission accidents (highway/pipeline), and upstream influences (non-point).

In the past, natural gas development posed a serious threat to fish, wildlife, and their habitats on D'Arbonne Refuge. The five main problems listed in the draft plan, and this plan as well, were primarily a result of lack of state regulation to govern the activities, a federal court decision that prohibited most Fish and Wildlife Service regulation, and irresponsible operators. However, the general attitude of the gas industry to work cooperatively and responsibly with the refuge has greatly improved in the last 10 years. It is important to note that one precedent-setting legal decision drives management of mineral activities on D'Arbonne Refuge. The 1986 federal case of Caire vs. Fulton resulted in the opinion that when mineral rights are not owned by the Federal Government on D'Arbonne Refuge, the Fish and Wildlife Service cannot require gas companies to abide by a special use permit and cannot enforce protective conditions under Title 50 of the Code of Federal Regulations (Section 29.32).

Strategies:

- Evaluate opportunities to collaborate with operators to fund or support independent biological monitoring and operational compliance of drilling activities.
- Work closely with the Louisiana Department of Natural Resources to incorporate refuge wildlife and habitat concerns into permits issued for exploration and development activities on the refuge.
- Develop standards or guidelines (i.e., best management practices suggested) for gas management on Refuge System lands within Fish and Wildlife Service policy (612 FW 2), Louisiana state law, and Caire vs. Fulton 1986.

Refuge Administration Objective 8 – Facilities:

Repair and maintain existing facilities, buildings, and roads, while adding 25 percent more office space to house existing staff and maintain refuge programs that can provide safe and efficient refuge operations.

Discussion:

The safe and efficient operation of the refuge is dependent upon having the necessary equipment to carry on daily operations. It is imperative to maintain existing vehicles, maintenance shop, and office equipment for this refuge to accomplish objectives. As resources allow, additional office space is needed to adequately manage programs and provide productive work space for all staff.

Strategies:

- Build additional office space as an addition to current refuge headquarters building.
- Repair and maintain facilities, buildings, and roads on an “as-needed basis.”
- Implement RONS and MMS projects to maintain refuge resources.
- Hire maintenance worker to assist Refuge Complex in facility maintenance and implementation of refuge programs.

V. Plan Implementation

INTRODUCTION

This comprehensive conservation plan outlines an ambitious course of action for the management of D'Arbonne Refuge over the coming 15 years. As mentioned in previous chapters, refuge lands are managed using proven scientific practices, sound biological principles, and up-to-date research, as directed under the National Wildlife Refuge System Improvement Act of 1997, and the Fish and Wildlife Service Manual. Congress has defined a clear mission of wildlife conservation for all national wildlife refuges, which unlike other public lands, are dedicated to the conservation of the nation's fish and wildlife resources. Recreational uses are accommodated where appropriate and compatible, while still meeting the congressional mandate of wildlife first.

PROJECT SUMMARIES

To implement the comprehensive conservation plan, the refuge proposes projects that reflect the basic needs identified by Service staff, the public, and planning team members for the management of wildlife and habitat, resource protection, education and visitor services, and refuge administration. The costs for special projects are an estimation of costs associated with research, investigations, physical improvements, and other special projects that are of short duration (1 to 6 years). The recurring costs listed are estimated yearly costs. While this project list is not intended to be all inclusive, it does reflect the basic needs supporting the outlined objectives in this plan.

PROPOSED PROJECTS

FISH AND WILDLIFE POPULATION MANAGEMENT

Improve management of endangered species, wildlife and water levels – Improve D'Arbonne Refuge's ability to manage for endangered species, wildlife, and water level of natural bodies of water. A biologist (1 FTE, GS-07) is needed to assist refuge staff with prescribed fire activities and fire break maintenance to improve endangered red-cockaded woodpecker habitat; to trap, band, and erect nest boxes for wood ducks; to increase surveys and monitor for management impacts on migratory birds, reptiles, amphibians, butterflies, and fisheries; and to reduce damage to bottomland hardwood habitat and improve water level management capabilities by controlling beaver populations. RONS 00011
Recurring Cost: \$53,000 Special Project Cost: \$65,000

Determine nesting success of priority neotropical migratory songbirds – Improve D'Arbonne Refuge's ability to manage bottomland hardwood forest to increase the biological potential for nesting habitat of hooded warbler, Kentucky warbler, northern parula, Swainson's warbler, wood thrush, and prothonotary warbler. Management practices impacts should be incorporated into the research design to determine the bird response so that adaptive management decisions can be made. The research project should be explored for cooperation with the Louisiana Department of Wildlife and Fisheries and a university. Point count surveys, nest searches, vegetation analysis, and landscape analysis will be conducted for a minimum of 3 years. New RONS
Recurring Cost: \$30,000 Special Project Cost: \$100,000

Wintering habitat for grassland bird species – Conduct a research project to determine how to provide the range of habitat conditions required for grassland species wintering on D'Arbonne Refuge, with emphasis on Henslow's sparrows, sedge wrens, and LeConte's

sparrows within two years of the date of this plan. Many grassland birds have been demonstrating a decline and are a high priority for refuges to monitor for presence, abundance, and nesting productivity. Not many data are available for these species and to what extent they forage and nest on the refuge. Data are needed to establish a baseline that can then be compared to future monitoring efforts to watch for changes in trends. A biologist needs to be hired to assist with field projects and data management. There will be literature searches conducted, experts contacted, and partnering with universities to define habitat requirements of grassland species of concern that may winter on the refuge. Implement Project Prairie Bird or similar surveys to better understand habitat use by wintering species.

New RONS

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

Population status and management impacts with reptiles and amphibians – Although the prospective herpetofauna of the refuge is large, at least 80 species, the presence of relatively few of the species has been confirmed and associated with particular refuges or their habitats. When confronted with a lack of knowledge concerning the species actually residing on refuge lands, the first step in conserving them is learning of their presence, and to the extent possible, associating their presence with particular habitats and how forest management activities are impacting their populations. The refuge will cooperate with a university or organization to design and implement the project and collaborate with the U.S. Geological Service for cooperative funding possibilities through the Amphibian and Reptile Monitoring Initiative. While certain aspects of the biology of the alligator snapping turtle are slowly unfolding, population dynamics are still largely unknown. In cooperation with the University of Louisiana at Monroe and its herpetologist, A. Carr, the refuge provides a good opportunity to further understanding of alligator snapping turtle nesting requirements and components of nesting successfully. These data are crucial in furthering the refuge's conservation efforts of this declining species. New RONS

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

Fisheries of Bayou D'Arbonne – Not much fisheries data have been collected on the refuge since the late 1970s. However, cooperation with the Louisiana Department of Wildlife and Fisheries has occurred in the past, and a strong relationship exists now for future investigations of the fishery. Both agencies see the need and the benefits of supporting the existing fisheries and maintaining a self-sustaining sport fish population. The refuge needs a current inventory of the fish population for species presence and abundance in the mainstream and backwater areas and needs to explore opportunities to enhance habitat for fish in these areas within 3 to 5 years of the date of this plan. The refuge will look into cooperative possibilities with the U.S. Geological Service and universities for establishing a research project for defining the aquatic resources of Bayou D'Arbonne and effects of backwater flooding from Ouachita River, relative to flood regime and contaminants. Fish will be inventoried with electrofishing gear, gill nets, and angler surveys. A sample for darters, madtoms, and minnows will be conducted in the shallow areas by using seines and identifying the presence of endangered species. An evaluation of overflow areas in times of low water will be conducted for opportunities of providing wood debris, brush, etc., for habitat enhancement that does not conflict with other management strategies in those areas. New RONS

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

Bat use of bottomland hardwood forest – Conduct a research project to determine roost habits, reproductive success, and wintering roost locations of Rafinesque’s big-eared bats and southeastern bats on the refuge within 2 years of the date of this plan. These two species of bats are of concern and their presence is documented on the refuge. Little information exists as to their habitat needs, which is imperative for successful management decisions. The refuge will look into cooperative possibilities with U.S. Geological Service and universities for establishing a research project.

New RONS

Recurring Cost: \$15,000

Special Project Cost: \$60,000

HABITAT MANAGEMENT

Improve water level management – Improve water level management through control of beavers on D’Arbonne Refuge. Beavers construct dams that cause floods and hold water that can damage and even kill trees. Ponded water also backs up onto the property of adjacent landowners, which causes tension with refuge neighbors. Additionally, beavers chew trees and seedlings, which hamper reforestation efforts made by staff members. One permanent and one seasonal maintenance worker (1 FTE, WG-8; 0.5 FTE, WG-7) are needed on the refuge to control beavers to prevent damage to forests, to individuals trees, and to prevent flooding damage to adjacent landowners.

RONS 99012 and 00010

Recurring Cost: \$80,000

Special Project Cost: \$97,500

Control invasive plants – Chinese tallow and Japanese climbing fern are established on D’Arbonne Refuge and are an imminent threat to wetland and upland habitats. Control of exotics is no longer possible as a routine component of general refuge management both from the resource and manpower perspective. Chinese tallows grow quickly, shades out desirable planted species, and its fallen leaves are toxic to other plants. Without control, they will be the dominant species in many forested areas, thus eliminating natural diversity. Chinese tallows are particularly noticeable following logging operations and monitoring and treatment protocols must be developed. One forester (1 FTE, GS-7) and equipment/supplies (primarily chemicals) should be obtained. Increased use of volunteers will be promoted, along with private lands biologist, to investigate opportunities to establish partners’ projects with adjacent landowners whose properties are often sources of infestations. Environmental education and interpretation relative to invasive species will be promoted through brochure and/or interpretive panel.

New RONS

Recurring Cost: \$53,000

Special Project Cost: \$65,000

Habitat management – Bottomland hardwood and upland pine mixed with hardwoods management has been minimal and sporadic due to lack of staff for inventories, timber cruises, and monitoring of management action effects on wildlife. This project will improve the management of these habitats by re-establishing and improving forest inventories, evaluating wildlife habitat needs and prescribing treatments on the refuge, implementing GIS resources, and developing and implementing habitat management plans. This project includes the addition of a forester (1FTE, GS-7) and associated equipment and supplies. New RONS

Recurring Cost: \$53,000

Special Project Cost: \$100,000

RESOURCE PROTECTION

Safety and resource protection – D’Arbonne Refuge relies on one full-time law enforcement officer whose time is split among all the refuges of the Complex. Public use has continued to increase with hunting and fishing along with other issues requiring law enforcement, such as vandalism, compliance with access, and public use regulations. The refuge is currently unable to adequately address safety and resource protection issues. The refuge needs to hire one full-time and one seasonal law enforcement officer to just begin to keep up with a growing population utilizing the refuge from public use to gas lease compliance. New RONS

Recurring cost: \$42,000

Special Project Cost: \$75,000

VISITOR SERVICES

Improve public use opportunities – Improve public use opportunities at D’Arbonne Refuge by placing directional and interpretive signs at major visitor access points. The refuge has several access points, most of which are not located along federal or state highways. Currently, not enough signs are present to provide adequate information to visitors. Public use and wildlife interpretation will be enhanced through the increased opportunities this project provides. RONS 00022

Recurring cost: \$5,000

Special Project Cost: \$34,000

Enhance visitor amenities and programs – Improve visitor amenities by adding interpretive panels, obtaining environmental education equipment, and improving gravel boat launches with concrete. Additional public programs and contact can be made with hiring a public use specialist (1 FTE, GS-07) to coordinate a youth turkey hunt, assist visitors at the headquarters, provide environmental education programs upon request, etc.

Recurring cost: \$53,000

Special Project Cost: \$55,000

ARCHAEOLOGICAL AND CULTURAL RESOURCES

Cultural resource overview of the refuge – Using available scientific and historical information, the selected contractor will author an interdisciplinary cultural resources 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 satisfies the cultural resources objectives listed in this plan, as well as those listed in the Region’s GPRA and RAPP.

Recurring Cost: \$0

Special Project Cost: \$20,000

Comprehensive Cultural Resource Inventory – Using the information generated from the cultural resources 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. As 100 percent coverage is impossible, the contractor will develop and test an archaeological potential probability model. The model’s parameters will include, at a minimum, recorded historic properties, cultural components, landform, soil type and drainage classification, vegetative cover, elevation, slope, nearest water source and order classification, and nearest permanent water sources. The contractor will conduct systematic subsurface testing on the probability model. The contractor will preliminarily ascertain the integrity, parameters, and periods of cultural occupation for recorded historic period sites. Submission of a final technical report will enable the refuge to partially satisfy the cultural resources objectives listed in this plan, as well as the Service’s historic preservation policies and

legal mandates. Recurring costs include conservation and protection of sites and administrative needs for existing or new sites that are found.

Recurring Cost: \$15,000 Special Project Cost: \$100,000

Cultural Resource Interpretative Brochure – Develop a brochure that describes the Indian, Euroamerican, and African American cultures present on and near the refuge, as well as significant historic events and land-use patterns.

Recurring Cost: \$500 Special Project Cost: \$2,000

REFUGE ADMINISTRATION

Administrative support – Increase base budgeting for D’Arbonne Refuge to cover salaries with cost of living increases and to provide adequate training and equipment for personnel. Volunteers and interns are used presently and will be used in the future, but need stipend support and recreational vehicle pads to adequately support them. New RONS

Recurring cost: \$28,000 Special Project Cost: \$110,000

Facilities support – D’Arbonne Refuge is the headquarters for the North Louisiana National Wildlife Refuge Complex and is a visitor contact station for the public. Space for the public is limited to a small hallway for brochures and office space designed for 11 is needed to house 16 (add 800 square feet). New RONS

Recurring cost: \$5,000 Special project cost: \$148,800

Provide equipment for staff – Equipment from pens and paper, computers to vehicles and heavy equipment will be needed throughout the life of this plan in support of refuge operations and management. Equipment repair and replacement are included in SAMMS Projects (Table 10).

FUNDING AND PERSONNEL

Increased staffing and resources will result in long-lasting protection, maintenance, and enhancement of bottomland hardwood forests, mixed hardwood/pine, public use facilities and programs, and will maintain refuge operations and maintenance. The following tables (11 and 12) identify proposed projects described in this plan and current and future positions needed to carry out the goals and objectives of the plan.

Table 11. Cost summary of proposed projects

Project Number	Project Title	Special Project Cost	Recurring Annual Cost
RONS			
00011	Improve management of endangered species, wildlife and water levels	\$65,000	\$53,000
New	Determine nesting success of priority neotropical migratory songbirds	100,000	30,000
New	Wintering habitat for grassland bird species	30,000	15,000
New	Population status and management impacts with reptiles and amphibians	30,000	15,000
New	Fisheries of Bayou D’Arbonne	30,000	15,000
New	Bat use of bottomland hardwood forest	60,000	15,000

Project Number	Project Title	Special Project Cost	Recurring Annual Cost
99012 and 00010	Improve water level management	97,500	80,000
New	Control invasive plants	65,000	53,000
New	Habitat management	100,000	53,000
New	Safety and resource protection	75,000	42,000
RONS 00022	Improve public use opportunities	34,000	5,000
New	Enhance visitor amenities and programs	55,000	53,000
New	Cultural resource overview of the refuge	20,000	0
New	Comprehensive Cultural Resource Inventory	100,000	15,000
New	Cultural Resource Interpretative Brochure	2,000	500
New	Administrative support	110,000	28,000
New	Facilities support	148,800	5,000
SAMMS			
04135719	Rehab gravel parking lot on Bob Field Road #907	14,000	n/a
04135093	Replace roof on west side shop	50,000	n/a
00123249	Construct handicapped accessible pier	68,000	n/a
02121940	Rehabilitate public use roads	1,104,000	n/a
01102170	Replace 1990 John Deere tractor	71,000	n/a
01102169	Replace 1978 International Harvester TD-20E bulldozer	252,000	n/a
98110077	Rehabilitate Point-Rocky Branch Road	7,630,000	n/a
97102159	Replace John Deere 4040 tractor	93,000	n/a
97102157	Replace 40 hp outboard motor and 16' aluminum boat	8,000	n/a
97102155	Replace 1969 Allis-Chalmers front-end loader	27,000	n/a
97102151	Replace John Deere motor grader	181,000	n/a
97102148	Replace 1980 John Deere 410 backhoe	93,000	n/a
96102163	Rehabilitate Holland's Bluff Road used for main public access	46,000	n/a
95102162	Replace 20 hp outboard motor	5,000	n/a
80102154	Replace 1966 TD-20 bulldozer	252,000	n/a
93102166	Rehabilitate Holland's Bluff Road and office parking lot	152,000	n/a
92102165	Rehabilitate deteriorated High Line Road used for public access	26,000	n/a

Table 12. Current Staff at D'Arbonne Refuge and for the Complex and new positions proposed (all are for one FTE unless otherwise designated)

Position	Grade	Annual Cost
Refuge Personnel		
Forester	GS-11	74,008
Maintenance Worker	WG-8	57,944
Equipment Operator	WG-10	53,353
Complex Personnel		
Project Leader	GS-14	111,620
Deputy Project Leader	GS-13	98,143
Law Enforcement Officer	GS-9	84,522
Wildlife Biologist	GS-11	67,341
Office Assistant	GS-9	55,846
Office Automation Clerk	GS 5/6/7	34,117
Outdoor Recreation Specialist//Ranger	GS-11	77,599
Natural Resource Planning Biologist	GS-12	90,410
New Positions Proposed would work throughout the Complex		
Forester	GS 7/9	55,846
Biologist	GS 7/9	55,846
Public Use Specialist	GS 7/9	55,846
Law Enforcement Officer (1.5 FTE)	GS 6/7/8	78,000
Maintenance Worker (1.5 FTE)	WG 7/8	86,916

VOLUNTEERS

A volunteer program exists on the refuge and will be continued for the life of this plan. The refuge will continue to recruit volunteers to assist with wood duck and blue bird box management, migratory songbird point count surveys, amphibian and reptile surveys, grounds maintenance, etc.

PARTNERSHIP OPPORTUNITIES

A major objective of this comprehensive conservation plan is to establish partnerships with local landowners, private organizations, and state and federal natural resource agencies. Partnerships assist in conserving resources and providing recreational opportunities for the refuge and in the Lower Mississippi River Valley. Projects proposed in this plan will rely on partners to assist in implementation of everything from wildlife surveys to special research projects to improve habitat management to conducting hunting programs. In the immediate vicinity of the refuge, opportunities exist to establish partnerships with local landowners, Louisiana Department of Wildlife and Fisheries, Louisiana Tech, Grambling University, and the University of Louisiana at Monroe. At state and regional levels, partnerships may be able to be established with agencies such as U.S. Geological Service, National Wild Turkey Federation, The Nature Conservancy, Ducks Unlimited, and National Audubon Society.

STEP-DOWN MANAGEMENT PLANS

A comprehensive conservation plan is a strategic plan that guides the direction of the refuge. Refuge policy requires that specific management plans be developed for each refuge. A step-down management plan provides specific guidance on activities, such as habitat, fire, and visitor services management. These plans require annual revision and others are on a 5- to 10-year schedule for revision. Refuge staff will continue to seek public and professional input in the development, revision, and implementation of step-down plans. Some of these plans are already in place, while others have yet to be developed (Table 13).

Table 13. D'Arbonne National Wildlife Refuge step-down management plans and associated completion and revision dates

Plan	Completion Date	Revision Date
Master Plan	1981	CCP will replace
Station Safety Plan	1998	2008
Law Enforcement Plan	1998	2008
Fishery Management Plan	1991	2006
Sign Plan	1992	2006
Fire Management Plan	2001	2011
Forest Management Plan	1983	HMP will replace
Water Management Plan	1987	2006
Animal Control Plan	1984	2006
Biological Inventory and Monitoring Plan	1992	2006
Trapping Plan	1999	2009
Hunt Plan	1997	2007
Cultural Resource Protection Plan	2014*	2024
Habitat Management Plan	2008*	2018
Visitor Services Management Plan	2008*	2018
Invasives Management Plan	2008*	2018

*Based on ccp approval in 2006 and completion dates given as stated in objectives

MONITORING AND ADAPTIVE MANAGEMENT

Adaptive management is a flexible approach to long-term management of biotic resources, which is directed over time by the results of ongoing monitoring activities and incorporating new information. Monitoring the Service's performance, while implementing this plan, will help ensure its success. Monitoring and evaluation provide the crucial feedback necessary to determine whether management efforts are achieving their desired outcome on target and non-target species and/or communities or

public use programs. If the results are not as predicted, then management efforts will be modified based on sound biological principles. This adaptive approach provides a prescriptive process rather than a crisis management. Species are then better provided for in a manner that is driven with a purpose, which leads to a better chance of success and use of resources.

PLAN REVIEW AND REVISION

The comprehensive conservation plan is meant to provide guidance to the refuge manager and staff over the next 10-15 years. However, this document and the ecological system it is meant to provide management for are dynamic. The Service will monitor, evaluate, and determine whether or not progress is being made towards achieving the refuge's purposes, vision, and goals annually. Through adaptive management, evaluation of monitoring and research results will indicate if any revisions need to be made to refuge objectives or strategies based on significant new information or change in ecological conditions. At a minimum, plan revision will occur every 15 years. All plan revisions will follow the procedures outlined in current policy and will require compliance with the National Environmental Policy Act. The Service will continue to encourage public involvement regarding the management of this refuge.

SECTION B: APPENDICES

Appendix I. Glossary

<i>Adaptive Management</i>	A process in which projects are implemented within a framework of objectives developed to describe the desired condition; management is designed to meet the objectives, or existing management is continued; the response of the resource is monitored to determine if the objective has been met; and management is adapted (changed) if objectives are not reached.
<i>Alternatives</i>	Different sets of objectives and strategies or means of achieving refuge purposes and goals, helping fulfill the System mission, and resolving issues.
<i>Approved Acquisition Boundary</i>	A project boundary that the Director of the Fish and Wildlife Service approves upon completion of the detailed planning and environmental compliance process for establishment of a refuge.
<i>Basal Area</i>	The cross-section area of all plants in a stand, generally expressed as square feet per acre.
<i>Bayou</i>	A minor river or secondary watercourse, usually sluggish or back flooding water flow.
<i>Biological Diversity</i>	Variety of life forms and its processes, including the variety of living organisms, the genetic differences among them, and the communities and ecosystems in which they occur. The National Wildlife Refuge System focus is on indigenous species, biotic communities and ecological processes.
<i>Biological Integrity</i>	Composition, structure, and function at the genetic, organism, and community levels consistent with natural conditions, and the biological processes that shape genomes, organisms, and communities.
<i>Bryophyte</i>	A term applied to about 22,000 species of small plants that usually grow in moist areas on soil, tree trunks, and rocks (e.g., mosses and liverworts.)
<i>Canopy</i>	A layer of foliage, generally the upper-most layer, in a forest stand. It can be used to refer to mid- or under-story vegetation in multi-layered stands. Canopy closure is an estimate of the amount of overhead tree cover (also canopy cover).
<i>Categorical Exclusion</i>	A category of actions that do not individually or cumulatively have a significant effect on the human environment and have been found to have no such effect in procedures adopted by a federal agency, pursuant to the National Environmental Policy Act of 1969.

<i>Compatible Use</i>	A wildlife-dependent recreational use or any other use of a refuge that, in the sound professional judgment of the refuge manager, will not materially interfere with, or detract from, the fulfillment of the mission or the purposes of the refuge. A compatibility determination supports the selection of compatible uses and identifies stipulations or limits necessary to ensure compatibility.
<i>Comprehensive Conservation Plan</i>	A document that describes the desired future conditions of a refuge and provides long-range guidance and management direction to achieve the purposes of the refuge and help fulfill the mission of the Refuge System.
<i>Community</i>	A distinct assemblage of plants that develops on sites characterized by particular climates and soils, and the species and populations of wild animals that depend on the plants for food, cover, and/or nesting.
<i>Cultural Resources</i>	The remains of sites, structures, or objects used by people of the past.
<i>Deciduous</i>	Pertaining to perennial plants that are leafless for sometime during the year.
<i>Diameter at Breast Height (dbh)</i>	Tree diameter at breast height (4.5 feet above ground)
<i>Ecological Succession</i>	The orderly progression of an area through time from one vegetative community to another in the absence of disturbance or management.
<i>Ecosystem</i>	A dynamic and interrelating complex of plant and animal communities, including people, and their associated non-living environment,
<i>Ecosystem Approach or Management</i>	A strategy or plan to protect and restore the natural function, structure, and species composition of an ecosystem, recognizing that all components (ecological, social, and economical) are interrelated.
<i>Endangered Species</i>	A plant or animal species listed under the Endangered Species Act that is in danger of extinction throughout all or a significant portion of its range.
<i>Environmental Assessment (EA)</i>	A systematic analysis prepared in compliance with the National Environmental Policy Act that determines if proposed actions would result in a significant effect on the quality of the human environment.
<i>Even-Aged Forests</i>	Forests that are composed of trees with a time span of less than 20 years between oldest and youngest individuals.
<i>Fauna</i>	All the vertebrate and invertebrate animals of an area.
<i>Fragmentation</i>	The process of reducing the size and connectivity of habitat patches. The disruption of extensive habitats into isolated and small patches.

<i>Geographic Information System (GIS)</i>	A computer system capable of collection, processing, and managing spatially referenced data. GIS allows for the overlay of many data layers and provides a valuable tool for addressing resource management issues.
<i>Goal</i>	A descriptive, open-ended, and often broad statement of desired future conditions that conveys a purpose.
<i>Herbicide</i>	A chemical agent used to kill plants or inhibit plant growth.
<i>Historic Conditions</i>	Composition, structure, and functioning of ecosystems resulting from natural processes that, based on sound professional judgment, were present prior to substantial human-related changes to the landscape.
<i>Hydrology</i>	The properties, distribution, and effects of water in the atmosphere, on the earth's surface and in soil and rocks. The movement of water and how it changes in depth, timing, flow, or location of surface water.
<i>Indicator Species</i>	A species of plant or animals that is assumed to be sensitive to habitat changes and represents the needs of a larger group of species.
<i>In-holding</i>	Privately owned lands inside the boundary of a national wildlife refuge.
<i>Invasive Species</i>	Species that are not native to a particular ecosystem, have flourished beyond their normal constraints due to changes in their natural environment, or whose introduction does, or is likely to, cause economic or environmental harm, or harm to human health.
<i>Inventory</i>	A point-in-time measurement of the resource to determine location or condition.
<i>Issue</i>	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 the presence of an undesirable resource condition.
<i>Levee</i>	An embankment created by soil deposited adjacent to a stream or water body.
<i>Midden</i>	A slightly elevated mound composed of shell fragments and other debris left as waste by Native Americans; shell mounds found throughout the ecosystem constructed by Native Americans.
<i>Migratory</i>	The seasonal movement from one area to another and back.
<i>Monitoring</i>	The collection and analysis of repeated observation or measurements to evaluate changes in condition and progress toward meeting a management objective.

<i>National Wildlife Refuge System</i>	A network of designated areas of land, water, or an interest in land or water administered by the Fish and Wildlife Service as wildlife refuges, wildlife ranges, wildlife management areas, waterfowl production areas, and other areas for the protection and conservation of fish, wildlife, and plant resources.
<i>Native Species</i>	Species that normally live and thrive in a particular ecosystem.
<i>Neotropical Migratory Bird</i>	A bird species that breeds north of the United States/Mexican border and winters primarily south of that border, which includes Mexico, West Indies, Central America, and part of South America.
<i>Objective</i>	A quantitative (where possible) target statement of actions to be accomplished to achieve a desired outcome or goal. Objectives are attainable, time-specific, and measurable.
<i>Old Growth Forest</i>	Forested areas lacking frequent disturbance to vegetation, usually characterized by dominant species entered into a late-successional stage; usually associated with high diversity of species, specialization and structural complexity.
<i>Passerine</i>	The largest bird group composed of small perching birds. Examples include northern cardinals, blue jays, warblers, sparrows, and wrens.
<i>Planning Team</i>	A team that prepares the comprehensive conservation plan. Planning teams are interdisciplinary in membership and function. A team generally consists of the planning team leader, refuge manager, staff biologists, other Service specialists, and partnering state wildlife agencies as appropriate.
<i>Preferred Alternative</i>	The alternative determined by the decision-maker to best achieve the refuge purpose, vision, and goals; contribute to the Refuge System mission, address the significant issues; and is consistent with principles of sound fish and wildlife management.
<i>Prescribed Fire</i>	A planned or intentional fire set by resource land managers to improve or restore wildlife habitat and reduce potentially dangerous fire fuel loads, also known as “controlled burn.”
<i>Refuge Operating Needs System (RONS)</i>	A national database which contains the unfunded operational needs of each refuge. Projects included are those required to implement approved plans and meet goals, objectives, and legal mandates.
<i>Refuge Purpose</i>	The purpose 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.

<i>Scoping</i>	A process for determining the scope of issues to be addressed by a comprehensive conservation plan and for identifying the significant issues. Involved in the scoping process are federal, state, and local agencies, private organizations, and individuals.
<i>Sink Habitat</i>	A habitat in which local mortality exceeds local reproductive success for a given species.
<i>Sink Population</i>	A population in a low-quality habitat in which birth rate is generally less than the death rate and population density is maintained by immigrants from source populations.
<i>Source Habitat</i>	A habitat in which local reproductive success exceeds local mortality for a given species.
<i>Source Population</i>	A population in a high-quality habitat in which birth rate greatly exceeds death rate and the excess individuals leave as migrants.
<i>Species</i>	A distinctive kind of plant or animal having distinguishable characteristics and that can interbreed and produce young.
<i>Species of Management Concern</i>	This is a category assigned to species for which information in the possession of the Service indicated that proposing to list as threatened or endangered was possibly appropriate, but for which sufficient data were not available to support proposed rules.
<i>Step-down Management Plans</i>	Step-down management plans provide the details necessary to implement management strategies and projects identified in the comprehensive conservation plan.
<i>Strategy</i>	A specific action, tool, or technique or combination of actions, tools, and techniques used to meet unit objectives.
<i>Threatened Species</i>	Species listed under the Endangered Species Act that are likely to become endangered within the foreseeable future throughout all or a significant portion of their range.
<i>Trust Species</i>	Species for which the Fish and Wildlife Service has primary responsibility, including most federally listed threatened and endangered species, anadromous fish once they enter the inland coastal waterways, and migratory birds.
<i>Vegetation Type</i>	A category of land based on potential or existing dominant plant species of a particular area.
<i>Wetland</i>	Areas such as lakes, marshes, bogs, and streams that are inundated by surface or ground water for a long enough period of time each year to support, and that do support under natural conditions, plants and animals that require saturated or seasonally saturated soils.

<i>Wildlife Corridor</i>	A landscape feature that facilitates the biologically effective transport of animals between larger patches of habitat dedicated to conservation functions. Such corridors may facilitate several kinds of traffic, including frequent foraging movement, seasonal migration, or the once in a lifetime dispersal of juvenile animals. These are transitional habitats and need not contain all habitat elements required by migrants for long-term survival or reproduction.
<i>Wildlife-Dependent Recreation</i>	A use of a refuge involving hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation. The National Wildlife Refuge System Improvement Act of 1997 specifies that these are the six priority general public uses of the system.
<i>Wildlife Diversity</i>	A measure of the number of wildlife species in an area and their relative abundance.

Description of acronyms used in the D'Arbonne National Wildlife Refuge Comprehensive Conservation Plan and Environmental Assessment

Acronym	Description
CATEX	Categorical Exclusion
CCP	Comprehensive Conservation Plan
CFR	Code of Federal Regulations
DNR	Department of Natural Resources
DOI	Department of the Interior
EA	Environmental Assessment
EE	Environmental Education
FBCR	Forest Bird Conservation Region
FONSI	Finding of No Significant Impact
FWS	Fish and Wildlife Service
LDWF	Louisiana Department of Wildlife & Fisheries
LMVJV	Lower Mississippi Valley Joint Venture
LMRE	Lower Mississippi River Ecosystem
MSL	Mean Sea Level
MMS	Maintenance Management System
NABCI	North American Bird Conservation Initiative
NAWMP	North American Waterfowl Management Plan
NWR	National Wildlife Refuge
NWRSI	National Wildlife Refuge System Improvement Act
PIF	Partner's In Flight
PUNA	Public Use Natural Area
RCW	Red-cockaded Woodpecker
RNA	Research Natural Area
RONS	Refuge Operating Needs System
USC	United States Code
WGCPE	West Gulf Coastal Plain Ecosystem

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Appendix III. Legal Mandates

The Fish and Wildlife Service must comply with several laws, regulations, and policy prior to, during, and following implementation of the comprehensive conservation plan.

Department of the Interior Policy

The mission of the Department is to protect and provide access to our nation's natural and cultural heritage and honor our trust responsibilities to tribes.

Fish and Wildlife Service Policy

The mission of the Service is working with others to “conserve, protect, and enhance fish, wildlife, and plants and their habitats for the continuing benefit of the American people.”

National Wildlife Refuge System

The Refuge System is guided by the **National Wildlife Refuge System Improvement Act of 1997: Public Law 105-57 amended the National Wildlife Refuge System Act of 1966 (16 U.S.C. 668dd-ee)**.

As stated in the Improvement Act, the mission of the National Wildlife Refuge System is “...to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.”

The act mandates several actions including:

- The refuge system shall consistently be directed and managed as a national system of lands and waters devoted to wildlife conservation and management. While each refuge fulfills the mission of the system, it shall also be managed to fulfill the specific purposes for which it was established first.
- Wildlife-dependent recreational uses can receive priority consideration in refuge planning and management, but must first be determined compatible with the purpose of the refuge prior to allowing the use to occur. Six wildlife-dependent uses established as priority for consideration include hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation. A compatible use is one which, in the sound professional judgment of the refuge manager, will not materially interfere with, or detract from, fulfillment of the Refuge System mission or refuge purpose(s).
- Development of a Comprehensive Conservation Plan is required for each refuge and management is consistent with the plan. Development of plans should include effective coordination with other federal agencies, state fish and wildlife or conservation agencies, and provide opportunities for public involvement throughout the planning process.
- Monitor the status and trends of fish, wildlife, and plants in each refuge. Provide for the conservation of fish, wildlife, and plants, and their habitats within the Refuge System. 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.

Establishing Legislative Purpose for D’Arbonne National Wildlife Refuge

“...conservation, maintenance, and management of wildlife, resources thereof, and its habitat thereon...” (16 U.S.C. 664 *Fish and Wildlife Coordination Act*)

OTHER RELEVANT LEGAL MANDATES

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

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

Antiquities Act (16 U.S.C. 431-433), The Act of June 8, 1906, (34 Stat. 225): Authorizes the President of the United States to designate as National Monuments objects or areas of historic or scientific interests on lands owned or controlled by the United States. The act required that a permit be obtained for examination of ruins, excavation of archaeological sites and the gathering of objects of antiquity on lands under the jurisdiction of the Secretaries of Interior, Agriculture, and Army, and provided penalties for violations. Authorizes the scientific investigation of antiquities on federal land and provides penalties for unauthorized removal of objects taken or collected without a permit.

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

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

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

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

Emergency Wetlands Resources Act (1986): The purpose of the Act is "To promote the conservation of migratory waterfowl and to offset or prevent the serious loss of wetlands by the acquisition of wetlands and other essential habitat, and for other purposes." This Act authorized the purchase of wetlands from Land and Water Conservation Fund moneys, removing a prior prohibition on such acquisitions. The Act also requires the Secretary of the Interior to establish a National Wetlands Priority Conservation Plan, requires the states to include wetlands in their Comprehensive Outdoor Recreation Plans, and transfers to the Migratory Bird Conservation Fund an amount equal to import duties on arms and ammunition.

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

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

Executive Order 11593, Protection and Enhancement of the Cultural Environment: The purpose of this Executive Order, signed May 12, 1971, is for the Federal Government to provide leadership in preserving, restoring, and maintaining the historic and cultural environment of the Nation. Federal agencies shall (1) administer the cultural properties under their control in a spirit of stewardship and trusteeship for future generations, (2) initiate measures necessary to direct their policies, plans and programs in such a way that federally owned sites, structures, and objects of historical, architectural or archaeological significance are preserved, restored and maintained for the inspiration and benefit of the people, and (3) in consultation with the Advisory Council on Historic Preservation institute procedures to assure that Federal plans and programs contribute to the preservation and enhancement of non-federally owned sites, structures and objectives of historical architectural or archaeological significance.

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

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

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

Executive Order 1312 Invasive Species (1999): This order seeks to prevent the introduction of invasive species, provides for their control, and minimizes the economic, ecological, and human health impacts that are caused by invasive species.

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

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

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

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

Historic Sites, Buildings, and Antiquities Act (16 U.S.C. 461-462, 464467): The Act of August 21, 1935, (49 Stat. 666) popularly known as the Historic sites Act, as amended by Public Law 89-249, approved October 9, 1965, (79 Stat. 971), declared it a national policy to preserve historic sites and objects of national significance, including those located on refuges. It provided procedures for designation, acquisition, administration and protection of such sites. Among other things, National Historic and Natural Landmarks are designated under authority of this Act. As of January 1989, thirty-one national wildlife refuges contained such sites.

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

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

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

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

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

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

National Environmental Policy Act of 1959 (42 U.S.C. 4321-4347) Public Law 91-190, January 1, 1970, 83 Stat. 852, as amended by Public Law 94-52, July 3, 1975, 89 Stat. 258, and Public Law 94-83, August 9, 1975, 89 Stat. 424. Title 1 of the 1969 National Environmental Policy Act: Requires that all federal agencies prepare detailed environmental impact statements for “every recommendation or report on proposals for legislation and other major federal actions significantly affecting the quality of the human environment.” The 1969 statute stipulated the factors to be considered in environmental impact statements, and required that federal agencies employ an interdisciplinary approach in related decision-making and develop means to ensure that environmental values are given appropriate consideration, along with economic and technical considerations. Title II of this statute requires annual reports on environmental quality from the President to the Congress, and established a Council on Environmental Quality in the Executive Office of the President with specific duties and functions.

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

National Wildlife Refuge System Administration Act of 1966 as amended by the National Wildlife Refuge System Improvement Act of 1997, 16 U.S.C. 668dd-668ee. (Refuge Administration Act): Defines the National Wildlife Refuge System authorizes the Secretary of the Interior to permit any use of a refuge provided such use is compatible with the major purposes for which the refuge was established. The Refuge Improvement Act clearly defines a unifying mission for the refuge system; established the legitimacy and appropriateness of the six priority public uses; establishes a formal process for determining compatibility; established the responsibilities of the Secretary of the Interior for managing and protecting the System; and requires a comprehensive conservation plan for each refuge by the year 2012. This Act amended portions of the Refuge Recreation Act and National Wildlife Refuge System Administration Act of 1966.

North American Wetlands Conservation Act (103 Stat. 1968; 16 U.S.C. 4401-4412) Public Law 101-233, enacted December 13, 1989: Provides funding and administrative direction for implementation of the North American Waterfowl Management Plan and Tripartite Agreement on Wetlands between Canada, the United States and Mexico. The Act converts the Pittman-Robertson account into a trust fund, with the interest available without appropriation through the year 2006, to carry out the programs authorized by the Act, along with an authorization for annual appropriation of \$15 million plus an amount equal to the fines and forfeitures collected under the

Migratory Bird Treaty Act. Available funds may be expended, upon approval of the Migratory Bird Conservation Commission, for payment of not to exceed 50 percent of the United States' share of the cost of wetlands conservation projects in Canada, Mexico, or the United States (or 100 percent of the cost of projects on federal lands). At least 50 percent and no more than 70 percent of the funds received are to go to Canada and Mexico each year.

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

Refuge Recreation Act of 1952: This Act authorizes the Secretary of the Interior to administer refuges, hatcheries, and other conservation areas for recreational use, when such uses do not interfere with the area's primary purposes. It authorizes construction and maintenance of recreational facilities and the acquisition of land for incidental fish and wildlife-dependent recreational development or protection of natural resources. It also authorizes the charging of fees for public uses.

Refuge Recreation Act (1962): Allows the use of refuges for recreation when such uses are compatible with the refuge's primary purposes and when sufficient funds are available to manage the use of Land and Water Conservation Fund Act (1965): Uses the receipts from the sale of surplus federal land, outer continental shelf oil and gas sales, and other sources for land acquisition under several authorities.

Refuge Revenue Sharing Act (16 U.S.C. 715s) Section 401 of the Act of June 15, 1935, (49 Stat. 383): Provided for payments to counties in lieu of taxes, using revenues derived from the sale of products from refuges. Public Law 88-523, approved August 30, 1965, (78 Stat. 701) made major revisions by requiring that all revenues received from refuge products, such as animals, timber and minerals, or from leases or other privileges, be deposited in a special Treasury account and net receipts distributed to counties for public schools and roads. Public Law 93-509, approved December 3, 1974, (88 Stat. 1603) required that monies remaining in the fund after payments be transferred to the Migratory Bird Conservation Fund for land acquisition under provisions of the Migratory Bird Conservation Act. Public Law 95-469, approved October 17, 1978, (92 Stat. 1319) expanded the revenue sharing system to include National Fish Hatcheries and Service research stations. It also included in the Refuge Revenue Sharing Fund receipts from the sale of salmonid carcasses. Payments to counties were established as follows: on acquired land, the greatest amount calculated on the basis of 75 cents per acre, three-fourths of one percent of the appraised value, or 25 percent of the net receipts produced from the land; and on land withdrawn from the public domain, 25 percent of net receipts and basic payments under Public Law 94-565 (31 U.S.C. 1601-1607, 90 Stat. 2662). This amendment also authorized appropriations to make up any difference between the amount in the fund and the amount scheduled for payment in any year. The stipulation that payments be used for schools and roads was removed, but counties were required to pass payments along to other units of local government within the county which suffer losses in revenues due to the establishment of Service areas.

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

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

Appendix IV. Public Involvement

SUMMARY OF PUBLIC SCOPING COMMENTS

In preparation for developing the comprehensive conservation plan, the refuge conducted a biological review and public use review in September 2003 and May 2004, respectively. Early in the process, the refuge identified a variety of issues, concerns, and opportunities that were provided to both review teams.

The Biological Review was held during the week of September 8, 2003. A diverse team of experts from universities, state and federal agencies, and non-profit organizations were invited to review the biological program on the refuge. The team conducted a critical examination of all aspects of the refuge's biological program. Members of the Review Team then produced a report that summarized recommendations to be used in the development of the draft plan and environmental assessment.

The Public Use Review was conducted in May 2004. The team was comprised of D'Arbonne Refuge and neighboring refuge staff, and Regional Office visitor services and outreach staff. The team reviewed the existing public use programs and facilities, as well as opportunities available. Emphasis was placed on the priority six wildlife-dependent public uses. The team prepared a Public Use Review Report that provided recommendations for the short- and long-term of D'Arbonne Refuge's public use program. These recommendations were taken into consideration during the development of the draft plan and environmental assessment.

Public scoping was initiated for D'Arbonne Refuge in March 2004, when the notice of intent to prepare a draft plan and environmental assessment was published in the Federal Register. The notice provided three public involvement questions to the public and requested comments about the future management of the refuge. Scoping continued with an open house to discuss management of the refuge. The open house was held June 8, 2004, from 3-7 p.m., at the Rocky Branch Elementary School. Information concerning the meeting appeared in the local papers, was announced on radio stations, appeared on flyers placed in local businesses, as well as on the school's billboard. Unfortunately, turn-out was extremely low (one visitor) and no comments were received.

DRAFT PLAN COMMENTS AND SERVICE RESPONSE

A part of the planning process was to solicit comments on a fully developed draft comprehensive conservation plan and environmental assessment. The public review and comment period for the Draft Comprehensive Conservation Plan and Environmental Assessment for D'Arbonne National Wildlife Refuge opened on April 11, 2006, and closed on May 11, 2006, as published in the Federal Register. Media releases and mailings invited anyone so desiring to submit written comments on the draft document to the Service. An open house was held on Tuesday, May 2, 2006, at the Headquarters Office to answer questions regarding the documents. No one attended the open house. Written comments were submitted by one member of the general public and two organizations. No comments were submitted by other federal agencies. The Defenders of Wildlife and Animal Protection Institute were the identified organizations that submitted comments. Each comment received, either in full text or summarized, is included in this appendix.

Under NEPA, the Service must respond to substantive comments. For purposes of this plan, a substantive comment is one that was submitted during the public review and comment period, which is within the scope of the proposed action (and the other alternatives outlined in the environmental

assessment), is specific to the proposed action, has a direct relationship to the proposed action, and includes reasons for the Service to give it consideration. (For example, a substantive comment might be that the document referenced 500 individuals of a particular species, but that current research found 600. In such a case, the Service would likely update the plan to reflect the 600, citing the current research. While a comment that would not be considered substantive would be: "We love the refuge.")

Fish, Wildlife, and Plant Populations

Comment – No survey work to support small game hunting and impacts not evaluated

Two organizations had concerns regarding the effect of small game hunting since the draft plan stated that no survey work had been conducted on the refuge. The organizations also felt that the information necessary to make a compatibility determination was lacking.

Service Response

Hunting is one of the six priority public uses identified in the 1997 Refuge Improvement Act, and hunting has been found to be compatible with the purpose for which D'Arbonne Refuge was established. Although no studies have been conducted on small game within the refuge, studies have been conducted within and outside of Louisiana to determine the effect of hunting on the population dynamics of small game. Results have consistently shown that small game, such as rabbits and squirrels, are not affected by hunting, but rather are limited by food resources. 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 they exist today.

Comment – Turkey, quail, and woodcock hunting

One organization did not agree with the draft plan stating that even though there were not enough turkey, quail, and woodcock to justify a hunt, the Service still proposed to offer hunting programs of these species anyway.

Service Response

Turkey hunting is not currently offered on the refuge because very few acres of turkey habitat are available on the refuge and therefore would only support a lottery hunt. In the proposed alternative, a youth lottery turkey hunt is proposed. Another refuge within the Complex that has very similar habitat issues offers a youth lottery turkey hunt. In 2006, 10 youth were drawn to hunt, and three turkeys were harvested. The refuge believes the turkey population on D'Arbonne Refuge can be maintained with such a low harvest rate.

Woodcock and quail are available for hunting but refuge data indicate that very few people hunt woodcock and quail on the refuge, nor do they have much success. The Service believes the quail and woodcock population on the refuge can be maintained with such low harvest rates. The refuge does not support a large population due to a lack of upland habitat. Surrounding areas provide sufficient habitat for these birds, which spend portions of their time on the refuge. Although woodcock and quail are not plentiful on the refuge, this is not due to hunting; rather there is not much habitat available due to frequent flooding.

Comment – Trapping program

One organization notes there was not a compatibility determination included for trapping on the refuge. It felt that there was a lack of data on trapped species and no description of impacts of current and future trapping programs on target and non-target wildlife. The comment included that the trapping plan was outdated from 1999, and not scheduled for revision until 2009. The organization felt it was premature to issue a final comprehensive conservation plan prior to a

thorough assessment of the refuge's trapping program. It wanted to see an amended version and have it re-circulate for public comment or suspend the current trapping program until fully analyzed. The organization requested it be publicly reviewed and brought into compliance with refuge policies, regulations, and statutes. In addition, it requested the Service to provide the following information:

1. Current and historic (last 20 years) population status of species targeted in refuge trapping and or lethal control programs;
2. Number of target and on-target animals trapped each year under the current trapping program(s) and projected data on number of animals trapped under any proposed action;
3. Impacts of species-specific "overpopulations" on ecosystem and/or other species;
4. Description, and degree of damage to facilities/habitat as a result of perceived "overpopulations" of targeted species, if any, and effects of trapping or lethal control in past years on perceived damage and on targeted species populations; and
5. Wounding and retrieval rates of hunting on the refuge.

They also asked the Service to discuss and evaluate the following:

1. The population demography of the species in question;
2. Have any alternative methods of habitat protection/facilities management been explored?
3. What efforts have been taken to reduce trap-related injuries to captured animals?
4. What are the real and potential impacts of trapping and lethal control to non-target species, including threatened and endangered species?
5. What efforts are taken to ensure that non-target species will not be injured or killed by the current control programs?
6. Feasibility of implementing non-lethal water-level control devices for controlling beaver damage, including, but not limited to, Beaver Deceiver devices, Clemson levelers, Beaver Baffles, diversion dams, pipe systems; and
7. Feasibility of implementing other non-lethal beaver control methods including, but not limited to, different types of fencing (including wire mesh and electrical systems), tree wrapping, and textural and taste repellents.

Service Response

A trapping compatibility determination had been completed but left out of the draft plan, and that will be rectified as it is included in the appendix of the final plan. A trapping plan was also completed in 1999 for the North Louisiana National Wildlife Refuge Complex, which includes D'Arbonne Refuge. Under the current trapping plan, permits are issued to trappers for \$10 fee. Trapping can only occur during the two-month state season. The number of permits issued for the last ten years has averaged less than one a year (2006=3, 2002, 1999, 1998, and 1996=1 each). Although very few people trap on the refuge currently, any trapping of raccoons (the most trapped species) and opossums, is helpful in controlling these species' populations. The extirpation of natural predators in Louisiana, such as wolves and cougars, has led to overpopulation of some species. Raccoons and opossums depredate bird, mammal, and reptile nests at much higher rates than occurred historically, directly causing population threats to some species, such as alligator snapping turtles and neotropical migratory songbirds.

Trappers are required to report the species (e.g., target and non-target) they capture. When trapping was a more popular use in the late 1980s and early 1990s, as many as 12 permits were issued annually. In 1990, nine trappers were issued permits, and 100 percent of captured animals were target species. Of these, 73 percent were raccoons, 12 percent were opossums, 11 percent mink, 3 percent nutria, and 1 percent beaver. Less than 3 percent of all species captured on the refuges by trappers were non-target species over the span of the refuge trapping program. No instance of threatened or endangered species being trapped has occurred on the refuge.

In 1996, the International Association of Fish and Wildlife Agencies began a program to develop Best Management Practices (BMPs) for trapping wildlife in the United States. BMPs improve an activity by developing recommendations based on sound scientific information while maintaining practicability.

Once completed, the BMPs for trapping furbearers will be provided to federal/state agencies and trappers for incorporation into trapper education and wildlife management programs. In addition to improving wildlife management in the United States, the research and resulting BMPs may be used by other countries to improve their programs. BMPs will also be used by the United States to address international commitments to identify and promote the use of humane traps and trapping methods for capturing wildlife. These BMPs will be incorporated into the refuge's trapping program.

Comment – Lethal control of beaver

Beaver control for overpopulation fails to describe how conflicts arising from alleged “overpopulation” of beaver are mitigated. The organization suspected that lethal control played a major role in current management practices. It was not understood why the draft plan and environmental assessment provided no description, evaluation, analysis, or rationale for this trapping program and other measures taken to mitigate wildlife conflicts on the refuge. It felt that killing wildlife as a means to resolve human/wildlife conflicts is ineffective in the long run and wanted to know why this was not adequately addressed in the draft plan. It felt that other non-lethal wildlife management tools were available, such as water-level control devices to prevent flooding, and serve as a humane substitute for trapping and killing beavers.

Service Response

On D'Arbonne Refuge, beavers cause an unacceptable degree of damage to the bottomland hardwood forest. On a landscape scale, considering the historical forest as greatly diminished in size, the percent of remaining forest impacted by beavers is much greater than would have occurred naturally in an undisturbed setting. Although some beaver-driven habitat is desirable, the current level is disproportionate for a diverse, healthy forest.

Beaver damage on D'Arbonne Refuge is mitigated by (1) removing dams manually, with explosives, and/or heavy equipment; (2) installing excluder devices on water control structures; and (3) shooting/trapping by Service employees. Most of the refuge is a bottomland hardwood forest that experiences dramatic, deep, seasonal inundations. The degree of flooding precludes the effective use of devices such as Clemson levelers, Beaver Bafflers, diversion dams, etc. The extent of beaver damage is too vast and widespread for techniques, such as fencing, tree wrapping, and repellents, to be cost effective when considering the amount of required labor and materials. Lethal control is site-specific and intended to remove those individuals causing the most serious problems. Within the scope of all beaver control efforts on D'Arbonne Refuge, lethal control is the least used. On average, less than 12 beavers are removed from the refuge yearly.

Habitats

Comment – prescribed fire

One individual responded in writing against any type of prescribed fire program on the refuge because of concerns over release of mercury and fine particulate matter into the air.

Service Response

Under the Service's biological integrity policy (601 FW 3), refuges are charged with maintaining and restoring biological integrity, diversity, and environmental health. And, under fire policies (621 FW 1, 621 FW 3), refuges are to employ prescribed fire whenever it is an appropriate tool for managing resources. Prescribed burning for fuel reduction is considered a Categorical Exclusion, which is a category of actions that does not individually or cumulatively have a significant effect on the human environment and has been found to have no such effect in procedure adopted by a federal agency pursuant to National Environmental Policy Act (40 CFR 1508.4). Furthermore, Department of the Interior policy, 516 Departmental Manual, Appendix 2, 1.12 states that hazardous fuel reduction activities are exempt from an environmental impact statement.

Prescribed burning on D'Arbonne Refuge is conducted to reduce hazardous fuels and to maintain habitat preferred by the endangered red-cockaded woodpecker, which is required in the Endangered Species Act of 1975. This open, pine habitat was present prior to early settlement of the area. Not only does prescribed burning increase biological integrity by restoring the historical ecosystem, it also removes heavy fuels, reducing the risk of catastrophic wildfires. The refuge conducts prescribed burns according to prescriptions that have been pre-approved by fire management officers and wildlife biologists in the Service's Regional Office. One of the specific aspects of the burn plan is smoke management. A set of stringent guidelines, specifying wind speed and direction, vertical mixing, and smoke dispersal, must be met to initiate the burn. The safety of the public is always first priority.

Comment – grassland/moist-soil management

The draft plan and environmental assessment states that the loss of bottomland hardwood forest is the biggest ecological threat and problem facing the refuge ecosystem, along with invasive species and contaminants. The draft plan states, "the entire 25 million-acre Lower Mississippi Valley was once a floodplain forest of primarily oak-gum-cypress cover types with overcup, willow, Nuttall, water, swamp chestnut and cherrybark oaks, as well as sweetgum, water tupelo, water hickory, willow, cottonwood, sycamore, sugarberry, red maple, box elder, baldcypress, and green ash. Only about 23 percent remains in forest with the rest primarily lost to cropland conversion and hydrological changes associated with flood control." The draft plan also states that large blocks of bottomland hardwood forests are rare, and the refuge provides one such large block. [We] recommend restoring the grassland and moist-soil management units of the refuge to bottomland hardwood forests to reduce fragmentation on the refuge and contribute to the restoration of this important ecosystem. Doing so would provide the following benefits, as outlined in the draft plan:

- Increase in bottomland hardwood forest would increase foraging habitat for wood ducks.
- Restoration would provide for a small increase in core acreage of bottomland hardwood forest that may foster an increase in foraging and nesting habitat and nesting productivity for forest songbirds and wood ducks.
- Deer foraging and cover habitat would be increased with increase in bottomland hardwood acreage.
- Increase in bottomland hardwoods would provide more cover for larval fish.
- With forest restoration the levee and pumping would not be maintained and refuge costs would be decreased.

Service Response

Two natural wetland habitats that ducks used historically in the Mississippi Delta are bottomland hardwood forests and moist-soil habitats (i.e., early successional grass-sedge and other herbaceous vegetated wetlands). These natural wetlands are critical foraging and resting habitats. Both bottomland hardwoods and moist-soil habitats are rich in high-energy natural seeds (e.g., acorns in

oak bottomlands; grass-sedge seeds, roots, and tuberts in moist-soil areas) and aquatic invertebrates. Indeed, wintering waterfowl satisfied their nutritional and other physiological needs in these wetlands before large-scale conversion of the Lower Mississippi Valley to agriculture.

Working under the direction of the North American Waterfowl Management Plan, the Lower Mississippi Valley Joint Venture (LMVJV) strives to provide habitat for over-wintering waterfowl in the Mississippi Alluvial Valley and West Gulf Coastal Plain Bird Conservation Region. As such, the LMVJV established habitat objectives that link continental waterfowl populations to on-the-ground habitat objectives through a planning “step-down process.” In this modeling exercise, the LMVJV assumes that the availability of foraging habitat is the most important factor affecting the number of dabbling ducks that can be accommodated during winter. Looking at private and public land in the state, the LMVJV produces an acreage figure for each national wildlife refuge to target for contributing to some portion of the foraging requirements of wintering waterfowl in the Lower Mississippi Valley. This process resulted in D’Arbonne Refuge being assigned the production of 563 acres of moist-soil acreage to contribute to the West Gulf Coastal Plain waterfowl objectives.

As outlined in this final plan, the refuge will contribute to this joint effort by trying to provide the 563 acres of moist-soil habitat in the open field. However, the refuge recognized the concerns of bottomland hardwood restoration and reducing fragmentation. Therefore, the final plan consists of objectives that will monitor the effect of maintaining the open field in moist-soil management for waterfowl. The plan also allows for maintaining the moist-soil area but at the same time evaluates the response of waterfowl, while conducting a study to determine if the open field is negatively affecting songbird nest survival from fragmentation effects.

Through monitoring and adaptive management, the plan provides for D’Arbonne Refuge to maintain a moist-soil management acreage target, or restore bottomland hardwood forest based on current information and the priority needs of migratory birds. The pertinent objectives and their strategies are referenced below:

Bottomland Hardwood Objective 9:

Five years after plan approval, re-evaluate water levels and animal/plant responses to water manipulations and fluctuations in the agricultural field to determine whether to maintain the area in moist-soil habitat or let the area regenerate into bottomland hardwood forest.

Strategies:

- Evaluate animal and plant response to water level management relative to costs and benefits of moist-soil management.
- Evaluate whether the acres reforested would provide enough forest core to enhance area-sensitive species nesting requirements and protection from cowbird parasitism.
- Hire biologist to assist with data monitoring and evaluation.

Migratory Bird Objective 6:

Determine nesting success of priority neotropical migratory songbirds and use production data as a baseline for comparison in future years as surrounding land cover changes.

Comment – climate change

We believe the draft plan can be strengthened by including strategies to address both current and future impacts of climate change on the refuge’s wildlife and habitat. Climate change has the potential to disrupt the delicate balance of entire ecosystems and threaten the biological integrity of the refuge. By not addressing climate change in the draft plan, we believe the Fish and Wildlife Service will not be able to adequately manage and protect the refuge, and therefore fulfill the refuge’s

specific legislative purpose, “conservation, maintenance, and management of wildlife resources thereof, and its habitat thereon,” (16 U.S.C. 664 Fish and Wildlife Coordination Act).

Service Response

The scientific community has reached a consensus that climate change in the form of global warming is a reality. This warming is largely the result of emissions of carbon dioxide and other greenhouse gases from human activities. Though potentially dramatic, the effects of climate change on plants and animals are difficult to measure. There are currently no known impacts of climate change on D’Arbonne Refuge’s wildlife or their habitat. Existing monitoring schemes (e.g., breeding bird surveys, herp surveys, waterfowl counts, browse surveys, and forest inventories) should reveal trends that can be evaluated for cause and effect. The present state of science is such that, other than being aware of potential warming impacts, the development of strategies for hypothetical situations is not feasible.

Education and Visitor Services

Comment – no hunting

One individual responded in writing against any type of hunting program on the refuge.

Service Response

Hunting is one of the six priority public uses identified in the 1997 Refuge Improvement Act, and hunting has been found to be compatible with the purpose for which D’Arbonne Refuge was established. Hunting of white-tailed deer is necessary to keep deer from becoming overpopulated, which leads to disease, starvation, an increase in lime disease infections in humans, and increased vehicle/deer collisions. Studies have shown that hunting of small game, such as rabbits and squirrels, does not affect populations of these animals due to their high reproductive rate. Overpopulated raccoons depredate bird, mammal, and reptile nests at much higher rates than occurred historically, directly causing population threats to some species, such as alligator snapping turtles and neotropical migratory songbirds. Beavers, when overpopulated, kill tens of thousands of acres of critical bottomland hardwood forest.

Thirteen million Americans hunted in 2001 across the country, spending 20 billion dollars. Each year nearly 200 million dollars from federal excise taxes on hunting equipment are distributed to state conservation agencies to support wildlife management programs and purchase lands for wildlife conservation, which directly benefit both game and non-game wildlife. Over five million acres have been purchased for the National Wildlife Refuge System using Federal Duck Stamp proceeds.

Comment – All-terrain vehicles

One individual responded in writing against allowing the use of all-terrain vehicles on the refuge.

Service Response

All-terrain vehicles are not allowed on the refuge currently and are not allowed in the final plan.

Comment – evaluation of hunting impacts

One organization suggested that the draft plan did not provide adequate compatibility determinations for hunting activities, nor evaluate impacts to a great enough detail with existing information. Along with this, it felt that the Service relied too heavily on state wildlife agency season limits that had not been independently and rigorously evaluated by the Service. Subsequently, the organization requested the Service to systematically research all factors associated with hunting effects before completing a compatibility determination. The organization also wanted to see the effects of hunting with dogs addressed in the compatibility determination. These comments were then suggested as reasons for not allowing adequate evaluation and that the Service must fully analyze its proposed

alternative in a revised draft plan and environmental assessment and re-circulate an amended version of these documents for public comment.

Service Response

The Service did provide in the draft plan and environmental assessment the compatibility determinations for all hunting programs: big game hunting, small game hunting, and migratory bird hunting. The life histories and population dynamics, including the impacts of hunting of those game species on D'Arbonne Refuge, have been studied extensively and are well-known. The fact that detailed research has not occurred on the relatively small area of D'Arbonne Refuge does not negate the broad applications of these studies. In almost all cases, the quality of habitat dictates the health and vigor of resident wildlife populations. Refuge habitats have been monitored and manipulated for the benefit of wildlife since the establishment of the refuge. The resulting healthier forests yield habitat with greater carrying capacities for game species. Based on the known parameters of the existing habitat, known population dynamics for each species, and site-specific anecdotal evidence gathered by professional biologists since 1975, hunting has been determined to have no significant impact on refuge wildlife populations.

In general, state game and fish agencies have primary responsibility for managing resident game species within the United States. Accordingly, most expertise, experience, and research relevant to resident game species lie within state game and fish agencies. The Louisiana Department of Wildlife and Fisheries manages resident game on all lands within the state, excluding national wildlife refuges, and has a long history of professional, sustainable management. Refuge personnel work closely with state biologists on an annual basis to ensure that hunting regulations are crafted to maintain healthy, sustainable wildlife populations on D'Arbonne Refuge.

Dogs are not permitted during white-tailed deer hunting but are allowed for squirrel, rabbit, waterfowl, and upland game bird hunting on the refuge. The commenter referred to the finding by Crab Orchard National Wildlife Refuge that foxhunting with unleashed dogs caused disturbance to wildlife. The commenter then states that "it seems reasonable that the hunting of waterfowl, quail, woodcock, squirrel and rabbit with dogs would have a similar impact on wildlife of D'Arbonne NWR...." The Service disagrees. Foxhunting is very different than other forms of hunting with dogs. During waterfowl and game bird hunts, generally one or two dogs are used for flushing, point and/or retrieving birds in a much more controlled situation. Hunting with squirrel and rabbit dogs usually impact much smaller areas for shorter periods of time than with foxhounds.

Comment – other wildlife-dependent recreational uses

The draft plan and environmental assessment states that the fishing and wildlife observation programs of the proposed alternative would have an adverse impact on waterfowl populations on the refuge:

- Fishing can also influence distribution, abundance, and productivity of waterbirds. However, on Bayou D'Arbonne there are currently no waterbird colonies or rookeries that could be affected by fishing. The open field section of the refuge could potentially affect wintering and migratory waterfowl. Many studies have recommended designating confined fishing areas to reduce disturbance or temporal restriction of fishing during critical waterfowl wintering and breeding periods (Johnson 1964; Braun et al., 1978). Many southern refuges prohibit fishing during the winter to provide sanctuary for wintering waterfowl (Braun et al., 1978). In Alternative B, fishing may have less of an impact or disturbance to wintering waterfowl with the closure of the open field.

-
- Public use visits for wildlife observation and photography are currently very low on the refuge. This may be a use that increases in the future if additional opportunities are provided. Alternative C provides the current opportunities of the observation tower and one designated foot path that is open all year. Alternative A improves on the current opportunities if funding is acquired and the mowed foot path is enhanced into an interpretive nature trail and additional opportunities for a viewing area are evaluated. Again, these would be open all year. Alternative B would take the current opportunities and reduce the access during the winter and late spring to reduce disturbance to wintering waterfowl and nesting migratory birds. (Draft CCP/EA, emphasis added).

How has the Fish and Wildlife Service determined the fishing and wildlife observation programs compatible in Alternative A, the proposed alternative, if there are other reasonable alternatives that have less impact on wintering waterfowl and nesting migratory birds? We recommend the Fish and Wildlife Service reevaluate the compatibility determinations in the draft plan and environmental assessment and adopt the public use programs described in Alternative B.

Service Response

Although Alternative B may have less of an impact or disturbance to wintering waterfowl and nesting migratory birds, no evidence on D'Arbonne Refuge supports this. Very few people visit the refuge by foot during the songbird breeding season. Refuge personnel traverse the refuge during breeding season by foot much more often than all visitors combined.

Although fishing is allowed in the open field section, refuge personnel have surveyed waterfowl weekly in the open field for the past 15 years, and no impact to waterfowl has been recorded. Waterfowl use in the open field is highest when water levels are low to facilitate foraging of moist-soil plants, and when water is at this level, it is impractical for motorboats to be operated.

Land Protection and Conservation

Comment – natural gas management

This issue of natural gas development on the refuge is peppered throughout the draft plan and environmental assessment with no coherent strategy for dealing with this resource issue, which is likely one of the most important on the refuge. D'Arbonne Refuge has one of the highest numbers of gas wells of any national wildlife refuge. The draft plan generally describes the extent of the problem under the contaminants section under "Refuge Overview" and lists habitat/wildlife disturbance, improperly covered mud pits, abandoned/poorly maintained wells and facilities, mercury contamination, and saltwater contamination of soil and water as concerns associated with natural gas development on the refuge. Yet no where in the draft plan and environmental assessment are these concerns comprehensively addressed as part of Service management of the refuge over the life of the plan. The Service planning policy specifically states that the plan must identify and describe: significant problems that may adversely affect the ecological integrity or wilderness characteristics and the actions necessary to correct or mitigate the problems; and significant problems that may adversely affect the populations and habitats of fish, wildlife, and plants (including candidate, threatened, and endangered species) and the actions necessary to correct or mitigate the problems. The draft plan and environmental assessment fails to describe the actions necessary to correct or mitigate the problems associated with natural gas development on the refuge. The only action proposed is to "conduct regular surveillance of gas production facilities within the refuge and report all suspected problems to the responsible company and state regulatory agency."

We believe the plan can be strengthened in the following ways:

- Quantify the impacts of oil and gas activities on the refuge, including number of acres covered by oil and gas infrastructure (e.g., well pads, pipelines, processing and other facilities, rights-of-way, and roads), and the number and size of oil, brine, and other spills since the refuge was established.
- Include strategies to monitor impacts of drilling operations on wildlife species and to monitor drilling facilities to ensure that operators are in compliance with refuge rules and regulations to help protect fish and wildlife and their habitats. The Service should work closely with the Louisiana Department of Natural Resources to ensure refuge wildlife and habitat concerns are incorporated into permits issued for exploration and development activities on the refuge, and to develop stronger standards for gas management and permitting. We believe the Service, under the laws and regulations governing the Refuge System, can develop stronger gas management standards that are consistent with allowing private companies access to their mineral rights.

Stronger gas management standards should include:

- Requiring gas operators to submit a plan of operations and written notification before being allowed access to the refuge. Included within this plan should be a plan for reclamation to the natural vegetative communities found on the specific site.
- Requiring operators and mineral owners to notify the Service when interests of subsurface minerals have been transferred.
- Prohibiting the use of refuge water for oil and gas operations.
- Prohibiting surface operations within 500 feet of the banks of perennial, intermittent, or ephemeral watercourses, or within 500 feet of the high pool line of any lake. Development within Wolf Brake should be prohibited to prevent water contamination by toxic drilling waste.
- Requiring a performance bond in an amount adequate to ensure proper reclamation upon cessation of operations.
- Requiring operators to pay for independent biological monitoring and operation compliance of drilling activities.

The above provisions are consistent with refuge laws and regulations and provide practical limits to gas operations to protect refuge resources without resulting in a “taking” of private property rights. Other national wildlife refuges with oil and gas operations have successfully implemented many of these provisions.

In addition to the above recommended improvements on the regulation of natural gas development on the refuge, the draft plan and environmental assessment should include details of how natural gas development impacts red-cockaded woodpeckers and red-cockaded woodpecker management, including the use of prescribed fire. The nesting locations for red-cockaded woodpeckers on the refuge directly coincide with the natural gas field (Draft CCP/EA Figure 5 and Draft CCP/EA Figure 10), yet no mention of the interaction between the natural gas infrastructure and red-cockaded woodpeckers and their management is made in the draft plan and environmental assessment.

Service Response

In the past, natural gas development posed a serious threat to fish, wildlife, and their habitats on D’Arbonne Refuge. The five main problems listed in the draft plan, and this plan as well, are primarily a result of lack of state regulation to govern the activities, a federal court decision that prohibited most

Service regulation, and irresponsible operators. It is important to note that the climate of this issue has changed dramatically in recent years.

The following factors were involved:

- No new wells have been drilled on the refuge in 20 years (since 1986).
- Many of the problems were associated with wells owned by one operator. These wells have been sold to a very cooperative operator.
- The Louisiana Office of Conservation has promulgated and enforces many new laws to regulate the industry.
- The Monroe Gas Field has been depleted to the point that most refuge wells have no head pressure, greatly reducing the potential for brine spills. (Wells are produced under low-pressure vacuums.)
- The refuge habitat is recovering from past gas development. Fragmentation is reduced. For example, the footprint of a 2-acre drilling site has been reduced to a 1/8-acre production area in many cases.
- Operator maintenance of producing wells has significantly improved.
- Mercury contamination associated with gas wells has stopped as a result of newer technology, which does not use mercury in metering devices. All known spill sites on the refuge have been cleaned up and remediated.
- The Louisiana Office of Conservation has implemented a plan to properly plug and abandon “orphan” wells. The plan includes refuge wells.
- As there has been no new gas development on the refuge since 1986, there are no current impacts on red-cockaded woodpeckers or their management.
- The general attitude of the gas industry to work cooperatively and responsibly with the refuge has greatly improved in the last 10 years.

Accordingly, natural gas activities are not presently considered “significant problems” on D’Arbonne Refuge, as referenced in Fish and Wildlife Service planning policy. The proposed action to “conduct regular surveillance of gas production facilities within the refuge and report all suspected problems to the responsible company and state regulatory agency” has been in effect for several years and is working effectively. However, we have added one more objective and strategies that address your concerns for monitoring more effectively.

Refuge Administration Objective 7 – Contaminants:

If drilling/exploration recur on the refuge, the refuge will develop a plan to monitor and mitigate impacts on wildlife species and to ensure operators are in compliance with refuge rules and regulations (to the extent possible within the confines of the Caire vs. Fulton findings).

Strategies:

- Evaluate opportunities to collaborate with operators to fund or support independent biological monitoring and operational compliance of drilling activities.
- Work closely with the Louisiana Department of Natural Resources to incorporate refuge wildlife and habitat concerns into permits issued for exploration and development activities on the refuge.
- Develop standards or guidelines (i.e., best management practices suggested) for gas management on Refuge System lands within Fish and Wildlife Service policy (612 FW 2), Louisiana state law, and Caire vs. Fulton 1986.

It is important to note that one precedent-setting legal decision drives management of mineral activities on D’Arbonne Refuge. The 1986 federal case of Caire vs. Fulton resulted in the opinion that when

mineral rights are not owned by the Federal Government on D'Arbonne Refuge, the Fish and Wildlife Service **cannot** require gas companies to abide by a special use permit and **cannot** enforce protective conditions under Title 50 of the Code of Federal Regulations (Section 29.32). Therefore, implementing the "gas management standards," as suggested, is not legally possible on D'Arbonne Refuge.

Refuge Administration

Comment – Fiscal irresponsibility

One organization suggested the proposal to expend limited resources to maintain existing hunting programs or establish new programs was fiscally irresponsible in light of overwhelming public opposition to the allowance of consumptive use activities on national wildlife refuges. It thought none of these programs generated any revenues to offset these costs of \$55,000 per year stated in the compatibility determination to provide the hunting programs, and, therefore, felt that it was difficult for the refuge to expend limited funds and personnel (Alternative A proposing 5.5 positions) to perform the administrative, maintenance, and law enforcement functions required to monitor and manage hunting activities given the many other important needs. Therefore, it felt Alternative B offered a more fiscally reasonable approach by minimizing management and public use, while still maintaining the integrity of the refuge and requiring only four additional positions

Service Response

Hunting is one of the six priority public uses identified in the 1997 Refuge Improvement Act, and hunting has been found to be compatible with the purpose for which D'Arbonne Refuge was established. Thirteen million Americans hunted in 2001 across the country spending 20 billion dollars. Each year, nearly 200 million dollars from federal excise taxes on hunting equipment are distributed to state conservation agencies to support wildlife management programs and purchase lands for wildlife conservation, which directly benefit both game and non-game wildlife. Partnerships exist between the Fish and Wildlife Service and the Louisiana Department of Wildlife and Fisheries for coordination and collaboration for law enforcement regarding hunting activities on D'Arbonne Refuge. Over five million acres have been purchased for the National Wildlife Refuge System using Federal Duck Stamp proceeds, suggesting a much higher acceptance of hunting on national wildlife refuges than comment stated.

Appendix V. Decisions and Approvals

INTRA-SERVICE SECTION 7 BIOLOGICAL EVALUATION FORM

Originating Person: Gypsy Gooding,
Phone: 318-726-4222,
Email: gypsy_gooding@fws.gov
Date: July 11, 2005

PROJECT NAME: D'Arbonne National Wildlife Refuge
Comprehensive Conservation Plan

- I. Region: 4
- II. Service Activity (Program): Refuges
- III. Station Name: D'Arbonne National Wildlife Refuge
- IV. Description of Proposed Action: Implement the Comprehensive Conservation Plan for D'Arbonne National Wildlife Refuge by adopting the proposed alternative. This plan directs the management of the refuge for the next 15 years.
- V. Pertinent Species and Habitat:
 - A. Listed species and/or their critical habitat within the action area: Four active groups of federally endangered red-cockaded woodpeckers (*Picoides borealis*) on the eastern side of D'Arbonne Refuge in upland pine habitat.

Bald eagles (*Haliaeetus leucocephalus*) utilize the refuge mostly during the winter months for foraging. Usually only one or two are seen annually in the open field, moist soils unit, and along the bayou. One active nest is known to occur along Choudrant Ditch.
 - B. Proposed species and/or proposed critical habitat within the action area: None
 - C. Candidate species within the action area: None
 - D. One thousand, two hundred (1,200) acres of upland loblolly pine/hardwood habitat exists on the eastern side of the refuge and an additional 700 acres of this habitat is on the western side of the refuge. These habitats are separated by bottomland hardwood forest and ultimately Bayou D'Arbonne. Red-cockaded woodpecker (RCW) clusters have only been documented on the eastern portion of the refuge. Five clusters exist, of which only four are active. The refuge can only support five groups of woodpeckers according to habitat guidelines outlined in the RCW Recovery Plan due to limited pine habitat surrounded by bottomland hardwood forest and private lands.

Current and past management has focused on the removal of hardwood trees in the red-cockaded woodpecker foraging and nesting habitat. Techniques used include

mechanical removal, growing and winter season burns, and chemical injections. The current understory is herbaceous in some areas and woody in others.

The entire refuge is potential foraging and/or nesting habitat for the bald eagle. Even pine lands adjacent to bottomland hardwood forests can be used for nesting.

VI. Location (attach map):

- A. Ecoregion Number and Name: Lower Mississippi River Ecosystem
- B. County and State: Union and Ouachita Parishes, Louisiana
- C. Section, township, and range: Woodpecker clusters are located in Sections 7 and 20 in T19N, R03E. Habitat also includes Sections 13, 17, 18, 21 in T19N, R03E. Although the 700 acres on the west side of the refuge has never supported or had documented any use by red-cockaded woodpeckers, it is pine habitat and theoretically could become inhabited. This area is located in T19N, R02E in sections 3, 10, 37, 26, 23, 22, and 35.

Eagle nest coordinates are 573093.61, 3606073.47 UTM
- D. Distance (miles) and direction to nearest town: ~2 miles south of Rocky Branch, Louisiana

VII. Description of proposed action:

Current management consists of maintaining pine basal area within RCW foraging partitions to at least 40 square feet/acre of mature pine, i.e. > 30 years of age within foraging habitat and >60 years of age in nesting habitat. Within RCW foraging partitions, canopy hardwoods represent less than 30 percent of the overstory stem count, and grass and herbaceous plants represents at least 40 percent of the ground cover. Controlled burning is currently conducted for the benefit of red-cockaded woodpeckers during March-May with a 100 percent burn coverage objective.

The D'Arbonne National Wildlife Refuge is proposing to restore the 1,200 acres of RCW habitat on the eastern side of refuge to its historical condition, characterized by native grasses and herbs representing at least 40 percent of the ground cover and dense enough to carry growing season fires at least once every five years, canopy hardwoods within RCW foraging partitions representing less than 30 percent of the total stem count in the overstory, contiguous foraging habitat for each cluster so that foraging habitat is not separated by more than 200 feet of non-foraging habitat, and the usage of fire and timber thinning to promote an open park-like forest with no hardwood midstory within the foraging partitions. The historical conditions would have been a pine dominated landscape with a mix of hardwood species in the wetter, lower areas and a herbaceous understory. The amount of hardwood basal area in the historical landscape would have been 20-30 percent depending on how often the stand burned. Fire frequency would have been dictated by how wet an area was which is largely a factor of elevation.

The proposed action would change the majority of burning to September and October, which is when the peak number of wildfires occurred historically. The red-cockaded woodpecker habitat would be burned as close to historical frequency as possible and

would be conducted in a way that would mimic the historical fire regime. This entails allowing the fire to burn patchy. These uplands were dynamic in that wetter areas did not burn as often and hardwood trees would regenerate. Hardwood trees were interspersed amongst the pine but in a patchy distribution. The amount of hardwood in an area was dictated by fire frequency and intensity, which were largely influenced by elevation and soil types. Moving fire timing to the historical period of September/October would increase fire intensity due to drier seasonal conditions, and will over time manage against the percentage of hardwood in the landscape compared to spring burns. However, the variation in moisture will provide conditions that promote hardwoods in the drains and pines on the hills. This shift in fire timing will benefit the RCW if fires are allowed to burn naturally, which is entirely consistent with RCW management.

The proposed action would delineate the upland pine into four management units (see Mixed Pine and Hardwood Objectives 1-4 of the Draft CCP) based on elevation classes. The highest elevation areas would have burned the most frequently and therefore 10-25 percent of the trees would have consisted of hardwood trees whereas the lowest elevation areas would have had as much as 30 percent hardwood trees. All of these areas would be burned frequently and with enough intensity to promote an herbaceous understory.

The proposed action would rely on patchiness of burns to achieve the objectives. A 100 percent coverage burn will not allow hardwoods to regenerate. Hardwood trees would regenerate in small patches where the fire was not successful due to fuel being wet or not ignitable.

The proposed action for the bald eagle (see Species of Concern Objective 1) would be to continue monitoring bald eagle use on the refuge during the annual mid-winter eagle survey and to continue monitoring the one eagle nest on the refuge annually. The nest is monitored beginning in December continuing to July. The nests in northeast Louisiana usually fledge chicks in June or July. If the nest is active, then management will monitor for disturbance. If disturbance is likely, the guidelines for the Management for the Bald Eagle in the Southeast Region would be implemented.

VIII. Determination of effects

- A. Explanation of effects of the action on species and critical habitats in item V: According to habitat guidelines set forth in the RCW Recovery Plan, no hardwood mid-story is to exist above 2.1 m in height and canopy hardwoods are to be less than 30 percent of the number of canopy trees in loblolly forests.

A foraging analysis has been conducted and attached. As long as 120 acres of pine at least 40 sq. ft. in basal area is available in each ½-mile circle center on each nesting cluster, then no take occurs. The foraging analysis indicates that this minimum will be met.

Basically the proposed action would produce habitat that is very similar to the open, park-like pine stands with the herbaceous understory that red-cockaded woodpeckers prefer, but there would be patches of hardwood trees within the landscape, mostly at the toe of slopes or in wet, depressional areas.

The proposed action would have no adverse effects on bald eagles. The nest is located in a very inaccessible, seasonally flooded stand of baldcypress. No timber thinning would ever occur in this area. The timing of flooding is such

that during the nesting season most fishermen cannot get their boats in the shallow water surrounding the nest for hundreds of yards; therefore, disturbance is very unlikely.

- B. Explanation of actions to be implemented to reduce adverse effects: The woodpeckers are more sensitive to hardwoods being in the nesting cluster than in their foraging habitat. For this reason, red-cockaded woodpecker management in the proposed action (Species of Concern Objective 2) would exclude hardwood midstory and strictly limit hardwoods in the overstory within the 10-acre nesting cluster. In other words, hardwoods would not be promoted in the nesting cluster. Hardwoods would not constitute more than 30 percent in the foraging areas (Figure 12 in Draft CCP) and would be mostly confined to drains and depressional areas. Even though these drains may move in and out of the foraging areas in irregular patterns as they naturally will, this is not promoting hardwoods within the foraging area, because the foraging area is on the higher ground that will burn more frequently.

The proposed action of changing the burning regime would still kill many hardwood trees; however, the patchiness of the burns would allow small pockets of hardwoods to regenerate. The proposed fire regime will reduce the hardwood component; except for hardwood regeneration within the drains and depressions, which will not constitute more than 30 percent of overstory stems. Small pockets of hardwoods in wet, depressional areas would in all likelihood be avoided all together by the woodpeckers in favor of pine dominated habitat within the landscape.

Monitoring will continue of wintering and nesting bald eagles to ensure that refuge activities are not having an adverse effect on the eagle population.

IX. Effect determination and response requested:

- A. Listed species: Red-cockaded Woodpecker

<u>Determination</u>	<u>Response Requested</u>
No effect	<input type="checkbox"/> Concurrence
May affect, but is not likely to adversely affect species	<input checked="" type="checkbox"/> Concurrence
May affect, and is likely to adversely affect species	<input type="checkbox"/> Concurrence

- B. Listed species: Bald Eagle

<u>Determination</u>	<u>Response Requested</u>
No effect	<input type="checkbox"/> Concurrence

May affect, but is not likely to adversely
affect species

Concurrence

May affect, and is likely to adversely
affect species

Concurrence

Signed

Refuge Manager

1-18-06
Date

X. Reviewing ESO Evaluation:

A. Concurrence Nonconcurrency

B. Formal consultation required

C. Conference required

D. Informal conference required

E. Remarks:

Signed

Signature
(Title/office of reviewing official)

1/23/06
date

COMPATIBILITY DETERMINATIONS

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

Uses: Several uses were evaluated to determine their compatibility with the Refuge System and mission and purposes of the refuge: 1) wildlife observation and photography; 2) environmental education and interpretation; 3) big game hunting; 4) small game hunting; 5) migratory bird hunting; and 6) fishing.

Refuge Name: D'Arbonne National Wildlife Refuge

County: Ouachita Parish, Union Parish, Louisiana

Establishing and Acquisition Authority: Fish and Wildlife Coordination Act

Refuge Purpose(s): "... shall be administered by him [Secretary of the Interior] directly or in accordance with cooperative agreements ... and in accordance with such rules and regulations for the conservation, maintenance, and management of wildlife, resources thereof, and its habitat thereon, ..." 16 U.S.C. §664 (Fish and Wildlife Coordination Act).

National Wildlife Refuge System Mission: "The mission of the National Wildlife Refuge System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans" (National Wildlife Refuge System Administration Act of 1966, as amended) [16 U.S.C. §668dd-668ee].

Description of Use:

Wildlife Observation and Photography

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

Wildlife photography, including other image-capturing activities such as videography, has occurred on the refuge since its inception. There are no photography blinds but an observation tower is located on the west side of the refuge.

Wildlife observation and photography could occur anywhere on the refuge throughout the year. These activities can be accomplished while driving, boating, or walking on the refuge according to refuge regulations.

Availability of Resources:

Resources involved in the administration and management of the use:

Minor amounts of personnel time associated with administration, management, and law enforcement

Special equipment, facilities, or improvements necessary to support the use:

Observation tower, access roads, kiosks, and brochures

Maintenance costs: \$20,000/year

Monitoring costs: \$5,000/year

Offsetting revenues: None

Anticipated Impacts of the Use:

Short-term impacts:

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

Long-term impacts:

Current utilization of these uses is incidental to overall refuge programs and no long-term adverse impacts have been experienced.

Cumulative impacts:

No cumulative impacts are anticipated.

Public Review and Comment:

This compatibility determination was part of the Draft Comprehensive Conservation Plan and Environmental Assessment for D'Arbonne National Wildlife Refuge, which was announced in the Federal Register on April 11, 2006, and made available for public comment for 30 days. No comments were received relative to this compatibility determination.

Determination (check one below):

Use is Not Compatible

Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility:

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

Justification:

Visitors have the opportunity to view and photograph many species of wildlife with relative ease at many places on the refuge. Opportunities exist for these activities by boat, by walking, or by driving the public roads. During winter, thousands of waterfowl are easily seen from the observation tower.

Mandatory 15-Year Re-evaluation Date: August 1, 2021

Description of Use: Environmental Education and Interpretation

Environmental education and interpretation activities include traditional environmental education, such as teacher or staff-led on-site field trips, off-site programs in classrooms, and interpretation of wildlife resources on the refuge. These activities are largely conducted at Black Bayou Lake National Wildlife Refuge, another refuge in the Complex, and are utilized to encourage understanding in citizens of all ages to develop land ethics, foster public support, increase visibility, and improve the image of the Service. Sometimes, environmental education and interpretation activities occur on D'Arbonne Refuge.

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

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

Availability of Resources:

Resources involved in the administration and management of the use:

Minor amounts of personnel time

Special equipment, facilities, or improvements necessary to support the use:

Kiosks, observation tower, brochures, and environmental education materials

Maintenance costs: \$2,000/year

Monitoring costs: None

Offsetting revenues: None

Anticipated Impacts of the Use:*Short-term impacts:*

The use of on-site, hands-on, action-oriented activities by groups of teachers/students to accomplish environmental education objectives may impose a low-level impact on the sites used for these activities. Impacts may include trampling of vegetation and temporary disturbance to wildlife species in the immediate vicinity during the activities. Since most activities would take place on existing roads, trails, and other facilities, impacts would be minimal.

Long-term impacts:

Current utilization of these uses is incidental to overall refuge programs and no long-term adverse impacts have been experienced. Long-term beneficial impacts include the furthering of the refuge mission through the education of the general public.

Cumulative impacts:

No cumulative impacts are anticipated.

Public Review and Comment:

This compatibility determination was part of the Draft Comprehensive Conservation Plan and Environmental Assessment for D'Arbonne National Wildlife Refuge, which was announced in the Federal Register on April 11, 2006, and made available for public comment for 30 days. No comments were received relative to this compatibility determination.

Determination (check one below):

Use is Not Compatible

Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility:

On-site activities should be held where minimal impact would occur. Evaluations of sites and programs should be conducted periodically to assess if objectives are being met and to ensure that the natural resources are not being degraded. If evidence of unacceptable adverse impacts begins to appear, it may be necessary to change the location of the outdoor activities.

Justification:

Environmental education and interpretation are used to encourage understanding in citizens of all ages in order to act responsibly in protecting a healthy ecosystem. They are tools to use in building land ethic, developing public support, and decreasing wildlife violations. They constitute one method of increasing visibility in the community and improving the image of the Service.

Mandatory 15-Year Re-evaluation Date: August 1, 2021

Description of Use: Big Game Hunting

Big game hunting on D'Arbonne Refuge consists of white-tailed deer. Hunting activities are permitted with a valid refuge hunt permit and appropriate state licenses. The refuge hunt program is an excellent wildlife management and public relations tool, which provides quality recreational opportunities for the public while regulating specific animal populations at desired levels. The refuge hunt plan was developed to ensure that associated public recreation and wildlife management objectives are met in a responsible and consistent manner.

Hunting, a wildlife-dependent recreation, has been identified in the National Wildlife Refuge System Improvement Act of 1997 as a priority public use provided it is compatible with the purpose for which the refuge was established.

Hunting could occur anywhere on the refuge depending on the method of take. Archery hunting occurs on the entire refuge. Gun hunting occurs everywhere except a 2,250-acre waterfowl sanctuary. All hunting seasons are established annually through coordination with the Louisiana Department of Wildlife and Fisheries. Gun hunts are always conducted during the state's either sex weekends. Gun season on the refuge usually consists of 7-9 days. One antlerless and one antlered deer may be harvested each day of the season. All regulations and annual changes are published in the Code of Federal Regulations (50 CFR).

Hunters access the refuge on open roads, by boat, and by foot. No all-terrain vehicles are allowed on the refuge.

Public hunting opportunities are limited in north Louisiana. Hunting opportunities on private land are virtually non-existent unless a person is willing and able to purchase hunting rights through hunting leases.

Availability of Resources:

Resources involved in the administration and management of the use:

Personnel time associated with administration and law enforcement

Special equipment, facilities, or improvements necessary to support the use:

Access roads, gates, boat ramps, brochures, kiosks, and law enforcement equipment

Maintenance costs: \$15,000/year

Monitoring costs: \$5,000/year

Offsetting revenues: None

Anticipated Impacts of the Use:

Short-term impacts:

National wildlife refuges administered by the North Louisiana National Wildlife Refuge Complex have been open to hunting since 1975, with no documented disturbance to refuge habitats and no noticeable impact on the abundance of species hunted or other associated wildlife. While managed

hunting opportunities may result in localized disruption of individual animals' daily routines, no noticeable effect on populations has been documented.

Long-term impacts:

To date, there is no indication of adverse biological impacts associated with the Complex's hunting program. However, should it become necessary, the refuge has the latitude to adjust hunting seasons and bag limits annually, or to close the refuge entirely if there are safety issues or other concerns that merit closure. This latitude, coupled with monitoring of wildlife populations and habitat conditions by the Service and the Louisiana Department of Wildlife and Fisheries, will ensure that long-term negative impacts to either wildlife populations and/or habitats on the refuge are unlikely.

Should hunting pressure increase on the refuge, alternatives such as quota hunts, a reduction in the number of days of hunting, or restrictions on that part of the refuge open to hunting can be utilized to limit impacts.

Cumulative impacts:

The timing and duration of the refuge's hunting program does not coincide with most other uses of the refuge and would not result in cumulative impacts to refuge resources.

Public Review and Comment:

This compatibility determination was part of the Draft Comprehensive Conservation Plan and Environmental Assessment for D'Arbonne National Wildlife Refuge, which was announced in the Federal Register on April 11, 2006, and made available for public comment for 30 days. Only one comment was received and it was opposed to hunting. The Service response is that hunting is one of the six priority wildlife-dependent public uses identified in the National Wildlife Refuge System Improvement Act of 1997. The Service allows hunting as long as it is compatible with the mission of the Service, the National Wildlife Refuge System, and the purposes of the refuge.

Determination (check one below):

Use is Not Compatible

Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility:

Hunting seasons and bag limits are established annually as agreed upon during the annual hunt coordination meeting with state personnel. These generally fall within the state framework. The refuge can, and has, established more restrictive seasons and bag limits to prevent over-harvest of individual species or disturbance to trust species. All hunters are required to possess a refuge hunting permit while participating in refuge hunts. This permit, which augments the state hunting regulations, explains both the general hunt regulations and the refuge-specific regulations. Law enforcement patrols are frequently conducted throughout the hunting season to ensure compliance with refuge laws and regulations. The refuge has included a Refuge Operating Needs System project for a full-time officer to ensure compatibility over the long term.

Justification:

White-tailed deer hunting is necessary to keep deer populations at or below the habitat's carrying capacity. Deer herd health checks conducted on the refuge in 2003 indicated that the herd was at or just above carrying capacity; therefore, at least the same number of deer needs to be harvested if not more. Overpopulation of deer causes an increase in disease and starvation. Deer herds that are overpopulated will significantly alter habitats.

Mandatory 15-Year Re-evaluation Date: August 1, 2021

Description of Use: Small Game Hunting

Small game hunting consists of squirrels, rabbits, raccoons, opossum, and quail. Hunting activities are permitted with a valid refuge hunt permit and appropriate state licenses. The refuge hunt program is an excellent public relations tool, which provides quality recreational opportunities for the public while promoting national wildlife refuges. The refuge hunt plan was developed to ensure that associated public recreation and wildlife management objectives are met in a responsible and consistent manner.

Hunting, a wildlife-dependent recreation, has been identified in the National Wildlife Refuge System Improvement Act of 1997 as a priority public use provided it is compatible with the purpose for which the refuge was established.

Hunting occurs everywhere on the refuge except in a 2,250-acre waterfowl sanctuary. Small game hunting seasons on the refuge follow the state regulated seasons, which usually are from October through January. All hunting seasons are established annually through coordination with the Louisiana Department of Wildlife and Fisheries. All regulations and annual changes are published in the Code of Federal Regulations (50 CFR).

Hunters access the refuge on open roads, by boat, and by foot. No all-terrain vehicles are allowed on the refuge.

Public hunting opportunities are limited in north Louisiana. Hunting opportunities on private land are virtually non-existent unless a person is willing and able to purchase hunting rights through hunting leases.

Availability of Resources:

Resources involved in the administration and management of the use:

Personnel time associated with administration and law enforcement

Special equipment, facilities, or improvements necessary to support the use:

Access roads, gates, boat ramps, brochures, kiosks, and law enforcement equipment

Maintenance costs: \$10,000/year

Monitoring costs: \$5,000/year

Offsetting revenues: None

Anticipated Impacts of the Use:*Short-term impacts:*

National wildlife refuges administered by the North Louisiana National Wildlife Refuge Complex have been open to hunting since 1975, with no documented disturbance to refuge habitats and no noticeable impact on the abundance of species hunted or other associated wildlife. While managed hunting opportunities may result in localized disruption of individual animals' daily routines, no noticeable adverse effect on populations has been documented.

Long-term impacts:

To date, there is no indication of adverse biological impacts associated with the Complex's hunting program. However, should it become necessary, the refuge has the latitude to adjust hunting seasons and bag limits annually, or to close the refuge entirely if there are safety issues or other concerns that merit closure. This latitude, coupled with monitoring of wildlife populations and habitat conditions by the Service and the Louisiana Department of Wildlife and Fisheries, will ensure that long-term negative impacts to either wildlife populations and/or habitats on the refuge are unlikely.

Should hunting pressure increase on the refuge, alternatives such as quota hunts, a reduction in the number of days of hunting, or restrictions on that part of the refuge open to hunting can be utilized to limit impacts.

Cumulative impacts:

The timing and duration of the refuge's hunting program does not coincide with most other uses of the refuge and would not result in cumulative impacts to refuge resources.

Public Review and Comment:

This compatibility determination was part of the Draft Comprehensive Conservation Plan and Environmental Assessment for D'Arbonne National Wildlife Refuge, which was announced in the Federal Register on April 11, 2006, and made available for public comment for 30 days. Only one comment was received and it was opposed to hunting. The Service response is that hunting is one of the six priority wildlife-dependent public uses identified in the National Wildlife Refuge System Improvement Act of 1997. The Service allows hunting as long as it is compatible with the mission of the Service, the National Wildlife Refuge System, and the purposes of the refuge.

Determination (check one below):

Use is Not Compatible

Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility:

Hunting seasons and bag limits are established annually as agreed upon during the annual hunt coordination meeting with state personnel. These generally fall within the state framework. The refuge can, and has, established more restrictive seasons and bag limits to prevent over-harvest of individual species or disturbance to trust species. All hunters are required to possess a refuge hunting permit while participating in refuge hunts. This permit, which augments the state hunting

regulations, explains both the general hunt regulations and the refuge-specific regulations. Law enforcement patrols are frequently conducted throughout the hunting season to ensure compliance with refuge laws and regulations. The refuge has included a Refuge Operating Needs System project for a full-time officer to ensure compatibility over the long term.

Justification:

Regulated hunting does not have an adverse impact on populations of small game. Hunting is a priority public use and offers the public an inexpensive wildlife-dependent recreational opportunity.

Mandatory 15-Year Re-evaluation Date: August 1, 2021

Description of Use: Migratory Bird Hunting

Migratory bird hunting on D'Arbonne Refuge consists of ducks, gallinules, snipe, woodcock, coots, geese, and rails. Hunting activities are permitted with a valid refuge hunt permit and appropriate state licenses. The refuge hunt program is an excellent public relations tool, which provides quality recreational opportunities for the public while promoting national wildlife refuges. The refuge hunt plan was developed to ensure that associated public recreation and wildlife management objectives were being met in a responsible and consistent manner.

Hunting, a wildlife-dependent recreation, has been identified in the National Wildlife Refuge System Improvement Act of 1997 as a priority public use provided it is compatible with the purpose for which the refuge was established.

Hunting occurs everywhere on the refuge except in a 4,750-acre waterfowl sanctuary. Migratory bird hunting seasons on the refuge follow the state regulated seasons. All hunting seasons are established annually through coordination with the Louisiana Department of Wildlife and Fisheries. All regulations and annual changes are published in the Code of Federal Regulations (50 CFR). Waterfowl, though, can only be hunted until noon each day on the refuge.

Hunters access the refuge on open roads, by boat, and by foot. No all-terrain vehicles are allowed on the refuge.

Public hunting opportunities are limited in north Louisiana. Hunting opportunities on private land are virtually non-existent unless a person is willing and able to purchase hunting rights through hunting leases.

Availability of Resources:

Resources involved in the administration and management of the use:

Personnel time associated with administration and law enforcement

Special equipment, facilities, or improvements necessary to support the use:

Access roads, gates, boat ramps, brochures, kiosks, and law enforcement equipment

Maintenance costs: \$15,000/year

Monitoring costs: \$5,000/year

Offsetting revenues: None

Anticipated Impacts of the Use:

Short-term impacts:

National wildlife refuges administered by the North Louisiana National Wildlife Refuge Complex have been open to hunting since 1975, with no documented disturbance to refuge habitats and no noticeable impact on the abundance of species hunted or other associated wildlife. While managed hunting opportunities may result in localized disruption of individual animals' daily routines, no noticeable adverse effect on populations has been documented.

Long-term impacts:

To date, there is no indication of adverse biological impacts associated with the Complex's hunting program. However, should it become necessary, the refuge has the latitude to adjust hunting seasons and bag limits annually, or to close the refuge entirely if there are safety issues or other concerns that merit closure. This latitude, coupled with monitoring of wildlife populations and habitat conditions by the Service and the Louisiana Department of Wildlife and Fisheries, will ensure that long-term negative impacts to either wildlife populations and/or habitats on the refuge are unlikely.

Should hunting pressure increase on the refuge, alternatives such as quota hunts, a reduction in the number of days of hunting, or restrictions on that part of the refuge open to hunting can be utilized to limit impacts.

Cumulative impacts:

The timing and duration of the refuge's hunting program does not coincide with most other uses of the refuge and would not result in cumulative impacts to refuge resources.

Public Review and Comment:

This compatibility determination was part of the Draft Comprehensive Conservation Plan and Environmental Assessment for D'Arbonne National Wildlife Refuge, which was announced in the Federal Register on April 11, 2006, and made available for public comment for 30 days. Only one comment was received and it was opposed to hunting. The Service response is that hunting is one of the six priority wildlife-dependent public uses identified in the National Wildlife Refuge System Improvement Act of 1997. The Service allows hunting as long as it is compatible with the mission of the Service, the National Wildlife Refuge System, and the purposes of the refuge.

Determination (check one below):

Use is Not Compatible

Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility:

Hunting seasons and bag limits are established annually as agreed upon during the annual hunt coordination meeting with state personnel. These generally fall within the state framework. The

refuge can, and has, established more restrictive seasons and bag limits to prevent over-harvest of individual species or disturbance to trust species. All hunters are required to possess a refuge hunting permit while participating in refuge hunts. This permit, which augments the state hunting regulations, explains both the general hunt regulations and the refuge-specific regulations. Law enforcement patrols are frequently conducted throughout the hunting season to ensure compliance with refuge laws and regulations. The refuge has included a Refuge Operating Needs System project for a full-time officer to ensure compatibility over the long term.

Justification:

Regulated hunting does not have an adverse impact on populations of migratory birds. Hunting is a priority public use and offers the public an inexpensive wildlife-dependent recreational opportunity.

Mandatory 15-Year Re-evaluation Date: August 1, 2021

Description of Use: Fishing

Fishing was a traditional recreational use of the area that is now D'Arbonne Refuge prior to its inclusion into the National Wildlife Refuge System and continues to be a recreational pursuit with the public. It is one of the more popular wildlife-dependent uses on the refuge. Fish populations currently support a sustainable harvest under a regulated fishing program.

Fishing, a wildlife-dependent recreation, has been identified in the National Wildlife Refuge System Improvement Act of 1997 as a priority public use, provided it is compatible with the purpose for which the refuge was established.

Fishing is permitted in the entire refuge. The use is conducted year-round. Fishing is conducted subject to regulations established by the Louisiana Department of Wildlife and Fisheries. Fishing is further restricted on the refuge by regulations which prohibit commercial fishing on the refuge and prohibit the use of certain fishing methods.

Availability of Resources:

Resources involved in the administration and management of the use:

Personnel time associated with administration and law enforcement

Special equipment, facilities, or improvements necessary to support the use:

Boat ramps, kiosks, brochures, law enforcement equipment, and access roads

Maintenance costs: \$10,000/year

Monitoring costs: \$5,000/year

Offsetting revenues: None

Anticipated Impacts of the Use:

Short-term impacts:

Minor impacts, such as litter and gasoline contamination, could occur but not at a level that would cause serious concern. There is some erosion from outboard wakes.

Long-term impacts:

Fishing, as regulated, should not have any long-term negative impacts on the refuge.

Cumulative impacts:

No cumulative impacts are known to occur.

Public Review and Comment:

This compatibility determination was part of the Draft Comprehensive Conservation Plan and Environmental Assessment for D'Arbonne National Wildlife Refuge, which was announced in the Federal Register on April 11, 2006, and made available for public comment for 30 days.

Determination (check one below):

Use is Not Compatible

Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility:

Commercial fishing is prohibited. Recreational fishing using commercial gear is allowed by obtaining a special use permit from the refuge. Trotlines must have cotton line attached to the ends and they must be tended daily.

Justification:

Fishing is probably one of the most popular forms of outdoor recreation in the state, and the refuge has the opportunity to provide quality fishing to the public, which is a priority public use. Current state and refuge regulations limit impacts to fish and wildlife populations on the refuge, while providing a safe and rewarding experience for the refuge visitor.

Mandatory 15-Year Re-evaluation Date: August 1, 2021

Note: The following compatibility determinations were made available for public review in 2004, and were approved earlier this year but were not published as approved prior to the publication of this comprehensive conservation plan.

Refuge Name: D'Arbonne National Wildlife Refuge
County: Ouachita and Union Parishes, Louisiana

Establishing and Acquisition Authority: Fish and Wildlife Coordination Act

Refuge Purpose(s): "... shall be administered by him [Secretary of the Interior] directly or in accordance with cooperative agreements ... and in accordance with such rules and regulations for the conservation, maintenance, and management of wildlife, resources thereof, and its habitat thereon," 16 U.S.C. § 664 (Fish and Wildlife Coordination Act).

National Wildlife Refuge System Mission: The mission of the National Wildlife Refuge System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans (National Wildlife Refuge System Administration Act of 1966, as amended) [16 U.S.C. 668dd-668ee].

Description of Use: Horseback Riding

Is the use a priority public use?

While not one of the six priority wildlife-dependent public uses listed or identified in the National Wildlife Refuge System Administration Act of 1997, horseback riding is an existing use at D'Arbonne Refuge that can be used to facilitate wildlife observation and upland game hunting (raccoon only).

Where will the use be conducted?

Horseback riding for wildlife observation is restricted to roads and trails as outlined in a special use permit. Permits are also required for using horses or mules for night-time raccoon hunting, which is allowed over the entire refuge.

When will the use be conducted?

Riding for wildlife observation would be open to the public year-round but restricted to daytime use only. The majority of the use would be in fall and winter with maybe one or two horse trailers (2-4 horses and riders) observed on weekends intermittently. Little use is expected in the summer when the temperatures and humidity are so high. Using horses and mules for raccoon hunting would be restricted to the season as set by refuge regulations. No horseback riding is allowed during the gun deer hunting season.

How will the use be conducted?

The general public would come into the refuge headquarters to request a special use permit for trail riding or raccoon hunting. A map with designated roads and trails and any other refuge-specific regulations in effect at that time would be included in the special use permit.

Why is this use being proposed?

Horseback riding is a historical use and common activity in rural areas such as this one. Public land available for riding is limited. Members of the public who ride horses for pleasure are interested in being outdoors and participating in wildlife observation. Those using horses for raccoon hunting have historically used this area for this wildlife-dependent activity.

Availability of Resources:

Resources involved in the administration and management of the use:

Minimal resources would be required to handle the special use permits. Some law enforcement would be necessary to provide resource and visitor protection.

Special equipment, facilities, or improvements necessary to support the use:

None, the lands have been open to the public since they were acquired. Horseback riding is a self-initiated activity with no amenities provided specifically for this activity. Thus, access trails, parking lots, and staff to enforce regulations have already been provided by the Service.

Maintenance costs:

Negligible, with road maintenance conducted for operations other than this public use.

Monitoring costs:

Minimal, with monitoring the number of permits provided to alert for whether use is increasing above compatibility and monitoring for resource impacts.

Offsetting revenues:

None

Anticipated Impacts of the Use:

The purpose of this section is to critically and objectively evaluate the potential effects that horseback riding could have on the wildlife, habitat, and other public use elements encompassed in refuge purposes, through the use of professional judgment and available information. Of key concern is to maintain adverse impacts within acceptable limits. Therefore, one of the functions of this section is to point out whether adverse impacts are within or exceed these acceptable thresholds.

Impacts related to horseback riding range from exotic plant seed dispersal, soil compaction and erosion, stream sedimentation, trail widening, vegetation trampling, direct wildlife disturbance, to direct and indirect conflicts with other recreationists.

Exotic plants can be spread to new sites through manure. Horse digestive systems are relatively inefficient and seeds of exotic plants are often still viable after passing through the horse's digestive system. This could result in introduction and/or spread of exotic species, limiting the ability to restore and maintain natural biological diversity within a refuge. However, while the above-mentioned relationship between horses and the spread of invasive species is well-known in western states, there are no known problems of this type in southern bottomland hardwood habitat that is found on this

refuge. For example, horseback riding has occurred on this refuge for several years and there has never been an instance of a new invasive species encroaching into this habitat associated with horseback riding. In addition, horseback riding is restricted to open roads and trails and roads are the first to be treated for invasives because maintenance personnel are alerted to their presence and provide control.

Soil disturbance is often created through soil compaction with as much as 1500 p.s.i. exerted on the soil surface with each step. Additionally, hoof action tends to dig up and puncture the soil surface, which causes sediment loss and increases potential for disturbance-tolerant vegetation to establish. However, horseback riding is restricted to open roads and trails. The use is minimal at this time, with a special use permit system in place for monitoring for greater impacts.

Trail widening can occur with horses or hikers due to vegetation becoming flattened and the churning up of soil. This can increase spread of previously established exotics by providing loose disturbed soil for germination. This impact initially increases exotic plant encroachment with light to moderate trail use and eventually can lower species richness values to near zero with heavy impacts. This type of impact occurs with several priority wildlife-dependent uses and must be continually monitored with refuge operations as well.

There is some temporary disturbance to wildlife due to human activity on the land, but minimal. Studies have shown that activities restricted to trails and roads will often allow wildlife, especially migratory birds, to habituate to human presence due to the activity being consistently on a trail versus moving unpredictably (Gabrielsen & Smith 1995). Disturbance, such as flushing a nesting bird, is inherent to these activities, but the disturbance is temporary and not significant. One study even identified that disturbance of waterfowl to horseback riders resulted in tolerance up to 46 m versus 75 m with hikers (Miller et al., 1998) and 77-273 m with boaters. Many wildlife species appear to be habituated to livestock, thus, are less likely to flee when approached through this method. However, any form of approach will likely result in some level of disturbance-related impact. Monitoring of disturbance would be conducted and high levels of disturbance would be grounds for the refuge manager to close the area to these uses or restrict the uses further to minimize harm.

Anticipated impacts described suggest that unrestricted horseback riding could lead to invasive plant seed encroachment, vegetative trampling, and disturbance to wildlife. These impacts could be cumulative with associated impacts from other public use opportunities. However, horseback riding is restricted to open roads and trails only, anticipated impacts are not believed to exceed those already induced by vehicles and foot travel associated with other public use activities.

These effects would not be focused to roads and trails when riding horses for raccoon hunting anywhere on the refuge. However, so few individuals request a permit for this activity that the impacts are expected to be minimal to negligible.

Public Review and Comment:

The period of public review and comment began December 1, 2004, and ended December 15, 2004.

The following methods were used to solicit public review and comment:

A news release was provided to newspapers (Monroe, Louisiana News-Star, Farmerville Gazette, Ruston Leader, Ouachita Citizen) and radio stations (KXKZ 107.5, KNOE FM 102, Monroe Radio Partners) on November 29, 2004. The news release was also posted at refuge headquarters, Haile Store, and Rocky Branch Store.

Summarize comments received and any actions taken or not taken because of comments received.

No written or verbal comments were received.

Refuge Determination:

Use is Not Compatible

Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility:

The permit holder and those accompanying him/her are responsible for knowing and complying with refuge regulations.

Only designated roads and trails are open for horseback riding during daylight hours, except when in support of raccoon hunting.

Open roads are subject to seasonal closures based on the presence of sensitive wildlife populations.

Horse trailers are restricted to designated parking areas.

No firearms are allowed while horseback riding.

Justification:

While not listed as a primary, wildlife-dependent recreational use under the National Wildlife Refuge System Administration Act, as amended, horseback riding is often used as a means of transportation for wildlife observation and appreciation of the outdoors, just as hikers, birders, or photographers use walking or vehicles. Therefore, horseback riding is determined compatible with the refuge mission of providing wildlife-dependent public use.

Horseback riding is believed to be a compatible public use under the stipulations outlined in this compatibility determination. Primary reasons for this determination include:

1. Wildlife observation is an element of horseback riding.
2. A few permit requests are for horseback riding in support of raccoon hunting (a priority, wildlife-dependent recreational use).
3. This use is infrequent and seasonal, with only low levels expected.
4. Impacts associated with horseback riding are not believed to exceed impacts already caused by other public use activities.

It is understood from the summary of anticipated impacts that there are elements of allowing horseback riding to have the potential of detrimental effects. Yet, this often is the case with several of the primary wildlife-dependent recreational uses that support the refuge mission and purpose (Pease et al., 2005). Hence the refuge has to constantly consider spatial and seasonal control of public access to minimize disturbance during critical times, such as when waterfowl are overwintering on the refuge and fat deposition and energy conservation are important, or during the nesting period. Hence, impacts would be closely monitored and if they, or any not-yet-considered impacts are discovered, this compatibility determination would be reevaluated.

NEPA Compliance for Refuge Use Decision:

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

Mandatory 10-Year Re-evaluation Date: June 8, 2016

Signature:

for **Refuge
Manager:**

Signed

(Signature and Date)

Review:

Regional Compatibility

Coordinator:

Signed

(Signature and Date)

13 JUNE 06

Review:

**Refuge
Supervisor:**

Signed

(Signature and Date)

31 May 2006

Concurrence:

**Regional
Chief:**

Signed

(Signature and Date)

6/8/06

Mandatory 10- or 15-year Re-evaluation Date: *6/8/16*

Literature Referenced

- Gabrielson, G.W. and E.N. Smith. 1995. Physiological responses of wildlife to disturbance. Pages 95-107 in R.L. Knight and K.J. Gutzwiller, ed. *Wildlife and Recreationists: coexistence through management and research*. Island Press, Washington, D.C. 372 pp.
- Miller, S.G., R.L. Knight, and C.K. Miller. 1998. Influence of recreational trails on breeding bird communities. *Ecological Applic.* 8:162-169.
- Pease, M.L., R.K. Rose, and M.J. Butler. 2005. Effects of human disturbances on the behavior of wintering ducks. *Wildl. Soc. Bull.* 33(1):103-112.

Refuge Name: D'Arbonne National Wildlife Refuge
County: Ouachita and Union Parishes, Louisiana

Establishing and Acquisition Authority: Fish and Wildlife Coordination Act

Refuge Purpose(s): "... shall be administered by him [Secretary of the Interior] directly or in accordance with cooperative agreements ... and in accordance with such rules and regulations for the conservation, maintenance, and management of wildlife, resources thereof, and its habitat thereon," 16 U.S.C. § 664 (Fish and Wildlife Coordination Act).

National Wildlife Refuge System Mission: The mission of the National Wildlife Refuge System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans (National Wildlife Refuge System Administration Act of 1966, as amended) [16 U.S.C. 668dd-668ee].

Description of Use: Recreational Trapping

Is the use a priority public use?

Trapping by the public with a special use permit is not a priority public use. However, it would be allowed through the special use permit program for those species allowed under state law and seasons. Announcements of the trapping program are made through the refuge complex regulations brochure, which is available to the public. Regulations regarding the trapping of furbearing animals will be the same, except where otherwise noted, as those approved by the Louisiana Department of Wildlife and Fisheries.

Where will the use be conducted?

Once a special use permit is obtained, trapping can occur throughout the refuge. However, traps cannot be set along roads, trails, or in sight of observation towers.

When will the use be conducted?

The trapping season will follow the Louisiana Department of Wildlife and Fisheries regulations and season, and refuge-specific regulations as noted in brochures.

How will the use be conducted?

Special use permits for trapping will be unlimited and available to obtain at the Refuge Complex headquarters from two weeks before the program starts until mid-way through the season. Trappers will be required to pay a fee of not less than \$10 for a trapping permit. Trappers will be required to report their trap take at the end of the season so the refuge can monitor the program. Each trapper must comply with all special conditions and regulations for the trapping year.

Why is this use being proposed?

The trapping program is used as a wildlife management tool. The land comprising the refuge has always been available to trappers prior to establishment, as well as post establishment. The primary target species are beaver, nutria, opossum, and raccoon, which can become overpopulated and do extensive damage to bottomland hardwood forests and migratory bird nests; both bottomland hardwood forests and migratory birds are integral components of the purpose of this refuge.

Furbearer populations have remained favorable up to the present with past trapping efforts. It would be expected that further trapping would have no more impact on furbearer populations than in years past. The trapping program is needed to maintain furbearer populations at levels compatible with refuge habitat objectives, and ensure other wildlife species are not adversely impacted.

Availability of Resources:

Resources involved in the administration and management of the use:

Visitor contact hours would increase minimally for issuing trapping permits and explaining the program.

Special equipment, facilities, or improvements necessary to support the use:

None

Maintenance costs:

None

Monitoring costs:

Minimal time is required for documenting trapper report forms to monitor species and number of individuals caught each day in order to determine trapper success and population impacts. If permit issuance ever becomes above negligible again, these reports will signal a need to design monitoring protocols to determine the effectiveness of the trapping program.

Offsetting revenues:

None

Anticipated Impacts of the Use:

Short-term impacts:

With enough trapping pressure, raccoon and beaver populations may be kept from increasing to nuisance proportions. Fewer trees would be killed and girdled by nutria and beaver.

Trapping has had little direct affect on waterfowl. There is a chance of waterfowl disturbance in the open field on the refuge. This area has been closely observed for disturbance by trappers and little has been noted in the past. However, measures will be taken to restrict access in this area if necessary.

Some conflicts between hunters and trappers or persons engaged in some form of nonconsumptive use on the refuge may occur, but again would be minimal. Trappers are not permitted to place traps along roads, trails, or in sight of observation towers. Waterfowl hunting coincides with the trapping season for a limited number of days, but restrictive hours for waterfowl hunting decrease the chance of interaction and any confrontations should be minimal in number.

A short-term impact of trapping can include non-target species being captured, injured, or killed. Trappers are required to report the species (target and non-target) they capture. When trapping was

a more popular use in the late 1980s and early 1990s, as many as twelve permits were issued annually. In 1990, nine trappers were issued permits and 100 percent of captured animals were target species. Of these, 73 percent were raccoons; 12 percent were opossums; 11 percent were minks; 3 percent nutria; and 1 percent beaver. Less than 3 percent of all species captured on the Refuge Complex by trappers have been non-target species over the span of the refuge trapping program. In addition, there has never been an instance of threatened or endangered species being trapped on the refuge.

Long-term impacts:

On D'Arbonne Refuge, beavers cause an unacceptable degree of damage to the bottomland hardwood forest. On a landscape scale considering the historical forest as greatly diminished in size, the percent of remaining forest impacted by beavers is much greater than would have occurred naturally in an undisturbed setting. Although some beaver-driven habitat is desirable, the current level is disproportionate for a diverse, healthy forest. The prolonged flooding and killing of trees from too many beaver and nutria would be decreased leading to a long-term effect of less habitat alteration. Forest resources would be positively affected by reduced flooding. In addition, with reduced populations there is less likely the chance to create high population problems of death by starvation or disease.

No adverse effects would occur to soils, vegetation, endangered species, human health/safety, archaeological or historic resources, or aesthetics.

Cumulative impacts:

Lower populations of raccoons can greatly benefit nesting success of waterfowl, songbirds, and turtles. Fewer depredations and less habitat alteration from beavers and nutria combine for a significant benefit to the waterfowl objectives of the refuge.

Economic effects would include extra income generated by trappers from fur sales. Also, local income would be generated from trappers purchasing equipment and fuel.

Public Review and Comment:

The period of public review and comment began December 1, 2004, and ended December 15, 2004.

The following methods were used to solicit public review and comment:

A news release was provided to newspapers (Monroe, Louisiana News-Star, Farmerville Gazette, Ruston Leader, Ouachita Citizen) and radio stations (KXKZ 107.5, KNOE FM 102, Monroe Radio Partners) on November 29, 2004. The news release was also posted at refuge headquarters, Haile Store, and Rocky Branch Store.

Summarize comments received and any actions taken or not taken because of comments received.

No written or verbal comments were received.

Refuge Determination:

Use is Not Compatible

Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility:

- Trappers would be required to pay the refuge at least \$10 for a trapping permit.
- Due to elevated levels of mercury, raccoons are not to be sold for human consumption.
- Traps used on the Refuge Complex would be clearly marked or labeled with the name and permit number of the trapper.
- Traps would be checked daily no later than 12 Noon.
- No vehicles would be allowed off of designated roads and trails.
- Trappers may carry a .22 rimfire rifle or pistol while checking traps for the one purpose of quickly and humanely dispatching trapped animals.
- Traps would not be set where captured animals would be visible to the visiting public from roads, trails, or observation points.
- Only scent baits (no animal parts) would be permitted.
- Traps would not be set before 6 a.m. on the first day of the season and would be removed by 6 p.m. of the last day of the season.
- Trappers would be required to complete a trappers report (form provided by refuge) showing species, numbers, and sex of animals caught each day, and turned in to the refuge headquarters at the end of the season.
- Violations of any refuge, federal or state wildlife law would result in termination of the trapping permit.

Justification:

Trapping has existed on refuge lands since prior to establishment. Trapping is compatible with the purposes for which the refuge was established by fostering increased migratory bird nest survival, best management practices for bottomland hardwood forest habitat, and providing wildlife-dependent recreational opportunities.

In 1978, trapping was halted until the refuge developed a trapping plan. In 1979, a plan was developed and the season was reopened. A new trapping plan was developed in 1999 and permits are monitored yearly for level of permits issued and trap reports. Over the past 10 years, permits have averaged less than one permit each year. In 2006, three permits were issued, and in 2002, 1999, 1998, and 1996 only one permit was issued. There is no significant increase in the magnitude of use expected over the next 10 years. Although very few people trap on the refuge, any trapping of raccoons (the most-trapped species) and opossums is helpful to controlling these species' populations. Overpopulated raccoons and opossums depredate bird, mammal, and reptile nests at much higher rates than occurred historically, directly causing population threats to some species, such as alligator snapping turtles and neotropical songbirds.

Judging from the amount of signs and past trapping data, furbearer populations on the refuge are abundant. Limited natural predation on furbearers predicates management of the populations. Trapping is a wildlife management tool that can reduce furbearer populations to maintain desirable wildlife habitat and nesting success of waterfowl, songbirds, and turtles.

The trapping program provides authorized individuals with quality wildlife-dependent experiences, educational opportunities, and allows them to utilize a renewable natural resource.

NEPA Compliance for Refuge Use Decision:

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

Mandatory 10-Year Re-evaluation Date: June 8, 2016

Approval of Compatibility Determination

The signature of approval is for all compatibility determinations considered within the comprehensive conservation plan. If one of the descriptive uses is considered for compatibility outside of the plan, the approval signature becomes part of that determination.

Refuge Manager: **Signed** 6-6-06
Kelby Ouchley (Signature/Date)

Regional Compatibility Coordinator: **Signed** 7-5-06
(Signature/Date)

Refuge Supervisor: **Signed** 8/1/06
Lou Hinds (Signature/Date)

Regional Chief, National Wildlife Refuge System, Southeast Region: **Signed** 8/1/06
Jon Andrew (Signature/Date)

Appendix VI. Refuge Biota

North Louisiana Refuge Complex Bird List

This list contains those species of birds thought to occur on lands owned by North Louisiana National Wildlife Refuge Complex according to various literature sources, surveys, and observations.

Grebes

- Pied-billed Grebe (*Podilymbus podiceps*)
- Horned Grebe (*Podiceps auritus*)

Pelicans, Cormorants, and Darters

- American White Pelican (*Pelecanus erythrorhynchos*)
- Double-crested Cormorant (*Phalacrocorax auritus*)
- Anhinga (*Anhinga anhinga*)

Bitterns, Herons, and Egrets

- American Bittern (*Botaurus lentiginosus*)
- Least Bittern (*Ixobrychus exilis*)
- Great Blue Heron (*Ardea herodias*)
- Great Egret (*Ardea alba*)
- Snowy Egret (*Egretta thula*)
- Little Blue Heron (*Egretta 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, Storks, and New World Vultures

- White Ibis (*Eudocimis albus*)
- Roseate Spoonbill (*Ajaia ajaia*)
- Wood Stork (*Mycteria americana*)
- Black Vulture (*Coragyps atratus*)
- Turkey Vulture (*Cathartes aura*)

Waterfowl

- Greater White-fronted Goose (*Anser albifrons*)
- Snow Goose (*Chen caerulescens*)
- Ross's Goose (*Chen rossii*)
- Canada Goose (*Branta canadensis*)
- Wood Duck (*Aix sponsa*)
- Gadwall (*Anas strepera*)
- American Wigeon (*Anas americana*)
- American Black Duck (*Anas rubripes*)
- Mallard (*Anas platyrhynchos*)
- Mottled Duck (*Anas fulvigula*)
- 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*)
Greater Scaup (*Aythya marila*)
Lesser Scaup (*Aythya affinis*)
Bufflehead (*Bucephala albeola*)
Hooded Merganser (*Lophodytes cucullatus*)
Common Merganser (*Mergus merganser*)
Red-breasted Merganser (*Mergus serrator*)
Ruddy Duck (*Oxyura jamaicensis*)

Hawks, Eagles, and Kites

Osprey (*Pandion haliaetus*)
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*)
Golden Eagle (*Aquila chrysaetos*)

True Falcons

American Kestrel (*Falco sparverius*)
Merlin (*Falco columbarius*)
Peregrine Falcon (*Falco peregrinus*)

Gallinaceous Birds (Quail, Turkey, and Allies)

Wild Turkey (*Meleagris gallopavo*)
Northern Bobwhite (*Colinus virginianus*)

Rails, Gallinules, Coots, and Cranes

King Rail (*Rallus elegans*)
Virginia Rail (*Rallus limicola*)
Sora (*Porzana carolina*)
Purple Gallinule (*Porphyryla martinica*)
Common Moorhen (*Gallinula chloropus*)
American Coot (*Fulica americana*)

Plovers

American Golden-Plover (*Pluvialis dominica*)
Black-bellied Plover (*Pluvialis squatarola*)
Semipalmated Plover (*Charadrius semipalmatus*)
Piping Plover (*Charadrius melodus*)
Snowy Plover (*Charadrius alexandrinus*)
Killdeer (*Charadrius vociferous*)

Avocets and Sandpipers

Black-necked Stilt (*Himantopus mexicanus*)
American Avocet (*Recurvirostra americana*)
Greater Yellowlegs (*Tringa melanoleuca*)
Lesser Yellowlegs (*Tringa flavipes*)
Solitary Sandpiper (*Tringa solitaria*)
Spotted Sandpiper (*Actitis macularia*)
Upland Sandpiper (*Bartramia longicauda*)
Whimbrel (*Numenius phaeopus*)
Willet (*Catoptrophorus semipalmatus*)
Dunlin (*Calidris alpina*)
Semipalmated Sandpiper (*Calidris pusilla*)
Western Sandpiper (*Calidris mauri*)
Least Sandpiper (*Calidris minutilla*)
Pectoral Sandpiper (*Calidris melanotos*)
Stilt Sandpiper (*Calidris himantopus*)
Wilson's Phalarope
Short-billed Dowitcher (*Limnodromus griseus*)
Long-billed Dowitcher (*Limnodromus scolopaceus*)
Wilson's Snipe (*Gallinago gallinago*)
American Woodcock (*Scolopax minor*)

Gulls, Terns, and Skimmers

Bonaparte's Gull (*Larus philadelphia*)
Ring-billed Gull (*Larus delawarensis*)
Herring Gull (*Larus argentatus*)
Caspian Tern (*Sterna caspia*)
Forster's tern (*Sterna forsteri*)
Least Tern (*Sterna antillarum*)
Black Tern (*Chlidonias niger*)

Pigeons and Doves

Rock Dove (*Columba livia*)
Mourning Dove (*Zenaida macroura*)
Common Ground Dove (*Columbina passerina*)
Eurasian Collared Dove (*Streptopelia decaocto*)

Cuckoos

Black-billed Cuckoo (*Coccyzus erythrophthalmus*)
Yellow-billed Cuckoo (*Coccyzus americanus*)
Greater Roadrunner (*Geococcyx californianus*)

Owls

Barn Owl (*Tyto alba*)
Eastern Screech-Owl (*Otus asio*)
Great Horned Owl (*Bubo virginianus*)
Barred Owl (*Strix varia*)
Short-eared owl (*Asio flammeus*)

Nightjars

Common Nighthawk (*Chordeiles minor*)
Chuck-will's-widow (*Caprimulgus carolinensis*)
Whip-poor-will (*Caprimulgus vociferous*)

Swifts and Hummingbirds

Chimney Swift (*Chaeura pelagica*)
Ruby-throated hummingbird (*Archilochus colubris*)

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*)
Red-cockaded Woodpecker (*Picoides borealis*)
Northern Flicker (*Colaptes auratus*)
Pileated Woodpecker (*Dryocopus pileatus*)

Shrikes

Loggerhead Shrike (*Lanius ludovicianus*)

Vireos

White-eyed Vireo (*Vireo griseus*)
Yellow-throated Vireo (*Vireo flavifrons*)
Blue-headed Vireo (*Vireo solitarius*)
Warbling Vireo (*Vireo gilvus*)
Philadelphia Vireo (*Vireo philadelphicus*)
Red-eyed Vireo (*Vireo olivaceus*)

Jays and Crows

Blue Jay (*Cyanocitta cristata*)
American Crow (*Corvus brachyrhynchos*)
Fish Crow (*Corvus ossifragus*)

Larks

Horned Lark (*Eremophila alpestris*)

Martins and Swallows

Purple Martin (*Progne subis*)
Tree Swallow (*Tachycineta bicolor*)
N. Rough-winged Swallow (*Stelgidopteryx serripennis*)
Bank Swallow (*Riparia riparia*)
Barn Swallow (*Hirundia rustica*)

Chickadees and Titmice

Carolina Chickadee (*Poecile carolinensis*)
Tufted Titmouse (*Baeolophus bicolor*)

Nuthatches

Red-breasted Nuthatch (*Sitta canadensis*)
White-breasted Nuthatch (*Sitta carolinensis*)
Brown-headed Nuthatch (*Sitta pusilla*)

Creepers

Brown Creeper (*Certhia americana*)

Wrens

Carolina Wren (*Thryothorus ludovicianus*)
Bewick's Wren (*Thryomanes bewickii*)
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*)

Mockingbirds and Thrashers

Gray Catbird (*Dumetella carolinensis*)
Northern Mockingbird (*Mimus polyglottos*)
Brown Thrasher (*Toxostoma rufum*)

Starlings

European Starling (*Sturnus vulgaris*)

Pipits

American Pipit (*Anthus rubescens*)

Waxwings

Cedar Waxwing (*Bombycilla garrulous*)

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*)

Chestnut-sided Warbler (*Dendroica pensylvanica*)
Magnolia Warbler (*Dendroica magnolia*)
Black-throated Blue Warbler (*Dendroica caerulescens*)
Yellow-rumped Warbler (*Dendroica coronata*)
Black-throated Green Warbler (*Dendroica virens*)
Blackburnian Warbler (*Dendroica fusca*)
Yellow-throated Warbler (*Dendroica dominica*)
Pine Warbler (*Dendroica pinus*)
Prairie Warbler (*Dendroica discolor*)
Palm Warbler (*Dendroica palmarum*)
Bay-breasted Warbler (*Dendroica castanea*)
Blackpoll Warbler (*Dendroica striata*)
Cerulean Warbler (*Dendroica cerulean*)
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 Towhee (*Pipilo erythrophthalmus*)
Bachman's Sparrow (*Aimophila aestivalis*)
Chipping Sparrow (*Spizella passerine*)
Field Sparrow (*Spizella pusilla*)
Vesper Sparrow (*Pooecetes gramineus*)
Savannah Sparrow (*Passerculus sandwichensis*)
Grasshopper Sparrow (*Ammodramus savannarum*)
Henslow's Sparrow (*Ammodramus henslowii*)
Le Conte's Sparrow (*Ammodramus leconteii*)
Fox Sparrow (*Passerella iliaca*)
Song Sparrow (*Melospiza melodia*)
Lincoln's Sparrow (*Melospiza lincolni*)
Swamp Sparrow (*Melospiza georgiana*)
White-throated Sparrow (*Zonotrichia albicollis*)
White-crowned Sparrow (*Zonotrichia leucophrys*)
Dark-eyed Junco (*Junco hyemalis*)
Lapland Longspur (*Calcarius lapponicus*)

New World Finches

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

Red-winged Blackbird (*Agelaius phoeniceus*)
Eastern Meadowlark (*Sturnella magna*)
Rusty Blackbird (*Euphagus carolinus*)
Brewer's Blackbird (*Euphagus cyanocephalus*)
Common Grackle (*Quiscalus quiscula*)
Brown-headed Cowbird (*Molothrus ater*)
Orchard Oriole (*Icterus spurius*)
Baltimore Oriole (*Icterus galbula*)

Old World Finches

Purple Finch (*Carpodacus purpureus*)
Pine Siskin (*Carduelis pinus*)
American Goldfinch (*Carduelis tristis*)
Evening Grosbeak (*Coccothraustes vespertinus*)

**North Louisiana Refuge Complex
Mammal List**

This list contains those species of mammals thought to occur on lands owned by the North Louisiana National Wildlife Refuge Complex according to various literature sources. Those species marked with an asterisk (*) have been documented on the specified refuge by sightings or specimens. The abbreviations are as follows: BBL – Black Bayou Lake NWR, UO – Upper Ouachita NWR, DB – D'Arbonne NWR, LWMD – LA Wetlands Management District. This list is largely based on information from The Mammals of Louisiana and Its Adjacent Waters by Lowery (1974).

Didelphiidae (Opossums)

*Opossum (*Didelphis marsupialis*)—BBL, UO, DB

Soricidae (Shrews)

*Short-tailed Shrew (*Blarina brevicauda*)—DB
Least Shrew (*Cryptotis parva*)

Talpidae (Moles)

*Eastern Mole (*Scalopus aquaticus*)--DB

Bats (Chiroptera)

- *Southeastern Myotis (*Myotis austroriparius*)--DB
- Eastern Pipistrel (*Pipistrellus subflavus*)
- *Big Brown Bat (*Eptesicus fuscus*)--DB
- *Red Bat (*Lasiurus borealis*)--DB
- *Seminoe Bat (*Lasiurus seminolus*)--DB
- Hoary Bat (*Lasiurus cinereus*)
- *Evening Bat (*Nycticeius humeralis*)--DB
- *Rafinesque's Big-eared Bat (*Coryrhincus rafinesquii*)--DB
- Brazilian Free-tailed Bat (*Tadarida brasiliensis*)

Dasypodidae (Armadillos)

- *Nine-banded Armadillo (*Dasypus novemcinctus*)—DB, UO, BBL

Leporidae (Hares, Rabbits)

- *Eastern Cottontail (*Sylvilagus floridanus*)—DB, UO, BBL
- *Swamp Rabbit (*Sylvilagus aquaticus*)—DB, UO, BBL

Sciuridae (Squirrels)

- *Eastern Gray Squirrel (*Sciurus carolinensis*)—DB, BBL, UO
- *Fox Squirrel (*Sciurus niger*)—DB, BBL, UO
- *Southern Flying Squirrel (*Glaucomys volans*)—DB, UO, BBL

Geomyidae (Pocket Gophers)

- *Plains Pocket Gopher (*Geomys bursarius*)---DB

Castoridae (Beaver)

- *Beaver (*Castor canadensis*)—DB, BBL, UO

Cricetidae (Mice, Rats, Lemmings, Voles)

- Marsh Rice Rat (*Oryzomys palustris*)
- Fulvous Harvest Mouse (*Reithrodontomys fulvescens*)
- *White-footed Mouse (*Peromyscus leucopus*)--DB
- *Cotton Mouse (*Peromyscus gossypinus*)--DB
- *Golden Mouse (*Peromyscus nuttalli*)--DB
- *Hispid Cotton Rat (*Sigmodon hispidus*)
- *Eastern Woodrat (*Neotoma floridana*)--BBL
- Pine Vole (*Pitymys pinetorum*)
- *Muskrat (*Ondatra zibethica*)—DB, UO, BBL

Muridae (Old World Rats and Mice)

- Roof Rat (*Rattus rattus*)
- Norway Rat (*Rattus norvegicus*)
- House Mouse (*Mus musculus*)

Capromyidae (Nutria)

*Nutria (*Myocastor coypus*)—DB, UO, BBL

Canidae (Dogs, Wolves, Foxes)

Red Wolf (*Canis rufus*) (extirpated)

*Coyote (*Canis latrans*)—DB, UO, BBL

*Red Fox (*Vulpes fulva*)—DB, UO, BBL

*Gray Fox (*Urocyon cinereoargenteus*)—DB, UO, BBL

Ursidae (Bears)

*Black Bear (*Ursus americanus*)—UO, LWMD

Procyonidae (Raccoons)

*Raccoon (*Procyon lotor*)—DB, BBL, UO

Mustelidae (Weasels, Skunks)

Long-tailed Weasel (*Mustela frenata*)

*Mink (*Mustela vison*)

*Striped Skunk (*Mephitis mephitis*)—DB, UO, BBL

*River Otter (*Lutra canadensis*)—DB, BBL, UO

Felidae (Cats)

*Bobcat (*Lynx rufus*)—UO

Mountain Lion (*Felix concolor*) (extirpated)

Suidae (Hogs)

*Feral Hog (*Sus scrofa*)—UO

Cervidae (Deer)

*White-tailed Deer (*Odocoileus virginianus*)—DB, UO, BBL

North Louisiana Refuge Complex Herptile List

This list contains those species of reptiles and amphibians thought to occur on lands owned by the North Louisiana National Wildlife Refuge Complex according to various literature sources. Those species marked with an asterisk (*) have been documented on the specified refuge by sightings or specimens. The abbreviations are as follows: BBL – Black Bayou Lake NWR, UO – Upper Ouachita NWR, DB – D’Arbonne NWR. Documentation of these species was compiled from surveys conducted by the refuge biologist and by herpetologists at the University of Louisiana in Monroe, namely Dr. Carr.

Alligatoridae (Alligators)

*American Alligator (*Alligator mississippiensis*) – BBL, DB, UO

Chelydridae (Snapping Turtles)

*Common Snapping Turtle (*Chelydra serpentina*) – BBL, UO, DB

*Alligator Snapping Turtle (*Macrochelys temminckii*) – BBL, UO, DB

Kinosternidae (Musk and Mud Turtles)

*Common Musk Turtle (*Sternotherus odoratus*) – BBL, UO

*Razorback Musk Turtle (*Sternotherus carinatus*) - BBL

*Mississippi Mud Turtle (*Kinosternon subrubrum hippocrepis*) - BBL

Emydidae (Box and Water Turtles)

*Three-toed Box Turtle (*Terrapene carolina triunguis*) – BBL, DB

*Mississippi Map Turtle (*Graptemys pseudogeographica kohnii*) – BBL, UO, DB

Ouachita Map Turtle (*Graptemys ouachitensis*)

*Red-eared Slider (*Trachemys scripta elegans*) – BBL, UO, DB

*River Cooter (*Pseudemys concinna*) – BBL

*Southern Painted Turtle (*Chrysemys picta dorsalis*) – BBL, UO, DB

*Western Chicken Turtle (*Deirochelys reticularia miaria*) – HB, UO

Trionychidae (Softshell Turtles)

*Smooth Softshell (*Apalone mutica*) - UO

*Spiny Softshell (*Apalone spinifera*) - BBL

Iguanidae (Anoles and Fence Lizards)

*Green Anole (*Anolis carolinensis*) – BBL, DB, UO, M

*Northern Fence Lizard (*Sceloporus undulatus hyacinthinus*)-DB

Teiidae (Racerunners)

*Six-lined Racerunner (*Cnemidophorus sexlineatus sexlineatus*)--DB

Scincidae (Skinks)

*Ground Skink (*Scincella lateralis*) – BBL, DB

*Five-lined Skink (*Eumeces fasciatus*) – BBL, DB

*Broadhead Skink (*Eumeces laticeps*) – BBL, UO, DB

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*)—BBL, DB
- *Diamondback Water Snake (*Nerodia rhombifer rhombifer*) – BBL, DB, UO
- *Yellowbelly Water Snake (*Nerodia erythrogaster flavigaster*)--DB
- *Broadbanded Water Snake (*Nerodia fasciata confluens*) - BBL
- Graham's Crayfish Snake (*Regina grahamii*)
- *Gulf Glossy Crayfish Snake (*Regina rigida sinicola*)--BBL, DB
- *Midland Brown Snake (*Storeria dekayi wrightorum*) - BBL
- Florida Redbelly Snake (*Storeria occipitomaculata obscura*)
- Eastern Garter Snake (*Thamnophis sirtalis sirtalis*)-DB
- *Western Ribbon Snake (*Thamnophis proximus proximus*) – BBL, DB
- Western Smooth Earth Snake (*Virginia valeriae elegans*)
- Rough Earth Snake (*Virginia striatula*)
- *Eastern Hognose Snake (*Heterodon platirhinos*)-DB
- Mississippi Ringneck Snake (*Diadophis punctatus stictogenys*)--DB
- Western Worm Snake (*Carphophis vermis*)
- *Western Mud Snake (*Farancia abacura reinwardtii*) – BBL, DB
- *Racer (*Coluber constrictor anthicus* or *C. c. latrunculus* or intergrades) – BBL, DB
- Eastern Coachwhip (*Masticophis flagellum flagellum*)--DB
- *Rough Green Snake (*Opheodrys aestivus*) – BBL, DB
- Corn Snake (*Elaphe guttata guttata X emoryi*)
- *Black Rat Snake (*Elaphe obsoleta obsoleta*) – BBL, DB, UO
- *Speckled King Snake (*Lampropeltis getula holbrooki*) – BBL, DB
- *Louisiana Milksnake (*Lampropeltis triangulum amaura*)--DB
- Prairie King Snake (*Lampropeltis calligaster calligaster*)
- Northern Scarlet Snake (*Cemophora coccinea copei*)
- Flathead Snake (*Tantilla gracilis*)

Elapidae (Coral Snakes)

- *Texas Coral Snake (*Micrurus fulvius tener*)--DB

Viperidae (Vipers & Pit Vipers)

- *Southern Copperhead (*Agkistrodon contortrix contortrix*)- BBL
- *Western Cottonmouth (*Agkistrodon piscivorus leucostoma*) – BBL, UO, DB
- Western Pygmy Rattlesnake (*Sistrurus miliarius streckeri*)
- *Timber Rattlesnake (*Crotalus horridis*)--UO

Proteidae (Waterdogs and Mudpuppies)

- Red River Mudpuppy (*Necturus maculosus louisianensis*)

Amphiumidae (Amphiumas)

- *Three-toed Amphiuma (*Amphiuma tridactylum*)--DB

Sirenidae (Sirens)

- *Western Lesser Siren (*Siren intermedia nettingi*)--BBL

Ambystomatidae (Salamanders)

- *Mole Salamander (*Ambystoma talpoideum*) - DB
- *Marbled Salamander (*Ambystoma opacum*)--DB
- Smallmouth Salamander (*Ambystoma texanum*)
- *Spotted Salamander (*Ambystoma maculatum*)--DB

Salamandridae (Newts)

- *Central Newt (*Notophthalmus viridescens*) - BBL

Plethodontidae (Lungless Salamanders)

- Dusky Salamander (*Desmognathus fuscus* complex)
- Dwarf Salamander (*Eurycea quadridigittata*)

Bufoidea (Toads)

- *Fowler's Toad (*Bufo fowleri*) – BBL, DB
- Gulf Coast Toad (*Bufo valliceps valliceps*)

Hylidae (Treefrogs and Their Allies)

- *Northern Cricket Frog (*Acris crepitans crepitans*) – BBL, DB, UO
- *Green Treefrog (*Hyla cinerea*) – BBL, DB, UO
- *Gray Treefrog (*Hyla versicolor*) – BBL, DB
- *Cope's Gray Treefrog (*Hyla chrysoscelis*) – BBL, DB, UO
- *Squirrel Treefrog (*Hyla squirella*) -BBL
- *Bird-voiced Treefrog (*Hyla avivoca*) - BBL
- *Northern Spring Peeper (*Pseudacris crucifer*) – BBL, DB, UO
- *Upland Chorus Frog (*Pseudacris feriarum*) – BBL, DB, UO

Microhylidae (Narrowmouth Toads)

- *Eastern Narrowmouth Toad (*Gastrophryne carolinensis*) – BBL, DB

Ranidae (True Frogs)

- *Bullfrog (*Rana catesbeiana*) – BBL, DB, UO
- *Bronze Frog (*Rana clamitans clamitans*) – BBL, DB, UO
- *Southern Leopard Frog (*Rana sphenoccephala*) – BBL, DB, UO
- *Pickerel Frog (*Rana palustris*)--DB

North Louisiana Refuge Complex Fish List

This list contains those species of fish thought to occur in waters administered by North Louisiana National Wildlife Refuge Complex according to various literature sources. Those species marked with an asterisk (*) have been documented on the specified refuge by sightings, fishing, and/or specimens. The abbreviations are as follows: BBL – Black Bayou Lake NWR, UO – Upper Ouachita NWR, DB – D’Arbonne NWR. Documentation of these species was compiled from surveys conducted by Service personnel, Dr. Aku at the University of Louisiana in Monroe, and Arkansas Game and Fish Commission personnel. Literature sources used include Dr. Douglas’ Fishes of Louisiana and Mike Wood’s M.S. Thesis entitled “A taxonomic survey of the fishes of Bayou D’Arbonne after impoundment.”

Petromyzontidae---Lampreys

Chestnut Lamprey (*Ichthyomyzon castaneus*)
Southern Brook Lamprey (*Ichthyomyzon gagei*)

Polydontidae—Paddlefishes

*Paddlefish (*Polydon spathula*)—UO, DB

Lepisosteidae—Gars

*Spotted Gar (*Lepisosteus oculatus*)-BBL, UO
*Longnose Gar (*Lepisosteus osseus*)-BBL
*Shortnose Gar (*Lepisosteus platostomus*)--UO
Alligator Gar (*Lepisosteus spatula*)

Amiidae—Bowfin

*Bowfin (*Amia calva*)-BBL/s, UO/s, DB

Anguillidae—Eels

American eel (*Anguilla rostrata*)

Clupeidae—Shads

Skipjack Herring (*Alosa chrysochloris*)
*Gizzard Shad (*Dorosoma cepedianum*)-BBL, UO
*Threadfin Shad (*Dorosoma petenense*)-BBL, UO

Hiodontidae--Mooneyes

*Mooneye (*Hiodon alosoides*)-BBL/s
Goldeye (*Hiodon alosoides*)

Esocidae—Pikes

Grass Pickerel (*Esox americanus*)
*Chain Pickerel (*Esox niger*)-BBL, UO

Cyprinidae—Minnows

Goldfish

- * Common Carp (*Cyprinus carpio*)--UO
- *Cypress Minnow (*Hybognathus hayi*)-UO
- *Silvery Minnow (*Hybognathus nuchalis*)--UO
- Speckled Chub (*Hybopsis aestivalis*)
- Silver Chub (*Hybopsis storeriana*)
- *Golden Shiner (*Notemigonus crysoleucas*)-BBL, UO
- *Pallid Shiner (*Notropis amnis*)--UO
- *Emerald Shiner (*Notropis atherinoides*)--UO
- Bigeyed Shiner (*Notropis boops*)
- Ghost Shiner (*Notropis buchana*)
- *Ironcolor Shiner (*Notropis chalybaeus*)--UO
- Striped Shiner (*Luxilus chrysocephalus*)
- *Ribbon Shiner (*Notropis fumeus*)--UO
- Bluehead shiner (*Notropis hubbsi*)
- *Taillight Shiner (*Notropis maculatus*)--UO
- Weed Shiner (*Notropis texanus*)
- Redfin Shiner (*Lythrurus umbratilis*)
- *Blacktail Shiner (*Cyprinella venusta*)--UO
- Mimic Shiner (*Notropis volucellus*)
- Steelcolor Shiner (*Notropis whipplei*)
- *Pugnose Minnow (*Opsopoeodus emiliae*)--UO
- Bluntnose Minnow (*Pimephales notatus*)
- Flathead Minnow (*Pimephales promelas*)
- Bullhead Minnow (*Pimephales vigilax*)
- Cheek Chub (*Semotilus atromaculatus*)

Catostomidae--Suckers

- River Carpsucker (*Carpionodes carpio*)
- Creek Chubsucker (*Erimyzon oblongus*)
- *Lake Chubsucker (*Erimyzon sucetta*)--UO
- *Smallmouth Buffalo (*Ictiobus bubalus*)--UO
- *Bigmouth Buffalo (*Ictiobus cyprinellus*)--UO
- Black Buffalo (*Ictiobus niger*)
- *Spotted Sucker (*Minytrema melanops*)--UO
- Blacktail Redhorse (*Moxostoma poecilurum*)
- River Redhorse-UO

Ictaluridae—Catfishes

- *Blue Catfish (*Ictalurus furcatus*)--UO
- *Black Bullhead (*Ameiurus melas*)--UO
- *Brown Bullhead (*Ameiurus nebulosus*)—BBL, UO
- *Yellow Bullhead (*Ameiurus natalis*)-BBL, UO
- *Channel Catfish (*Ictalurus punctatus*)—UO
- *Tadpole Madtom (*Noturus gyrinus*)--UO
- Brindled Madtom (*Noturus miurus*)
- Freckled Madtom (*Noturus nocturnus*)

Brown Madtom (*Noturus phaeus*)
*Flathead Catfish (*Pylodictis olivaris*)--UO

Aphredoderidae—Pirate Perch

*Pirate Perch (*Aphredoderus sayanus*)--UO

Cyrinodontidae—Topminnows

*Golden Topminnow (*Fundulus chrysotus*)--UO
*Blackstripe Topminnow (*Fundulus notatus*)--UO
Starhead Topminnow (*Fundulus notti*) listed as N. starhead F. dispar
*Blackspotted Topminnow (*Fundulus olivaceus*)--UO

Peociliidae—Livebearers

*Mosquitofish (*Gambusia affinis*)--UO

Atherinidae—Siversides

*Brook Silverside (*Labidesthes sicculus*)-BBL, UO

Percichthyidae—Temperate Basses

*White Bass (*Morone chrysops*)--UO
*Yellow Bass (*Morone mississippiensis*)-UO
Striped Bass (*Morone saxatilis*)

Centrarchidae--Sunfishes

*Flier (*Centrarchus macropterus*)--UO
*Green Sunfish (*Lepomis cyanellus*)-BBL
*Warmouth (*Lepomis gulosus*)-UO
*Orangespotted Sunfish (*Lepomis humilis*)--UO
*Bluegill (*Lepomis macrochirus*)-BBL, UO
*Dollar Sunfish (*Lepomis marginatus*)--UO
Longear Sunfish (*Lepomis megalotis*)
*Redear Sunfish (*Lepomis microlophus*)-BBL, UO
*Spotted Sunfish (*Lepomis punctatus*)--UO
*Bantam Sunfish (*Lepomis symmetricus*)-BBL,UO
Spotted Bass (*Micropterus punctulatus*)
*Largemouth Bass (*Micropterus salmoides*)-BBL, UO
*White Crappie (*Pomoxis annularis*)-UO, BBL
*Black Crappie (*Pomoxis nigromaculatus*)-BBL, UO

Elassomatidae—Pygmy Sunfishes

*Banded Pygmy Sunfish (*Elassoma zonatum*)-BBL/s

Percidae--Perches

Scaly Sand Darter (*Ammocrypta vivax*)
Western Scaly Sand Darter (*Ammocrypta clara*)
*Mud Darter (*Etheostoma asprigene*)--UO
*Bluntnose Darter (*Etheostoma chlorosomum*)--UO
Creole Darter (*Etheostoma collettei*)
Swamp Darter (*Etheostoma fusiforme*)
Slough Darter (*Etheostoma gracile*)
Harlequin Darter (*Etheostoma histrio*)
Goldstripe Darter (*Etheostoma parvipinne*)
Cypress Darter (*Etheostoma proeliare*)
Speckled Darter (*Etheostoma stigmaeum*)
Redfin Darter (*Etheostoma whipplei*)
*Logperch (*Percina caprodes*)--UO
Channel Darter (*Percina copelandi*)
Blackside Darter (*Percina maculata*)
Ouachita Darter (*Percina ouachitae*)
Dusky Darter (*Percina sciera*)
River Darter (*Percina shumardi*)
Sauger (*Stizostedion canadense*)
Walleye (*Stizostedion vitreum*)

Sciaenidae-Drums

*Freshwater Drum (*Aplodinotus grunniens*)--UO

North Louisiana Refuge Complex Woody Plant List

This list contains those species of woody plants thought to occur on lands owned by North Louisiana National Wildlife Refuge Complex according to various literature sources, specimens, and sightings.

Aceraceae

Boxelder (*Acer negundo*)
Red Maple (*Acer rubrum*)

Agavaceae

Adam's needle (*Yucca filamentosa*)

Anacardiaceae

Shiny Sumac (*Rhus copallinum*)
Smooth Sumac (*Rhus glabra*)
Chittimwood (*Sideroxylon lanuginosum*)
Poison Ivy (*Toxicodendron radicans*)

Annonaceae

Dwarf Pawpaw (*Asimina parviflora*)
Pawpaw (*Asimina triloba*)

Araliaceae

Devil's Walkingstick (*Aralia spinosa*)

Arecaceae

Palmetto (*Sabal minor*)

Aristolochiaceae

Dutchman's pipevine (*Aristolochia tomentosa*)

Asteraceae

Saltbush (*Baccharis halimifolia*)
New Jersey Tea (*Ceanothus americanus*)

Aquifoliaceae

Carolina Holly (*Ilex ambigua*)
Deciduous Holly (*Ilex deciduas*)
American Holly (*Ilex opaca*)
Youpan (*Ilex vomitoria*)

Betulaceae

Smooth Alder (*Alnus serrulata*)
River Birch (*Betula nigra*)
Ironwood (*Carpinus caroliniana*)
Blue beech (*Carpinus caroliniana*)
Eastern Hophornbeam (*Ostrya virginiana*)

Bignoniaceae

Cross Vine (*Bignonia capreolata*)
Trumpet Creeper (*Campsis radicans*)
Southern Catalpa (*Catalpa bignonioides*)

Caprifoliaceae

Buttonbush (*Cephalanthus occidentalis*)
Coral Honeysuckle (*Lonicera sempervirens*)
Japanese honeysuckle (*Lonicera japonica*)
Elderberry (*Sambucus canadensis*)
Arrowwood (*Viburnum dentatum*)
Rusty Blackhaw (*Viburnum rufidulum*)

Celastraceae

Strawberrybush (*Evonymus americana*)

Clusiaceae

St. Andrew's Cross (*Hypericum hypericoides*)

Broombush (*Hypericum prolificum*)

Cornaceae

Rough-leaf Dogwood (*Cornus drummondii*)

Flowering Dogwood (*Cornus florida*)

Swamp dogwood (*Cornus foemina*)

Cupressaceae

Eastern Red-cedar (*Juniperus virginiana*)

Ebonaceae

Persimmon (*Diospyrus virginiana*)

Ericaceae

Sparkleberry (*Vaccinium arboretum*)

Elliot's Blueberry (*Vaccinium elliotii*)

Deerberry (*Vaccinium stamineum*)

Large Cluster Blueberry (*Vaccinium virgatum*)

Euphorbiaceae

Chinese Tallow tree (*Triadica sebiferum*)

Fabaceae

False Indigo (*Amorpha spp.*)

Mimosa (*Albizia julibrissin*)

Eastern Redbud (*Cercis canadensis*)

Coralbean (*Erythrina herbacea*)

Water Locust (*Gleditsia aquatica*)

Honey Locust (*Gleditsia triacanthos*)

Black Locust (*Robinia pseudoacacia*)

American Wisteria (*Wisteria frutescens*)

Fagaceae

Allegheny chinquapin (*Castanea pumila*)

American Beech (*Fagus grandifolia*)

White Oak (*Quercus alba*)

Southern Red Oak (*Quercus falcate*)

Laurel Oak (*Quercus laurifolia*)

Overcup Oak (*Quercus lyrata*)
Blackjack Oak (*Quercus marilandica*)
Swamp Chestnut Oak (*Quercus michauxii*)
Water Oak (*Quercus nigra*)
Post Oak (*Quercus stellata*)
Cherrybark Oak (*Quercus pagodafolia*)
Willow Oak (*Quercus phellos*)
Shumard Oak (*Quercus shumardii*)
Delta Post Oak (*Quercus similes*)
Nuttall Oak (*Quercus texana*)
Black Oak (*Quercus velutina*)

Grossulariaceae

Sweetspire (*Itea virginica*)

Hamamelidaceae

Witch hazel (*Hamamelis virginiana*)
Sweetgum (*Liquidambar styraciflua*)

Hippocastanaceae

Red Buckeye (*Aesculus pavia*)

Hoary Azalea (*Rhododendron canescens*)

Juglandaceae

Mockernut Hickory (*Carya alba* (*C. tomentosa*)
Bitter Pecan (*Carya aquatica*)
Bitternut Hickory (*Carya cordiformis*)
Pignut Hickory (*Carya glabra*)
Sweet Pecan (*Carya illinoensis*)
Black Hickory (*Carya texana*)
Black Walnut (*Juglans nigra*)

Lauraceae

Sassafras (*Sassafras albidum*)
Spicebush (*Lindera benzoin*)

Loganiaceae

Carolina Jessamine (*Gelsemium sempervirens*)

Magnoliaceae

Sweetbay Magnolia (*Magnolia virginiana*)

Meliaceae

Chinaberry (*Melia azedarach*)

Moraceae

Osage-orange (*Maclura pumifera*)

Red Mulberry (*Morus rubra*)

Myricaceae

Waxmyrtle (*Myrica cerifca*)

Nyssaceae

Water Tupelo (*Nyssa aquatica*)

Blackgum (*Nyssa sylvatica*)

Oleaceae

Fringetree (*Chioanthus virginicus*)

Swamp Privet (*Forestiera acuminata*)

White Ash (*Fraxinus americana*)

Green Ash (*Fraxinus pennsylvanica*)

Chinese privet (*Ligustrum sinense*)

Pinaceae

Shortleaf Pine (*Pinus echinata*)

Loblolly Pine (*Pinus taeda*)

Platanaceae

American Sycamore (*Platanus occidentalis*)

Polygonaceae

Lady's eardrop vine (*Brunnichia ovata*)

Ranunculaceae

Virgin's bower (*Clemantis virginiana*)

Rhamnaceae

Rattan vine (*Berchemia scandens*)

Carolina Buckthorn ((*Frangula caroliniana*) *Rhamnus caroliniana*)

Rosaceae

Serviceberry (*Amelanchier arborea*)
Cockspur hawthorn (*Cretageous crus-galli*)
Parsleyhaw (*Cretageous marshallii*)
Mayhaw (*Cretageous opaca*)
Green Hawthorn (*Cretageous viridis*)
Chickasaw Plum (*Prunus angustifolia*)
Mexican Plum (*Prunus mexicana*)
Black Cherry (*Prunus serotina*)
Blackberry (*Rubus argutus*)

Rubiaceae

Buttonbush (*Cephalanthus occidentalis*)

Rutaceae

Toothache Tree (*Zanthoxylum clava-hercules*)
Trifoliolate-orange (*Poncirus trifoliolate*)

Salicaceae

Ea. Cottonwood (*Populus deltoids*)
Black Willow (*Salix nigra*)

Sapotaceae

Gum Bumelia (*Bumelia lanuginose*)

Schizaeaceae

Japanese Climbingfern (*Lygodium japonicum*)

Scrophulariaceae

Princesstree (*Paulownia tomentosa*)

Simarubaceae

Tree-of-heaven (*Ailanthus altissima*)

Smilacaceae

Fiddleleaf Greenbriar (*Smilax bona-nox*)
Sawbriar (*Smilax glauca*)
Common Greenbriar (*Smilax rotundifolia*)
Upland Bamboo Vine (*Smilax smallii*)
Red Berry Greenbriar (*Smilax waltherii*)

Styracaceae

Two-winged Silverbell (*Halesia diptera*)
Large Snowbell (*Styrax americanum*)
Small Snowbell (*Styrax grandifolius*)

Symplocaceae

Sweetleaf (*Symplocos tinctoria*)

Taxodiaceae

Baldcypress (*Taxodium distichum*)

Ulmaceae

Southern Hackberry (*Celtis laevigata*)
Winged Elm (*Ulmus alata*)
American Elm (*Ulmus americana*)
Cedar Elm (*Ulmus crassifolia*)
Slippery Elm (*Ulmus rubra*)
Water Elm (*Planer aquatica*)

Verbenaceae

American beautyberry (*Callicarpa americana*)

Vitaceae

Peppervine (*Ampelopsis arborea*)
Heart-leaf Peppervine (*Ampeopsis cordata*)
Virginia Creeper (*Parthenocissus quinquefolia*)
Summer Grape (*Vitis aestivalis*)
Gray Grape (*Vitis cinerea*)
Muscadine Grapes (*Vitis rotundifolia*)

Appendix VII. Consultation and Coordination

INTRODUCTION

This appendix summarizes the consultation and coordination that occurred in the processes of identifying the issues, alternatives, and proposed alternative, which were presented in the Draft Comprehensive Conservation Plan and Environmental Assessment; during the period of time while the draft plan and environmental assessment were being prepared and distributed; and during the period of public review and comment.

The D'Arbonne National Wildlife Refuge comprehensive conservation planning process involved a wide variety of participants including federal and state personnel, university researchers, and local residents. The majority of input occurred during the biological review and public use review with participants listed below. Public input was provided at a minimum with scoping and review of the public draft. The core planning team was made up of refuge staff who led the planning process, with an interdisciplinary support team providing review of the internal draft.

CORE PLANNING TEAM MEMBERS

The core planning team included refuge staff from D'Arbonne National Wildlife Refuge. This team was the primary decision-making team for this comprehensive conservation plan. This group was tasked with defining and refining the vision; identifying, reviewing, and filtering the issues; defining goals; developing objectives and strategies; developing feasible alternatives; and outlining a realistic plan for the future.

- George Chandler, Project Leader, North Louisiana National Wildlife Refuge Complex
- Kelby Ouchley, Refuge Manager, D'Arbonne National Wildlife Refuge
- Lindy Garner, Planning Biologist, North Louisiana Refuge Complex
- Gypsy Gooding, Wildlife Biologist, North Louisiana Refuge Complex
- Steve Pagans, Forester, D'Arbonne National Wildlife Refuge
- Gay Brantley, Interpretive Ranger, North Louisiana Refuge Complex
- Chris Foster, Fire Management Officer, North Louisiana Refuge Complex

INTERDISCIPLINARY PLANNING TEAM MEMBERS

Several individuals supported the planning process with participation on the biological review team, visitor services review team, and additional special-topic discussions. Their information provided additional biological support for developing objectives found in this plan. Some members are internal to the Service and provide additional policy guidance and support for objective development as well.

BIOLOGICAL REVIEW TEAM – SEPTEMBER 2003

- D'Arbonne National Wildlife Refuge Staff
- Pat Stinson, Migratory Birds, Fish and Wildlife Service
- Bob Strader, Migratory Birds, Fish and Wildlife Service
- Chuck Hunter, Regional Biologist, Fish and Wildlife Service
- Rose Hopp, Assistant Regional Biologist, Fish and Wildlife Service
- Jeff Denman, Forester, White River National Wildlife Refuge
- Kenny Ribbeck, Forest Program Supervisor, Louisiana Department of Wildlife and Fisheries
- Jerald Owens, Wildlife District Supervisor, Louisiana Department of Wildlife and Fisheries

-
- Latimore Smith, Director of Science and Stewardship, The Nature Conservancy of Louisiana
 - Sammy King, Cooperative Wildlife Research Unit Leader, Louisiana State University
 - Cedric Doolittle, Fisheries, Fish and Wildlife Service
 - John Carr, Herpetology Professor, University of Louisiana at Monroe
 - Randy Wilson, Science Coordinator, Lower Mississippi Valley Joint Venture
 - Kirk Cormier, Regional Manager, Louisiana Department of Environmental Quality
 - Mike Wood, Fisheries Biologist, Louisiana Department of Wildlife and Fisheries
 - Tom Edwards, Migratory Birds, Fish and Wildlife Service

VISITOR SERVICES REVIEW – MAY 2004

- Kelby Ouchley, Refuge Manager, D'Arbonne National Wildlife Refuge
- Gay Brantley, Interpretive Ranger, North Louisiana Refuge Complex
- Garry Tucker, Regional Visitor Services and Outreach, Fish and Wildlife Service
- Ray Paterra, Public Use Specialist, White River National Wildlife Refuge
- Dana Dukes, Interpretive Ranger, White River National Wildlife Refuge
- Kim Randall, Administrative Officer, Catahoula National Wildlife Refuge

OTHER CONTRIBUTORS

- Tom Foti, Ecologist, Arkansas Natural Heritage Commission
- Jody Pagans, Botanist, Arkansas Natural Heritage Commission
- Ralph Costa, Red-cockaded Woodpecker Recovery Leader, Fish and Wildlife Service
- Rick Kanaski, Regional Archaeologist, Fish and Wildlife Service
- Craig Moore, Contaminants Assessment Process Coordinator, Fish and Wildlife Service
- Bo Blackman, Information Technology, Louisiana Department of Natural Resources
- Dale Yocum, GIS Specialist, Lower Mississippi Valley Joint Venture
- Jaymee Fojtik, GIS Specialist, Fish and Wildlife Service
- Evelyn Nelson, Writer/Editor, Fish and Wildlife Service

Appendix VIII. Finding of No Significant Impact

INTRODUCTION

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

ALTERNATIVES

In developing the Comprehensive Conservation Plan for D'Arbonne National Wildlife Refuge, the Fish and Wildlife Service evaluated three alternatives:

The Service adopted Alternative A, the "Preferred Alternative," as the comprehensive conservation plan for guiding the direction of the refuge for the next 15 years. The overriding concern reflected in this plan is that wildlife conservation assumes first priority in refuge management and that wildlife-dependent recreational uses are allowed if they are compatible with wildlife conservation. Wildlife-dependent recreational uses (e.g., hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation) will be emphasized and encouraged.

ALTERNATIVE A.

Alternative A, the preferred alternative, is considered to be the most effective management action for meeting the purposes of the refuge. This alternative will restore ecological processes in conjunction with adaptive management to enhance migratory bird habitat and bottomland hardwood forest conservation in balance with wildlife-dependent uses at a compatible level.

ALTERNATIVE B.

The primary focus under Alternative B will be to minimize management activities to focus on maintaining artificial habitat for the endangered red-cockaded woodpecker. Visitor services will be decreased to minimize management resources.

ALTERNATIVE C.

Alternative C, the status quo, represents no change from current management of the refuge.

SELECTION RATIONALE

Alternative A is selected for implementation because it directs the development of programs to best achieve the refuge purpose and goals. Implementing the preferred alternative will result in management based on sound science for the conservation of a structurally diverse and species diverse bottomland hardwood habitat for migratory birds and resident wildlife. Upland habitat will be allowed to function and respond to processes mimicking the natural fire regime and disturbances to benefit migratory birds, red-cockaded woodpeckers, and resident wildlife. A focused effort will be

placed on reducing invasive species, which are threatening the biological integrity of the refuge. Wintering waterfowl habitat will be maintained as important foraging habitat in the open field and forested wetlands. Baseline inventories and monitoring of management actions will be completed to gain information on a variety of species, from reptiles and amphibians to butterflies and several species of concern. Several cooperative projects will be conducted with universities, Louisiana Department of Wildlife and Fisheries, and other agencies and individuals to provide biological information to be used in management decisions. When compatible, the wildlife-dependent recreational opportunities for hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation will be provided, and in some instances enhanced, while achieving the refuge purpose and remaining consistent with existing laws, Service policies, and sound biological principles.

Under this alternative, all lands under the management and direction of the refuge will be protected, maintained, and enhanced to best achieve national, ecosystem, and refuge-specific goals and objectives within anticipated funding and staffing levels. In addition, the action positively addresses significant issues and concerns expressed by the public.

ENVIRONMENTAL EFFECTS

Implementation of the Service's management action is expected to result in environmental, social, and economic effects as outlined in the comprehensive conservation plan. The effects of habitat management, population management, land conservation, and visitor service management activities on D'Arbonne National Wildlife Refuge are detailed as follows:

EFFECTS COMMON TO ALL ALTERNATIVES

Public Health and Safety

Each of the alternatives will have similar effects or minimal to negligible effects on human health and safety. Wildfires or prescribed fires used as a management tool in all three alternatives could have a negative impact on human health and safety. There is a slim chance of increased health effects associated with smoke, and any increase in field time could increase the possibility of injuries to fire staff.

Refuge Revenue-Sharing

There are no current plans for land acquisition additions to D'Arbonne National Wildlife Refuge. Annual refuge revenue-sharing payments to Union and Ouachita Parishes will continue at similar rates under each alternative. If lands were ever acquired or added to the refuge, the payments would increase accordingly.

Cultural Resources

The Fish and Wildlife Service is required by statute to exercise caution in carrying out its activities to assure that archaeological and historical properties are not inadvertently sold, demolished, substantially altered, or allowed to deteriorate significantly without adequate review and protection. It is the policy of the Service to identify, protect, and manage cultural resources located on Service lands and affected by Service undertakings, in a spirit of stewardship, for future generations. For all the alternatives, the Service will manage these resources in such a manner that sites, buildings, structures, objects, and values of importance are sufficiently protected for present or future scientific study, public appreciation, and socio-cultural use.

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. This order focuses 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’ access to public information and participation in matters relating to human health or the environment.

All alternatives comply with and have no significant effect on environmental justice. None of the alternatives will disproportionately place any adverse environmental, economic, social, or health impacts on minority and low-income populations. Implementation of any action alternative that includes public use and environmental education will actually provide a benefit to the residents of all races, ethnic groups, and income levels residing in the surrounding communities.

SUMMARY OF EFFECTS

The three alternatives share similarities with differences resulting from various types and levels of impacts. None of the proposed management activities will lead to a violation of federal, state, or local laws imposed for the protection of the environment.

Soils

Silviculture and fire are two management techniques that could influence the soils of the refuge. Fire will be discussed for its impacts to soils and other attributes of the refuge in the next section.

Accelerated erosion, soil compaction, and displacement are the primary concerns associated with maintaining long-term soil productivity. Activities that contribute to erosion, soil compaction, and displacement include construction, maintenance and use of temporary and permanent roads, forest management, recreation, and minerals management. Alternative B will have the least effect on soils from less use of roads and forest management since little to no forest management is conducted. However, Alternatives A and C will have some ground disturbing activities with forest management. Vegetative groundcover is removed with forest machinery, allowing soils to be removed by runoff. The extent of this effect depends on the soil type. The kinds and intensity of erosion control work on timber sales will be adjusted to ground conditions and the need for controlling sediment. Refuge management will conduct erosion control measures in both alternatives to reduce the potential effects from proposed forest management work.

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

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

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

Recreational activities, in general, are less disruptive to soils than typical forest management activities; however, both horses and motorized vehicles in the forest have the potential to rut and compact soils. Horseback riding is limited to trails and access roads under each alternative, and each does not allow the use of all-terrain vehicles. Permitted motor vehicles are allowed only on improved roads under each alternative.

Fire

Prescribed fires are used in each alternative, with the most extensive prescribed burn program occurring under Alternative B, Upland Management. Fires can impact soil negatively if the burn is too hot or severe, which can lead to a decrease in soil organisms, reduce too much of the organic matter and remove nutrients, all leading to soil erosion and nutrient leaching later with rains. However, burns under each alternative are generally conducted to burn at low to moderate intensities, limiting adverse impacts. Burning under Alternative A will occur in the cooler winter months. Under Alternatives B and C, the burning will be conducted in early spring months. Cooler burns generally leave the underlying, decomposed material that protects the mineral soil and helps prevent or minimize erosion. With all three alternatives having lighter severity fires, the upland habitat will gain a nutrient release and uptake by the vegetation with the prescribed fires, and soil organisms should recover quickly. A negative effect could occur with the winter burns in Alternative A, if the fires burn too severe. Hot fires may remove more of the vegetation and forest floor material and the groundcover would not be able to recover as quickly, causing erosion to increase with rains. The spring burns under Alternatives B and C will create a smaller window of ground being uncovered with vegetation and possibly less chance of erosion problems.

Hydrology

Fluctuating water levels is a priority factor in defining and constraining refuge resources and management. Bayou D'Arbonne levels are out of refuge control and respond to the manipulation from the Columbia Lock and Dam and to rainfall within the watershed. Water can be captured and released with water control structures for wintering waterfowl foraging and resting habitat under Alternatives A and C, but not under Alternative B. Under Alternative A only, water level fluctuations will be monitored to help define water availability for waterfowl foraging habitat. Otherwise, watershed flow and function are similar for all three alternatives.

Water Quality

Most likely, refuge activities proposed will only affect water quality by potentially increasing the sediment load to the watershed. "Sediment increases can adversely affect fish productivity and diversity (Alexander and Hansen 1986), degrade drinking water, and affect recreational values. Changes in water nutrients or nutrient fluxes within streams as a result of management activities [silviculture practices] are minor..." (USDA Forest Service 2005). Changes in water quality could occur as a result of road type, location, surface type, maintenance, and use. All three alternatives are similar with road impacts, since no new roads are proposed. Alternative A will change two gravel boat launches to concrete that could decrease sediment for a minimal amount next to the bayou.

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

With a more extensive burn program under Alternative B, erosion and sedimentation from plowed fire lines could potentially result in minor increases in sediment concentrations in watersheds.

All three alternatives have a degree of invasive plant control. Herbicide, however, is not direct to the water, so there will be an insignificant indirect effect.

Air Quality

All three alternatives include prescribed fire management. Alternative C has the least amount, while Alternative B has the most extensive fire program for maintaining a grassy understory in the upland pine habitat. Alternative B will have the highest potential for impacts from smoke spreading from burn areas to reduce visibility and deposit particulate matter on the surrounding landscape.

With the limited acreage involved in any of the alternatives' burn program, the prescribed fire management would only affect air quality on a local scale, with some particulate release and smoke management. The Environmental Protection Agency recognizes the need for wildland fire for sustaining ecological integrity and yet minimizes air pollution. The EPA (1998) developed its "Interim Air Quality Policy on Wildland and Prescribed Fires" with the public policy goal of allowing fire to function, as nearly as possible, in its natural role in maintaining healthy wildland ecosystems, and to protect public health and welfare by mitigating the impacts of air pollutant emissions on air quality and visibility. In order to minimize the negative effects of smoke and associated pollutants, smoke management plans are required as part of every prescribed fire burn plan. Implementation of the refuge prescribed fire program is always sensitive to potential smoke impacts on local communities, residential areas, and travel corridors. All refuge burns are executed following Louisiana Office of Forestry Voluntary Smoke Management Guidelines. The guidelines determine category days by the ventilation rate (multiply afternoon mixing height by transport windspeed). All refuge burns are conducted on days with a 4,000-16,000 ventilation rate to reduce lingering smoke and screen the distance to sensitive areas, such as communities, recreation areas, airports, highways, hospitals, nursing homes, or schools. Application of these guidelines and planning efforts will limit the risk and severity of any problems that might occur from prescribed fire smoke.

Another impact of all three alternatives will include the slight possibility for a prescribed fire to escape and cause damage to natural resources or real property either on or off the refuge. Burning under acceptable predetermined environmental conditions, and with strict adherence to an approved prescribed fire plan, will mitigate these impacts.

Vegetation

Bottomland Hardwoods

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

Alternative B will have the most intensive baseline inventory to define current conditions, but will only monitor natural succession. Active management is limited to allowing the forest to grow and succeed under only natural processes. A database will track changes in the forest composition in response to deep overflow, beaver damage, and other ecological processes, such as storms. This alternative will result in a late seral stage forest sooner and less diverse for species and vertical structure. Most of the refuge forest management resources will involve inventorying and monitoring.

Alternative A will have a moderate baseline inventory to define current conditions with active management using fire and mechanical thinning to maintain a variety of early, mid- and late-seral stages. Late-seral stage components will be maintained at less basal area and canopy cover than Alternative C, to open more patches in the forest for more shrub and midstory species that will increase hard and soft mast for wildlife and nesting structure for migratory birds. An increase of woody debris and snags will be retained in Alternative A. All three alternatives should see an increase of baldcypress and water tupelo stands. Alternatives A and B may see an increase in this rare old-growth forest type, if the experimental afforestation plots are successful. Refuge forest management resources will increase for inventorying and monitoring and active forest management (e.g., fire and thinning), as compared to Alternative C.

The effects of the open field section of the bottoms on the refuge are illustrated in Table 15. Vegetation effects will include a large increase in bottomland hardwood forest over time with natural succession under Alternative B. Alternatives A and C will continue to maintain a more diverse vegetation coverage with a moist-soil unit, grassy field, and patches of bottomland hardwood forest succession. Better management of water levels in moist-soil units will occur under Alternative A, with an increase in resources.

Mixed Pine and Hardwood Uplands

In all three alternatives, the long-term result in a portion of the mixed pine and hardwood uplands will be a grassier understory with dispersed patches of midstory and a canopy of pine and hardwoods (Table 15). The length of time to obtain this habitat condition and the extent of this condition varies across the alternatives due to resources and timing of management practices. Alternative B will reach the described habitat condition the quickest and to the greatest degree, with an intensive fire program every 2-3 years. The canopy will include a greater pine component compared to more of a hardwood component under Alternatives A and C. Under Alternative A, fall burns will be conducted instead of spring burns and be more lenient in prescribed fires' extent for a mosaic of coverage, which will increase the hardwood component. Alternative A will also temporarily have a larger hardwood mid-story component to allow those trees to grow into the canopy. Alternative C is similar to Alternatives A and B, but does not result in the desired habitat conditions due to a lack of resources.

Invasives

Alternatives A and B both have a more intensive invasive species control program than Alternative C. Alternatives A and B should increase native flora in response to a decrease in invasive species. This should be much more visible under Alternative A than Alternative C in areas post-forest treatment. After burning or thinning, invasive species move into disturbed sites. Under Alternative A, there is a comprehensive program for monitoring and controlling invasives in treatment areas.

Wildlife

Habitat management in the bottomland forest and upland hardwood pine mix, as proposed under Alternative A, serves the most diverse group of wildlife by increasing vertical structure and decreasing

stand densities in the bottoms. This creates more open patches that result in an increase in hard and soft mast species. Alternative A will include a mosaic of early, to mid or immature forest, to late or mature forest. Alternative C will include some of the same habitat management but to a lesser degree, resulting in only a few patches of early and immature forest with the majority lending toward mature forest. Alternative B will have more late-seral stage forest as the forest naturally succeeds without intervening management.

Early successional forests often provide an abundance of nesting and escape cover, and forage such as insects, small mammals, reptiles, seeds, and soft mast. However, edge species often occur and create cumulative effects on other species. For example, in edge habitats cowbirds may be more numerous and they parasitize other migratory songbird nests leading to decreased nesting success. However, the grassy/forb/shrub habitat state can be a positive effect for red-cockaded woodpeckers, Bachman's sparrow, and Henslow sparrows.

The mid or immature forest is sometimes viewed as the least beneficial to wildlife species. The closed canopy prevents sunlight from reaching the forest floor, limiting the development of herbaceous groundcover and shrubby understory. This condition does provide forage and cover for some species. For the majority of wildlife, this vertical structure condition provides lower quality habitat than early or late-seral stages, although a few species do prefer mid-stage conditions, such as hooded and Kentucky warblers.

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

Wintering and migratory waterfowl, other than wood ducks, may be less abundant under Alternative B, since the locally important moist-soil unit and grassy field under Alternatives A and C will be restored to bottomland hardwood forest. However, wood duck foraging habitat will be increased in Alternative B. The reforestation of bottomland hardwood forest will increase the core acreage under Alternative B that could result in higher quality habitat for several migratory songbirds, potentially leading to an increase in nest success and population trends for the refuge.

In Alternative A, huntable populations of locally favored game species (e.g., deer, turkey, squirrel, rabbit, and quail) will be maintained and increased in relation to habitat capability, where possible and when desirable, and where increases will not be in conflict with other species management. Nongame wildlife species will be considered and managed on a basis equitable with game species. Critical components of nongame and game species habitats, such as snags, den trees, dead and downed woody materials, and a variety of forest types and age classes, will be provided and coordinated with all other resource management activities. Deer and other early forest-stage species will be favored by the abundant grassy/forb understory under all three alternatives, but to a greater extent with the mosaic of habitat types under Alternative A. Woodpeckers and other species associated with mature forests would be supported by the older trees under Alternative B. Species requiring cavities and snags (e.g. raptors, bluebirds, and woodpeckers) will be favored over those highly dependent on hard mast (e.g., squirrels) or dense brush (e.g., gray fox).

Species of Concern

All three alternatives provide habitat for the endangered red-cockaded woodpecker and threatened bald eagle. Alternative A combines biological integrity of the habitat and species management to a greater degree than Alternatives B and C, but may have an insignificant effect temporarily on red-cockaded woodpeckers.

According to habitat guidelines set forth in the Red-cockaded Woodpecker Recovery Plan, no hardwood mid-story is to exist above 2.1 m in height, and canopy hardwoods are to be less than 10 percent of the number of canopy trees in loblolly forests. Mixed Pine and Hardwood Objectives 1, 2, and 3 under Alternative A would be in violation of the above guidelines. Although many red-cockaded woodpecker biologists agree that these woodpeckers are more accepting of hardwood trees in the loblolly pine systems of Texas and Louisiana than the red-cockaded woodpecker guidelines state, the preferred action will technically not be in accordance with the recovery guidelines. It is well known that red-cockaded woodpeckers did inhabit pine lands in northeastern Louisiana in the mid-1800s, when these areas had a greater hardwood component.

Restoring the historic fire regime to allow more hardwood trees into the landscape could potentially adversely affect individual woodpeckers by causing them to abandon the area during the interim period, when hardwoods are being allowed to regenerate, producing a heavier midstory. This effect will likely be insignificant. Once hardwood trees have reached the height of the canopy, the hardwood presence will likely have little adverse effect on the woodpeckers, because they are more tolerant of hardwoods in the canopy than hardwoods in the mid-story. Plus, restoring the historic fire regime will result in a very herbaceous understory with little to no mid-story of any kind, which is preferable to red-cockaded woodpeckers. Alternative A will produce habitat that is very similar to the open, park-like pine stands with the herbaceous understory that red-cockaded woodpeckers prefer, but there will be patches of hardwood trees within the landscape, mostly at the toe of slopes or in wet, depressions. Alternative B will result in a similar landscape but with much less to no hardwoods, creating an artificial habitat that is not aligned with the biological integrity policy. Alternative C upland management is more aligned with Alternative B, but not as extensive due to lack of resources.

The woodpeckers are more sensitive to hardwoods occurring in the nesting cluster than in their foraging habitat. For this reason, red-cockaded woodpecker management in Alternative A (Species of Concern Objective 2) will still call for strict adherence to the red-cockaded woodpecker guidelines within the 10-acre nesting cluster. In other words, hardwoods will not be promoted in the nesting cluster even under Alternative A.

The preferred action of changing the burning regime under Alternative A will still kill many hardwood trees; however, the patchiness of the burns will allow small pockets of hardwoods to regenerate. These hardwoods will be interspersed within the pine habitat that the woodpeckers utilize. Small pockets of hardwoods in wet depressions will, in all likelihood, be avoided altogether by the woodpeckers in favor of pine-dominated habitat within the landscape.

Alternatives A, B, or C will have no adverse effects on bald eagles. Nesting habitat used in the past is located in a very inaccessible, seasonally flooded stand of bald cypress. No timber thinning will ever occur in this area. The timing of flooding is such that during the nesting season most fishermen cannot get their boats in the shallow water surrounding the nest for hundreds of yards; therefore, disturbance is very unlikely.

Monitoring of wintering and nesting bald eagles will continue to ensure that refuge activities are not adversely affecting the eagle population.

Visitor Services

Management activities outlined under Alternative A are designed to improve and expand some wildlife-dependent public use opportunities, while Alternative B reduces opportunities and Alternative C maintains current visitor program. Alternative A provides more interpretation, enhanced visitor access, and a youth turkey hunt. These activities will provide an indirect positive effect on fish and wildlife resources. Alternative B will limit hunting opportunities with a target threshold to instigate deer hunting and a larger waterfowl sanctuary. Alternative A provides the existing program for deer and waterfowl hunting with expanded monitoring efforts to ensure good data are obtained on wildlife populations and the public is enjoying quality hunting experiences. Alternative C continues the existing visitor program.

Presence of the public can be detrimental to wildlife from disturbance to activities that are important to survival. However, timing of disturbance, the species involved, and activity can all vary in what degree the wildlife is affected. The key is for refuge managers to monitor the public use program and the wildlife population trends to determine if there is a significant change. Alternative A has an increased monitoring program for several wildlife species and public use programs, whereas Alternative B has a monitoring program for the deer population prior to the hunting program being allowed to occur.

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

Fishing can also influence distribution, abundance, and productivity of waterbirds. However, on Bayou D'Arbonne there are currently no waterbird colonies or rookeries that could be affected by fishing. The open field section of the refuge could potentially affect wintering and migratory waterfowl. Many studies have recommended designating confined fishing areas to reduce disturbance or temporal restrictions of fishing during critical waterfowl wintering and breeding periods (Johnson 1964; Braun et al., 1978). Many southern refuges prohibit fishing during the winter to provide sanctuary for wintering waterfowl (Braun et al., 1978). Under Alternative B, fishing may have less of an impact or disturbance to wintering waterfowl with the closure of the open field.

Public use visits for wildlife observation and photography are currently very low on the refuge. This may be a use that increases in the future if additional opportunities are provided. Alternative C provides the current opportunities of the observation tower and one designated foot path that is open all year. Alternative A improves on the current opportunities and the mowed foot path is enhanced into an interpretive nature trail and additional opportunities for a viewing area are evaluated. Again, these would be open all year. Alternative B will take the current opportunities and reduce the access during the winter and late spring to reduce disturbance to wintering waterfowl and nesting migratory birds.

Wildlife observation and photography conducted in an ethical manner can have none or minimal impacts on wildlife. However, these uses can produce negative effects if public visitation levels increase (Klein 1993), the public pursue rare species, or approach wildlife too close (Pease et al., 2005); and all these effects can differ depending upon which species is involved. Impacts can be mitigated by designating viewing areas and the use of trails. Gabrielsen and Smith (1995) suggested that some species are disturbed to a greater degree with unpredictable movement compared to humans following a particular trail. Alternative B will have the least impact from wildlife observation and photography, since the areas will be closed to access more than under Alternatives A or C. Alternatives A and C have similar levels of impacts with the opportunities being equal. Both alternatives could decrease the level of impacts by educating the visiting public on how to use the viewing areas and trail so that it understands how its activities affect wildlife, and how staying on the trail will minimize impacts. Alternative A also has the added long-term benefit of providing wildlife interpretation panels on the nature trail.

Environmental education is a use that is prioritized at the sister unit, Black Bayou Lake National Wildlife Refuge. On D'Arbonne National Wildlife Refuge, all three alternatives have only limited opportunities for working with local schools and civic groups. Impacts are minimal from disturbance to wildlife or trampling of vegetation with only a few school group tours a year. Under Alternative C, the impact may be even nonexistent due to staff being unavailable to provide tours on a case-by-case basis. Under Alternatives A and B, a few more visits a year may occur, but again, any impacts will be negligible. All three alternatives have some long-term benefits being provided by educating young people of the importance of conserving wildlife habitat and of how they fit into the natural world.

Refuge Administration

All alternatives include staff expansion and/or filling of vacancies to some degree. Staff expansion or funding increases are directly related to supporting wildlife management and visitor services. Alternative A will increase biological, forestry, maintenance, law enforcement, and administrative staff. Alternative B does not have as much staff increase but does include biological, forestry, and maintenance staff. Alternative C will maintain current staff and continue to maintain programs and facilities. A funding increase is included for Alternatives A and B to support increased staff but to also be able to accomplish more with forest management, invasive species control, increased visitor service programs, and law enforcement.

Volunteers and partnerships have proven effective in the management of D'Arbonne Refuge. All three alternatives will continue the use of volunteers to foster the implementation of the comprehensive conservation plan. Partnerships will be increased under Alternative A to work with neighbors on invasive species control and potential for Partners for Fish and Wildlife projects.

Refuge administration for contaminants and management of mineral rights will be increased under Alternatives A and B, while a limited, periodic monitoring program will continue under Alternative C. With increased surveillance of gas production facilities, potential problems should be found sooner, leading to a faster response for resolving any problems.

COORDINATION

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

Congressional representatives
Governor of Louisiana
Louisiana Department of Wildlife and Fisheries

Louisiana State Historic Preservation Officer
Tunica-Biloxi Indians of Louisiana
Quapaw Tribe
Caddo Nation of Oklahoma
Local community officials
Interested citizens
Conservation organizations

FINDINGS

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

1. Both beneficial and adverse effects have been considered and this action will not have a significant effect on the human environment. (Environmental Assessment, pages 155-163)
2. The actions will not have a significant effect on public health and safety. (Environmental Assessment, page 155)
3. The project will not significantly affect any unique characteristics of the geographic area, such as proximity to historical or cultural resources, wild and scenic rivers, or ecologically critical areas. (Environmental Assessment, pages 156-158)
4. The effects on the quality of the human environment are not likely to be highly controversial. (Environmental Assessment, pages 155-163)
5. The actions do not involve highly uncertain, unique, or unknown environmental risks to the human environment. (Environmental Assessment, pages 155-163)
6. The actions will not establish a precedent for future actions with significant effects nor do they represent a decision in principle about a future consideration. (Environmental Assessment, pages 155-163)
7. There will be no cumulatively significant impacts on the environment. Cumulative impacts have been analyzed with consideration of other similar activities on adjacent lands, in past action, and in foreseeable future actions. (Environmental Assessment, pages 155-163)
8. The actions will not significantly affect any site listed in, or eligible for listing in, the National Register of Historic Places, nor will they cause loss or destruction of significant scientific, cultural, or historic resources. (Environmental Assessment, page 155)
9. The actions are not likely to adversely affect threatened or endangered species, or their habitats. (Environmental Assessment, pages 160-161)
10. The actions will not lead to a violation of federal, state, or local laws imposed for the protection of the environment. (Environmental Assessment, pages 155-163)

SUPPORTING REFERENCES

Fish and Wildlife Service. 2006. Draft Comprehensive Conservation Plan and Environmental Assessment for D'Arbonne National Wildlife Refuge, Ouachita and Union Parishes, Louisiana. U.S. Department of the Interior, Fish and Wildlife Service, Southeast Region.

DOCUMENT AVAILABILITY

The Environmental Assessment was Section B of the Draft Comprehensive Conservation Plan for D'Arbonne National Wildlife Refuge and was made available in April and May 2006. Additional copies are available by writing: D'Arbonne National Wildlife Refuge, 11372 Highway 143, Farmerville, Louisiana 71241.

Signed

Sam D. Hamilton

8-12-06

Date