Draft Comprehensive Conservation Plan
and Environmental Assessment

UPPER OUACHITA AND HANDY BRAKE NATIONAL WILDLIFE REFUGES

and the Louisiana Wetlands Management District

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

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I. Background

INTRODUCTION

This Draft Comprehensive Conservation Plan and Environmental Assessment (Draft CCP/EA) for Upper Ouachita and Handy Brake National Wildlife Refuges (NWRs) and the Louisiana Wetlands Management District (LWMD) was prepared to guide management actions and direction for these lands. 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 Service or the purposes for which these lands were established.

A planning team developed a range of alternatives that best met the goals and objectives of these lands and that could be implemented within the 15-year planning period. This Draft CCP/EA describes the Fish and Wildlife Service's proposed action, as well as other alternatives considered and their effects on the environment. This Draft CCP/EA will be made available to State and Federal government agencies, conservation partners, and the general public for review and comment. Comments from each entity will be considered in the development of the Final CCP.

PURPOSE AND NEED FOR THE PLAN

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

Specifically, the CCP is needed to:

- Provide a clear statement of management direction;
- Provide neighbors, visitors, and government officials with an understanding of Service management actions on and around the refuges;
- 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.

FISH AND WILDLIFE SERVICE

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

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

The Department of Commerce, Bureau of Fisheries, was combined with the Department of Agriculture, Bureau of Biological Survey, on June 30, 1940, and transferred to the Department of the

Interior as the Fish and Wildlife Service. The name was changed to the Bureau of Sport Fisheries and Wildlife in 1956, and finally to the U.S. Fish and Wildlife Service in 1974.

The U.S. Fish and Wildlife Service is responsible for conserving, enhancing, and protecting fish and wildlife and their habitats for the continuing benefit of people through Federal programs relating to wild birds, endangered species, certain marine mammals, inland sport fisheries, and specific fishery and wildlife research activities (142 DM 1.1).

As part of its mission, the Service manages more than 545 national wildlife refuges, covering over 95 million acres. These areas comprise the National Wildlife Refuge System, the world's largest collection of lands set aside specifically for fish and wildlife. The majority of these lands, 77 million acres, is in Alaska. The remaining acres are spread across the other 49 States and several United States' territories. In addition to refuges, the Service manages thousands of small wetlands, national fish hatcheries, 64 fishery resource offices, and 78 ecological services' field stations. The Service enforces Federal wildlife laws, administers the Endangered Species Act, manages migratory bird populations, restores nationally significant fisheries, conserves and restores wildlife habitat, and helps foreign governments with their conservation efforts. It also oversees the Federal Aid program that distributes hundreds of millions of dollars in excise taxes on fishing and hunting equipment to State fish and wildlife agencies.

NATIONAL WILDLIFE REFUGE SYSTEM

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

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

The National Wildlife Refuge System Improvement Act of 1997 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 CCPs for all refuges. These CCPs, which are completed with full public involvement, help guide the future management of refuges by establishing natural resources and recreation/education programs. Consistent with this Act, approved CCPs 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 CCPs that are prepared for each unit of the Refuge System;
- Maintain the biological integrity, diversity, and environmental health of the Refuge System; and
- Recognize that wildlife-dependent recreation activities, including hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation, are legitimate and priority public uses; and allow refuge managers authority to determine compatible public uses.

The following are just a few examples of your national network of conservation lands. Pelican Island National Wildlife Refuge, the first refuge, was established in 1903 for the protection of colonial nesting

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

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

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

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

LEGAL AND POLICY CONTEXT

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

Administration of national wildlife refuges is guided by the mission and goals of the 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.

Treaties, laws, administrative guidelines, and policy guidelines assist the refuge manager in making decisions pertaining to soil, water, air, flora, fauna, and other natural resources; historical and cultural resources; research and recreation on refuge lands; and provide a framework for cooperation between Upper Ouachita and Handy Brake NWRs, the LWMD, and partners such as local landowners, the Louisiana Department of Wildlife and Fisheries, U.S. Geological Service, the Nature Conservancy, Ducks Unlimited, National Audubon Society, Louisiana Tech University, Grambling University, and the University of Louisiana at Monroe.

Select legal summaries of treaties and laws relevant to administration of the National Wildlife Refuge System and management of the Upper Ouachita and Handy Brake NWRs and the LWMD are provided in Appendix C.

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

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

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

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 Draft CCP/EA.

This Draft CCP/EA supports the North American Bird Conservation Initiative, the North American Waterfowl Management Plan, the Partners-in-Flight Conservation Plan, the U.S. Shorebird Conservation Plan, and the North American Waterbird Conservation Plan.

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

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

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

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

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

RELATIONSHIP TO STATE WILDLIFE AGENCY

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

protection of species, and contribute to the overall health and sustainment of fish and wildlife species in the State of Louisiana.

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 (LDWF) 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. LDWF coordinates the State wildlife conservation program and provides public recreation opportunities on State wildlife management areas. Russell Sage, Ouachita, Union, and Bouef State management areas are within the ecosystem of Upper Ouachita and Handy Brake NWRs and the LWMD. The LDWF has also partnered with the Service on the development of this Draft CCP/EA through participation on the core planning team, biological review team, and internal reviews of the document.

LOUISIANA DEPARTMENT OF NATURAL RESOURCES

The mission of the Louisiana Department of Natural Resources (LDNR) 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, which includes some of the Refuge System lands of the district. Mineral rights were not obtained when the refuge was acquired. The refuge works with LDNR to maintain current records of all active and inactive gas leases on refuge lands.

The State's participation and contribution throughout this planning process will provide 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

The Upper Ouachita NWR and LWMD, which includes Handy Brake NWR, are units of the North Louisiana National Wildlife Refuge Complex (Figure 1). This Complex includes D'Arbonne NWR, Upper Ouachita NWR, Black Bayou Lake NWR, Handy Brake NWR, Red River NWR, and the LWMD. D'Arbonne, Red River, and Black Bayou Lake NWRs have issues that are unique and will require separate planning efforts and public involvement (Table 1.) It was determined that the planning efforts and public involvement for Upper Ouachita and Handy Brake NWRs and the LWMD could be combined with one Draft CCP/EA covering these units. The D'Arbonne NWR planning effort has been completed and planning effort for Red River NWR is in development. The remaining Black Bayou Lake NWR Draft CCP/EA will be initiated in Fiscal Year 2008.

Table 1. North Louisiana National Wildlife Refuge Complex proposed schedule for comprehensive conservation plan and environmental assessment development

Refuge	*Proposed Start*	*Proposed Finish*
D'Arbonne NWR	January 2004	September 2006
Upper Ouachita NWR	October 2005	September 2008
Handy Brake NWR	October 2005	September 2008
Louisiana Wetlands Management District	October 2005	September 2008
Red River NWR	February 2006	September 2008
Black Bayou Lake NWR	March 2008	September 2010

UPPER OUACHITA NWR

Upper Ouachita NWR is located in northeastern Louisiana. The northern boundary lies on the Louisiana-Arkansas state line. The refuge borders both sides of the Ouachita River running north-south for 13.7 miles and extends 3.3 miles to the east and 16 miles to the west. The southernmost point on the refuge is approximately 20 miles north of Monroe, Louisiana. The current acquisition area encompasses 61,633 acres, of which 42,594 acres have been purchased, with 26,304 acres in Union Parish and 16,290 acres in Morehouse Parish (Figure 2).

Upper Ouachita NWR was established in November 1978. The refuge consists of 4,540 acres of pine and pine/hardwood mix; 19,767 acres of bottomland hardwood forest; 9,236 acres of reforested bottomlands; 2,000 acres of scrub-shrub; 1,182 acres of moist-soil impoundments; 2,541 acres of agricultural fields; 682 acres of fallow agricultural fields; and 2,910 acres of open water. Habitat management is primarily focusing on reforestation, burning and thinning of uplands and bottomlands to promote a healthy forest, maintaining moist-soil units, and partnering for waterfowl foraging habitat.

Figure 1. North Louisiana National Wildlife Refuge Complex

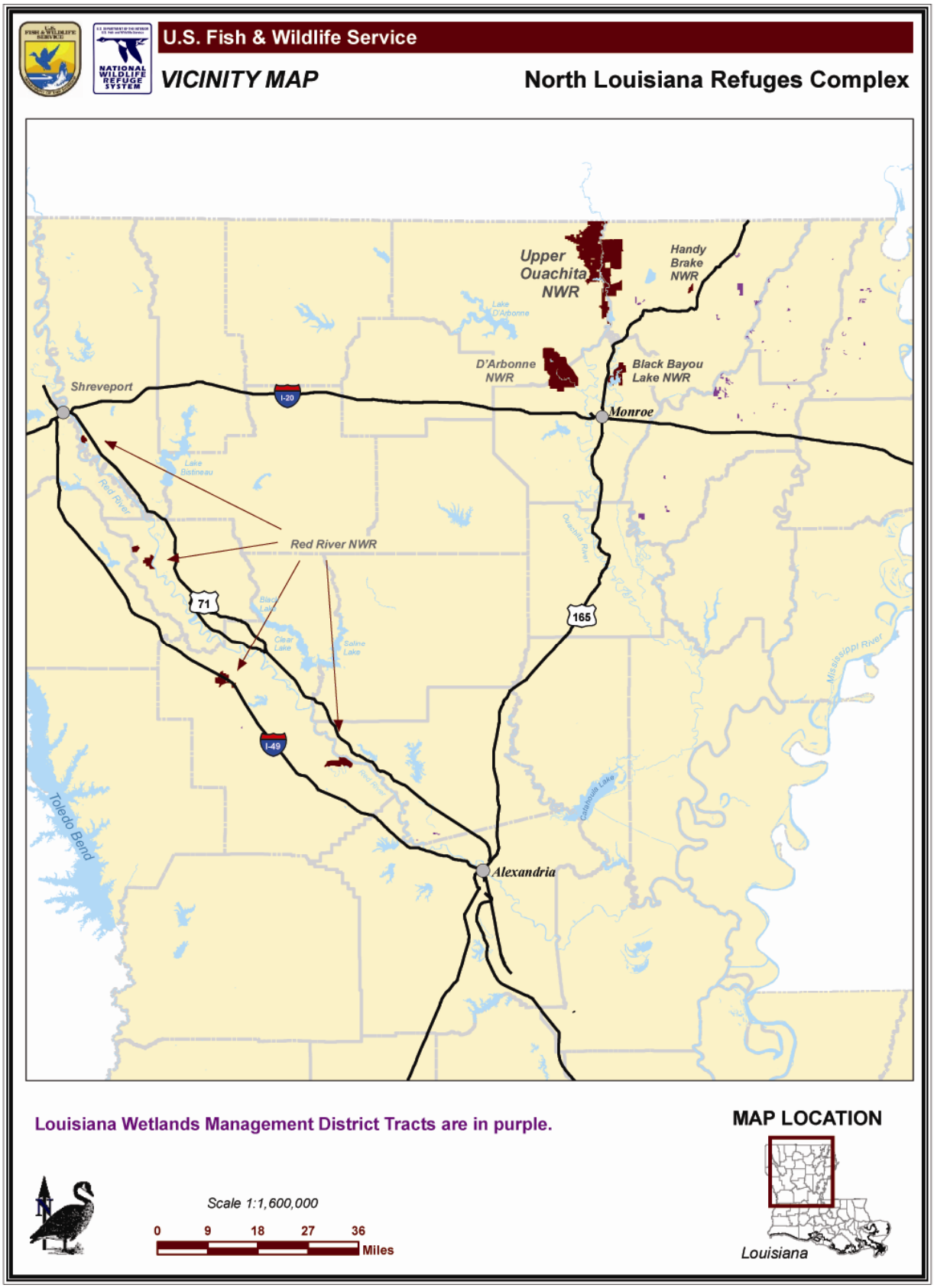
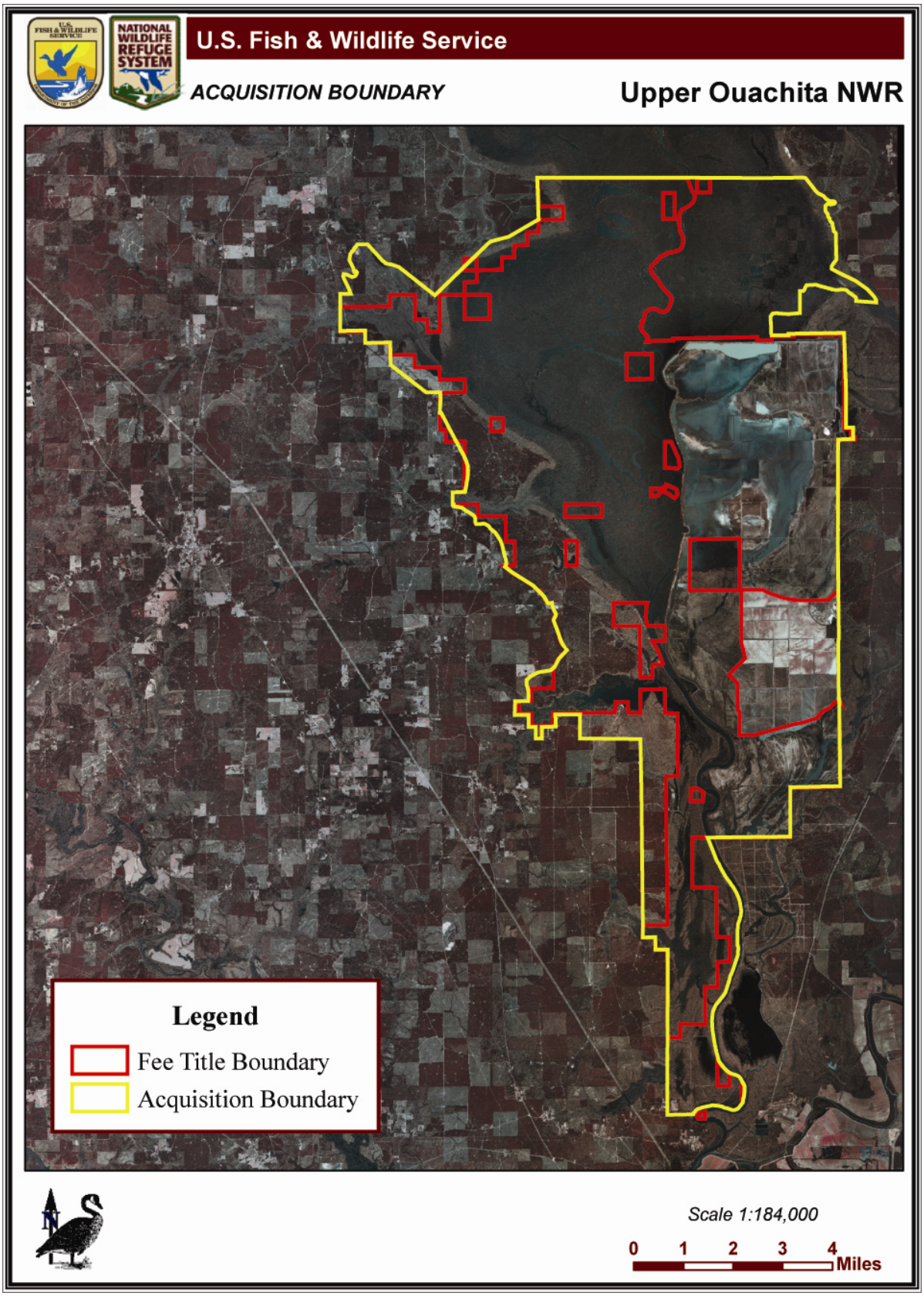


Figure 2. Upper Ouachita National Wildlife Refuge



The Ouachita River is designated as a Louisiana Natural and Scenic River. The refuge provides habitat for thousands of wintering ducks and geese and year-long habitat for wood ducks. The endangered red-cockaded woodpecker and threatened Louisiana black bear use the refuge throughout the year. The bald eagle also uses the refuge.

Hunting and fishing opportunities are permitted on most areas of the refuge, and is open year-round for wildlife observation, nature photography, and hiking. All-terrain vehicle trails and management roads are provided for access.

LOUISIANA WETLANDS MANAGEMENT DISTRICT INCLUDING HANDY BRAKE NWR

The Louisiana Wetlands Management District (LWMD) was established in 1990, in response to growing Fish and Wildlife Service land-based responsibilities off of traditional refuges. The Wetlands Office is responsible for the administration of wetland easements and fee title land transfers from the USDA Farm Service Agency (FSA) and for the fall and winter leasing of privately owned wetlands in northeastern Louisiana. It also includes the first fee title tract transfer from the Farm Service Agency to the Fish and Wildlife Service with the establishment of Handy Brake National Wildlife Refuge in 1988. The LWMD includes 36 FSA easements, 7 fee title tracts, and 1 lease that are concentrated in northeastern Louisiana (Figure 3) and encompass 6 parishes (Table 2). The LWMD is spread across north Louisiana in 44 units, ranging in size from 3 acres to 1,000 acres (Table 2).

Handy Brake NWR is primarily a permanent wetland of excellent habitat for wintering waterfowl, wading birds, and many other wetland-dependent species. A free lease of 35 acres of International Paper Company land provides an upland area overlooking the wetland. An observation deck in the upland area provides wildlife viewing opportunities into the wetlands. Habitat management within the LWMD focuses primarily on reforestation of marginal agricultural areas and development and maintenance of moist-soil units. These varied habitats provide for a diverse array of wildlife. There is no hunting or fishing permitted throughout the LWMD.

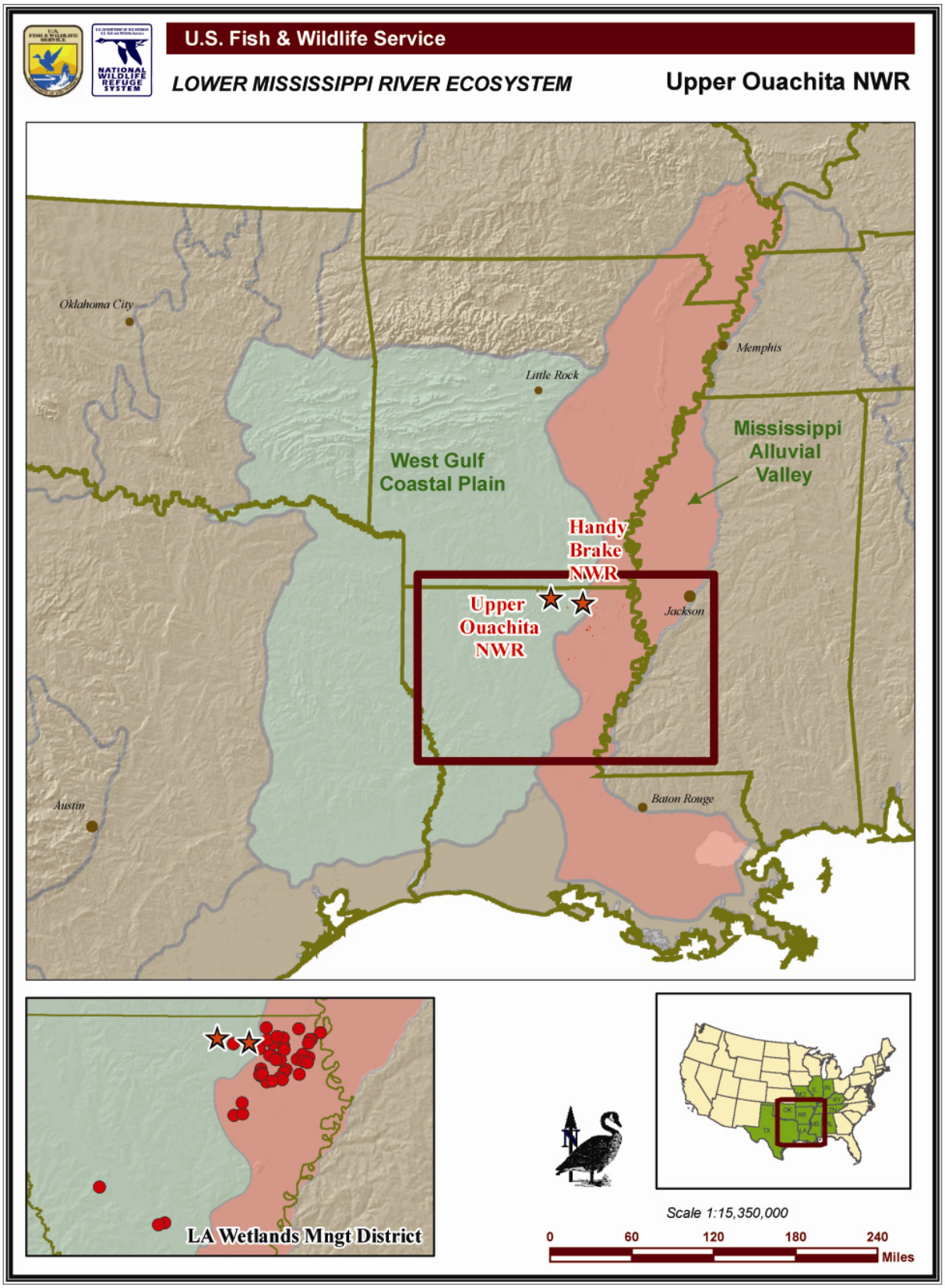
REFUGE HISTORY AND PURPOSE

UPPER OUACHITA NWR

Upper Ouachita NWR was established in November 1978. The federally legislated purposes are “for use as an inviolate sanctuary, or for any other management purpose, for migratory birds” (Migratory Bird Conservation Act, 16 U.S.C. 715d); and for “…the conservation of the wetlands of the nation in order to maintain the public benefits they provide and to help fulfill international obligations contained in various migratory bird treaties and conventions…” (16 U.S.C. 3901b).

In about 1977, Pennzoil Producing Company, a major landowner in the Ouachita River area, began to sell its holdings. Morehouse and Union Parishes Police Juries suggested the Louisiana Wildlife and Fisheries Commission as a possible purchaser. Without having the funds, the commission referred the Fish and Wildlife Service as a possible purchaser and Service personnel began to work toward a purchase agreement. In early 1978, when the Service learned that Pennzoil was willing to sell most of its 26,130 acres in the refuge area, an environmental assessment was prepared and signed by the Regional Director on July 20, 1978. In November, the first acquisition was completed with the sale of 20,834 acres by Pennzoil. Only the surface rights to the land were acquired, with Pennzoil reserving in perpetuity all oil and gas deposits found under the land. The Mollicy Unit, which totals 16,191 acres, was purchased from one landowner in parcels from 1997-1999. Plum Creek Timber Company sold 4,939 acres to the Service on the western edge of the refuge (from 1999 to 2004).

Figure 3. The Lower Mississippi River Ecosystem with Upper Ouachita and Handy Brake National Wildlife Refuges and the Louisiana Wetlands Management District



The current acquisition area encompasses 61,633 acres in northeast Union Parish and northwest Morehouse Parish, Louisiana. The current area owned in fee title totals 42,594 acres. The current acquisition boundary includes the area to the north of the Mollicy Unit, all inholdings, and areas to the south of the refuge, west of the river (Figure 2). These areas, mostly comprising bottomland hardwood forest, are adjacent to the refuge and would contribute to the core area of protected habitat for migratory birds and other wildlife.

LOUISIANA WETLANDS MANAGEMENT DISTRICT INCLUDING HANDY BRAKE NWR

In 1988, prior to the establishment of the LWMD, the maxi-lease program was implemented as an initiative of the North American Waterfowl Management Plan. With plummeting waterfowl populations, habitat was leased primarily to provide waterfowl sanctuaries. Large tracts of agricultural lands, especially rice, and subject to winter flooding, were leased annually at $3/acre and posted. Monitoring and enforcement were provided to the landowner, but limited due to manpower shortages. In 1990, the LWMD was established with primary objectives being evaluation and management of the maxi-leases. The primary reason the Service acquired the leases was to provide waterfowl habitat in an undisturbed setting. Some agreements included requirements of the landowner to provide pumping to wetlands on the lease to ensure water availability for wintering waterfowl. Currently, the Service only manages one property under the maxi-lease program (Table 2).

The LWMD was established in response to growing Fish and Wildlife Service land-based responsibilities off of traditional refuges. The Wetlands Office is responsible for the administration of wetland easements and fee title land transfers from the FSA. The Wetland Office manages these properties under the purpose of "… for conservation purposes…" (Consolidated Farm and Rural Development Act, 7 U.S.C. § 2002), and for the benefit of endangered species, resident and migratory waterfowl, neotropical migratory birds, and other wildlife.

Land that could be conveyed under the provisions of the Food Security Act of 1985 (i.e., Farm Bill) was signed, allowing the Service to request lands in fee title or easement once the FSA foreclosed on a piece of property. Fee title transfers from the FSA to the Fish and Wildlife Service through the Secretary of the Interior, by authority of Section 354 of the Consolidated Farm and Rural Development Act (7 U.S.C. 2002) transfer, without reimbursement, of fee title or other interest therein of inventory lands to any Federal or State agency for conservation purposes. They go through a process and determine that the "rights of all prior owners and operators of the lands described below have expired, that the land is determined to be suitable or surplus, and that it has marginal value for agricultural production, is environmentally sensitive, or has special management importance, and that this transfer and conveyance comports with and is in furtherance of said authority."

Handy Brake NWR was the first fee title transfer of a FSA tract to the Fish and Wildlife Service in 1988, with an establishing purpose of "… for conservation purposes…" (Consolidated Farm and Rural Development Act, 7 U.S.C. § 2002). The language of the establishing legislation is relevant only to those lands owned in fee title by the Government (Table 2).

Changes in the 1990 Farm Bill all but eliminated the opportunity to acquire significant new parcels from FSA inventory. Easement administration was then assigned to the Service pursuant to the National Wildlife Refuge System Administration Act (16 U.S.C. 668dd et seq.). "This easement is under the authority and in furtherance of the provisions of Federal law, including sections 331 and 335 of the Consolidated Farm and Rural Development Act (7 U.S.C. 1981, 1985), Executive Order 11990 providing for the protection of wetlands, and Executive Order 11988 providing for the management of floodplains. The restrictions and covenants contained in this easement constitute a perpetual servitude on and run with the property." Thirty-six easement tracts were established and

are regulated by the associated refuge easement (Table 2). The easement reservation does not authorize public entry upon or use of the land.

For this Draft CCP/EA, the fee title wetland management tracts, easement tracts, and lease are combined to evaluate them as a group and a program. The purposes and management capabilities and challenges are similar for all 44 Refuge System properties. However, Handy Brake NWR, though having the same purpose, has a slightly different management capability to merit developing a separate programmatic direction. All goals, objectives, and strategies are intended to support the individual purposes for which each Refuge System property was established.

Fish and Wildlife Service and Landowner Rights with Easement Properties

The conservation and wetland easements of the LWMD are primarily based on the same type of agreement between the Service and landowner. Since the program was established, some have questioned what rights the Federal Government purchased from the landowners relative to the property. According to agreements and historical records, it appears the intent was not to control the uses that occur on the uplands or naturally occurring wetlands. Generally, the agreements have the following language:

Covenants by the Landowner

- No dwellings, barns, outbuildings, or other structures will be built within easement area.
- Vegetation or hydrology of easement area will not be altered in any way or by any means or activity, including cutting or mowing; cultivation; grazing; harvesting wood products; burning; placing of refuse, waste, sewage, or other debris; draining, dredging, channeling, filling, disking, pumping, diking, impounding and related activities; or diverting or affecting the natural flow of surface or underground waters into, within, and out of the easement.
- Will be responsible for compliance with all Federal, State, and local laws for control of noxious or other undesirable plants on easement area.
- Cattle or other stock shall not be permitted on the easement area, except easement manager shall permit access to and use of waters within the area necessary for stock watering under terms as easement manager deems necessary to protect purposes of the easement.

Rights to Fish and Wildlife Service

- Right of ingress and agrees to conduct wetlands management, monitoring, and easement enforcement activities.
- Right to install, operate, and maintain structures for purpose of reestablishing, protecting, and enhancing wetlands' functional values.
- Right to establish or reestablish vegetation through seedings, planting, or natural succession.
- Right to manipulate vegetation, topography, and hydrology on easement areas through diking, pumping, water management, excavating, island construction, burning, cutting, pesticide application, fertilizing, and other appropriate practices.
- Right to conduct predator management activities.
- Right to construct and maintain fences in order to prevent grazing or other types of encroachment on easement area.

Table 2. Description for each refuge system property within the LWMD

Tract	*Ownership*	*Year*	*Acres*	*Floodplain*
Morehouse Parish				
Handy Brake NWR	Fee title	1988	468	
International Paper	Lease	1993	35	
King & Iverson South	Fee title	1992	876?	Within Boeuf River floodplain
Oliveros Tract (Burress and King were separate tracts combined)	Fee title	(1993 & 1992)	1000 (668 & 332)	Within Arkansas Alluvial Cone between Boeuf River and Bayou Bonne Idee (Burress and King have water management capability
R.Adcock	Easement	1990	250	
B.Brown	Easement	1990	103	Adjacent to Bayou Bonne Idee
McKinnie	Easement	1991	76	Along Bayou Bonne
Richland Parish				
R&A Farms	Fee title	1991	200	Boeuf River and Bayou Lafourche floodplain
A. Adcock	Fee title	1991	306	
W.R. Adcock	Fee title	1992	355	Boeuf River and Bayou Lafourche floodplain
Lewis	Easement	1990	29	
Leggitt	Easement	1990	49	
Moore	Easement	1990	24	
Norman	Easement	1989	322	Boeuf River and Bayou Lafourche floodplain
W-W North	Easement		269	
W-W South	Easement		82	

Richland Parish				
Douciere	Easement	1990	480	Between Boeuf River and Big Creek
Nobles	Easement	1990	140	
Thomas	Easement	1990	107	Within Boeuf River floodplain along Cypress Creek and headwaters of Cow Bayou
Walker	Easement	1989	4	Within Boeuf River floodplain
West Carroll				
Johnson	Easement	1998	3	Archaeological site
Burrell	Easement	1996	7	Along Macon Ridge with two tributaries of Colewa Bayou
Dosher	Easement		21	Within Bayou Macon floodplain along bogzack Creek
Hendrix	Easement	1990	19	Within Bayou Macon floodplain along Bear Skin Bayou
Leguin	Easement	1990	56	Within Boeuf River floodplain adjacent to Big Colewa Bayou
Mayhall	Easement	1990	182	Within Boeuf River floodplain bordering Colewa Bayou
Oldham	Easement	1990	15	Within Boeuf River floodplain with Colewa Bayou running through northwest corner
Prisock	Easement	1994	49	Within Boeuf River floodplain
Rawls	Easement	1990	14	Within Boeuf River floodplain adjacent to Big Colewa Bayou
Smith	Easement	1990	14	
East Carroll				
Harden	Fee title	1996	31	Within Bayou Macon floodplain and adjoins Caney Bayou
Coleman	Easement	1990	42	Within Bayou Macon floodplain along Joe's Bayou
Gilfoil	Easement	1989	7	

East Carroll				
Harvey	Easement	1990	35	Within Bayou Macon floodplain
Love	Easement	1990	113	
Minsky	Easement	1990	75	
Pippin Farms	Easement	1992	93	Within Bayou Macon floodplain bordering Joe's Bayou
Robinson	Easement	1990	86	Within Bayou Macon floodplain
Travis-Bobby	Easement	1990	56	Within Bayou Macon and Tensas Bayou floodplain, adjoins Joe's Bayou and Cypress Bayou passes through
Travis-William	Easement	1990	46	Within Bayou Macon floodplain
Wolfe	Easement	1990	7	Within Tensas Bayou floodplain
Grant				
Dean now Trotter	Easement	1989	88	Within Red River alluvial cone adjacent to Bayou Marteau
Brister	Easement	1990	19	Within Red River alluvial cone between Red River and Bayou Darrow
Natchitoches				
Van Matre	Easement	1990	11	Within Red River alluvial cone within Young's Bayou drainage on Montgomery Terrace; may have yellow lady slipper orchid (*Cypipedium kentuckiense*)

- Right to prohibit or regulate hunting or other taking of migratory birds, notwithstanding permissive provisions of State or Federal law. Unless the easement manager prohibits public entry, the landowner may permit it at the landowner's discretion. Subject to the easement manager posting the area, or giving notice of prohibitions to the landowner, the landowner and invitees may hunt and fish on the easement area in accordance with all Federal, State, and local game and fish regulations.

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 in order for it to be included in the system. The Act also established a regulatory program and empowered the Secretary of the LDWF to administer the system through regulation and permits.

LDWF designated the Ouachita River a Louisiana Natural and Scenic River. This designation extends across Morehouse and Union Parishes, from the north bank of Bayou Bartholomew at its intersection with the Ouachita River, to the Arkansas State line. Bayou Bartholomew, located in Morehouse Parish, is also designated a Louisiana Natural and Scenic River. This designation extends from the Louisiana-Arkansas State line to Dead Bayou. There is strong interest at the local, State, and Federal 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 the local residents and visitors. Therefore, certain activities, which drastically alter the natural and scenic qualities 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.

ECOSYSTEM CONTEXT

LOWER MISSISSIPPI RIVER ECOSYSTEM (LMRE)

The LMRE includes the alluvial plain of the Mississippi River downstream of its confluence with the Ohio River and the delta plain and associated marshes and swamps created by the meanderings of the Mississippi River and its tributaries (USFWS 2002). Louisiana has twelve water quality management basins delineated on the basis of natural drainage patterns of its major river basins (Lester et al., 2005). The Upper Ouachita and Handy Brake NWRs are within the drainage basins and tributaries of the Ouachita Basin. Upper Ouachita and Handy Brake NWRs, and four properties within the LWMD, are within the Upper West Gulf Coastal Plain ecoregion. The majority of the LWMD is within the ecoregion of the Mississippi Alluvial Valley (MAV) section of the LMRE (Figure 3). Three easements in Grant and Natchitoches Parishes are within the Red Basin and the ecoregions of the Lower West Gulf Coastal Plain and Upper West Gulf Coastal Plain.

Upper Ouachita NWR and the LWMD, including Handy Brake NWR, are in the heart of protected bottomland hardwood forests and wetlands of north Louisiana. Five national wildlife refuges (D'Arbonne, Upper Ouachita, Black Bayou Lake, Handy Brake and Tensas River), thirty-six Fish and Wildlife Service easements, and thirty-six LDWF wildlife management areas are lands focused on conservation, enhancement, and restoration of bottomland hardwood forests; moist-soil management; endangered species management; environmental education; and compatible wildlife-dependent recreation in the LMRE. The LMRE guides Service efforts to

enhance, restore, and conserve the natural functional processes and habitat types of the LMRE, while maintaining the economic productivity and recreational opportunities.

The ecosystem serves as 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 LMRE developed eight goals that this Draft CCP/EA will consider and promote when establishing refuge goals and objectives to ensure the refuge continues its contribution to ecosystem conservation and integrity. These goals are:

- Conserve, enhance, protect, and monitor migratory bird populations and their habitats in the LMRE.
- Protect, restore, and manage the wetlands of the LMRE.
- Protect and/or restore imperiled habitats and viable populations of all threatened, endangered, and candidate species and species of concern in the LMRE.
- Protect, restore, and manage the fisheries and other aquatic resources historically associated with the wetlands and waters of the LMRE.
- Restore, manage, and protect national wildlife refuges and national fish hatcheries.
- Increase public awareness and support for LMRE resources and their management.
- Enforce natural resource laws.
- Protect, restore, and enhance water and air quality throughout the LMRE.

West Gulf Coastal Plain Bird Conservation Region

The LMRE is covered primarily by two bird conservation regions: Mississippi Alluvial Valley and West Gulf Coastal Plain (Figure 3). The West Gulf Coastal Plain includes Upper Ouachita and Handy Brake NWRs, as well as some of the LWMD properties because it reaches to the most northwestern 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).

Mississippi Alluvial Valley Bird Conservation Region

Most of the LWMD properties lie within a physiographic region known as the Mississippi Alluvial Valley (MAV) (Figure 3). The MAV was at one time a 25-million-acre forested wetland complex that extended along both sides of the Mississippi River from Illinois to Louisiana. The primary threats to these forests include forest loss and fragmentation, alterations to hydrology, siltation of aquatic ecosystems, and proliferation of invasive aquatic plants.

REGIONAL CONSERVATION PLANS AND INITIATIVES

BLACK BEAR CONSERVATION COMMISSION (BBCC)

The goal of the BBCC “is to promote the restoration of the Louisiana black bear in its historic range, through education, research, and habitat management.” The Service is a partner with the BBCC in

its repatriation efforts. Although Upper Ouachita NWR is not considered an area for repatriation, the refuge supports timber management guidelines that produce good bear habitat. Bears have been seen on the refuge and may be utilizing it for more than just a travel corridor. Two properties of the LWMD lie within the core breeding area of the Louisiana black bear, while thirteen properties lie within its historic range.

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 the baseline year of 1980 [58,857,000]." The population objective for the West Gulf Coastal Plain Bird Conservation Region is to add 131,033 new coveys, with 21,833 of these in Louisiana. Habitat management is the primary vehicle for accomplishing this goal with two specific objectives:

1) 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.
2) 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.

AMERICAN WOODCOCK MANAGEMENT PLAN

The Woodcock 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. Although habitat for woodcock is limited on Upper Ouachita NWR and the LWMD, habitat practices that benefit woodcock are considered in this Draft CCP/EA.

RED-COCKADED WOODPECKER RECOVERY PLAN

The red-cockaded woodpecker population on Upper Ouachita NWR is considered an important support population, but is not identified in the recovery criteria (USFWS 2003). The CCP will evaluate resource and management needs for RCW management under the guidelines for critically small populations, as defined in the RCW Recovery Plan. These include such things as monitoring nest success, pre-breeding roost checks, maintaining at least four suitable cavities in each cluster, augmenting the population as needed, maintaining 120 acres of good quality foraging habitat for each group, and using prescribed fire during the growing season to maintain an herbaceous understory (USFWS 2003).

LOUISIANA COMPREHENSIVE WILDLIFE CONSERVATION STRATEGY (WILDLIFE ACTION PLAN)

The LDWF Comprehensive Wildlife Conservation Strategy (CWCS) was defined in 2005 (Lester et al., 2005). Its mission statement follows:

> Louisiana Department of Wildlife and Fisheries' mission is to manage, conserve, and promote wise utilization of Louisiana's renewable fish and wildlife resources and their supporting habitats through replenishment, protection, enhancement, research, development, and education for the social and economic benefit of current and future generations; to provide opportunities for knowledge of and use and enjoyment of these resources; and to promote a safe and healthy environment for the users of the resources.

The State developed four goals with associated objectives that this CCP will consider and promote to ensure that the refuge and LWMD continue their contribution to Louisiana wildlife conservation and habitat integrity. These four goals are:

- Provide the habitat and ecosystem functions that support healthy and viable populations of all species, avoiding the need to list additional species under the Endangered Species Act.
- Identify, conserve, manage, and restore terrestrial and aquatic habitats which are a priority for the continued survival of species of conservation concern.
- Support educational efforts to improve the understanding by the general public and conservation stakeholders regarding species of conservation concern and related habitats.
- Improve existing partnerships and develop new partnerships between LDWF and State and Federal natural resource agencies, non-governmental organizations and environmental groups, private industry, and academia.

The primary focus of the CWCS is species of conservation concern and the habitats they depend upon. Information relative to these species and those habitats found on Refuge System lands will be evaluated for opportunities to foster conservation efforts.

ECOLOGICAL THREATS AND PROBLEMS

LOSS OF BOTTOMLAND HARDWOOD FOREST AND FRAGMENTATION

The entire 25-million-acre LMV 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 of bottomland hardwood forests remain in the LMV. In Louisiana, 50-75 percent loss of bottomland hardwood forest has occurred statewide (Lester et al., 2005). Loss and fragmentation has primarily occurred due to cropland conversion and hydrological changes associated with flood control. There are a few large tracts remaining, such as Upper Ouachita NWR and State wildlife management areas, but much of it is second growth and not old growth forest. This unique ecosystem is important to hundreds of wildlife species and native plant communities. Bottomland hardwood forests 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. Conserving bottomland hardwood forest habitat is also a high priority for nesting neotropical migratory birds, breeding habitat for area-sensitive birds, and necessary stopover habitat for spring migratory birds coming across the Gulf of Mexico.

Because the remaining bottomland forest is so fragmented, conservation often focuses on retention or restoration of blocks of forest that are connected and of sufficient size to support healthy populations of bottomland hardwood forest birds. The refuge contributes to bottomland hardwood conservation by maintaining more than 19,000 acres of mature bottomland hardwood forest and 9,236 acres of reforestation as a critical component of maintaining a forested corridor in the Ouachita River basin. The refuge provides important 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. Over 10,000 wading birds utilize the refuge's bottomland hardwood forests during late summer and when post-breeding dispersal occurs.

ENCROACHMENT OF INVASIVES

Non-native or invasive plants alter the function of ecosystems by degrading wildlife habitat, displacing native species, changing 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. Until recently, invasive species were considered a minor nuisance. Meanwhile, two invasive plants, Japanese climbing fern and Chinese tallow tree, moved northward into this area and now threaten to disrupt the entire ecosystem both on and off the refuge. Other invasive plants found on the refuge include water hyacinth, princess tree, tree-of-heaven, Chinaberry, and mimosa. No formal monitoring program has been established and only opportunistic treatment has occurred. This threat has the potential to significantly decrease the integrity and natural diversity of plants and wildlife in all refuge habitats.

CONTAMINANTS

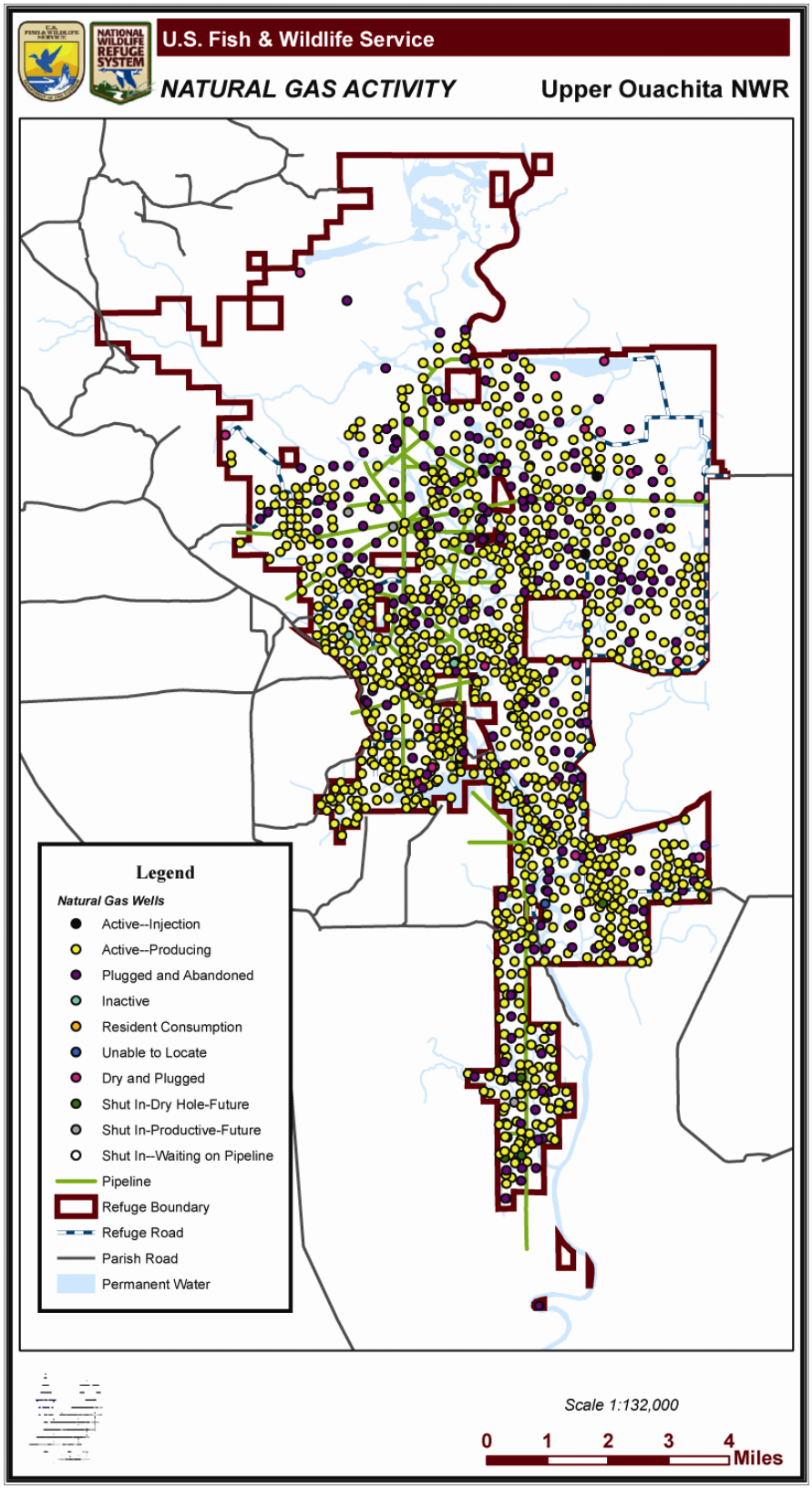
The Monroe Gas Field (MGF) underlies portions of Ouachita, Union, and Morehouse Parishes in northeast Louisiana. At the time of initial discovery and development, during the 1920s, it was the largest known gas field in the United States. A portion of the MGF underlies approximately 32,900 acres of the 42,594-acre Upper Ouachita NWR (Figure 4). 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 MGF more than doubled. In some instances, wells were drilled within 600' 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, 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 and 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 caused by increases in nest depredation and cowbird parasitism. The clearing of vegetation can result in destroying potential nesting and foraging trees within red-cockaded woodpecker clusters, and drilling can cause disturbance during the nesting season. There is potential for further habitat 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 surface soil layer was broken, animals, people, or eguipment would sink to the bottom of the pit, a distance of up to seven feet.

Figure 4. Natural gas activity on Upper Ouachita NWR



3) Abandoned or poorly maintained wells and facilities: equipment parts, survey marking tape, 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, needed, or when the well is vacated for reasons such as completion of the well or following repair projects. Often, equipment is left in place to rust and become an eyesore and result in additional cleanup duty for the refuge. Litterers can be cited by law enforcement, but dealing with this activity takes time away from more pressing law enforcement duties. Abondoned equipment can also be a safety hazard.

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 substances, and all known spill sites have been remediated. The primary source of environmental exposure to mercury is through the consumption of fish. It is likely that this contamination is related to the levels of methyl mercury in the Ouachita River and its tributaries.

5) Saltwater contamination of soil and water: saltwater contamination of soil and water was once a serious problem on the refuge. Saltwater (brine) is a by-product of natural gas during its production process. It was formerly stored in open pits that were subject to leaks and seasonal floodings. 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.

BARGE TRAFFIC AND SUBSEQUENT CHANNEL MAINTENANCE

Within the refuge, the Ouachita River is dredged by the Army Corps of Engineers (Corps) to allow navigation by barge traffic. The refuge portion of the river has not been straightened, and consequently, barges sometimes crash into the banks of the river, removing large swaths of trees on the refuge. Barge traffic needs to be monitored for impacts and disturbance to the refuge resources.

The Corps has caused siltation on the refuge by blowing dredge spoil (sand) on shore during high-water events. These disposal activities of dredge spoil being pumped into the forests need to be monitored and analyzed to determine if there are impacts to habitat and wildlife.

PHYSICAL RESOURCES

CLIMATE

The climate of the refuge lands is typical of northern Louisiana and largely determined by the large land mass to the north, the subtropical latitude, and the Gulf of Mexico to the south. Prevalent winds are from the south or southeast. Summer weather is predictable with regular thundershowers that develop rapidly. Occasionally, periods of hot, dry weather may interrupt the normally moist summer conditions. During late summer and fall, hurricanes and tropical storms may move across coastal Louisiana. Such occurrences may produce unusually heavy rainfall in the refuge area, and, at times,

bring damaging winds. Fall, winter, and spring weather is more variable with cold polar continental air alternately replacing the warmer humid subtropical air. Large cyclonic winter storms usually track north of the refuge area. Occasionally, when these storms track farther south, ice storms, heavy rains, sleet, or even snow may result.

Daily average temperatures normally range between 20°F to 70°F during winter and 70°F to 95°F during the summer with a yearly average of 64.9°F. The maximum daily temperature is above 90° F on an average of 41 days per year. Probability of freezing conditions earlier than November 5th and later than March 12th is less than 50 percent. 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

Refuge land is all composed of Recent- and Pleistocene-age alluvial soils in the floodplain of the Ouachita River. These lands are subject to annual flooding by stream overflow or backwater (Figures 5 and 6). The Recent alluvium exists in a band generally within one to one and a half miles of the present river channel. The Recent alluvium is mostly point bar deposits consisting of "tan to gray clays, clayey silts, and fine sands in the ridges, and soft, gray clays and silty clays in the swales (USFWS 1988)." Water and organic contents are high in the swales but usually lower in the ridges. The top strata of the Recent deposits are mostly between 50 and 70 feet above mean sea level (MSL).

The bulk of the refuge land consists of point bar and abandoned channel Pleistocene-age deposits known as the Deweyville Terrace formation. The somewhat older alluvial soils of the Deweyville Terrace are mostly "gray to light-brown silty to sandy clay." Elevation of the Deweyville Terrace formation is between 60 and 80 feet MSL.

On the western edge of the refuge is another Pleistocene-age formation known as the Prairie Terrace. Prairie terrace soils are similar to those of the Deweyville Terrace, but higher in elevation, generally between 80 and 150 feet MSL. Whereas the Recent alluvial land and Deweyville Terrace are relatively flat, the Prairie Terrace is gently rolling, due to differential erosion.

The Pleistocene and Recent deposits are underlain by much older Tertiary-age formations. The tertiary deposits outcrop beyond the Prairie Terrace several miles west of the refuge boundary, generally above 150 feet MSL. Soils of the Tertiary Uplands generally contain more sands and gravels than do the Recent and Pleistocene soils. These soils are also more acidic than the Pleistocene and Recent alluvial soils.

SOILS

Upper Ouachita NWR consists of thirteen different soil associations. The vast majority of the north unit on the west side of the river is level, poorly drained, and its Litro, Perry, and Portland soils are subject to frequent flooding by the Ouachita River. Most of the south unit is a grayish-brown silt loam surface and a mottled reddish brown and brownish gray silty clay loam subsoil (Hebert). These soils are mixed in with well-drained soils with a brown silt loam surface and reddish-brown silty clay loam subsoil. The higher edges of the western edge include level to gently sloping acid, silty soils. Portions of these soils (Frizzel and Guyton) are somewhat poorly drained, while others (Providence) are moderately well-drained. The east side of the refuge on the Mollicy Unit completely consists of poorly drained soils in the Perry-Portland, Litro-Haggerty, and Groom-Wrightsville associations.

Figure 5. Elevation of Upper Ouachita NWR

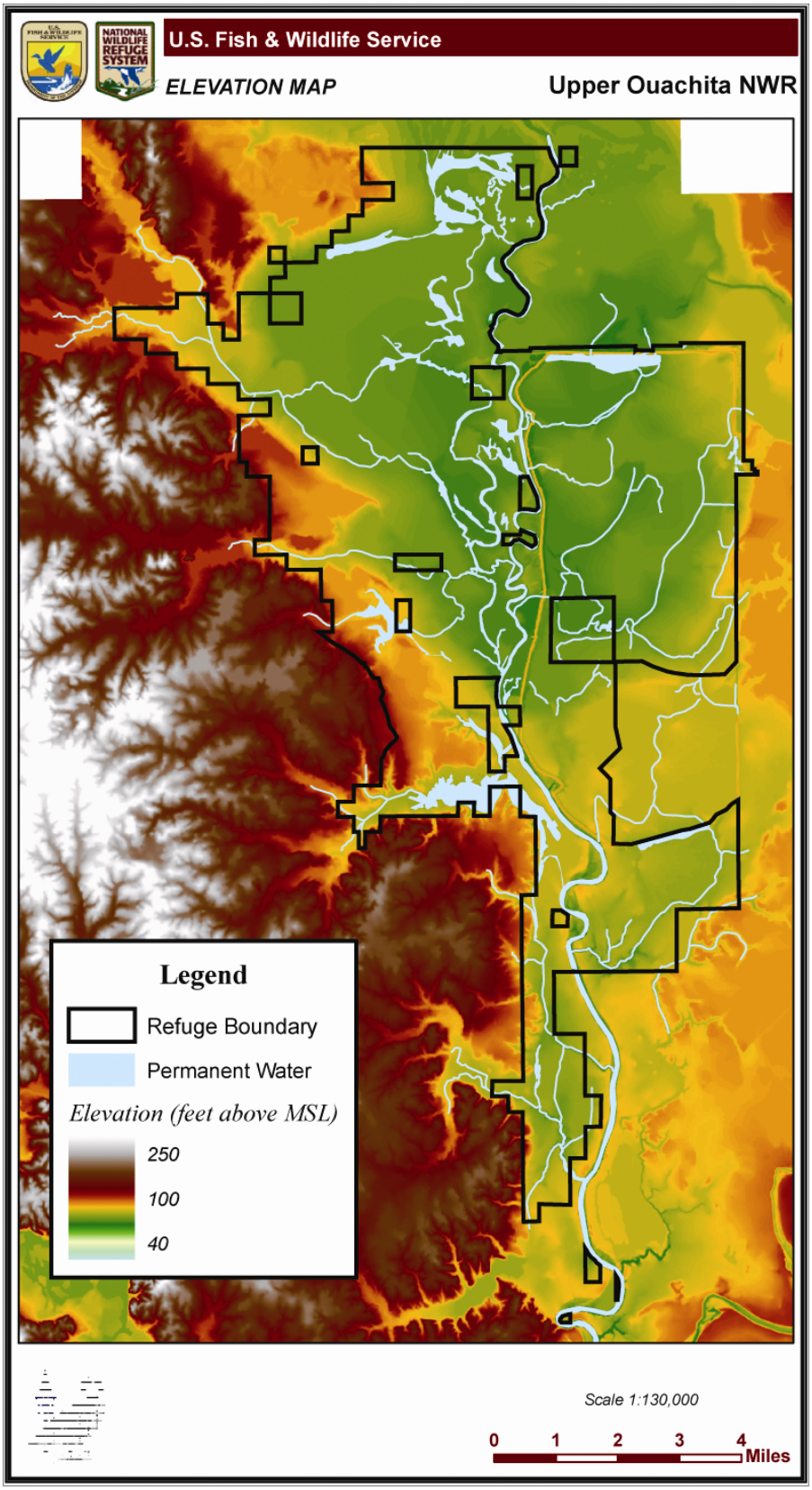
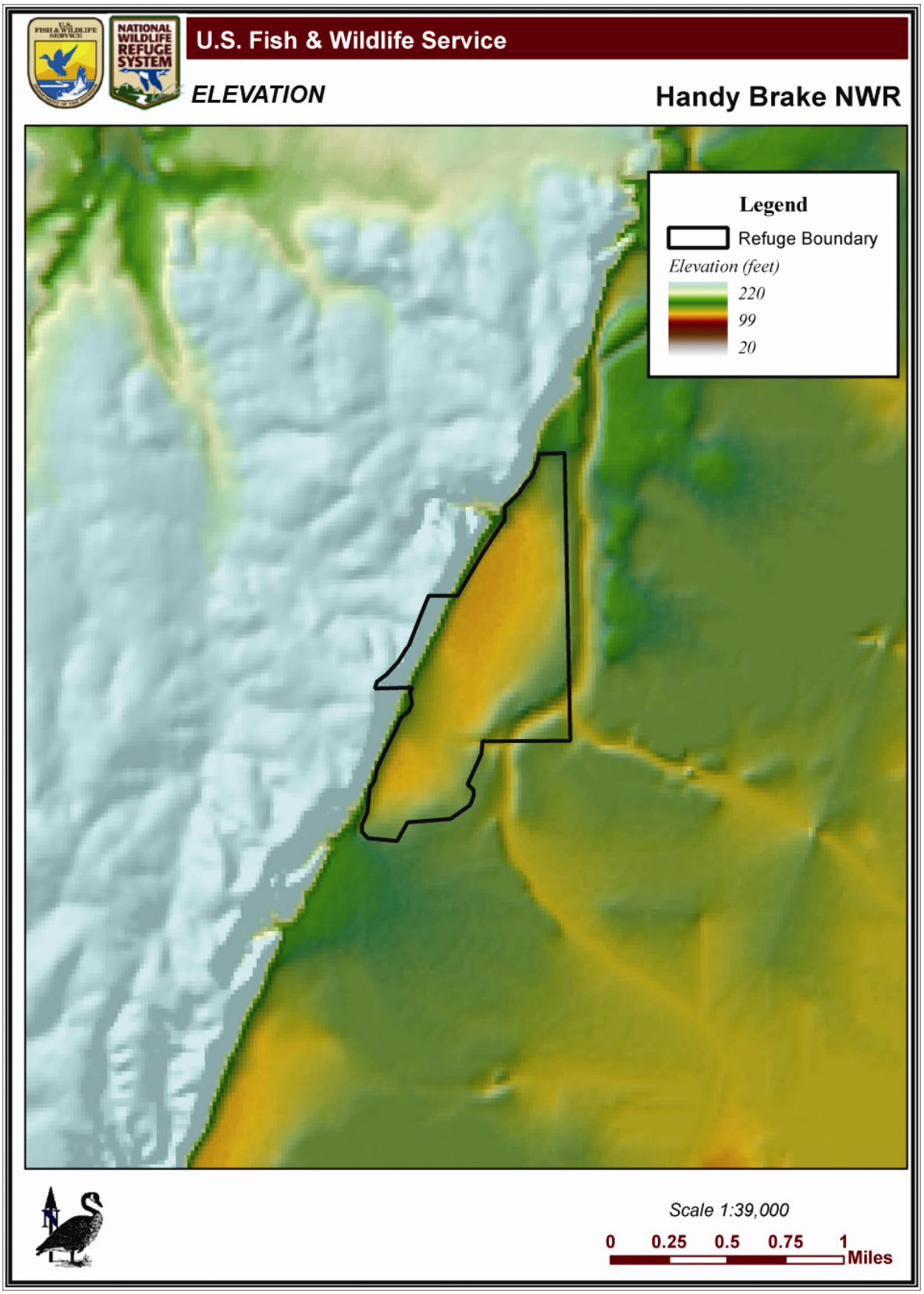


Figure 6. Elevation of Handy Brake NWR



HYDROLOGY

Upper Ouachita NWR and the majority of the LWMD and Handy Brake NWR are located in northeastern Louisiana. The northern boundary of Upper Ouachita NWR lies on the Louisiana-Arkansas State line (Figure 7). The refuge borders both sides of the Ouachita River for 13.7 miles and extends 3.3 miles to the east and 16 miles to the west.

The Ouachita River originates in the Ouachita Mountains of west-central Arkansas, near the Oklahoma border. It flows south through northeastern Louisiana, drains into the Little River at Jonesville, Louisiana, joins the Tensas River to form the Black River, which empties into the Red River. The river has a drainage basin of 10,825 square miles at the refuge (Figure 7). The drainage basin in Arkansas is mostly forested, resulting in extremely high water quality when it flows through the refuge, even during flood periods. A series of three major reservoirs are located on the Ouachita River in Arkansas. The Corps has a lock and dam at Felsenthal, Arkansas, approximately two river miles north of the northern refuge boundary. The combined effects of the dams on the river exert considerable influence on river stages at the refuge. In northern Louisiana, the Ouachita River is a slow moving, muddy river that averages 300 feet wide when at pool stage.

The normal low-water elevation of the Ouachita River during the dry summer months is 52.4 feet above MSL, a level maintained by another navigational lock and dam at the town of Columbia, approximately 98 river miles downstream from the refuge. Rainfall in the Ouachita Basin upstream from the refuge may produce river stage differences as great as 30 feet, causing various portions of the refuge to be flooded, depending upon river stage. When the river is at 70 feet MSL, approximately 80 percent of the refuge's western side is inundated (Figure 7).

Permanent water areas on the refuge include the Ouachita River, Fish Lake, Moss Lake, Pierre Creek, Cecil Creek, Bayou DeButte, Big Lake, Finch Lake, Harrel Lake, and Boggy Bayou.

There are a few LWMD refuge lands in the Red River Basin (Figure 8). The Red River originates in eastern New Mexico and flows east to northwestern Louisiana. At Shreveport, the river turns southeastward to join with the Atchafalaya River.

AIR QUALITY

Air quality receives protection under several provisions of the Clean Air Act, including the national ambient air quality standards (NAAQS) 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 under NAAQS are lead, nitrogen dioxide, ozone, and sulfur dioxide.

Since initially setting standards in the early 1970s, the EPA changed the standards in 1979, 1987, and most recently in 1997. Under the 1997 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).

Figure 7. Watershed map of Upper Ouachita NWR

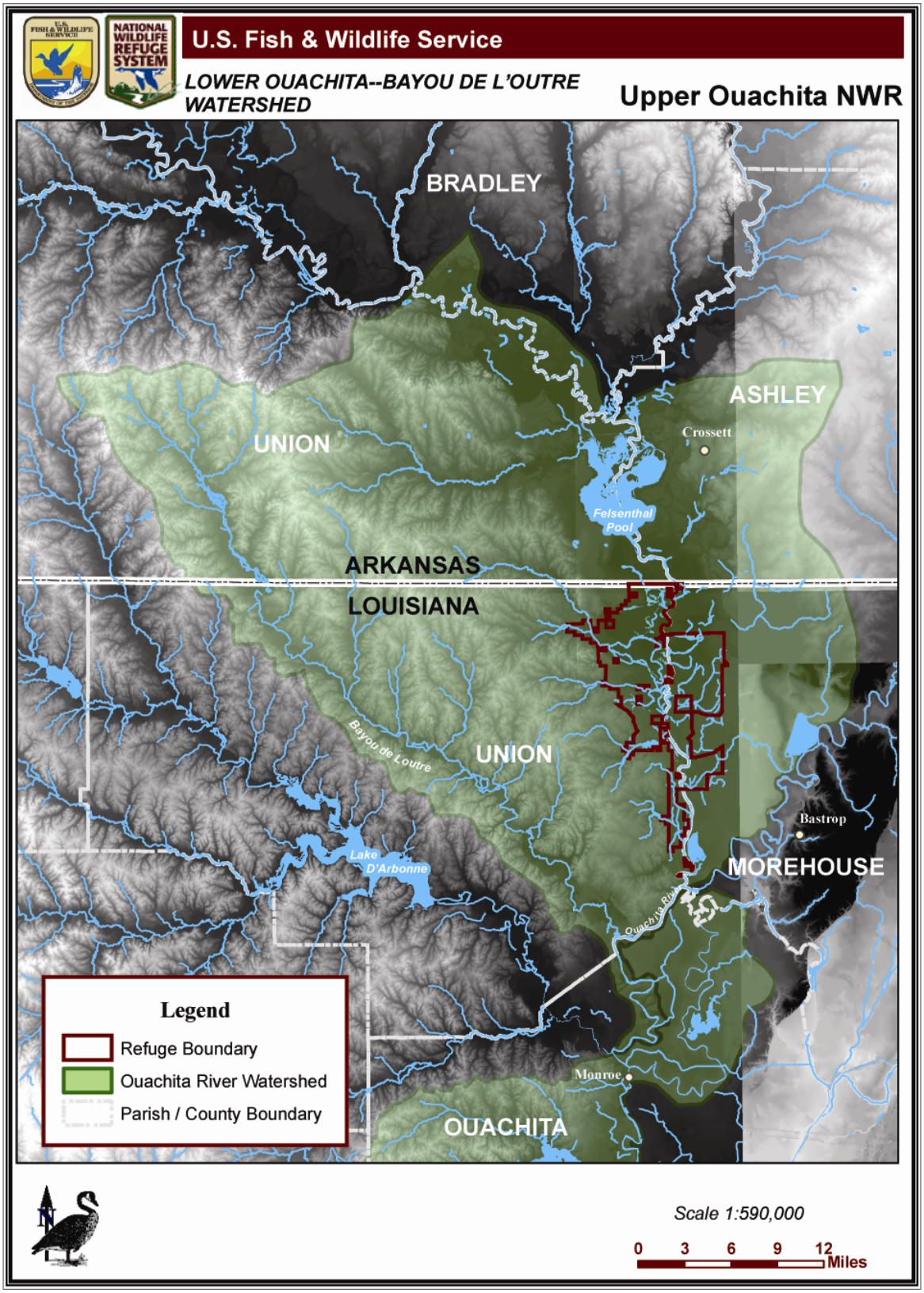
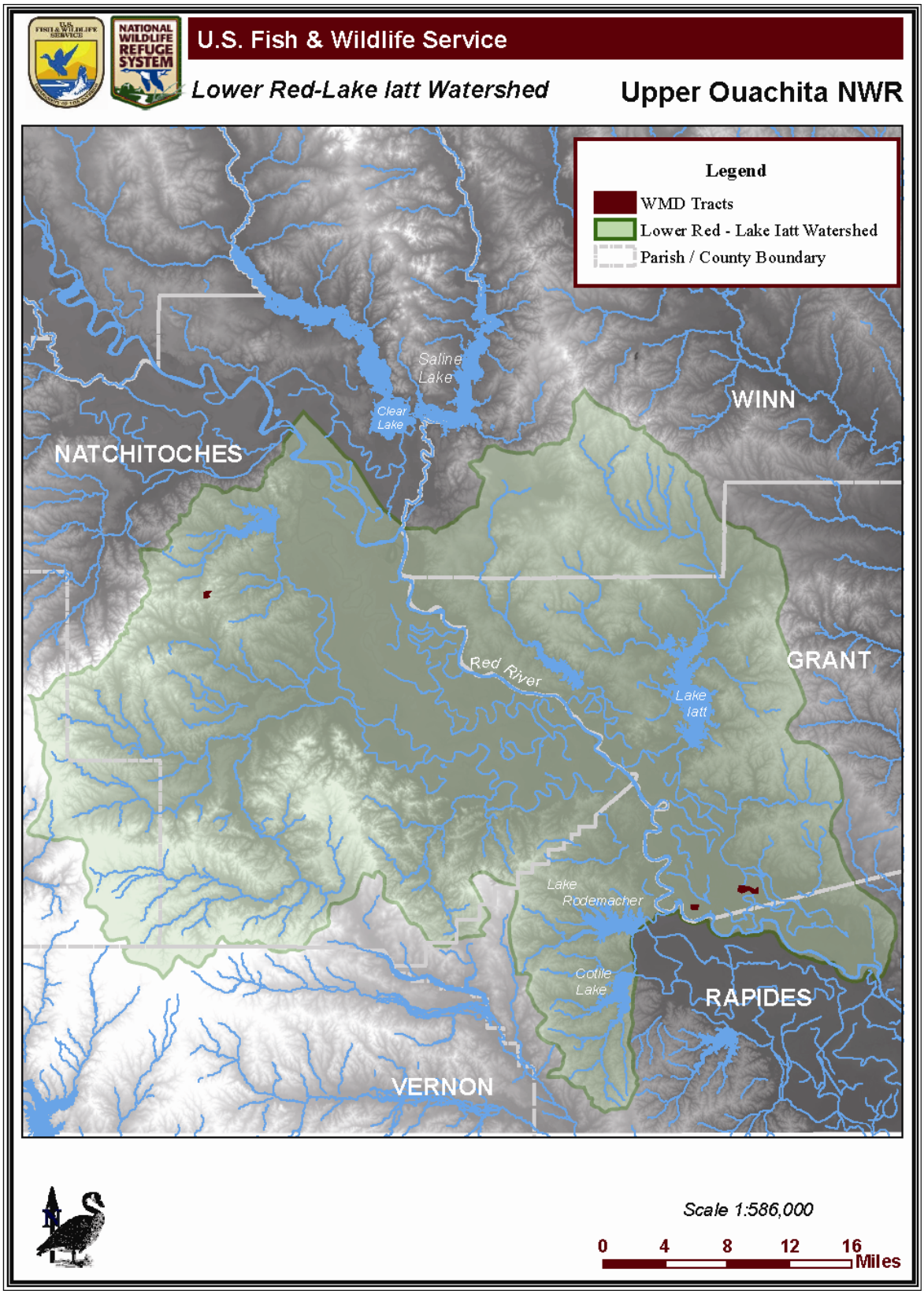


Figure 8. Watershed of some lands within the LWMD



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 (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 non-attainment area in 2004, as opposed to 20 in 1984. Union, Morehouse, Richland, East Carroll, West Carroll, Grant, and Natchitoches 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, air releases, and water releases for each parish of the refuge and district and their associated rank in the State to other parishes (Louisiana Department of Environmental Quality 2004).

WATER QUALITY

Upper Ouachita and Handy Brake NWRs and the majority of the LWMD lie within the Ouachita River Basin, which encompasses much of southwest Arkansas and northeast Louisiana (Figure 7). Contaminant issues in the past have always been related to high levels of mercury in the water and saltwater spills at gas well sites. As part of the 1134 Steep Bank Creek Project, a water quality study was conducted in August 2002. Water quality, fish tissue, and wetland soil samples were taken from Moss and Fish Lakes. Parameters measured in the field were water temperature, dissolved oxygen, conductivity, turbidity, pH, and Secchi Depth. Dissolved oxygen and turbidity exceeded their standards. Water samples were also collected for laboratory analysis of nutrients, organic carbon, solids, and mercury. Fish and Moss Lakes did not exceed State standards for any of these parameters. However, the Ouachita River is known to have concentrations of mercury in its water, sediment, and fish tissue. Fish and Moss Lakes had concentrations of total mercury two orders of magnitude lower than the Ouachita River mean concentration of 0.55 ug/l and were at or below the MDL for mercury. Samples of fish tissue showed that fish collected from Moss Lake did not exceed the fish consumption action level from the State. However, four of the fish collected from Fish Lake exceeded the consumption level of 0.5 mg/kg for Louisiana.

There have been mercury advisories in the past for the waters of Ouachita River. Advisories have been in place 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 the public fishing refuge waters.

Table 3. Toxic emissions released in pounds for each parish associated with Upper Ouachita NWR and the LWMD in 2002

Parish	# Facilities	Total Releases[1]		Air Releases		Water Releases	
		Pounds	Rank	Pounds	Rank	Pounds	Rank
Union	2	959,497	21	98,023	29	1,210,441	4
Morehouse	1	2,378,553	11	1,782,650	9	185,353	14
Richland	1	272	52	262	52	10	37
East Carroll	0	No data[4]		No data[4]		No data[4]	
West Carroll	0	No data[4]		No data[4]		No data[4]	
Grant	0	No data[4]		No data[4]		No data[4]	
Natchitoches	6	1,649,083	15	873,625	17	521,216	6

[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.

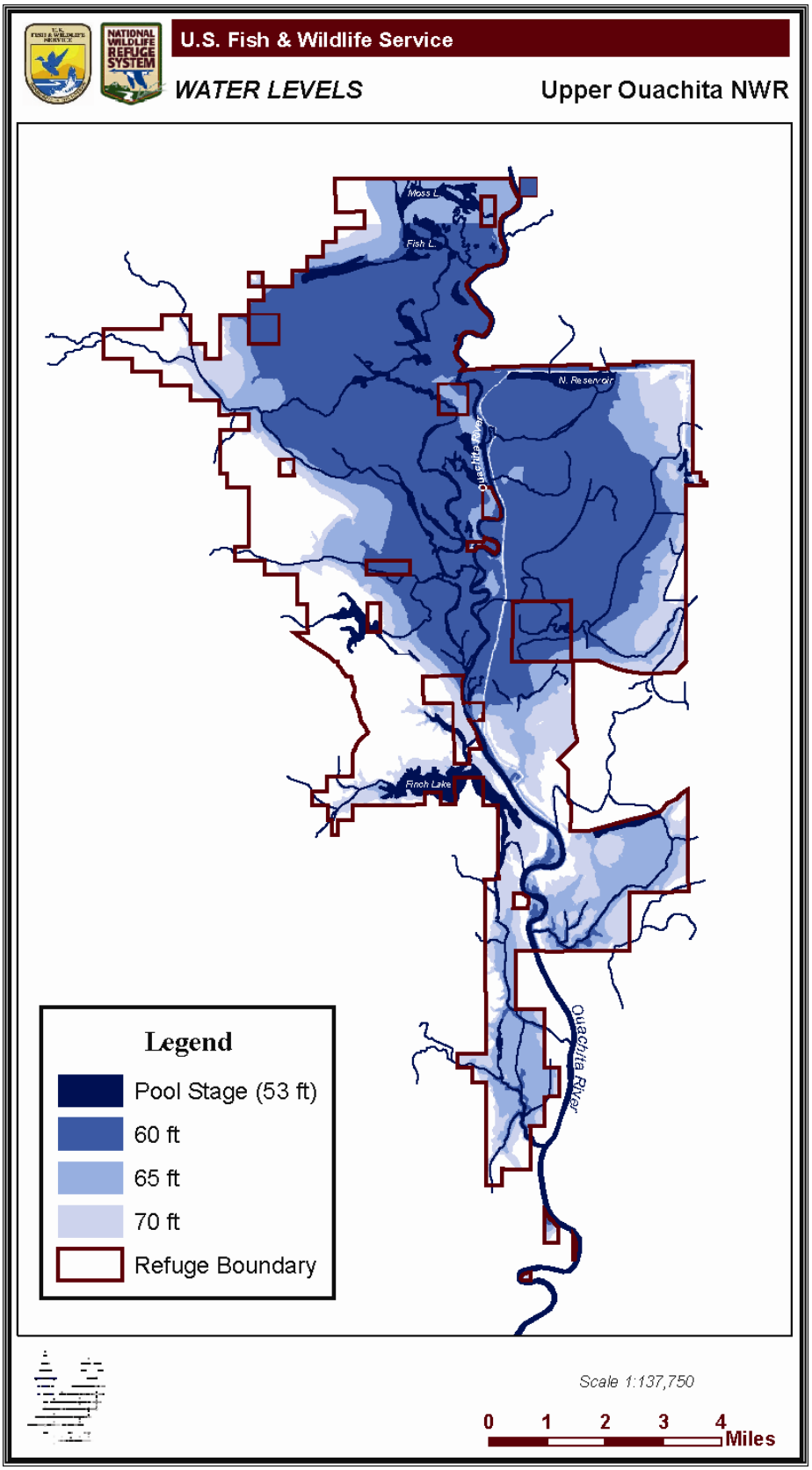
[4] Parish does not have a Toxic Release Inventory facility that reports releases for this category.

The source of mercury contamination may be from a certain kind of gas well meter, atmospheric contamination, or naturally occurring mercury in the Ozarks. Many of these meters were on the Mollicy Unit before it became part of the refuge. The Service required that the meter sites be cleaned up according to a specific remediation plan before the Mollicy Unit was purchased. A gas company contractor began cleanup of several dozen sites in 1996, and completed the work in August 1997.

HABITAT

Both refuges and the LWMD are situated on the western edge of the Mississippi River Delta. In this region, hydrology, topographic position, and soil moisture plays very important roles in determining the composition and character of floodplain plant communities because each species has a different level of tolerance to flooding. Upper Ouachita NWR and most tracts of the LWMD are predominately bottomland hardwood forest. The typical gradient of forest species relative to flooding in response to elevation is seen in Figures 9 and 10 for Upper Ouachita NWR. As one moves from permanent water up and out of the terraces to uplands, forest communites transition from 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 that flooding should occur during the growing season or dormant season.

Figure 9. Water levels of Upper Ouachita NWR



Upper Ouachita NWR contains 4,540 acres of pine and pine/hardwood forest, 19,767 acres of bottomland hardwood forest, 2,000 acres of scrub-shrub, 1,182 acres of moist-soil impoundments, 2,541 acres of agricultural fields, 9,236 acres of reforested bottomland hardwood forest, 682 acres of fallow agricultural fields, and 2,910 acres of open water (Figure 10).

Handy Brake NWR is primarily a permanent wetland of 455 acres. Open water constitutes 60 acres; forested wetlands 175 acres; and emergent vegetation covers 220 acres (Figure 11). A free lease of 35 acres from International Paper Company provides an upland area overlooking the wetland. These uplands include swamp chestnut oak, white oak, southern red oak, mockernut hickory, and loblolly pine.

The LWMD is primarily a variety of marginal agricultural tracts totalling 4,930 acres that were replanted in bottomland hardwood forest habitat. Several tracts have small acreages of moist-soil habitat; however, the vast majority of LWMD lands were reforested after acquisition.

Bottomland Hardwood Forest

Bottomland hardwoods account for the majority of Upper Ouachita NWR's land cover and can be classified into three primary habitat types: 1) Sweetgum – Willow Oak; 2) Overcup Oak – Water Hickory; and 3) Baldcypress – Water Tupelo. Handy Brake NWR has a Swamp Chestnut Oak-Cherrybark Oak habitat type. These classifications are described below:

Sweetgum - Willow Oak

The low ridges in the broad slackwater areas of the first bottom are typically occupied by this forest type. Sweetgum and willow oak 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 of the Upper Ouachita NWR. 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 stocking at times. 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 red vine.

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 of stocking. 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 red vine, peppervine, trumpet-creeper, dewberry, and possibly greenbrier. Panicums, asters, annual grasses, and cocklebur may occur in openings within the stand.

Figure 10. Vegetation on Upper Ouachita NWR

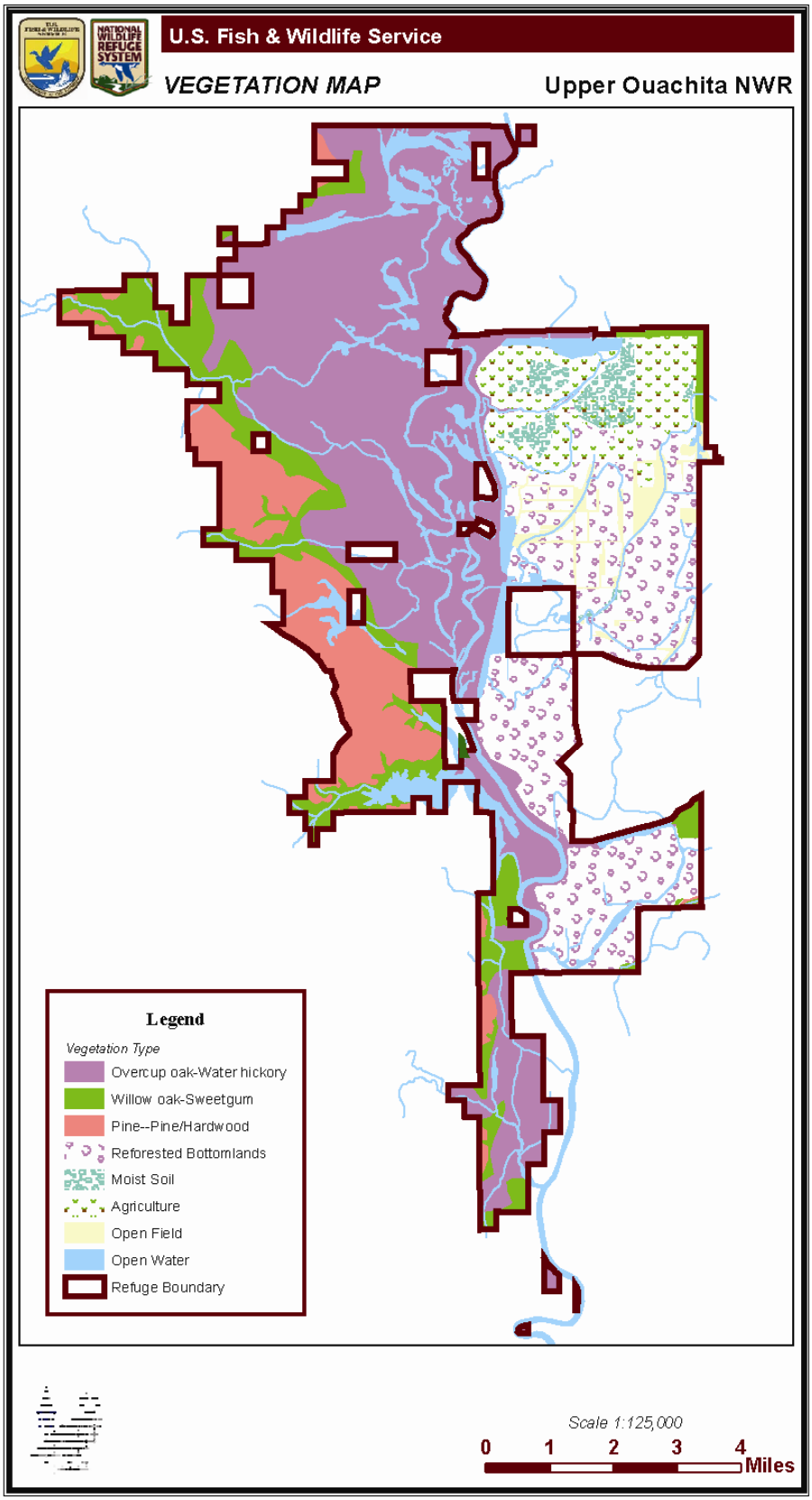
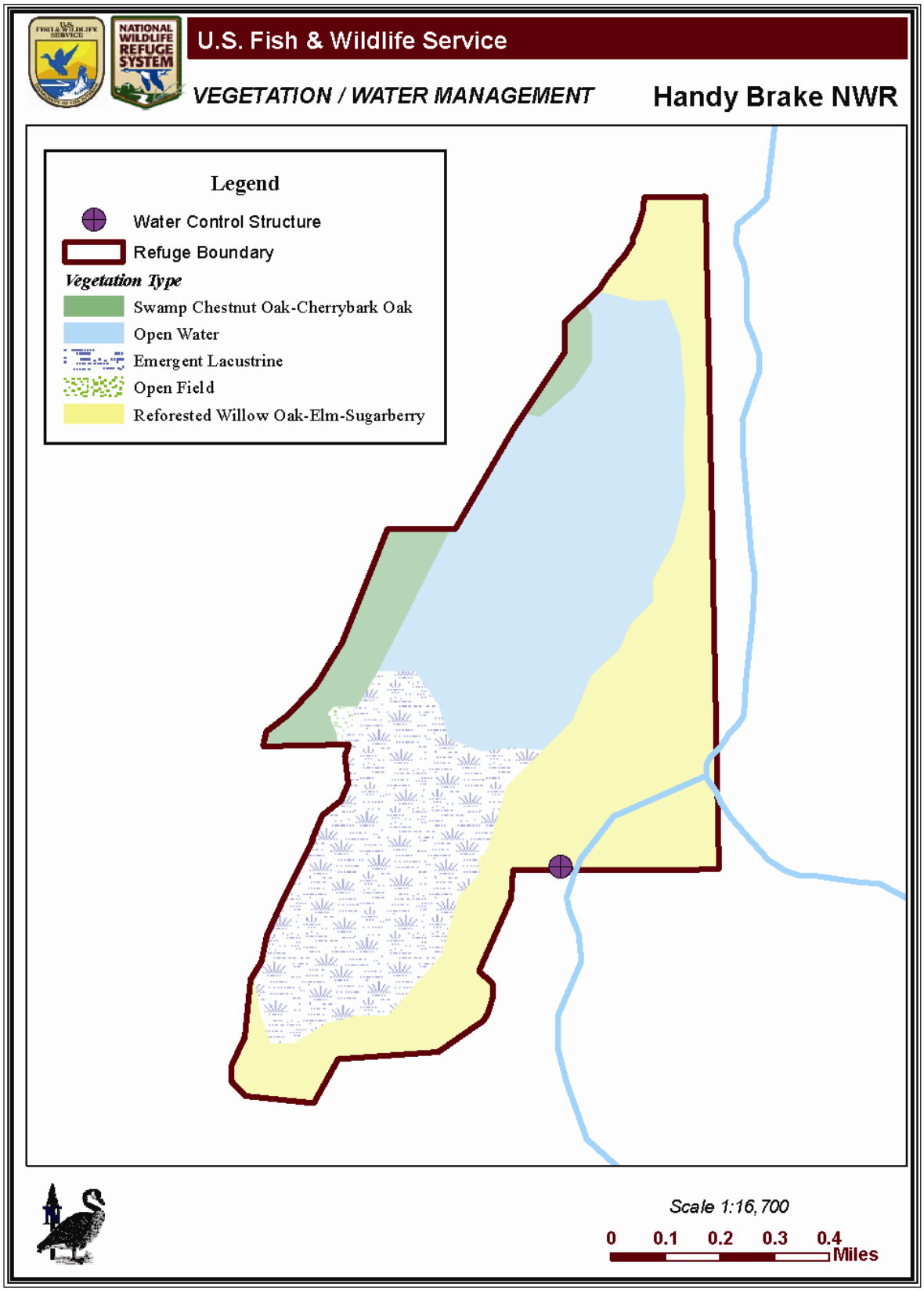


Figure 11. Vegetation and water management on Handy Brake NWR



Baldcypress – Water Tupelo

In stands of this type, the majority of the stocking comprises baldcypress and water tupelo together. This forest type 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.

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 jasmine, 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 jasmine, Alabama supplejack, greenbrier, grape, Japanese honeysuckle, and blackberry. Among the shrubs associated with this type are American beautyberry and *Viburnum 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 herbaceous species found with the loblolly pine type are also common associates in stands of the loblolly pine – hardwood type.

Scrub-Shrub

The acres of scrub-shrub habitat are found where shallow, semi-permanent water occurs on the refuge. Typically, these habitats are found adjacent to permanent water, in isolated swales, partially filled-in abandoned river channels, and along creeks and bayous. The dominant woody species is buttonbush. Swamp privet is often found associated with the buttonbush.

Mollicy Unit Open Fields (moist-soil, reforested, agriculture)

The Mollicy Unit, located on the east side of the Ouachita River, is the focus of the refuge's farming and moist-soil management for waterfowl and other migratory birds. The Mollicy Unit was once a vast bottomland hardwood forest that provided ideal habitat for a variety of wildlife species. Due to soaring soybean prices in the late 1960s, the land was cleared to make way for row crop agriculture. A large levee was constructed along the Ouachita River to protect some of the cropland from flooding. At that time, there were approximately 13,705 acres of cropland inside the levee and 2,574 acres of farmland outside the levee. The remaining 2,850 acres include the levee, two reservoirs for rice irrigation, roads, river frontage, abandoned fields, and moist soils in rotation with rice farming. Moist soils are managed for wintering waterfowl, migrating shorebirds, and wading birds (Figure 12). Vegetation mostly consists of sprangletop, millet, smartweed, sedges, rushes, toothcup, panic grass, goose foot, and cocklebur. The refuge planted 9,236 acres on the Mollicy Unit with bottomland hardwood seedlings between 1997 and 2001. The levee has broken several times over the years but has been repaired by previous landowners to prevent flooding at all but the highest river stages. The reforested fields outside the levee experience the highest flood depth, duration, and frequency. Rain water also accumulates inside the levee during the winter due to depressional topography of the area. All of these factors contribute to the shallow flooding of croplands and moist-soil areas producing extremely valuable migratory bird habitat.

Invasives

Invasive plants are not a large problem on the refuge--yet. The three species that are of primary concern are Japanese climbing fern, Chinese tallow, and water hyacinth.

Japanese climbing fern is well established on Upper Ouachita NWR 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. Figure 13 identifies areas where refuge staff have opportunistically identified invasion of the Chinese tallow tree. This species causes large-scale ecosystem disruption by replacing native vegetation, which reduces native species diversity. This, 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 water hyacinth, princess tree, tree-of-heaven, Chinaberry, and mimosa. 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. Control of invasives on the refuge is no longer possible as a routine component of general refuge management, both from a funding and manpower perspective.

Figure 12. Farming and moist-soil management on Upper Ouachita NWR

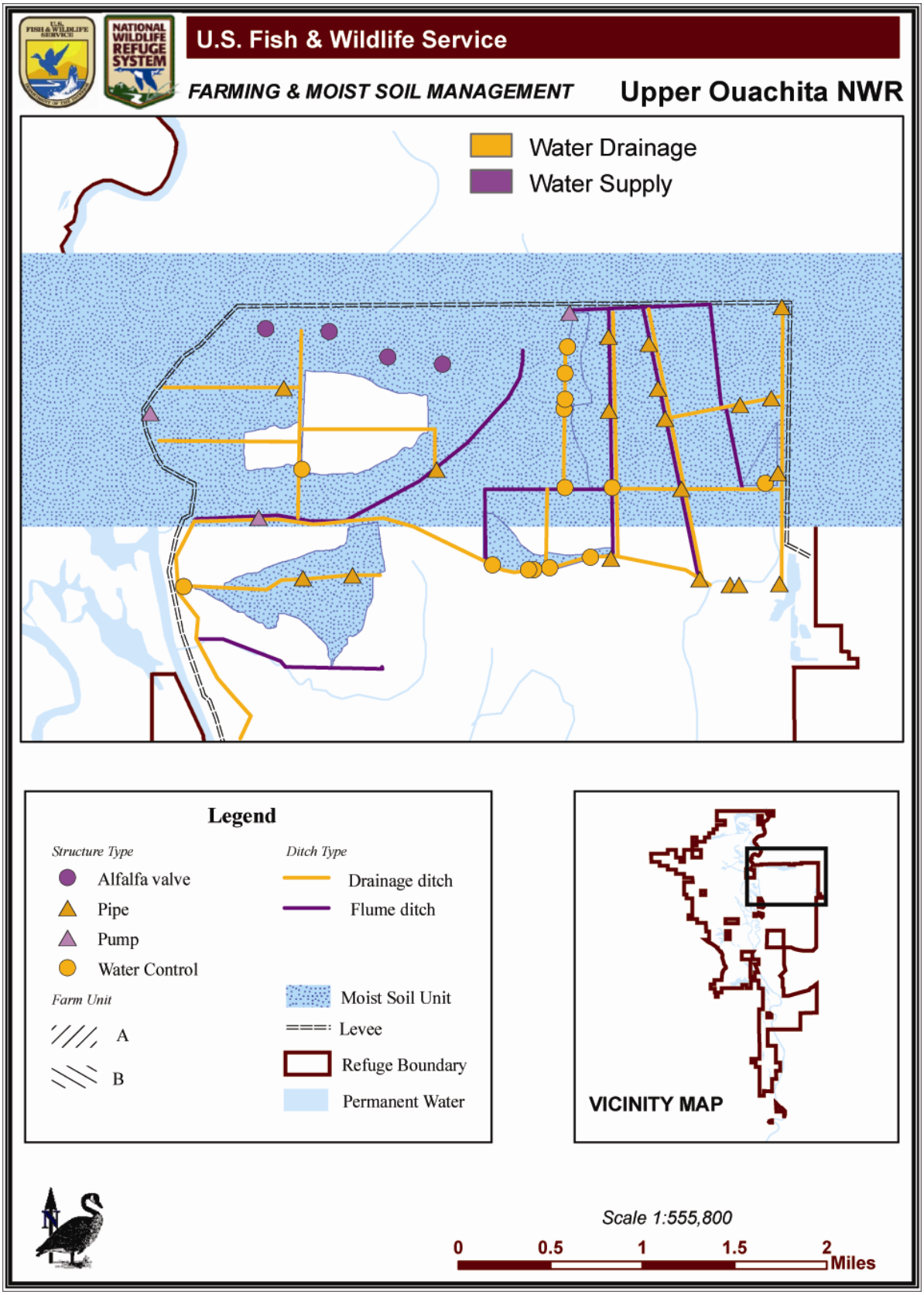
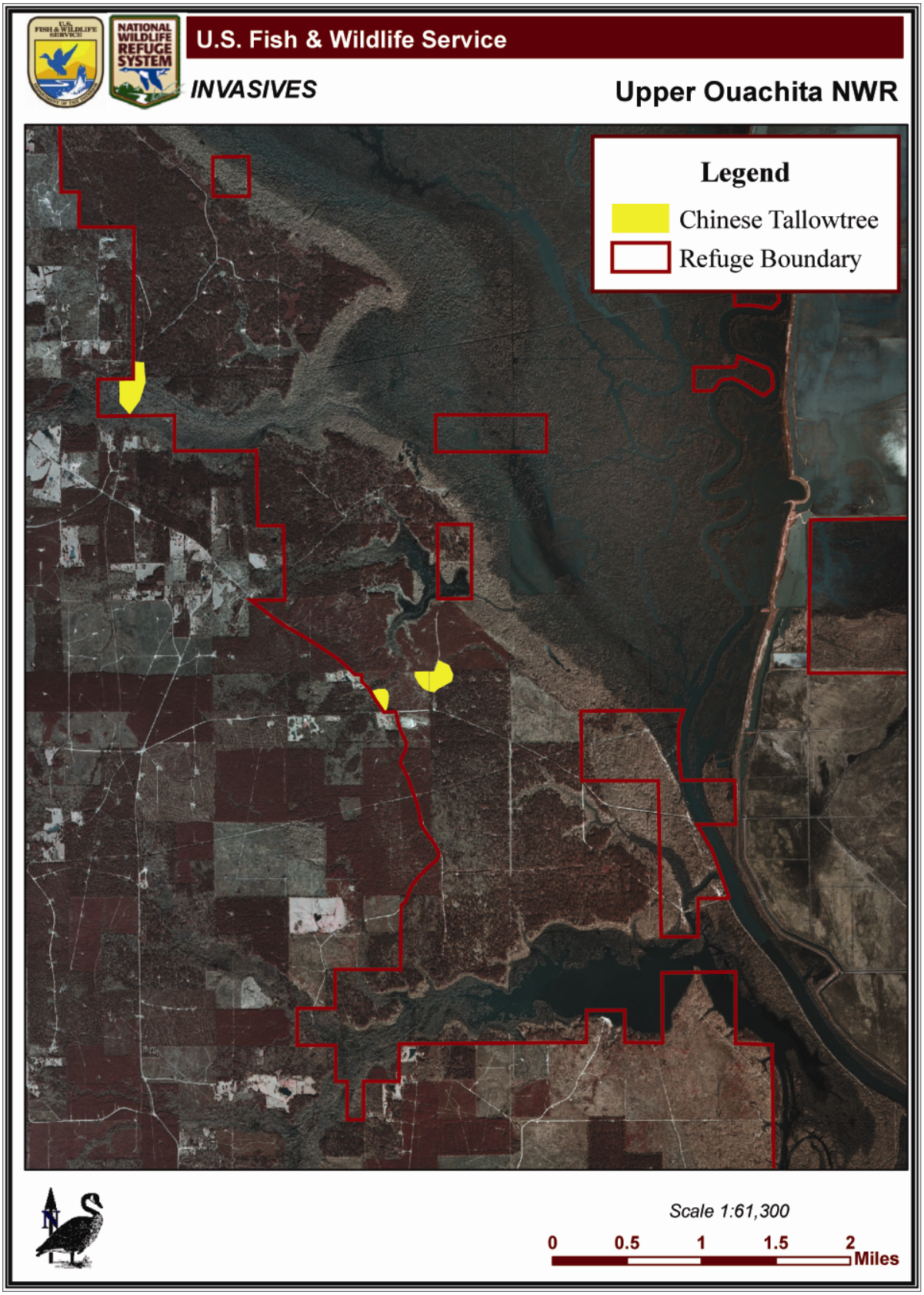


Figure 13. Invasive plant species identified on Upper Ouachita NWR



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 fires 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 to 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. In the last 10 years, Upper Ouachita NWR has had 6 wildfires burning only 1,904 acres, while the LWMD has had two wildfires burning 135 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 since 1987. For the entire Complex, there have been 116 management ignited burns for a total of 6,884 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 so that it doesn't continue toward more hardwoods and increased mid-story, which deteriorates habitat for this endangered species. 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, to increase the amount of grasses, and to 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

A complete list of biota is located in Appendix I.

Migratory Birds

Waterfowl

The refuges and LWMD lands provide important wintering waterfowl habitat that varies in quality and acreage available depending on water levels, weather, and mast crops. Dabbling ducks favor more shallow-water levels for feeding when off-refuge areas are dry, causing them to seek the permanently flooded areas and low, flooded fields on the refuges. As water levels rise and the backwater floods the uplands, mallards and other dabblers begin using the flooded timber. When open water in the maize field and at the Mollicy Unit becomes more deeply flooded, diving ducks, such as ring-necked ducks and canvasbacks, are attracted to the invertebrate food source on the submergent vegetation.

The majority of waterfowl use occurs at the north end of the Mollicy Unit where rice fields and moist soils are present. This area appears to be an ancestral wintering ground and migratory stop-over site.

At least 15 species of migratory waterfowl commonly use Upper Ouachita NWR for wintering habitat: mallard, mottled duck, gadwall, American wigeon, green-winged teal, blue-winged teal, northern shoveler, northern pintail, wood duck, hooded merganser, ring-necked duck, canvasback, and lesser scaup, snow goose, and white-fronted goose. 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 on Upper Ouachita NWR (Table 5), Handy Brake NWR, and the Oliveros Tract in the LWMD. Though mallards and ring-necks are abundant, wood ducks probably are the most abundant wintering duck on Upper Ouachita NWR. From 1992-2007, averages of 1,600 and 3,200 ducks were recorded on Handy Brake NWR and the Oliveros Tract, respectively. Of those species detected, mallard, green-winged teal, and pintail were most often recorded. 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.

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 during summer. Mottled ducks are present on the Mollicy Unit year-round. The staff has seen mottled ducks with young broods on the refuge but no nests have been documented.

Water and Marsh Birds

Sloughs, bayous, flooded timber, scrub-shrub, and the Mollicy Unit provide wadingbird habitat at different times of the year. When water is coming out of the refuge in late spring, wadingbird concentrations are high as they capitalize on trapped fish and crayfish. No major rookeries are known to occur on the refuge. Species that commonly use the refuge include: 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.

Glossy ibis, roseatte spoonbills, wood storks and tri-colored herons are seen irregularly, usually during post-breeding dispersal in late summer. When conditions are right during late summer, several hundred wood storks will forage on the Mollicy Unit. Least bitterns most likely migrate through the refuge. Large concentrations of double-crested cormorants utilize the refuge during winter, and anhingas are found during summer. American white pelicans are sometimes seen on the Mollicy Unit in late summer and during migration.

Marsh bird habitat is not available on the refuge, but Virginia rails and soras probably migrate through. King rails may breed irregularly in the fields on the Mollicy Unit when water levels are suitable. Coots are present year-round and are especially abundant in winter. Although common moorhen 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 5. Annual mid-winter waterfowl surveys* for Upper Ouachita NWR at the Mollicy Unit

Year	Mallard	G-w Teal	Pintail	Gadwall	Wigeon	Ring-neck	Other Species[1]	Total Ducks	Snow Goose	White-fronted Goose	Total Waterfowl
1990	47000	7200	3000	750	500	50	250	58750	7000	2000	67750
1991	19800	1150	16700	1270	0	0	1100	40020	7000	700	47720
1992	88200	5000	10000	15000	5000	8000	6500	137700	4000	1000	142700
1993	35880	4800	6000	4000	4000	600	4520	59800	10240	15360	85400
1994	18018	5000	1660	691	0	0	2351	27720	6250	3650	37620
1995**	7500	1200	2000	2500	0	600	1500	15300	10000	2000	27300
1997	38000	0	500	4000	0	0	5000	47500	10000	5000	62500
1998	18650	19650	4630	2260	770	0	356	46316	5100	100	51516
1999	16000	14000	10000	0	0	0	0	40000	30000	5000	75000
2000	1000	1000	250	250	500	0	0	3000	80	0	3080
2001[2]	6000	0	0	32	48	0	0	6080	1000	0	7080
2002	10370	7200	550	554	50	4545	90	23359	1100	842	25301
2003	12700	18900	7700	770	52	1000	70	41192	35000	2700	78892
2004[2]	8000	2500	1000	100	50	50	250	11950	2500	750	15200
2005	10370	1320	500	1335	120	3370	545	17560	0	0	17560
2006	335	75	0	15	0	0	5	430	6000	35	6465
2007	3287	4720	725	770	0	500	52	10054	220	4380	14654

** Surveys conducted first week of January from airplane*
***Mid-winter waterfowl surveys were not conducted in 1996.*
[1] *Other species may include unidentified ducks, black ducks, mottled, scaup, shoveler, blue-winged teal, and wood duck.*
[2] *Ground survey due to lack of funding for aerial.*

Shorebirds

Shorebird habitat is available on the Mollicy Unit when water levels are suitable. The unit tends to attract shorebirds during autumn migration rather than spring migration due to the lack of exposed land during spring when water is high. Thousands of shorebirds migrate through during fall; most commonly seen are pectoral, semi-palmated, western, and least sandpipers and yellowlegs. Other species seen include: dunlin, stilt sandpiper, solitary sandpiper, spotted sandpiper, American avocet, dowitchers, upland sandpiper, semi-palmated plover, and black-bellied plovers. The buff-breasted sandpiper, willet, and American golden-plover are seen irregularly. One or two piping and snowy plovers have been spotted. Black-necked stilts nest on the refuge during summer. Common snipe winter on the refuge and killdeer are seen year-round. International Shorebird Surveys and surveys for the LMVJV have been conducted in the past on the Mollicy Unit.

Neotropical Migratory Birds

Breeding landbird surveys have been conducted on the refuge for a few years but point-count stations were not randomly or systematically established. Large parts of the western side of the refuge have not been surveyed. The Mollicy Unit had 20 points along roads and the western side only had 15 points. In 2004, points were randomly established within forest compartments on the western side of the refuge. Three compartments will be surveyed per year and therefore the refuge will be entirely surveyed every five years. In 2005 and 2006, the initial surveys were in compartments that included bottomland hardwood forest and upland pine/hardwood mix. The three most abundant species detected were red-eyed vireo, blue-gray gnatcatcher, and yellow-billed cuckoo. Thirty-four species (11.38 $\pm$ 0.46) were detected on 18 points, with an average of 15.88 $\pm$ 0.17 individuals/point. Brown-headed cowbirds were detected on 33 percent of the points. The most abundant species on the Mollicy Unit were dickcissels, red-winged blackbirds, and western meadowlarks. Of course as reforested areas succeed, bird species composition is going to change drastically in the next few years. Surveys for breeding cerulean warblers were conducted along the Ouachita River in 2004, however, none were detected.

Resident Landbirds

Resident landbirds nesting on the refuge include northern cardinal, woodpeckers, 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). Wintering woodcock arrive in our area usually when the Mollicy Unit and the bottomland hardwoods are already completely flooded. Consequently, they are pushed into the upland pine/hardwood habitat that is mostly on the west side of the refuge. Woodcock hunting is open to the public, but they are not nearly as popular to hunt as in south Louisiana.

Wild turkey declined from over-hunting in the early 1900s in this area. Today, turkeys utilize the mixed upland pine/hardwood areas of the refuge, though that type of habitat is limited (i.e., 3,000 acres). At times, they are seen along the river in the bottoms. The bottoms are usually completely flooded during the spring gobbler hunting season, pushing turkeys into the uplands. General season turkey hunting is not allowed on the refuge due to the limited acreage available for a safe, quality hunt; however, plans for a limited youth turkey hunt are in the works.

Only a few northern bobwhite quail are found on the refuge, again, because of limited upland habitat. A small amount of quail habitat exists on the western side of the refuge. Reproduction does occur on

the west side of the refuge where a few coveys have been seen in the mixed pine/hardwoods. The Mollicy Unit supports a larger population of quail. Bobwhites are one of the more numerous birds recorded when breeding landbird surveys are conducted during May and June. However, the habitat is changing quickly from the grassy, herbaceous fields that the quail desire to regenerated bottomland hardwoods.

Resident Wildlife

Mammals

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

Furbearers found on Upper Ouachita NWR include: Virginia opossum, raccoon, striped skunk, river otter, beaver, mink, nutria, and muskrat. Gray fox, red fox, coyote, 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.

Rafinesque's big-eared bat and southeastern myotis have been found roosting in water tupelo trees on the refuge. One roost of southeastern myotis had approximately 1,000 bats and was most likely a maternity colony. Research on habiat selection, roosting behavior, reproduction, and wintering habitats is needed.

No inventories have been conducted on small mammals, such as mice, voles, or moles, and species occurrence and abundance are unknown.

Reptiles and Amphibians

Over seventy species of reptiles and amphibians are likely to occur on the refuge (Appendix I). Frog and toad surveys have confirmed 11 species on the refuge: northern cricket frog, upland chorus frog, spring peeper, cope's gray treefrog, squirrel treefrog, green treefrog, leopard frog, bronze frog, bullfrog, narrow-mouthed toad, and Fowler's toad. Other species that may be present but have not been recorded include: pickeral frog, Gulf Coast toad, spade-foot toad, crawfish frog, and bird-voiced treefrog.

Amphibian malformations have been occurring across the country. The U.S. Geological Survey and the Fish and Wildlife Service have been conducting studies to try to determine the extent and cause of these malformations. In 2004 and 2005, four collections of tadpoles were taken on Upper Ouachita NWR to check for malformations. Two collections were of southern leopard frogs and two were of bullfrogs. Only one leopard frog was found to be abnormal with fused digits on its hind foot, but many of the bullfrogs were malformed with their hindlegs fused to their tails.

American alligators are not common on the refuge. Highly fluctuating water levels cause habitat to be unsuitable. During the early 1980s, alligators were stocked by the State and Federal government from southern Louisiana to northern Louisiana, as part of an effort to reintroduce them to their natural range. In 1979, 98 alligators were released on the refuge at Finch Lake.

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

Fisheries

The Ouachita River and its tributaries provide habitat for many species of freshwater fish. When the river floods into the backwoods, good spawning habitat becomes available. The important game species present in refuge waters are: 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 the river and utilize shallow areas on the refuge for spawning. In Louisiana, 112 fish species have been documented within the Ouachita River. The greatest diversity of those documented was collected from Alabama Landing on the west side of the refuge. A fish species list can be found in Appendix I.

Moss and Fish Lakes were historically great fisheries that were legendary among the local public. The lakes held water in the spring and summer due to a water control structure located at the mouth of Steep Bank Creek. The structure was pulled out in the 1980s by refuge management for various reasons and the fisheries declined. In 2001, at the request of the Friends of Upper Ouachita NWR, refuge management decided to work with the Arkansas Game and Fish Commission and the Army Corps of Engineers to restore the fisheries by replacing the structure and completing an 1135 wetland restoration study. Hydrologic modeling has been conducted by the Corps. Fish and water quality sampling was conducted in the lakes before the structure was replaced and for two years after the structure was installed. Initial results of fish sampling suggest the fisheries are still good and will benefit by the completion of the 1135 project, when water is diverted from Felsenthal pool through the Steep Bank wetlands.

In 2002, Service fisheries' biologists sampled Finch Lake, Harrell Lake, wigeon pond, and north reservoir for fish. Bass catch per unit effort was low for both Finch and Harrell Lakes. Most of the bass were 8-12 inches in size. Because the Ouachita River influences the lakes by overflowing into them, it is very difficult to manage a sport fishery and have an efficient hatchery stocking. After sampling the wigeon pond on the Mollicy Unit, it was recommended that 500 bass fingerlings, 1,800 channel catfish fingerlings, and 10,500 bluegill be stocked, which has been completed. The North Reservoir on the Mollicy Unit showed sport fish to be sparse, probably due to high turbidity levels. It was recommended that a jar test be conducted to determine the source of turbidity, and then alternatives could be discussed on how to fix the turbidity.

Species of Concern

Red-cockaded Woodpecker (RCW)

The RCW is confined to old pine stands in the southeastern United States. Because this species evolved in a fire-maintained ecosystem, these woodpeckers prefer open, park-like pine stands with no midstory and herbaceous groundcover. Red-cockaded woodpeckers excavate only live pine trees that are usually 75 years old or older. Habitat loss and then demographic isolation are the primary causes of their endangerment. Current pine stands are on shorter rotations and fire has been excluded from most of the landscape, causing RCW habitat to be scarce.

The RCW Recovery Plan calls for growing season burns, pine basal areas of 40-70 square feet, the installation of artificial cavities, population monitoring, and the translocation of individuals to help increase genetic diversity and overcome demographic isolation.

Currently, there is one active group of RCWs on Upper Ouachita NWR (Figure 14). 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, populations should consist of 30 groups or more to be relatively safe from extirpation.

Bald Eagle

Many bald eagles are seen during the year, most of them during winter at the Mollicy Unit. For several years, golden eagles have been spotted every winter. For decades, bald eagles have not nested in northeast Louisiana; however, during the summer of 2000, a pair nested successfully on Shiloh Bayou at the Mollicy Unit. In 2004 and 2005, eagles nested successfully. Nests have been found near the refuge south of the Mollicy Unit. Eagle surveys are flown annually in conjunction with the mid-winter waterfowl counts.

Bald eagles are known to occur on the LWMD.

Louisiana Black Bear

Sightings and records of black bears on and adjacent to the refuge have become much more common in the past three years due to translocation of individuals into Felsenthal NWR. A contiguous block of bottomland hardwood forest exists from the southern end of Upper Ouachita NWR to the northern end of Felsenthal NWR. Bears being moved to Felsenthal NWR naturally disperse and wander onto Upper Ouachita NWR. As soon as these “Arkansas” bears cross the stateline, they are considered threatened Louisiana black bears by similarity of appearance.

One radio-collared sow and her four cubs stayed in one area on the refuge for over a year. The sow died naturally but the cubs are still seen, although one was killed by a car. Other collared bears have been tracked onto the refuge and bears without collars have been sighted.

In 1994, a black bear was photographed on the International Paper lease immediately adjacent to Handy Brake NWR in Morehouse Parish. In January 1995, staff and contract tree planters observed a bear on the Lewis fee title tract along Boeuf River. Eleven FSA easements in East Carroll Parish fall within the designated Tensas Basin critical habitat for the Louisiana black bear (Figure 15). Although no bears are currently known to use these areas, the recently reforested tracts near the Bayou Macon Wildlife Management Area may provide good future habitat (1993 Louisiana Wetlands Management District Narrative).

Pondberry

Pondberry (*Lindera melissifolia*) is a federally endangered, woody plant species that grows in bottomland hardwood forests. An old record exists of pondberry on what is now the refuge; however, no plants are known to currently exist. Surveys have been conducted on Upper Ouachita NWR by the Louisiana Natural Heritage Program but pondberry has not been found. When the plant is blooming, the refuge is often under water, which makes searching difficult.

Pink Mucket

Federally endangered pink mucket (*Lampsilis abrupta*), a freshwater mussel, has been collected in Bayou Bartholomew in Morehouse Parish, very near several FSA tracts.

Figure 14. Red-cockaded woodpecker habitat and occurence on Upper Ouachitat NWR

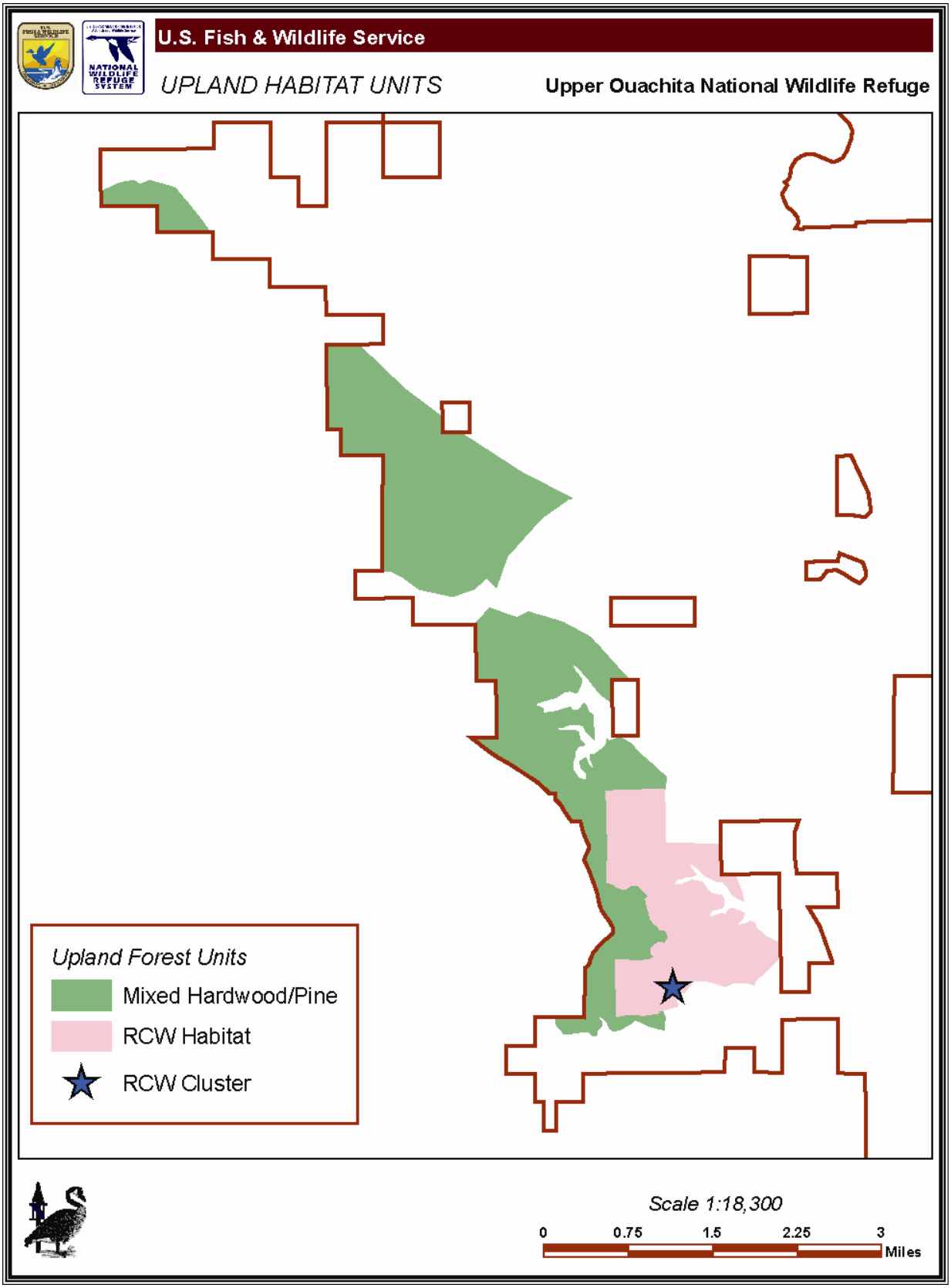
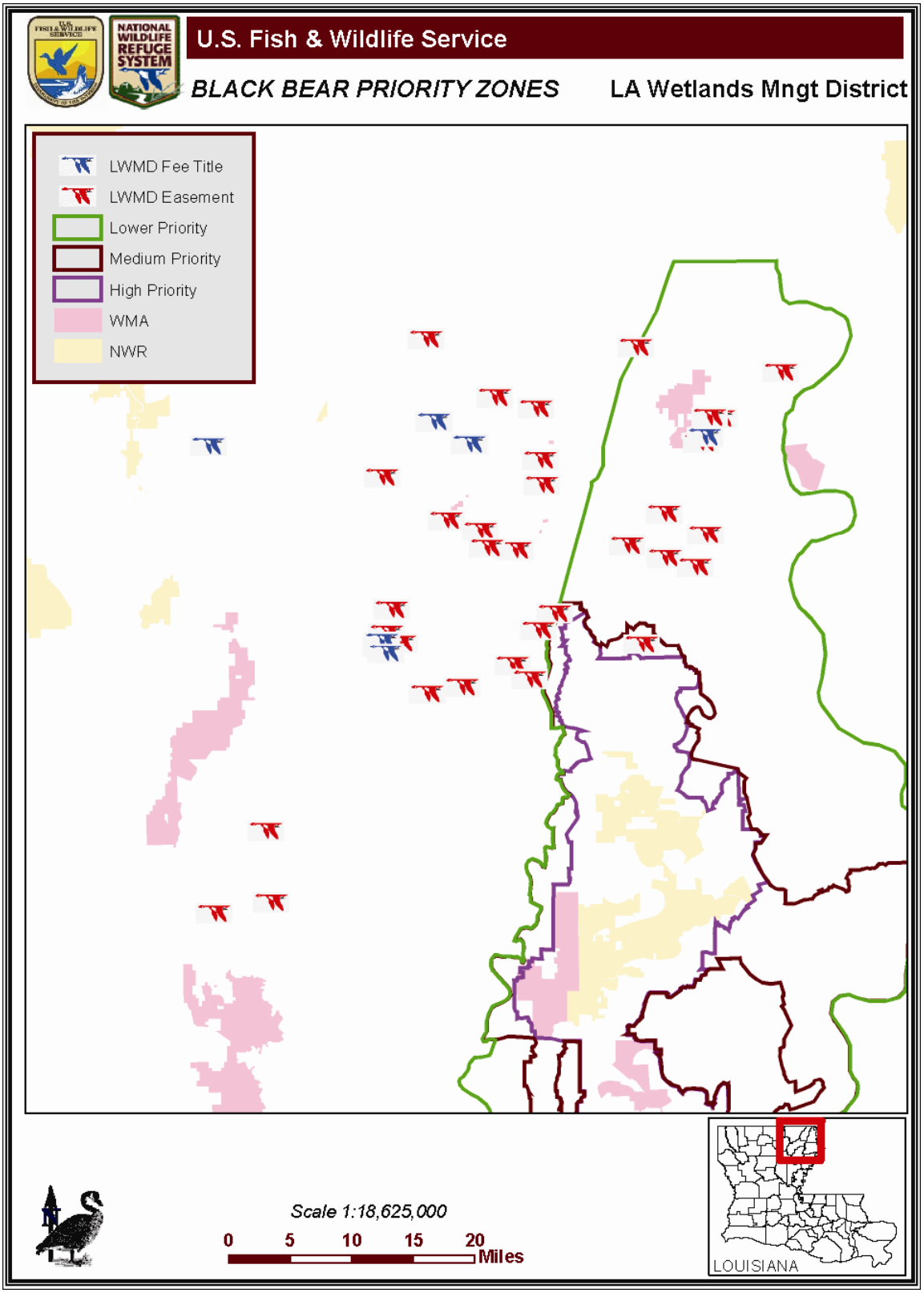


Figure 15 Louisiana black bear priority areas of conservation and protection associated with the LWMD



Alligator Snapping Turtle

Alligator snapping turtles are the largest freshwater turtles in the United States. Prior to 2004, they were protected from commercial harvest in every state except Louisiana. Since that time, Louisiana outlawed the commercial harvest of alligator snapping turtles; however, one turtle can be taken per day recreationally. Commercial harvest of these turtles threatens their populations because snappers do not breed until they are approximately 15 years old, and the take of turtles greater than 15 inches in size is targeting adults. Another factor contributing to the decline of this species is their low reproductive success. Raccoons, skunks, opossums, and fire ants depredate nests at alarming rates.

Rafinesque's Big-eared Bat

Rafinesque's big-eared bat is the least studied bat in the eastern United States and is federally designated a species of concern. Because this bat is associated with bottomland hardwood forests, many biologists are concerned about its status. Many states consider them to be endangered or threatened; however, Louisiana has no official designation for the Rafinesque's big-eared bat.

Southeastern Myotis

Although southeastern myotis are captured more frequently in mist-nets than big-eared bats, declines are being seen in their populations in Arkansas. Southeastern myotis, like big-eared bats, are associated with riparian areas or bottomland hardwood forests and are listed federally as a species of concern. Little is known about the roosting habits of the southeastern myotis in areas where there are no caves, such as Louisiana.

CULTURAL RESOURCES

PREHISTORIC BACKGROUND

The following is a description of the first people and settlements in north Louisiana in the refuge area:

Lithic Period (30,000-5000 B.C.)
Paleo-Indian people probably inhabited the Prairie and Deweyville Terrace zones of the refuge. The recent floodplain was probably not yet formed.

Archaic Period (5000-1500 B.C.)
Continuation of Paleo-Indian culture with beginnings of local and regional culture patterns; hunting/gathering existence; and dominant culture group inhabitating the Ouachita region, the Caddo people, were becoming defined at this time.

Late Archaic Period (1500-250 B.C.)
People of the Poverty Point culture probably had village sites along the Ouachita River near or on the present refuge. These people had rudimentary agriculture and were mound builders. Caddo Indians were developing culture patterns independently of other groups in the lower Mississippi Valley.

Tchefuncte Period (400-150 B.C.)
The people of this period exhibited an early woodland culture. These people had simple, poorly made pottery. This culture diffused gradually up the Mississippi Valley and probably co-existed with the Poverty Point culture and Caddo in the refuge area.

Marksville Period (100-500 A.D.)
A blending of northward-moving southeastern woodland culture and the southward-moving Hopewell culture probably occurred in the refuge area. The Poverty Point culture was still in evidence, however. Fine pottery, flint artifacts, and stone projectile points first appeared at this time. Elaborate burial techniques and cults developed.

Mississippian Culture (1400-1600 A.D.)
This culture was one of the earliest recognized cultural traditions in the United States. It was widely distributed in the southeastern United States and had distinctive pottery and projectile points. Agriculture was well developed. Although Mississippian type projectile points have been found on the refuge, the area was probably on the fringe of the Mississippian culture. The Ouachita branch of the Caddo people had become the dominant group along the Ouachita River.

HISTORICAL PERIOD (EUROPEAN CONTACT)

1541 – 1542
Hernando de Soto followed the Ouachita River in his exploration of the southern United States. He found Ouachita Indians living along the river. Village site or sites may have existed on the refuge area.

1682
La Salle claims lower Mississippi Valley area for France.

1718
Several French settlements established along the Ouachita River. Trappers, hunters, and traders probably utilized the refuge area.

1729
Natchez uprising disrupts French control of northeast Louisiana; French settlements along the Ouachita abandoned.

1734
Most of the Ouachita Indians had been decimated by European diseases and raids by Chickasaw war parties from Mississippi.

1762
France loses French and Indian War. Louisiana Territory is ceded to Spain.

1791
Fort Miro was established at a small Spanish settlement that would eventually become the city of Monroe. European trappers and hunters lived in the refuge area.

1803
Louisiana ws reacquired by France. The United States bought it from France. Choctaw Indians from Mississippi replaced the Ouachita Caddoans along the river. Congress established Territory of Orleans south of 33° N latitude.

1806
Ouachita City, at the southern end of the refuge becomes the first permanent European settlement in the present-day Union Parish.

1812
Territory of Orleans became the State of Louisiana. The county of Ouachita was established.

1839
Union Parish was established from part of the old Ouachita County. One of the Police Jury's first actions was to enact a law allowing free-ranging domestic animals in the parish.

1840-1845
This was the period of influx of settlers from Alabama, Georgia, and Mississippi. Most of these people disembarked at Alabama Landing, located on the present refuge. Towns of Marion, Haile, and Linville resulted from this wave of immigration. Most of these people were small farmers—not slaveholders. The town of Marion was named after Marion, Alabama, which was named for Francis Marion, the "Swamp Fox" of the American Revolution.

1861
Louisiana secedes from the United States. A major back-water flood occurs on the Ouachita River. The state sends aid to the victims in Union Parish. This indicates that the floodplain and refuge area were probably substantially populated at that time, probably by trappers, fishermen, subsistence, and commercial hunters.

1865-1930
Louisiana re-entered the United States. Between the Civil War and the 1940s, agriculture was the parish's major economic base. Most of the Tertiary uplands were cleared and planted in cotton and corn. By the 1930s and 1940s, much of the cropland was allowed to revert to forest. Lumber, paper, and mineral companies began buying much of the parish land. Breece Lumber Company acquired much of the refuge land prior to 1930. During this period also, natural gas was discovered in the refuge area.

1930
Breece Lumber Company sold some of the refuge land to the United Gas Company. Much of this land was subsequently sold to Union Producing Company.

1969
Union Producing Company changed its name to Pennzoil Producing Company. Pennzoil began leasing the land to private hunting clubs and continued selective harvest of overcup oak and pecan sawtimber.

About 1977
Pennzoil decided to sell its holdings in the Ouachita River Swamp. Morehouse and Union Parishes' Police Juries suggested the Louisiana Wildlife and Fisheries Commission as a possible purchaser. Not having funds, the commission referred the U.S. Fish and Wildlife Service as a possible purchaser. Numerous Service personnel in Region 4, particularly Area 3, worked toward culminating a purchase agreement with Pennzoil.

In 1980, a cultural resources survey of pre-selected portions of the refuge was conducted by New World Research, Inc., a private cultural resource management firm (New World Research 1981). It was an intensive survey of road easements, a pipeline corridor, and several land tracts projected as locations for various refuge support and recreational facilities. As a result of the survey, three prehistoric sites, all apparently dating to the Late Woodland (A.D. 800-1000) and Mississippian (A.D. 1000-1750) periods were identified. Two of the sites yielded both lithic and ceramic artifacts. The third was composed solely of prehistoric lithic artifacts. One site yielded not only artifacts, but evidence of a midden and two shell concentrations. It is likely that more prehistoric sites exist on the refuge, especially on deposits of Pleistocene age.

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 *National 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 refuge sites covered by this CCP 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 rural setting and sparse population of the refuges and LWMD vicinities are characteristic of much of Louisiana. Population estimates, total households, families, housing units, and average annual incomes are listed in Table 6 for Morehouse, Union, West Carroll, East Carroll, Richland, Grant, and Natchitoches Parishes (U.S. Census Bureau 2000). Forest products, natural gas production, agriculture, and light industry provide the main economic bases in these areas.

Table 6. Demographics of Morehouse, Union, East Carroll, West Carroll, Richland, Grant, and Natchitoches Parishes, Louisiana, based on U.S. Census 2000 data.

Parish	Population	Households	Families	Housing Units	Average Annual Income ($)
Morehouse	31,021	11382	8319	12,711	35,439
Union	22,803	8,857	6,412	10,873	37,563
East Carroll	9,421	2,969	2,140	3,303	28,531
West Carroll	12,314	4,458	3,250	4,980	33,203
Richland	20,981	7,490	5,481	8,335	34,170
Grant	18,698	7,073	5,274	8,531	38,160
Natchitoches	39,080	14,263	9,503	16,890	37,083

REFUGE ADMINISTRATION AND MANAGEMENT

LAND PROTECTION AND CONSERVATION

There are several parcels of land that lie within the existing boundaries of Upper Ouachita and Handy Brake NWRs that are not owned by the Service. Several of these compromise management due to conflicting management purposes, access, and disturbance to wildlife. Acquisition/exchange of these parcels would eliminate access issues, improve management options, and tighten some unclear and confusing boundary issues. There are no immediate plans to expand the acquisition boundaries.

Most of the lands within the LWMD are in perpetual easements with only seven tracts in fee title. Acquisition/exchange of some of these units in the future may eliminate access issues, improve management options, and allow public use.

VISITOR SERVICES

Upper Ouachita NWR

Upper Ouachita National Wildlife Refuge provides the Service's six priority wildlife-dependent recreational opportunities to the public (Figure 16). Hunting and fishing are the primary public uses on Upper Ouachita NWR. More opportunities for observation and photography of wildlife found uniquely in the Mollicy Unit have been made available with increased public access within the unit. There are interpretive signs at the refuge and onsite environmental interpretation and education are available when requested. University ecology classes visit the refuge periodically. Most of the education and interpretation for the refuge complex takes place at Black Bayou Lake NWR, which has much easier accessibility and facilities developed for these purposes.

Loose estimates of numbers of visitors to the refuge in the last five years are between19,000 and 24,000 per year. There are no good tools in place to estimate the number of visitors. Multiple access points by land and easy access from off the refuge by river make estimates for hunting and fishing visits abstract.

Orienting Visitors

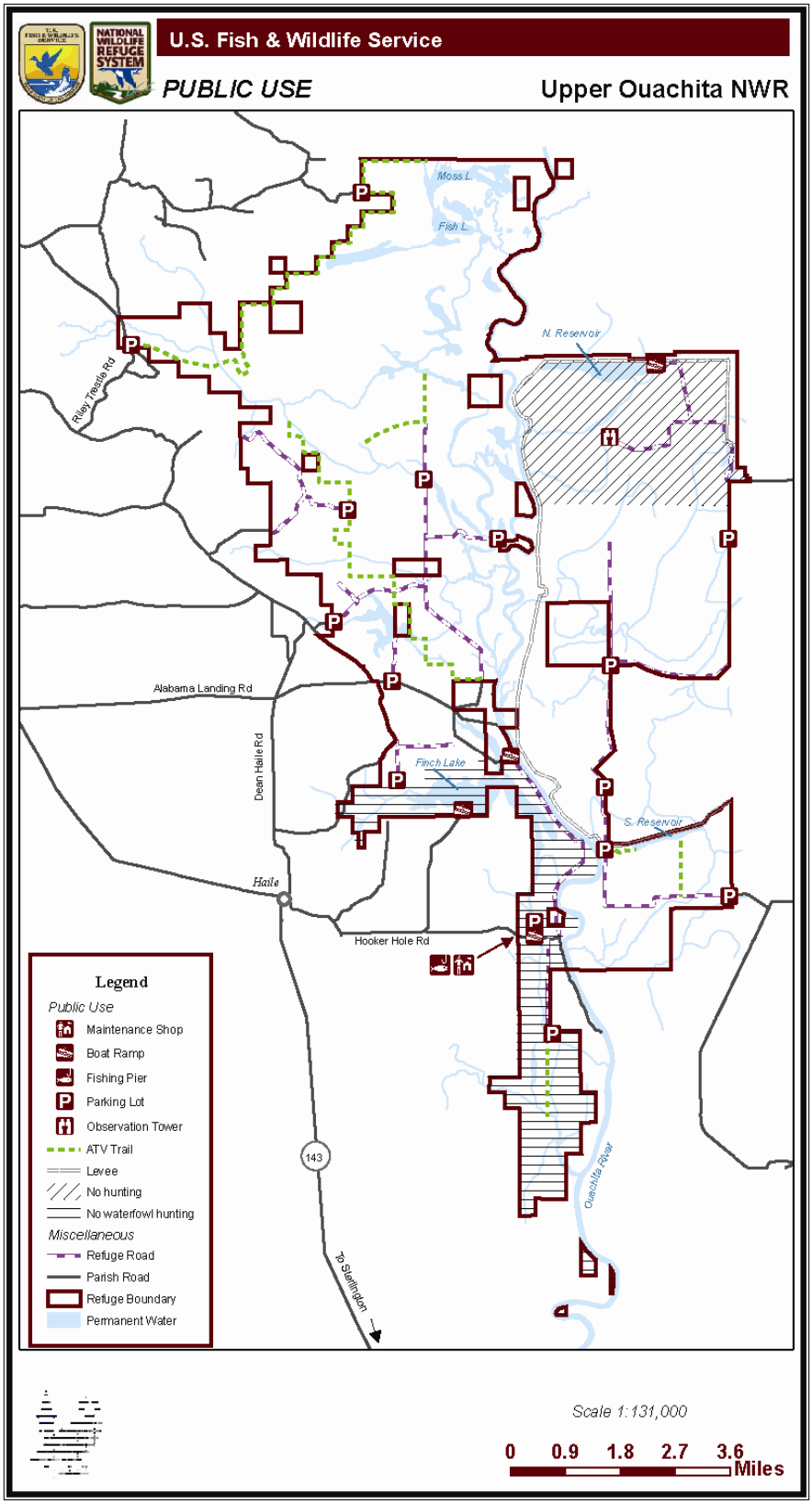
Welcoming kiosks with maps and refuge information and hunting and fishing regulations' brochures are located at all developed parking areas on the refuge. Upper Ouachita NWR is open year-round for permitted activities.

Hunting

Hunting is the second most popular public use on the refuge with estimated big game hunting visits being the greatest followed by waterfowl hunting visits. Either sex gun deer hunts are offered on three weekends in November and December. Archery deer hunts are the same as the State season with either sex all season. Feral hogs are also actively pursued by hunters.

Waterfowl hunting is allowed from legal starting hours until noon every day of the season. Most of the hunting occurs in the flooded bottomlands. The more open northern section of the Mollicy Unit is a "No Hunting" area. A limited youth duck hunt for ten hunters chosen by lottery is offered the first Saturday of the State Youth Hunt. The most commonly harvested species is mallard. Hunter success varies from year-to-year as a result of many factors, including refuge water levels, acorn production, and weather.

Figure 16 Current visitor services on Upper Ouachita NWR



The refuge offers State seasons for quail, woodcock, rabbit, and squirrel (except the spring squirrel State season). Mourning dove hunting is offered outside the levee on the Mollicy Unit the first three days of the State season. Raccoons can be harvested in daytime during the State small game season and at night in December and January. Feral hogs, beaver, and coyotes may be taken incidentally during all refuge hunts with whatever weapons are legal for the particular season.

Fishing

Fishing is the most popular public use on the refuge and is allowed according to State regulations. The Ouachita River, which bisects the refuge, attracts many anglers during spring and summer. Fish, Moss, Finch, and Harrell Lakes are popular fishing areas on the west side of the refuge. Wigeon Ponds and North Reservoir are fished on the Mollicy Unit. Fishing is year-round except for the "No Hunting" area of the Mollicy Unit where fishing is permitted March 1-August 31. Annual flooding greatly contributes to the productivity of the refuge waters. Bream, catfish, crappie, and bass are the most sought after fishes. Yo-yos, trotlines, and recreational gear (with special use permit) are allowed; gill nets are not permitted.

Wildlife Observation

Driving River Road on the west side of Upper Ouachita NWR provides frequent opportunities to observe deer and turkey and a variety of birds. The west side uplands provide opportunities to observe the endangered red-cockaded woodpecker. Wildlife observation opportunities on the Mollicy Unit have increased due to road improvement and increased public access. Birders frequent the Mollicy Unit because its unique habitat provides opportunities to a variety of bird species that may not be found at other locations in north Louisiana. A planned observation tower will allow the viewing of nesting bald eagles, wading birds, and thousands of wintering waterfowl without disturbance to the wildlife.

Wildlife Photography

There are no photo blinds on the refuge but visitors can photograph wildlife anywhere there is public access on the refuge. Several local photographers frequent the refuge and have provided pictures taken on the refuge for use in brochures, exhibits, and presentations.

Environmental Education

Upper Ouachita NWR is located in rural areas of Union and Morehouse Parishes and has no public restrooms, no educational exhibits, and no suitable facilities to shelter students in case of unexpected bad weather or for eating lunch. Black Bayou Lake Environmental Education Center has been developed for the environmental education program emphasis for the North Louisiana Refuge Complex and the refuge ranger for the Complex is housed at Black Bayou Lake NWR. University wildlife management and ecology classes occasionally make fieldtrips to the Mollicy Unit. Other educational fieldtrips could be arranged upon request, but groups are encouraged to schedule their fieldtrips to Black Bayou Lake NWR where staff, facilities, and equipment are available.

The Refuge Complex staff participates in a wide array of public events, including the area National Hunting and Fishing Day and Earth Day celebrations. Portable exhibits and educational materials are made available at informational booths at special events. The refuge manager accommodates requests to speak at local civic clubs and other organizations. Refuge brochures are posted in local sporting goods stores and at the LDWF District II office. The Refuge Complex general brochures are distributed at the Monroe/West Monroe Visitor and Convention Bureau. Educational brochures and

other materials are available at Complex headquarters, Complex visitor center at Black Bayou Lake NWR, and are mailed upon request.

Environmental Interpretation

Upper Ouachita NWR currently has three interpretive panels located on the Mollicy Unit. Other interpretive panels could be utilized on both sides of the refuge. Most of the formal and informal interpretation for the Refuge Complex is done in association with the Complex visitor center at Black Bayou Lake NWR.

Other Uses

Trapping and raccoon hunting on horseback are permitted with special use permits, but use for these activities is very low.

Handy Brake NWR and the LWMD

A short boardwalk to an observation deck is the only public access on Handy Brake NWR (Figure 17). Large numbers of waterfowl can be observed from the deck in the winter. Wildlife photography opportunities are limited unless a high power lens is used. An interpretive kiosk is located in the parking area and interpretive signs are located on the observation deck. School groups from Bastrop occasionally go to Handy Brake NWR on teacher-guided fieldtrips, but requests for educational fieldtrips are referred to the Black Bayou Lake NWRr where facilities, staff, and equipment are available.

No hunting or fishing is permitted at Handy Brake NWR.

There is no public access on LWMD tracts. Wildlife observation and photography could occur from the roads around or through the various tracts. There is one interpretive sign at the Joe Oliveros tract.

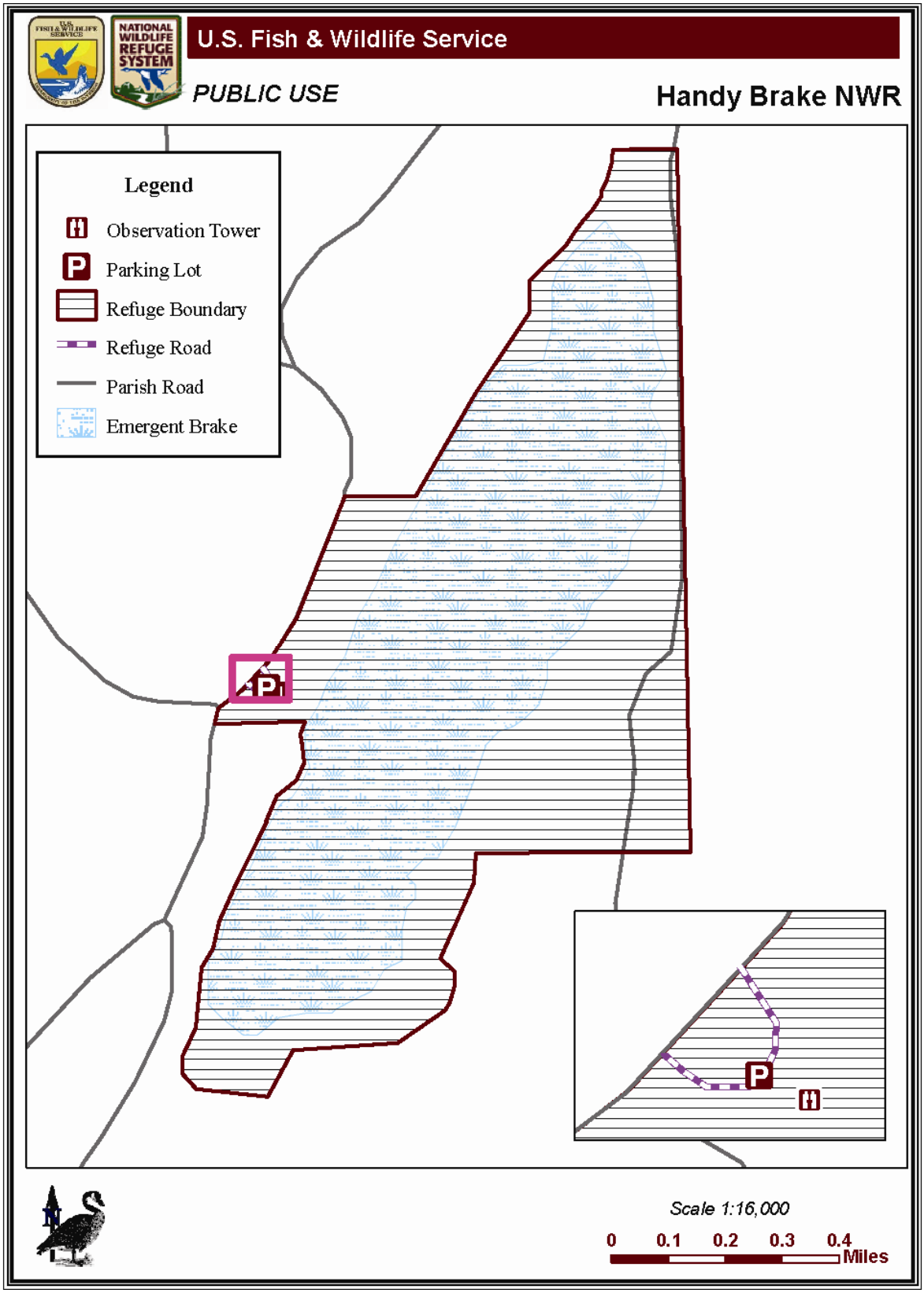
PERSONNEL, OPERATIONS, AND MAINTENANCE

Staffing

Staffing issues are complicated since some positions are “assigned” to the Refuge Complex and those individuals provide assistance to Upper Ouachita and Handy Brake NWRs and the LWMD, as well as all other refuges in the Complex. Other positions are “assigned” to specific refuges; however, the staff coordinates and collaborates on resource issues as needed. Private lands work has historically been administered under the LWMD. The private lands program will periodically check conservation easements within the LWMD for compliance and current condition.

Refuge Complex Personnel	*Upper Ouachita NWR and LWMD Personnel*
Project Leader	Refuge Manager
Deputy Project Leader	Forester
Private Lands Biologist	Equipment Operator
Wildlife Biologist	Equipment Operator
Office Automation Clerk	
Outdoor Recreation Specialist/Ranger	

Figure 17. Current visitor services on Handy Brake NWR



A volunteer program exists on the refuge. Currently, volunteers serve as guides and assist in getting blinds ready for youth turkey hunts. There is one volunteer at Handy Brake NWR who opens and closes gates each day, cleans up, mows, etc. Volunteers for the entire Complex are recognized at an annual banquet for their contributions to the refuge. The refuge tried to establish a Friend's group, but was unsuccessful. The refuge manager has been initiating efforts again with individuals who express an interest in forming such a group.

Funding

Upper Ouachita and Handy Brake NWRs and the LWMD are units of the North Louisiana National Wildlife Refuge Complex, and do not have their own budget. Refuge operations monies are spent among all refuges within the Complex (Table 7). Some years there are project-specific monies directed to only Upper Ouachita or Handy Brake NWRs.

Facilities

The Refuge Complex headquarters is located on D'Arbonne NWR. 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. Upper Ouachita NWR has two maintenance shops, one on the west side and one on the Mollicy Unit. The shop on the west side is the largest and stores and maintains the majority of the vehicles and equipment for Upper Ouachita NWR and the LWMD.

All refuge roads (37 miles) that are open to public travel are graveled. Grading and other maintenance are conducted by refuge staff. Some roads are closed during annual flooding. There are 11 access points and 14 maintained parking areas (Figure 16). In 2002, all refuge roads and parking areas were graveled.

Table 7. North Louisiana NWR Complex funding and staffing for Fiscal Year 2006

Description	FTE*	Amount
1121 Partners For Fish and Wildlife	1.0	$74,300
1261 Refuge Operations - Administration	5.5	$598,800
1262 Refuge Operations - Maintenance	5.0	$492,200
1263 Refuge Operations - Public Use	3.0	$273,400
1264 Refuge Operations – Law Enforcement	0.0	$41,000
1265 Natural Resource Planning	1.0	$108,100
4753 Hurricane Incident	0.0	$37,700
6860 Forest Management	0.5	$45,000
9264 Fire Support	0.0	$10,000
Total Refuge Complex Operating Budget	**16**	**$1,680,500**

** Full-time Employee*

Refuge Revenue Sharing

By law, the refuges are exempt from paying property tax, but makes in lieu payments to Morehouse, Union, Richland, West Carroll, and East Carroll 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 NWR Complex revenue payments for Morehouse, Union, Richland, West Carroll, and East Carroll Parishes, Louisiana, for the last three years

FY	Morehouse	Union	Richland	West Carroll	East Carroll	TOTALS
2006	$40,323	$118,872	$977	$0	$27	$160,199
2005	$37,778	$105,256	$866	$572	$24	$144,496
2004	$42,711	$117,127	$979	$647	$27	$161,491

III. Plan Development

In accordance with Service guidelines and National Environmental Policy Act recommendations, public involvement has been a crucial factor throughout the development of the Draft CCP/EA for Upper Ouachita and Handy Brake NWRs and the LWMD. This Draft CCP/EA has been written with input and assistance from interested citizens, conservation organizations, and employees of local and State agencies. The participation of these stakeholders and their ideas has been of great value in setting the management direction for Upper Ouachita and Handy Brake NWRs and the LWMD. 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.

A Core Planning Team (refer to Section B, Chapter V) composed of refuge staff was formed to prepare the Draft CCP/EA. Initially, the team focused on identifying the issues and concerns pertinent to refuge management. The team met on several occasions from September 2004 to June 2007.

In preparation for developing the Draft CCP/EA, the refuge conducted a Biological Review and Public Use Review in September 2004 and September 2005, respectively. Early in the process, the Planning Team identified a variety of issues, concerns, and opportunities that were provided to both review teams.

The Upper Ouachita NWR Biological Review was held during the week of September 13, 2004. 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 a 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 while developing the Draft CCP/EA.

The Public Use Review Team (see Chapter V for a list of members) was comprised of Upper Ouachita NWR and neighboring refuge staff and a Regional Office representative from the Visitor Services' and Outreach programs. The team reviewed the existing public use programs, facilities, and opportunities available. Emphasis is placed on the priority six wildlife-dependent public uses. The team prepared a Public Use Review Report that also provides recommendations for the short- and long-term public use program. These recommendations were taken into consideration during the development of the Draft CCP/EA.

A notice of intent to prepare the comprehensive conservation plan was published in the *Federal Register* in 2005 for Upper Ouachita NWR, and October 2005 for the LWMD, which includes Handy Brake NWR. The public was notified via local newspapers and media of two open house meetings to be held on November 14 and 15, 2006, in Marion and Bastrop, Louisiana. In addition, information packets, including a letter of invitation, public input workbook, and mailing list request form were mailed to approximately 160 different Federal, State, and local agencies; State and Federal congressional delegates; and private individuals. In Marion, 23 individuals attended with comments and discussions among staff and public. In Bastrop, only five individuals attended. The *Bastrop Daily News* and the cable community board announced the event. However, a large thunderstorm that evening may have minimized attendance. Of the workbooks, sixteen were returned along with seven notecards from the open houses, and two letters from private individuals.

SUMMARY OF ISSUES, CONCERNS AND OPPORTUNITIES

The Core Planning Team identified a number of issues, concerns, and opportunities related to fish and wildlife protection, habitat restoration, recreation, and management of threatened and endangered species. Additionally, the Core 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 decisions to be made within this planning process. The team has considered all raised issues throughout this planning process, and has developed a Draft CCP/EA 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

Beavers are overpopulating refuge lands and must be controlled for proper bottomland hardwood forest management. Without adequate control, beaver populations on the refuge will increase to a point that results in prolonged flooding of bottomland hardwood forest areas, resulting in loss of trees.

The public, in the past, has questioned the refuge's assessment of the carrying capacity 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 2006, a unique biological resource was found on the refuge. Many southeastern 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

Upper West Gulf Coastal Plain Ecoregion—The Louisiana Department of Wildlife and Fisheries defined habitats within this ecoregion and then defined species of concern for those habitats (Lester et al., 2005). Upper Ouachita NWR uplands contain mixed hardwood-loblolly pine and hardwood slope forests, which the wildlife conservation strategy identified. This habitat is not as imperiled as many other habitats given that mixed hardwood-loblolly pine forest is estimated to occupy 500,000 to 1,000,000 acres, historically, with the same percentage thought to remain today (Smith 1993, Lester et al., 2005). This habitat type is expanding into uplands due to fire suppression and conversion to pine plantations; however, the quality of this habitat is lower than in the past. Pine plantations are managed on short rotations, not allowing trees to be older than 25-30 years. Most of these plantations are owned by timber companies that manage them to be almost pure pine by using herbicides to kill hardwood speces. As a result, fewer hardwoods are present and the overall age of the forest is young.

Upper Ouachita NWR currently supports only one active red-cockaded woodpecker group with a present objective of one group (Figure 14). Recently, much discussion has centered on the problems of trying to maintain and increase this population. There has been a 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 group for much longer, much less being able to increase the family groups. This habitat historically was, and still pushes itself to be, a mixed pine and hardwood type with many more hardwoods and woody understory than what the

RCW 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 resources to maintain an artificial habitat for an endangered species, or allow the habitat to succeed with a natural progression to mixed pine hardwoods that will conserve the biological integrity of the area, and monitor for subsequent RCW use.

Parts of Upper Ouachita and Handy Brake NWRs and four of the lands within the LWMD occur in the West Gulf Coastal Plain ecoregion (Figure 3). Within this ecoregion, LDWF identified bottomland hardwood forests as the main natural community type. Clearing for agricultural production was the primary factor that led to the fragmentation and decline of this important habitat type.

The Service has been dealing with the conservation and management of bottomland hardwood forests throughout the Southeast Region. Constraints of thinning either from funding, logistics, or hydrological (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 a determination made 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 this one. In association with this, several priority species of migratory songbirds utilize bottomland hardwood forests, but it is unknown how much nesting occurs on Upper Ouachita NWR and whether nesting attempts are successful. Since Upper Ouachita NWR was established for migratory birds, there is an opportunity under future management to direct resources toward neotropical migratory songbirds.

A concern was noted for a loss of biological integrity of bottomland hardwood forests and upland mixed pine/hardwood forests with an increase in Japanese climbing ferns and Chinese tallow trees, as discussed in the previous chapter.

RESOURCE PROTECTION

Easement Issues

Problems specific to FSA easements include trespassing and destruction of survey markers and signs. Several meetings have been held with landowners to discuss easement requirements; however, when easements sell and resell without the refuge's knowledge, management is unable to discuss these requirements with the new owners. Therefore, violations of easement requirements can possibly exist.

Natural Gas Resources

Upper Ouachita NWR is saturated with natural gas wells (Figure 4). 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 (RM 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.

Watershed Protection

The large levee constructed along the Ouachita River to protect some of the cropland from flooding has broken several times over the years, but has been repaired by the previous landowners to prevent flooding at all but the highest river stages. The reforested fields outside the levee experience the highest flood depth, duration, and frequency. Rain water also accumulates inside the levee during the winter due to depressional topography of the area. Although all of these factors contribute to the shallow flooding of croplands and moist-soil areas producing extremely valuable migratory bird habitat, concern remains that the levee will breach again from a flood event. Breaching the levee from a high flood event or actively may restore some of the historic hydrology of the area. An evaluation of leaving a levee breach from a flood event versus actively breaching the levee in the most advantageous area will be addressed.

Contaminants

During public scoping, several individuals were concerned with the water quality of the Ouachita River and wanted the Service to “clean it up.” The Service does not have authority to regulate and control activity on the Ouachita River but will evaluate partnership opportunities to address overall contaminant issues.

VISITOR SERVICES

Hunting

Quality turkey habitat is limited on the refuge. Refuge management will evaluate the turkey habitat for opportunities to conduct safe, sustainable, quality turkey hunts.

Deer management is often an issue with a variety of user groups. Public comments have been received for deer management changes. These range from moving toward more or different harvests; leaving the harvest as is, or not allowing deer hunting at all. Bow hunters often want no gun hunting, or some want special muzzle-loader seasons, etc. Often deer management comments are associated with trophy hunts, antler size restrictions, and limitations to doe and buck days. Refuge management will evaluate the current program and determine opportunities for the future. Often coinciding with deer hunting is the access issue involving all-terrain vehicles (ATV). Currently, the refuge allows ATVs on designated trails. Comments have been received from individuals requesting more access with ATVs, while others want to maintain the existing restrictions.

Fishing

Improving the fishery and access to fishing through management were main concerns identified during the scoping process.

Wildlife Observation

Increasing wildlife observation opportunities on the refuges and improving signage to these areas will address public concern.

Other Uses

The public requests access for horseback riding. Currently no horseback riding is allowed. Special use permits are issued for night raccoon hunting that is conducted on horseback. Issues associated with horseback riding are habitat degradation and conflict with other uses.

REFUGE ADMINISTRATION

Staffing needs to support current and future public uses exist, as well as needs for public use facilities' improvement. In general, the number and condition of refuge access points and roads limit all public use on the refuges. Access will remain limited until more all-weather roads are provided and maintained.

The LWMD has had minimal administration needs except for boundary posting to reduce trespass issues. Refuge law enforcement officers cooperate with LDWF officers to enforce the closure of hunting and fishing activities on the tracts. Rights-of-way requests across easement properties have deemed it necessary for administration review and discussion.

Wilderness Review

Refuge planning policy requires a Wilderness Review concurrent with the comprehensive conservation planning process (RM 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 meet the defining wilderness criteria set forth in the Wilderness Act of 1964. These criteria are:

(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 5,000 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 Upper Ouachita and Handy Brake NWRs and fee-title lands in the LWMD 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 Draft CCP/EA.

IV. Management Direction

INTRODUCTION

The Service manages fish and wildlife habitats, considering the needs of all resources in decision-making. But first and foremost, fish and wildlife conservation assumes priority in refuge management. A requirement of the National Wildlife Refuge System Improvement Act of 1997 is for the Service to maintain the ecological health, diversity, and integrity of refuges. Public uses are allowed if they are appropriate and compatible with wildlife and habitat conservation. The Service has identified six priority wildlife-dependent public uses. Hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation are therefore emphasized in this Draft CCP/EA.

Described below is the Draft CCP for managing Upper Ouachita and Handy Brake NWRs and the LWMP for the next 15 years. This proposed management direction contains the goals, objectives, and strategies that will be used to achieve the vision for the refuges and the LWMP lands.

Three alternatives were considered: A) current management; B) proposed management; and C) minimize management and public use. Each of these alternatives is described in the Alternatives' section of the EA. The Service chose Alternative B as the proposed management direction.

Implementing the proposed 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 maintained 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 made to reduce invasive species threatening the biological integrity of the refuge. Wintering waterfowl habitat will be maintained and enhanced 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, ranging from reptiles and amphibians to butterflies to several species of concern. Cooperative projects will be conducted with universities, LDWF, 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 refuges' purposes.

VISION

Upper Ouachita and Handy Brake NWRs and the LWMD will conserve, enhance, and restore the integrity of bottomland hardwood forests, other wetlands, and upland mixed pine-hardwood habitats primarily in the Upper West Gulf Coastal Plain and MAV. Moist-soil and cropland habitats will be managed to benefit a variety of migratory waterfowl, shorebirds, and associated species. A diversity of wildlife species will be fostered while maintaining opportunities for the public to enjoy wildlife-dependent recreation. Future resource protection will be strategically charted for establishing habitat conservation linkages in the Lower Mississippi River Ecosystem through partnerships and collaboration.

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 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 Upper Ouachita and Handy Brake NWRs and the LWMD. The following goals, objectives, and strategies apply to all refuge lands unless specified according to individual units (i.e., Upper Ouachita NWR, Handy Brake NWR, lands in the LWMD). The Service intends to accomplish these goals, objectives, and strategies within the next 15 years.

FISH AND WILDLIFE POPULATION MANAGEMENT

GOAL A. Promote the conservation and management of migratory bird diversity, resident wildlife, and species of special concern in support of national, regional, and ecosystem habitat and population goals.

Objective A-1. Migratory Waterfowl
Annually monitor, assess, and inventory species abundance, use period, and habitat use on the refuge to help evaluate and improve management for migrating/wintering waterfowl.

Discussion: Upper Ouachita NWR is located in the West Gulf Coastal Plain close to the western edge of the MAV, 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. Handy Brake NWR and the LWMD lands are located in the MAV. 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 quality and quantity) 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. Concerning wintering habitat, dabbling ducks need a diversity of wetlands including the following: (1) flooded crop land; (2) natural wetlands; and (3) refuge (i.e., sanctuary) (Reinecke et al., 1989).

At times, the refuge has surveyed (indexed) over 80,000-100,000 waterfowl, but usual monthly winter "estimated" averages will vary between 30,000-45,000 birds depending on weather, surrounding lands/forage, survey timing, and landscape water conditions. Geese (white-fronted and primarily snow geese) can also add another 10,000-20,000 birds during winter periods. Although snow geese are targeted for major reductions in the Mississippi Flyway, they are a resource to be treasured at acceptable levels.

Strategies:

- Determine the feasibility for a multi-agency, multi-refuge cooperative aerial survey (inventory protocol) during key months (late-October through mid-February). Pool resources for monthly or twice monthly (fall/winter) aerial inventories (archive the data).
- Continue aerial mid-winter survey using the current Southeast Region Waterfowl Survey Protocol for Refuges.

- Hire biological technician to assist with surveys and data management.
- Design and implement a protocol for estimating wintering waterfowl use of flooded forest. Collaborate with LMVJV for design.

Objective A-2. Waterfowl Sanctuary
Maintain 9,734 acres (22 percent) of Upper Ouachita NWR and most other fee title lands within the LWMD as no waterfowl hunting areas, using adaptive management for yearly regulations, delineations, and modifications.

Discussion: Waterfowl need sanctuary from hunting pressure. Winter is an important season in the life of waterfowl. It is a biological preparatory period during which many ducks and geese pair and perform other life functions (e.g., females of some species [e.g., mallard] undergo a prebasic molt to acquire their breeding-season plumage) in readiness for reproduction. No hunting areas enable some species of waterfowl to prepare biologically for spring migration and reproduction.

Strategies:

- Enforce waterfowl hunting prohibitions in the closed area.
- Monitor the "closed to hunting" area for disturbance during waterfowl wintering period.
- Evaluate closed area from a conservation perspective for size, location, and access.
- The "No Hunting Area" of the Mollicy Unit will be monitored for disturbance levels by other user groups (e.g., birdwatchers).
- The school board section inholding should be leased (obtained) to provide flooded tree/shrub sites for cover, loafing, feeding, etc., where no hunting occurs.
- Since a majority of the refuge is open to waterfowl hunting, continue with the "hunting until noon policy" or consider only allowing 3 days-per-week of all-day waterfowl hunting.

Objective A-3. Resident/Nesting Waterfowl
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 MAV and West Gulf Coastal Plain.

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

Wood ducks are cavity nesters, seeking cavities in trees within a mile of water. Brood survival is higher in situations where nests are close to water. Due to conversion of forest lands to urban sprawl, agriculture, forestry practices, and competition for nest sites from a host of other species, 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 are not an end to all nesting problems. They require time to clean and repair at least annually. Production can be increased by more frequent checks and cleaning of boxes, but this must be weighed with other time constraints. The refuge has recently modified the nest box program strategy to minimize the impact of extreme water level fluctuations. Upper Ouachita NWR maintains 24 nest boxes placed on land above the normal flood elevation. There are numerous, dilapidated nest boxes on Handy Brake NWR and the LWMD. Box checks are conducted prior to and after the nest season as a minimum. Box checks during the nest

season are typically conducted to better estimate the number of broods, nest success, and productivity. The refuge reports only about 20 percent nest box usage and is currently compiling a report of past nest success.

A recent publication, *Increasing Wood Duck Productivity: Guidelines for Management and Banding on Refuge Lands* (Southeast Region) (U.S. Fish and Wildlife Service, Division of Migratory Birds 2003), provides guidelines for the use of wood duck nest boxes that should be used to guide the nest box program on refuge lands. It is critical that nest boxes be spread out so that they are at least 100 yards apart or cannot be seen from another box. The boxes must have a functional predator guard and be checked and repaired annually; otherwise, boxes are considered traps for the hen and her clutch. Conical predator guards should be placed on all of the boxes to more effectively keep rat snakes and raccoons from climbing into the boxes. Some reports indicate that if rat snakes learn there is a meal of eggs in the nest box, it is very difficult to exclude them from the boxes, even boxes with predator guards. If boxes cannot be properly maintained, they should be boarded up until sufficient effort can be put toward operating an effective nest box program. Cleaning the boxes after the initial peak of nesting (about mid-April) will significantly improve annual production if competition for nest sites increases. Continued monitoring of nest boxes is critical to success. If box usage and nest success does not improve, modifications to the current program should be considered.

Brood survival is always a consideration, especially if broods must travel long distances to suitable habitat. McGilvrey (1968) described preferred brood habitat as 30 to 50 percent shrubs, 40 to 70 percent herbaceous emergents, and 25 percent open water. Overhead cover within 1 to 2 feet of the water surface is vital for wood duck broods. Optimum habitat should have 75 percent cover and 25 percent open water, with a minimum of 1/3 cover to 2/3's open water. Probable reasons for the limited nest box usage should be reviewed periodically and corrected through reasonable management actions.

Because wood ducks are fairly secretive birds, it is extremely 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. The North Louisiana National Wildlife Refuge Complex has an annual preseason banding quota of 125 wood ducks, including 16 adult males, 27 adult females, 34 immature males, and 48 immature females. The Complex has a history of reaching its banding quota and it is essential that it continues so that this important resource can be managed.

Strategies:

- Maintain a program of well-maintained nest boxes (see 2003 Guidelines). Place boxes with functional predator guards so that it is difficult to see from one box to the next, or at least 100 yards apart. It is important to place boxes so that they are easy to access. As a minimum, box checks should be conducted in January, just prior to nest initiation that should begin between late-January and mid-February. Preferably, boxes will also be checked in late-April, soon after the first round of nest exodus by ducklings and again in August, just after the nesting season is complete.

- Evaluate nest use and nesting success in boxes. Adjust the program accordingly to add more boxes if over 50 percent of the existing boxes are used, but not to exceed more nest boxes than refuge staff can properly maintain. If nest box usage does not expand, boxes should only be replaced to provide about two times the average number of boxes used during the previous 2 or 3 years (e.g., if 10 boxes are used on the average during the past 2 years, maintain a box program of 20 nest boxes). Keep good records, archive data (see 2003 Guidelines).
- Evaluate areas on Handy Brake NWR and other fee title lands in the LWMD for nest box installation, repair, and replacement. Install when feasible. Collect GIS location information of all boxes.
- Utilize trapping/banding to help achieve banding objectives--focus on July-September banding periods. Continue meeting or exceeding the preseason wood duck banding quota of 125 wood ducks, including 16 adult males, 27 adult females, 34 immature males, and 48 immature females. The quota, by age and sex, should be the goal, not just the total duck (125) quota (see 2003 Guidelines).
- Favor/keep good brood rearing sites (do not destroy all beaver ponds, etc.). (See 2003 Guidelines.)
- Favor natural cavities when conducting forestry practices. Add this as an integral part of the Forest Habitat Management Plan.

Objective A-4. Mottled Duck
Collect data to determine mottled duck use of refuge and status in northeast Louisiana and promote nesting, brood-rearing, and molting habitat where applicable.

Discussion: Mottled ducks are a resident species with a range limited to the West Gulf Coast (WGC) and Florida. The Gulf Coast Joint Venture estimates midwinter mottled duck populations of the WGC to be 646,000. Available information on WGC population trends is somewhat ambiguous, but generally suggests a stable population in Louisiana and the possibility of declines in Texas. Mottled ducks are generally considered to only inhabit coastal areas, but have been documented as year-round residents in northeast Louisiana, particularly in the rice-growing region.

Mottled ducks have a long potential nesting period (February through mid-July), and as a result, frequent renesting attempts are common, but the peak of nesting activity occurs mid-April through May (Moorman and Gray 1994). Typical mottled duck nesting habitats are cordgrass ridges and other elevated sites within coastal marsh complexes, and cattle pastures and rice production zones of the former coastal prairie (Stutzenbaker 1988). Mottled ducks frequently select nest sites with some overhead cover, but typically abandon sites once they are overgrown with bacharis, willow, or Chinese tallow (Stutzenbaker 1988, Holbrook 1997).

Mottled duck brood rearing occurs March through mid-September, with the peak occurring April through June. Mottled duck broods require habitats that are fresh or intermediate (Moorman et al., 1991). The period of adult wing molt, mid-June to mid-September, is likely a time of particular susceptibility for mottled ducks (Moorman and Gray 1994). Large concentrations of birds (>2000/section) are not unusual during this period that is typically one of the driest of the year (B. Wilson, unpublished data).

The year-round residency of this species makes it susceptible to potential population stresses that are unique among ducks. For instance, extremely high shot ingestion rates have been documented from a large sample of mottled duck gizzards in Texas from 1981- 1999, with 41 percent containing shot, including 23 percent with lead shot (J. Neaville, unpublished data). Mottled ducks are also

susceptible to spring and summer mortality from a variety of predators that other dabbling duck species do not encounter, including an increasing population of alligators across their WGC range.

As such, special consideration is warranted to ensure that their unique needs are met. Although not as high a priority for management as in coastal Louisiana, mottled duck use of the refuge should be documented as well as possible.

Strategies:

- Monitor mottled duck population trends on the refuge through fall/winter aerial surveys and other rigorous and repeatable surveys (e.g., spring/summer surveys) as feasible.
- Promote nesting, brood-rearing, and molting habitat where applicable.

Objective A-5. Forest Breeding Birds
Every 3 years, determine neotropical migratory bird species relative abundance on the refuge and LWMD lands within priority bird conservation areas to monitor for trends and regional comparisons.

Discussion: Upper Ouachita NWR is a predominately forested refuge in a largely forested landscape context in the WGC plain of northern Louisiana. Of the 42,594 acres within the refuge, 24,307 acres are forested, with an additional 9,236 acres recently reforested. Upland forests totaling 4,540 acres are dominated by pine and pine/hardwood mix. Although the majority of forests on the refuge is in maturing or mature condition, the forested landscape surrounding the refuge is increasingly in early successional habitat.

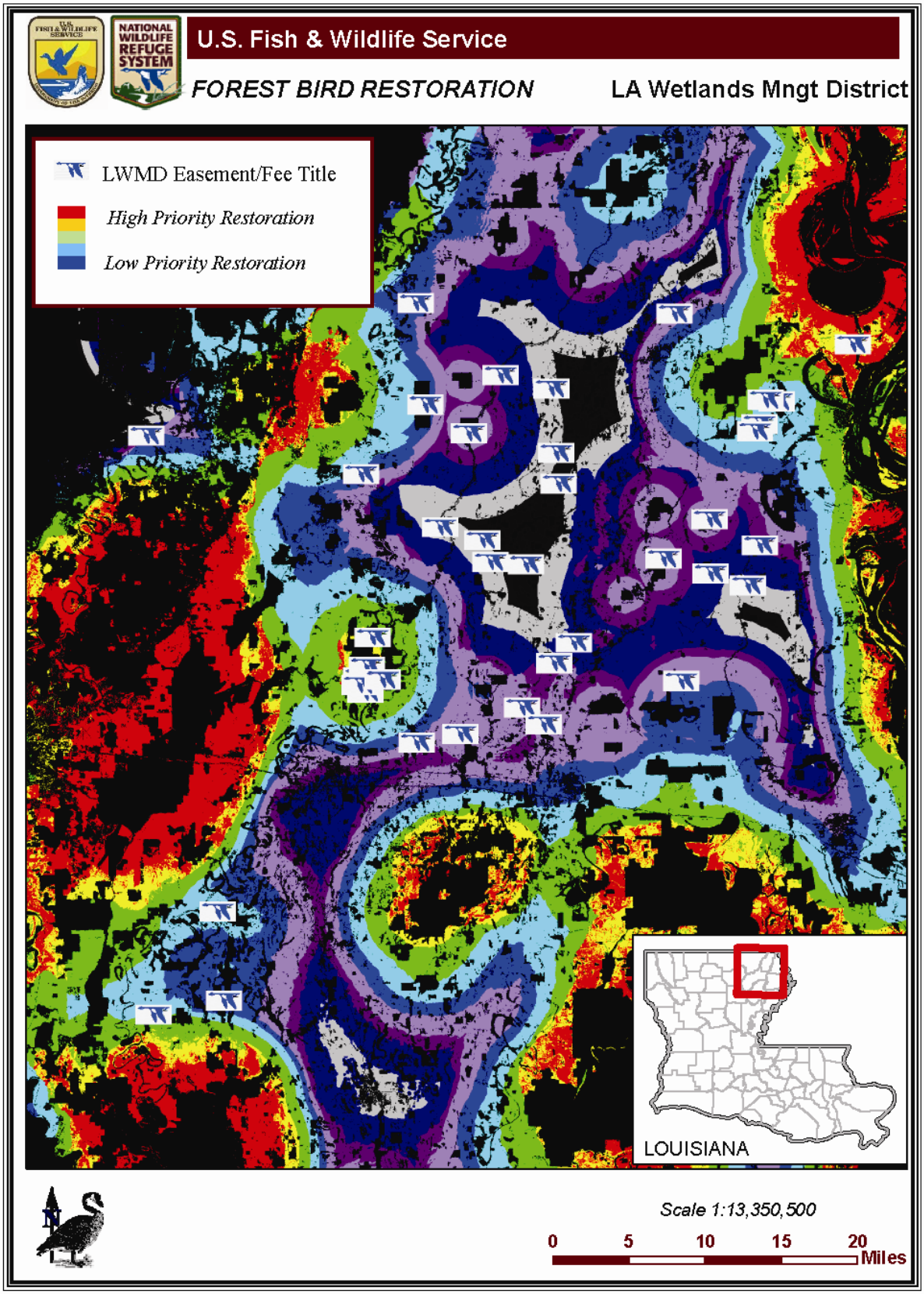
Several parcels of land within the LWMD are located in high priority restoration areas for forest breeding birds (Figure 18). Given the fact that these lands have recently been reforested, monitoring use would provide important information in priority areas.

Several research and survey needs were identified during the Biological Review with regard to forest bird habitat context and content issues. Most of these needs are with breeding species, but rising continental conservation concern with the rusty blackbird, which winters in forested wetlands of the southeastern United States, also requires survey attention.

Strategies:

- Use aerial photography that covers an area of at least 75,000 acres (including an area with radius extending 6 miles from the center of refuge) to compare land use patterns 10-15 years from now with today's patterns.
- If surrounding forest cover falls below 70 percent, evaluate nesting success of forest birds and if nesting success is found to be depressed due to nest predation or cowbird parasitism, consider additional reforestation.
- Collaborate with LMVJV for design.
- Refuge staff or volunteers conduct point-count surveys within each habitat type.
- Hire a biological technician to assist with surveys and data management.
- During the winter months, refuge staff should be encouraged to keep records on their encounters with rusty blackbirds, including locations, numbers, and dates when encountered.

Figure 18 Forest breeding bird priority areas of conservation associated with the LWMD



Objective A-6. Forest Breeding Birds
Determine nesting success of priority neotropical migratory birds (e.g., hooded warbler, Kentucky warbler, northern parula, Swainson's warbler, wood thrush, and prothonotary warbler) within 6 years after the CCP is approved, and use production data as a baseline for comparison in future years as surrounding land cover changes.

Discussion: At this point in time, it does not appear that forest birds occurring on Upper Ouachita NWR are subjected to elevated nest depredation and cowbird parasitism pressure associated with fragmented landscapes. Nevertheless, maintaining 2,540 acres in agricultural fields (Mollicy Unit) at the northeastern portion of the refuge may contribute to elevated numbers of nest predators and cowbirds that could affect overall forest bird nesting success at Upper Ouachita NWR. This does not appear to be a serious threat unless the forested landcover surrounding the refuge falls below 70 percent (covering an area of 75,000 to 100,000 acres).

Strategies:

- Develop research projects in cooperation with LDWF and a university to meet objective and obtain recommendations for best management practices that will increase production of Louisiana species of concern.
- Obtain funding for research project and graduate student or temporary employee for a period of 3 years.
- Test assumption that nesting success of forest breeding landbirds is high at Upper Ouachita NWR with existing surrounding landscape considered >70 percent forested, establishing baseline if surrounding landscape falls below 70 percent by 2010.
- Working with the LMVJV, establish point counts in stands that will be subjected to management in the near-term, as well as stands that will not be managed in the near-term to track bird responses by 2012.

Objective A-7. Marshbirds
Determine status of marshbirds, particularly breeding king rails, in moist-soil areas and unharvested rice fields on the Mollicy Unit.

Discussion: The moist soil areas and unharvested rice fields on the Mollicy Unit may support breeding king rails when water levels, and subsequent height and density of moist-soil plants, are appropriate. Similarly, transient rails and bitterns may also use the Mollicy Unit.

Strategy:

- Determine presence of marshbird species in suitable looking habitat and response of these species to habitat management by contributing to secretive marshbird survey data presently coordinated by BRD-University of Arizona.

Objective A-8. Waterbirds
Annually, monitor species presence, habitat use, and abundance of colonial waterbirds, pelicans, and waders during post-breeding periods.

Discussion: Generally speaking, nesting wadingbirds have adequate habitat. Controlling human disturbance at nesting colonies is a key to protecting these species. It is important to track changes in public use around established colony sites and responses by the nesting birds.

One important aspect of managing for long-legged wading birds, including post-breeding wood storks dispersing from Mexico, is providing post-breeding foraging habitat in summer and early fall. Drawdowns and stocking of forage fish improve foraging habitat and concentrate birds for viewing.

Species of conservation interest in the WGC plain include little blue heron, wood stork (not federally listed in Louisiana), and white ibis. Observations of these species, their numbers, use of impoundments, and the condition/management of these impoundments would provide valuable information in guiding future management decisions in line with what is needed for brooding wood ducks and later use by migrating and wintering waterfowl.

In addition, the Mollicy Unit also supports large numbers of American white pelicans (about 2,000 were observed in 2005), and tracking the occurrence and abundance of this species is considered important. This species is of increasing management interest with respect to aquacultural conflicts located east of Upper Ouachita NWR.

Strategies:

- Locate nesting sites of colonial waterbird species each year and determine if special measures are needed to control disturbance.
- Determine use of managed wetlands, especially during post-breeding periods by long-legged waders, starting in June on about a 15-day interval (on or about the 5th and 20th of each month) through September.

Objective A-9. Grassland Birds
Monitor presence, abundance, and habitat use of wintering grassland bird species, such as Henslow and LeConte's sparrows, in open wetland and recently reforested habitats.

Discussion: Approximately 4,200 acres of moist soil, rice, and fallow fields and 9,236 acres of recently reforested ground on the Mollicy Unit and in the LWMD are currently considered a locally important habitat for supporting grassland species, such as Henslow's and LeConte's sparrows. These grassy conditions may also support other priority grassland birds, including yellow rail, American woodcock (nocturnal display and foraging use), Wilson's snipe, short-eared owl, northern bobwhite, grasshopper sparrow, barn owl, loggerhead shrike, and sedge wren. Recently reforested sites may provide grassy conditions initially; however, as trees mature, grassland associated species are expected to decline.

Strategies:

- Monitor and compare changes in abundance of grassland birds, especially Henslow's and LeConte's sparrows and sedge wren.
- For better understanding of habitat use and monitoring trends over time in reforested areas, implement Project Prairie Bird or similar surveys.

Objective A-10. Scrub/Shrub Birds
Determine species presence, relative abundance, and habitat use of priority scrub/shrub species.

Discussion: Several species associated with early successional forests are often described as scrub/shrub species. The 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.

Painted buntings are associated with forest edges that have substantial understory. Maintaining unmowed grassy roadsides during the breeding season reduces cowbird foraging habitat (i.e., recently mowed roadsides). Many species, including painted buntings (but also many other songbirds and wild turkey), make substantial use of unmowed roadsides as "bugging" habitat to support feeding their young of the year. Limiting mowing operations along roadsides and utility rights-of-way, particularly between April 15 and August 15, is important to nesting success.

Strategies:

- Link status of scrub/shrub species at Upper Ouachita NWR with habitat improvements to 3,800 acres of pine woodland by 2015.
- All forest edges should be feathered by cutting into the existing woods to maximize potential use by scrub/shrub species and with nearby patches of unmowed grass, such as along roadsides and utility rights-of-way, from mid-April to mid-August (as is practicable), especially for painted buntings, by 2015.
- Working with the LMVJV, consider establishing roadside point counts along forest and field edges across the refuge to track habitat use by all priority scrub/shrub species.
- Cooperate with LDWF and a university for developing a research project with graduate students to evaluate timber management efforts on scrub/shrub birds.

Objective A-11. American Woodcock
Determine use of open field habitat by American woodcock during winter and spring.

Discussion: American woodcock use of refuge lands 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 support optimal breeding conditions (i.e., canebrakes or very dense understory patches). These conditions may increase with recommended forest management to promote more open canopies and denser patches of understory. Draft protocols for surveying American woodcock are now available for implementation if staffing and other priorities permit.

Strategies:

- Review literature and discuss with partners to design and implement a valid, feasible protocol.
- Establish protocol to survey American woodcock using fields during winter and spring.

Objective A-12. Shorebirds
Annually, monitor shorebird species presence, habitat use, and abundance during post-breeding periods.

Discussion: Where opportunities exist, managing shorebird habitat should be focused during both northbound and southbound movement periods. Although habitat objectives for shorebirds in the WGC plain have not been established, it appears most of the habitat in Louisiana would come from Upper Ouachita NWR.

The management regime for moist-soil areas on the Mollicy Unit is critically important for southbound migratory birds in the WGC plain bird conservation region, and may, in fact, be the most important site in Louisiana's portion of this bird conservation region during this time of year when habitat is generally unavailable in most areas. Of the approximately 1,000 acres of moist soil that should be available on the Mollicy Unit every year, the established regime of initiating gradual drawdowns starting in early July through early October provides excellent habitat in copious amounts.

For southbound migration, specific measures should be implemented, such as holding water in some impoundments into July and some into August/September, then gradually drawing down water for the greatest production of invertebrates. September habitat would overlap needs of southbound migrating blue-winged teal and northern pintail.

Both moist soil and rice also should provide important habitat for northbound migratory birds in concert with other management priorities (marshbirds, waterfowl, etc.).

Strategies:

- Continue to draw down water from early July through October on moist-soil areas on the Mollicy Unit.
- Determine if opportunity exists to provide northbound habitat from late March to late May in concert with waterfowl or other species management, by 2015.
- Continue to support LMVJV Shorebird Survey protocol and conduct more regular surveys using International Shorebird Survey protocol in coordination with the South Atlantic Migratory Bird Initiative.

Objective A-13. Mammals
Develop a comprehensive species list of mammals utilizing refuge lands.

Discussion: Many species of mammals are present on the refuge, including white-tailed deer, raccoon, bobcat, beaver, nutria, muskrat, otter, opossum, red and gray fox, coyote, rabbit, bat, and gray and fox squirrels and other rodents. No research has been conducted on refuge mammals, except for white-tailed deer; therefore, little information is available on populations of other species. Before management strategies can be developed, a basic understanding of the species that use the refuge needs to be acquired. The trapping and surveying of 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 target species or species of concern requiring more intensive monitoring or research.

Strategies:

- Research literature, including range maps, for species that should occur in north Louisiana.
- Implement a variety of survey techniques to sample for presence of potential species.

Objective A-14. Mammals
Monitor white-tailed deer herd health, age, and sex structure every 3 to 5 years to determine disease occurrence and carrying capacity on Upper Ouachita NWR habitat.

Discussion: 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 by deer, the refuge will be able to better understand the pressure being exerted on the habitat, and therefore make habitat and harvest recommendations.

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:

- Develop protocol to estimate deer population on the refuge (browse survey).
- Partner with Southeastern Disease Study Group to conduct deer herd health checks on the refuge.
- Partner with LDWF to monitor occurrence of chronic wasting disease in Louisiana and neighboring states.
- Apply adaptive management to determine best practices to use in response to monitoring data on deer population and habitat.
- If deer population increases beyond carrying capacity, reduce the herd size by adjusting season length, bag limits, and method of take.

Objective A-15. Amphibians and Reptiles
Maintain a species list of reptiles and amphibians utilizing the refuge based on opportunistic sightings each year and results of anuran call survey. Monitor impacts of forest management on amphibians and reptiles.

Discussion: Although the prospective herpetofauna of the refuge is large, at least 80 species, the presence of relatively few of the species has been confirmed and associated with particular refuges or their habitats. Among these are three species of special concern: Louisiana slimy salamander (*Plethodon kisatchie*), alligator snapping turtle (*Macrochelys temminckii*), and western worm snake (*Carphophis vermis*). The alligator snapping turtle is dealt with elsewhere (Objective A-16). The Louisiana slimy salamander is listed by the Louisiana Natural Heritage Program as an S1S2 species, and the western worm snake is listed as S1. In the case of both species, there are historical records of these two species from nearby parishes, although none for Union Parish or Upper Ouachita NWR (Dundee and Rossman 1989). Under provisions of the “National Wildlife Refuge System Improvement Act of 1997," refuges are called upon to conserve, manage, and restore wildlife populations and their habitats. When confronted with a lack of knowledge concerning the species actually resident on refuge lands, the first step in conserving them is determining their presence, and to the extent possible, associating this with particular habitats. These are fundamental aspects of biodiversity knowledge recommended as priorities for helping the Department of the Interior to manage its lands (NRC 1993).

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 for all major habitats throughout the year.

- If species of concern are documented on the refuge, then management actions will be reviewed for benefits and impacts.
- Continue to sample anurans with the current call survey protocol at a minimum of every other year in order to monitor population trends. Special effort should occur during the late-February to mid-April period to look for spadefoot toads (*Scaphiopus hurteri*) along the western boundary of the refuge in areas with predominantly sandy soils.

Objective A-16. Amphibians and Reptiles
Survey potential habitat for indications of successful nesting by alligator snapping turtles and other nesting turtles.

Discussion: The alligator snapping turtle (*Macrochelys temminckii*) is the largest North American freshwater turtle. As such, it is among the top tier of predators in most aquatic ecosystems that it inhabits, exceeded routinely in size only by the American alligator (*Alligator mississippiensis*). It is a characteristic component of lowland swamps, lakes, and streams in the southeastern United States; however, it has declined in abundance to the point where it is now considered a threatened or endangered species in all range States except for Louisiana. In Louisiana, it appears on the list of species of conservation concern by the Natural Heritage Program as an S3 species (rare and local throughout the State), and up to four individuals per day of any size may be taken for personal use with a fishing license. 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.

While certain aspects of the biology of the alligator snapping turtle are slowly unfolding, population dynamics are still largely unknown (Trauth et al., 1998) and critical to managing the species. 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 are studies that have relied upon meat market specimens of unknown provenance (Dobie 1971; Tucker and Sloan 1997). Until recently, the only study of nesting in Macrochelys was along the Apalachicola River in the Florida panhandle (Ewert 1976; Ewert and Jackson 1994; Woosley 2005). They found the turtles frequently nested on dredge spoil that produced a relatively open area with a significant elevation in close proximity to water. Observations of nesting Macrochelys at Black Bayou Lake NWR (Carr, pers. comm; J.B. Harrel, pers. Comm., Woosley 2005) indicate that nesting lasts for 2-4 weeks within the period from the last week of April through the first week in June. During this period, it is relatively simple to locate both intact and depredated nests. Nests appear to be concentrated in or near anthropogenically open areas within a forested matrix. Further, nesting efforts may be concentrated in areas with a relatively steep elevation above water level within a short distance of the water's edge. With this knowledge and the proper personnel, it is possible to survey for nesting activity and gauge the relative success of nesting by monitoring the fate of nests.

Strategies:

- Using the best available maps of elevation and cover for the refuge, identify 5-6 potential nesting sites along the shoreline, each approximately ½ km long, that can be surveyed during the spring (late April-May) for nesting by Macrochelys. For a proper survey, daily searching of the sites is required.

- Evaluate the frequency of nest site location along different sections of shoreline representing both natural and anthropogenically "opened" habitats.
- Evaluate nesting success by examining the ratio of successful nests. Predators should be identified, as possible, in particular the extent to which raccoons (*Procyon lotor*) are responsible. If the predation rate is deemed to be too high, then possible intervention strategies should be explored (e.g., installation of nest protectors).

Objective A-17. Butterflies and Moths
Inventory and create a species list and display of butterflies and moths utilizing the refuge.

Discussion: Butterflies and moths have been poorly understood and not well researched. However, recent interest has prompted studies on butterly response to fire and forest treatments, along with studies emphasizing that butterflies and moths could be indicators of a healthy ecosystem. On Upper Ouachita NWR, no information exists about butterfly and moth populations. Initial work should be directed towards a basic inventory to determine if any species of concern are present.

Strategy:

- Consult literature to determine best survey methods to implement. Conduct as suggested.

Objective A-18. Mussels
Inventory for mussels in refuge waters to determine whether species of concern or invasive species are present.

Discussion: Freshwater mussels are the most jeopardized animal group in North America, with 60 percent of species being classified as either threatened or endangered (Ricciardi et al., 1998). The introduction of invasive, exotic mussels, such as the zebra mussel, has threatened some species of native mussels with extinction. The Mississippi River has the largest number of endemic freshwater mussels in the world (Ricciardi et al., 1998); however, the zebra mussel has been extirpating local populations of native mussels in the basin since the early 1990s. Although zebra mussels have yet to be documented in the State of Louisiana, survey work along the Ouachita River on the refuge is needed to determine if species of concern are present and whether zebra mussels have encroached.

Strategy:

- Consult literature to determine best survey methods to implement. Conduct as suggested.

Objective A-19. Fisheries
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.

Discussion: The Southeast Region Fisheries Strategic Plan (2004-2008) details specific actions and tactics that will be implemented over the next five years to meet national goals and objectives supported by the Service's Fisheries Program Vision of the Future (2002). The national objective listed as 3.1.1 in the plan states "Quality opportunities for responsible fishing and other related recreational enjoyment of Aquatic resources on Service lands…." The national objective listed as 3.1.2 in the plan states "Enhance recreational fishing opportunities…." Other documents and/or legislation pertaining to the importance of aquatic species management and the associated role of the U.S. Fish and Wildlife Service are numerous. They include the following: Fish and Wildlife Act of

1956, National Recreational Fisheries Policy 1988, Action Plan for Fisheries Resources and Aquatic Ecosystems 1994, and Recreational Fishery Resources Conservation Plan 1996.

Upper Ouachita NWR is located within the Ouachita River Basin. The Ouachita River bisects the refuge for 13.7 miles (the river goes north and south). Three major reservoirs are located on the river in Arkansas. Felsenthal and Columbia locks and dams are located approximately 2 river miles north of the refuge in Arkansas, and approximately 98 river miles downstream from the refuge in Louisiana, respectively. Dams and rainfall in the river basin influence the river stage and approximately 80 percent of the refuge is subject to annual flooding from December through May.

Strategies:

- Explore cooperative opportunities with USGS and universities for inventorying and monitoring the insect and aquatic resources of refuge waters.
- Inventory fish with electro fishing gear, gill nets, angler surveys, seines, traps, rotenone, etc.
- Evaluate opportunities for fish habitat enhancement that does not conflict with other management strategies in Wigeon Ponds on the Mollicy Unit (i.e., gravel beds, fish-attracting structures, and fishing piers).

Objective A-20. Species of Special Concern
Annually monitor historic bald eagle nesting areas for activity and success.

Discussion: Bald eagles often winter on the refuge, and an active nest exists on the Mollicy Unit. The staff has documented eagles successfully fledging young in 2000, 2003, 2004, and 2005. Years where chicks were not recorded does not necessarily indicate the eagles did not attempt nesting. The Southeast Regional Management Guidelines suggest 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 and 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.

Strategies:

- Maintain records of nest location and nest success.
- Coordinate with LDWF for midwinter eagle surveys which include non-nesting birds.
- When bald eagle nesting activity is confirmed, follow regional and national guidelines.

Objective A-21. Species of Special Concern
Provide red-cockaded woodpecker (RCW) foraging and nesting habitat and conduct population monitoring, nest monitoring, translocations, and cavity management on 1,220 acres of the RCW Habitat Management Area of Upper Ouachita NWR per guidelines in the RCW Recovery Plan (Figure 14).

Discussion: Upper Ouachita NWR presently supports one active RCW group. During the Biological Review, there was much discussion about (1) the history of management for this species at Upper Ouachita; (2) the recent reduction of suitable habitat surrounding the refuge; (3) the very low priority being given on translocating birds from healthier populations to Upper

Ouachita NWR; (4) little hope for maintaining even the remaining family group for much longer; and (5) the substantial staff time that could be devoted to managing and monitoring what is clearly a doomed population, given points 1-4 above.

With less than 10 active family groups, the Upper Ouachita NWR population is considered in the USFWS Management Guidelines for the RCW as an "important support population," not otherwise identified as a RCW recovery population. According to these guidelines, such populations, regardless of status, still are subject to monitoring and management attention. Such small populations are to be closely monitored at the most intense level, which consists of color banding both nestlings and adults, conducting nest and fledgling checks, and conducting pre-breeding roost checks for all active and inactive clusters (USFWS 2003). However, the present evidence discussed below does not suggest this population is sustainable. It was the judgment of the Biological Review Team that even given unlimited staffing or funding resources devoted to this population it is still likely to disappear completely in the very near future.

The USFWS habitat management guidelines for RCWs include providing (1) at least four suitable cavities to be maintained in each cluster; (2) 120 acres of good foraging habitat for each group (within 250 acres around the cluster site); (3) use of prescribed burning (with preference for growing season) to maintain a herbaceous understory and minimal midstory; and (4) the use translocation and augmentation to maintain and grow small populations.

Present habitat considered potentially suitable for RCWs at Upper Ouachita NWR consists of 3,660 acres of mature pine-dominated stands concentrated on the western side of the refuge (of which almost all came from a recent land exchange between the Plum Creek Timber Company and The Nature Conservancy, and transferred to the Service in 2003). As is the case with many refuges where wetlands form the core of the acreage, uplands are generally included as transitional areas secondary to ensuring all the primary forested wetlands are within land acquisition boundaries. Thus, upland forest species that require large home ranges often occur on refuges at the margins of their habitat tolerances. In addition to Upper Ouachita NWR, similar inclusions of upland habitats occur at Felsenthal, D'Arbonne, and Okefenokee NWRs, and formerly at Santee and Pee Dee NWRs.

In terms of habitat conditions on Upper Ouachita NWR, the vast majority of pine is loblolly, with few shortleaf pines. Outside of cluster sites, pine stands need to be maintained at higher than otherwise recommended stocking rates to support adequate foraging habitat for each family group. A prominence of loblolly pine, as opposed to shortleaf, requires more care in the use of growing season prescribed fire, especially with respect to ensuring adequate regeneration for replacement stands. Finally, loblolly pine is relatively short-lived, with most dying by 120 years of age, again adding importance to ensuring successful regeneration for supporting adequate replacement stands. In contrast to D'Arbonne NWR, where restoring shortleaf pine is conceivable and would lead eventually to greater management flexibility, the pine habitats presently at Upper Ouachita NWR are flatwoods that are too moist for supporting shortleaf pine. Also, these flatwoods present a significant challenge for maintaining open loblolly pine woodlands as well.

Presently at Upper Ouachita NWR, the sole active cluster site has had no female present for a couple of years now. Four additional cluster sites were developed during 2002, but have gone unoccupied to date. On private lands on the east side of the refuge in contrast, there is a relatively large population (most on Plum Creek Timber Company land), but this population is effectively isolated from the west side of the Ouachita River by bottomland hardwood forests.

As late as 20 years ago there was substantial mature and maturing pine on private lands adjacent to Upper Ouachita NWR, suggesting that there was some historical interchange with other RCW

populations in northern Louisiana and southern Arkansas. However, this interchange most likely is severed today as almost all of the pine stands in the vicinity of the existing occupied and recruitment habitat has been cut within the last 20 years. In addition to this direct loss of potential habitat, there are increasing market pressures to harvest pines on less than a 20-year cycle. Thus, the likelihood of any increase of suitable habitat adjacent to the refuge in the foreseeable future seems remote under present ownership and land use patterns.

Strategies:

- Maintain the existing active cluster site according to RCW Recovery Guidelines.
- Ensure all aspects of Service policy are adhered to in considering this approach (ESA, NEPA, NWRS).

Objective A-22. Species of Special Concern
Annually monitor known Rafinesque's big-eared and southeastern Myotis bats' roost tree use and location on the refuge. Conduct a research project to determine roost habits, reproductive success, and wintering roost location of Rafinesque's big-eared and southeastern Myotis bats on Upper Ouachita NWR.

Discussion: The Rafinesque's big-eared bat and southeastern Myotis bat are both considered Federal species of concern. The Rafinesque's bat may be listed as federally threatened in the near future. Both Rafinesque's big-eared and southeastern Myotis bats utilize Upper Ouachita NWR to an unknown extent. Roosts of these bats have been found in water tupelo trees on the refuge and surrounding lands. They are strongly associated with bottomland hardwood forests and with water tupelo trees. Little is known about location of winter roosts, relative abundance, or roosting dynamics.

Strategies:

- Monitor known roost tree locations for annual use.
- Conduct a research project to determine roost dynamics, reproductive success, and wintering roost location of Rafinesque's big-eared and southeastern Myotis bats on Upper Ouachita NWR only.

Objective A-23. Species of Special Concern
Support the Louisiana black bear recovery efforts and continue to provide habitat to support this species.

Discussion: Habitat reduction and declining populations were reasons for listing the Louisiana black bear (*Ursus americanus luteolus*) as a threatened species under the Endangered Species Act. This subspecies once occurred throughout southern Mississippi, Louisiana, and eastern Texas. Habitat modification, particularly clearing for agriculture, has reduced suitable habitat by more than 80 percent.

Good black bear (*Ursus americanus*) habitat consists of diverse forests with stable and varied food supplies, suitable denning sites, and escape cover with minimal human contact. Black bears are opportunistic omnivores that exploit a variety of foods (Smith and Pelton 1986). Bears feed primarily on succulent vegetation during spring, berries and soft mast during summer, and hard mast during fall. Colonial hymenopterans, especially ants (*Formicidae*), are an important annual food source. Fall foods are especially important because high-energy diets are necessary for bears to accumulate fat reserves and thereby withstand winter denning, production of young, and the food scarcity of early spring. Black bears use a variety of den sites, including tree cavities above ground, excavated and natural depressions

under tree roots, stumps, and fallen logs, and in open ground nests. Dense understory vegetation is also an important factor for escape cover. Cover, such as switchcane, palmetto, and shrub understories, that limits visibility, slows foot travel, and creates considerable noise when traversed, provides security. Expanses of water can also be an important form of escape cover.

Sightings and records of black bears on and adjacent to the refuge have become much more common in the past three years due to translocation of individuals into Felsenthal NWR. A contiguous block of bottomland hardwood forest exists from the southern end of Upper Ouachita NWR to the northern end of Felsenthal NWR. Bears being moved to Felsenthal NWR naturally disperse and wander onto Upper Ouachita NWR. As soon as these "Arkansas" bears cross the stateline, they are considered threatened Louisiana black bears. One radio-collared sow and her four cubs stayed in one area on the refuge for over a year. The sow died but some cubs are still seen, although one was killed by a car. Other collared bears have been tracked onto the refuge and bears without collars have been sighted.

Documented breeding activity in north-central Louisiana has occurred and the potential for occupancy is good.

Strategies:

- Document sightings of bears on Upper Ouachita NWR and the surrounding area.
- Anticipate information requests/assistance with nuisance bear situations, particularly with deer feeders and household garbage.
- Timber management promoting diversity, while maintaining a hard mast component and retaining den trees, on Upper Ouachita NWR will improve habitat conditions for bears. Utilize the most current general guidelines for hardwood forest management.
- Refuge employees maintain communication and collaboration on biological issues such as Louisiana Black bear sightings or nuisance problems.

Objective A-24. Nuisance and Invasive Wildlife Species
Intensively remove nuisance and invasive species on Upper Ouachita and Handy Brake NWRs and other fee title lands where feasible using all control methods, including regulated hunting seasons, opportunistic harvest by refuge staff, and large-scale trapping program. Monitor success of control methods and educate public about adverse effects of feral hogs on native wildlife and habitat.

Discussion: Invasive wildlife species on the refuge include feral hogs, red fire ants, nutria, Eurasian collard doves, and European starlings. Control of doves, starlings, and fire ants is practically impossible. Nutria are established throughout Louisiana and can damage levees and impact native vegetation if populations become high. Numbers can be reduced by shooting or trapping. Feral hogs have been on the refuge for many decades. Hogs root up native vegetation and compete with native wildlife for food. Control of the population can be gained through shooting and trapping. Nuisance wildlife species, such as beaver, cause major damage to reforestation efforts.

The Ouachita River acts as the primary corridor of infestation for exotic fish species. Exotic carp are the primary species of concern in northeast Louisiana. Several species, including the Eurasian common carp (*Cyprinus carpio*) and the Asian grass carp, silver carp (*Hypopthalmichthys molitrix*), and bighead carp (*H. nobilils*) are now present in the Ouachita River. Common carp, which have been in North America for over 100 years, are known to be reproducing in the Ouachita River, while the reproductive success of the Asian species here is not fully known. The recent (early 1990s) occurrence of the Asian species can be attributed to commercial fish farming operations in the MRV. All of the carp have the ability to cause habitat

degradation. Common carp can increase turbidity, especially when abundant in shallow water bodies. Grass carp feed on vegetation and may cause decline or eradication of native aquatic plants in certain situations. Silver and big head carp are primarily planktivores, and may compete with native species, including bigmouth buffalo (*Ictiobus cyprinellus*), and paddlefish (*Polyodon spathula*), a protected species in Louisiana. Freshwater mollusks and the young of most fish species may also be affected by increased competition with exotic planktivores. The silver and bighead species have not been here long enough to accurately determine their impacts. Another species, the Asian black carp (*Mylopharyngodon piceus*), has been found in at least one river in the southern part of the State. This species feeds primarily on mollusks and shellfish. If established, it has the potential to damage native mussel and snail populations and create additional competition for food with other fish, birds, and mammals. Little can be done to prevent the introduction of this fish into the refuge. Periodic sampling may be conducted to inventory species and abundance, along with the noting of any changes in the condition of the fisheries that may be attributed to its presence. Eradication of this species without harm to other fish is not practical.

Strategies:

- Although nuisance and invasive wildlife, both aquatic and terrestrial, have spread over the entire refuge and do not need to be mapped, a basic species list (inventory) needs to be created.
- Implement an aggressive control program to reduce/eliminate invasive non-native species.
- Integrate information gained on nuisance animals into a Nuisance Animal and Plant Management Plan.
- Seek alternative funding sources to address nuisance animal concerns.
- Work with adjacent landowners to encourage participation in control efforts.

HABITAT MANAGEMENT

GOAL B. Restore, enhance, manage, and maintain healthy bottomland hardwood and upland forests to support a natural diversity of plant and animal species and to foster the ecological integrity of the Lower Mississippi River Ecosystem.

Discussion: Upper Ouachita NWR is a predominately forested refuge in a largely forested landscape context in the WGC plain of northern Louisiana. Of the 42,594 acres within the refuge, 24,307 acres are forested, with an additional 9,236 acres recently reforested. Upland forests consist of 4,540 acres dominated by pine and pine/hardwood mix. Although the majority of forest on the refuge is in maturing or mature condition, the forested landscape surrounding the refuge is increasingly in an early successional condition.

Objective B-1. Bottomland Hardwood Forest
Complete a Habitat Management Plan that will use the LMVJV Forest Working Group General Guidelines for Hardwood Forest Management as the desired future conditions and that will include a baseline inventory, entry schedule, and monitoring program.

Discussion: The refuge contains 19,767 acres of bottomland hardwood forest, which is mostly comprised of overcup/water hickory and willow oak/sweetgum cover types. Most of the present stands have a closed canopy, with dense shade limiting lower layers of the forest. Closed canopy stands should be thinned to a basal area of 70 sq. ft., leaving many, but not necessarily all, of the larger diameter class trees. This would provide an abundance of sunlight on the forest floor to spur the re-sprouting and/or

germination of plants in the lower levels of the forest. The new plants will be many tree and shrub species, but only those that can survive the present hydrologic regime will flourish over time. If willow oak seedlings/saplings don't appear to survive the current flood patterns, supplemental planting of overcup oak might be appropriate on sites that are now too wet for willow oak.

A few higher ridges along the river are more important to forest birds due to less flooding depth and duration. This habitat has more potential to be diverse structurally and should be of high priority in thinning operations.

Handy Brake NWR and lands within the LWMD have very little mature forests; therefore, no forest management is necessary at this time. However, reforested areas will eventually need to be treated.

Strategies:

- Implement Forest Management Plan and use General Guidelines for Hardwood Forest Management as Desired Future Conditions in bottomland hardwood forest prescriptions.
- Continue forest management activities by creating multi-canopied conditions through thinnings, group selections, and larger openings (1/2 to 2 acres) to improve understory tree species that provide food and cover, to maintain/improve mast and fruit production, and to encourage red oak regeneration for future stands.

Objective B-2. Bottomland Hardwood Forest
Continue to monitor reforestation survival and include in the Habitat Management Plan strategies for future silvicultural treatments.

Discussion: Most lands within the LWMD were reforested during the 1990s. Over 9,000 acres of reforestation on Upper Ouachita NWR occurred from 1997-2006. These young forests will eventually need to be treated siviculturally and incorporated into the refuge's Forest Management Plan. Refuge staff should assess reforested areas and estimate when treatments would begin. Within the context of this 15-year plan, most of these young forests will not be ready for thinning.

Strategies:

- Assess current ages of reforested lands within the LWMD, and Upper Ouachita and Handy Brake NWRs, and create a plan for forest management over the next 15 years.
- Continue monitoring reforested areas for tree survival and re-plant where necessary.

Objective B-3. Upland Pine Forest
Manage 1,220 acres of pine habitat on the west side of Upper Ouachita NWR for RCW habitat according to RCW Recovery Plan guidelines, which include pine basal area of 70-90 sq.ft., little midstory, and grassy understory. Manage remaining upland pine habitat (2,440 acres) as a mixed hardwood/pine forest (Figure 14).

Discussion: Uplands on the west side of the refuge consist of pine flatwoods that are located on Lake Monroe 1, Lake Monroe 2, and Intermediate and Prairie Terraces. This flatwoods habitat has significantly declined in Arkansas and Louisiana to where extensive coveage is mainly left on three national wildlife refuges: Flesenthal, 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. The RCW Habitat Unit will be managed to create a more open, park-like pine savannah by using frequent fire and timber thinnings. Historically, flatwoods

burned frequently, but the burns were very patchy due to soil types and moisture. Moisture is directly related to elevation. 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, where fires did not burn well, allowed hardwoods to regenerate.

The remaining pine forests (2,440 acres) will be managed to promote upland hardwood species, such as swamp chestnut oak, white oak, southern red oak, post oak, cherrybark oak, sweetgum, hickories, etc. Mature mixed hardwood/pine forests are declining at alarming rates in northern Louisiana due to conversion to pine plantations. Pine plantations are managed on shorter rotations (25-30 years) and hardwoods are often killed to reduce competition. The outcome is an unnaturally young, pure pine forest that is less diverse and does not provide habitat for as many species of wildlife as would a mature mixed hardwood/pine forest.

Strategies:

- Use prescribed fire and mechanical thinning to maintain an open pine forest condition at least every 2-5 years in the RCW Habitat Unit.
- Thinnings should occur to decrease pine basal area to 70 sq. ft./acre in the RCW Habitat Unit.
- Frequent, patchy growing season burns should be applied.
- Hardwood mid-story should be removed to achieve less than 30 percent coverage in the RCW Habitat Unit.
- In the hardwood/pine forest, hardwood will be promoted, and the pine basal area will be decreased to 40-70 sq. ft./acre.
- Fire will be used sparingly in the hardwood/pine forest on a case-by-case basis if needed to achieve objectives.

Objective B-4. Invasive Plant Species
Foster opportunities each year for developing cooperative invasive plant species control projects with other agencies, private landowners, and corporations on lands adjacent to and on the refuge.

Discussion: There are numerous exotic/invasive species now on the refuge and expanding their range in the region. Surveys should be performed to inventory and monitor their presence and to determine their impacts. When deemed detrimental to the management goals of the refuge, control measures should be taken whenever possible. Control of these species should be prioritized by refuge managers, as their levels of environmental impact are variable. The following are invasive species that are likely to occur, or the have potential to occur, on the refuge and impact native flora and fauna.

Terrestrial exotic plants are the most serious threat to the biological integrity of the refuge. Although many species have been recorded, such as crepe myrtle, royal palownia, and mimosa, the species of greatest concern are Chinese tallow tree and Japanese climbing fern. Both of these plants aggressively spread throughout the forest with little hope of being eradicated. Refuge personnel should also aggressively treat these two species with the objective of keeping them from spreading as much as possible. Tallow is a small, fast growing tree with high reproductive ability. It grows in a variety of habitats, having its most detrimental impacts in marsh type areas, where it has the ability to cause large-scale ecosystem modification by changing marshlands to forested communities. Tallow would be particularly detrimental to the refuge fields managed for waterfowl and shorebirds. Pulling seedlings by hand is effective if numbers are not too high. Basal applications of triclopyr and cut-stem application of 50 percent triclopyr or 10 percent imazaypr can be effective. Fire usually will not completely kill the tree, but burning during winter, followed by burning or mowing in the summer, has shown some success. This species should be

considered difficult to eliminate once established. Japanese climbing fern is a fast growing vine, preferring moist soils, which 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 becoming widespread throughout Louisiana and the southeast. Small patches and single plants may be hand-pulled. Fire will kill it back but not eliminate it. No herbicides have yet been tested specifically for *L. japonicum*, but Triclopyr amine and glyphosate are effective at controlling *L. microphyllum,* a similar species.

There are several species of invasive aquatic plant species of concern on the refuge. Most of these are capable of forming dense mats over the surface of the water. When this occurs, dissolved oxygen levels in the water may become too low to support oxygen-dependent aquatic species (fish, mollusks, etc.). The invasives compete with native species and can cause habitat degradation. They may also inhibit waterfowl and other animal use and boat navigation. The efficiency of water control structures may also be affected if left uncontrolled. When infestations occur, herbicidal applications are normally the most effective control measure. Biological control for certain species may also be achieved with the use of sterile grass carp (*Ctenopharyngodon idella*) in waterbodies that are not prone to flooding. Alligatorweed (*Alternanthera philoxercoides*), common salvinia (*Salvinia minima*), giant salvinia (*Salvinia molesta*), hydrilla (*Hydrilla verticillata*), and water hyacinth (*Eichhornia crassipes*) are invasive species known to exist in Louisiana and should be considered priorities for control.

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

Strategies:

- Map invasive terrestrial and aquatic plants using a GPS and enter into a GIS system.
- Establish a monitoring program of invasive plants to determine rate of spread by annually mapping areas of infestation and comparing to previous year's range.
- After comparison, calculate rate of growth (spread) by both tallow and Japanese fern, and any aquatic invasives.
- Treat 5 percent of invasive plants annually by hacking and using chemicals, such as RoundUp, or other more appropriate chemicals.
- Communicate and meet a minimum of once a year with the Louisiana Statewide Exotic Species Task Force to learn about new invaders, grant opportunities, and cooperation possibilities.
- Have refuge complex biologist develop priority ranking of those neighboring lands posing biggest threat of encroachment of invasive species onto refuge lands.
- Have private lands biologist communicate with neighbors to ascertain interest in developing cooperative projects for invasive species control.

WETLAND HABITAT

GOAL C. Continue to serve as an important component of the Lower Mississippi River Ecosystem's complex of managed moist-soil and croplands that provide crucial wintering and migratory habitat for waterfowl, shorebirds, and other associated wildlife.

Objective C-1. Open Wetland Habitat
Manage 2,500 acres of open field, split annually between moist-soil units and crop fields (preferably rice), to provide high-quality food for wintering waterfowl populations.

Discussion: Two natural wetland habitats historically used by ducks 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 hardwood bottomlands and moist-soil habitats are rich in high-energy natural seeds (e.g., acorns in oak bottomlands; grass-sedge seeds, roots, and tubers in moist-soil areas) and aquatic invertebrates. Indeed, wintering waterfowl satisfied their nutritional and other physiological needs in these wetlands before large-scale conversion of the MAV to agriculture.

Flooded cropland is also an important component of a waterfowl wintering habitat complex inasmuch as agricultural seeds provide high amounts of energy (i.e., hot foods). High-energy foods are critically important to waterfowl during cold periods and for migration and subsequent reproduction. Thus, flooded cropland can be a valuable habitat source for high-energy foods, but waterfowl satisfy most of their needs for protein by foraging on aquatic invertebrates in natural wetlands. Indeed, natural wetlands are rich in invertebrates compared to agricultural fields, which harbor comparatively meager amounts of invertebrates.

Working under the direction of the NAWMP, the LMVJV strives to provide habitat plans for over-wintering waterfowl in the MAV and WGC plain bird conservation regions. As such, 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. Based on a “step-down” process, the LMVJV established habitat objectives that link continental waterfowl populations to on-the-ground habitat objectives. Habitat objectives are apportioned among three categories: public managed, private managed, and natural flooding within each State (in the LMVJV administrative boundaries). By doing so, each national wildlife refuge is responsible for contributing to some portion of the habitat objectives (Table 9). This “step-down” process is now being updated for the MAV and for the WGC plain.

Table 9. LMVJV habitat objectives for Upper Ouachita NWR

Dabbling Ducks		
	Upper Ouachita NWR	
	Objective (ac)	*Objective (DUD)*
Bottomland Forest	0	0
Moist Soil	563	780,318
Harvested Rice	354	266,208
Unharvested Rice	118	3,464,952

Strategies:

- At a minimum, provide 1,500-2,000 nonforested acres focused on a combination of harvested/unharvested rice, moist soil, milo, etc., where water can be or usually is assured during late fall and winter (focus area is Mollicy Unit section).
- Manage to have 100-120 acres of an unharvested grain crop (preferably rice) where flooding is assured during most early winters or late falls. Work with cooperative farmers or achieve by force account or contracts the capability to maintain some fair-good rice production (at least every other year) on 100-120 acres as refuge non-harvested shares. This would include pumping, levee maintenance, and preferably providing some early fall water during dry years. This would also include plugging rice levees after harvest, when dry years prevail.
- Explore means of acquiring by fee-title or enacting partnership agreements for Delta Farmland's 3, 000 acres of rice land adjacent to the refuge and managing it for waterfowl habitat. If this is accomplished, the current agriculture base could be planted or let revert (passive reforestation) back to bottomland forest.
- Improve the refuge's long-range forest mast producing capability (primarily oaks) by utilizing group selection forest/tree silvicultural operations on 33 - 50 percent of the current hardwood acres (15-year time period). Increase oak regeneration within the current forest blocks via providing more sunlight on the forest floor.
- Explore means of maintaining/providing water in the "sump area" (on the north end of the Mollicy Unit) for early (late September to early October) migratory waterfowl (blue-winged teal, pintails), shorebirds, and waterbirds (long-legged waders).
- Initiate a "worst-case scenario" game plan for how the refuge will proceed with waterfowl habitat management when the levee fails and the farmer decides not to repair it. As a preferred option, do not intentionally break the main levee, but instead (at least for the next 5 years) pursue Alternative 3 as outlined in the 2004 Cropland Management Plan.

Objective C-2. Water Management
Complete an open wetland habitat management plan within 3 years of approval of this CCP.

Discussion: Moist-soil management and grain production are important components of the refuge's waterfowl foraging habitat objective. Proper water control infrastructure is needed in order to provide the greatest benefits to waterfowl and other species.

Strategies:

- Establish and maintain sufficient water control infrastructure (i.e., pumps, internal levees, ditches, control gates, and wells) to enable intensive management of moist-soil sites and facilitate crop production. Work with the current farmer to keep the large pump(s) on the main line levee functional.
- Have annual water management plans prepared for moist-soil units. Inspect each unit bi-weekly during the early spring/summer to change/refine management manipulations to better ensure sites with good food production.
- Place water control gauges at all key impoundments, etc., to correlate water levels and practices to plant responses. Implement a habitat monitoring program to assess "performance" of water management units. As the stated objectives reflect "full-pool capabilities," better knowledge of actual performance is needed to evaluate objectives. This could be accomplished through the use of staff gauges and/or collection of GPS points that can be utilized in a GIS. Record data.

- Sample plant responses within 30 days of drawdowns or water manipulation and then change water management as needed. Record data and actions.
- In late summer and early fall, sample moist-soil production (i.e., pounds of seed) to determine at a minimum the percentage of poor, fair, or good coverage of preferred waterfowl foods. Archive the data and results.
- Read 2-4 water level gauges at key areas in refuge on a monthly or twice-monthly basis. Some additional gauges are needed in the Mollicy Unit moist-soil sites to help compare plant responses to numerous water level stages within a year or a span of months for a given year.

RESOURCE PROTECTION

GOAL D. In collaboration with private landowners, LDWF, and other public and private organizations, strategically plan growth by connecting refuge lands or wetland management district units to provide wildlife benefits and conservation of archaeological resources and habitats where feasible for future and present generations.

Objective D-1. Refuge Land Protection
On Upper Ouachita NWR focus acquisitions on inholdings within the current refuge boundary with special emphasis on protecting the L. L. C. Tract and the Plum Creek Timber Company Tract.

Discussion: The current refuge acquisition boundary for Upper Ouachita NWR encompasses 61,633 acres, within which 42,594 acres have been acquired by the Service. Of the remaining 19,084 private inholding acres, 9,235 acres consist of two inholdings. The final 9,849 acres include numerous smaller inholding properties, ranging in size from a few acres to several hundred acres. These inholdings are mostly recreational hunting properties of various sizes distributed throughout the refuge. Also included is one 16th section property owned by the Morehouse Parish School Board. Acquisition of the private inholdings, and acquisition or leasing of the school board sections, would greatly facilitate refuge management by incorporating these smaller parcels into the larger contiguous block of refuge lands.

The Plum Creek Timber Company Tract is located in the northeast corner of the refuge, east of the Ouachita River. The north boundary of the tract is the Louisiana-Arkansas State line, which is also the north boundary of the refuge. The tract is primarily a bottomland hardwood forest intermixed with cypress/tupelo swamps and shallow lake/emergent and shrub wetlands. The property floods annually. The Mollicy Unit of the refuge borders the Plum Creek Timber Company Tract on the south.

Strategies:

- Assess inholdings, consult private landowners, and acquire land from willing sellers.
- Working through the Department of the Interior, Appraisal Services' Directorate, obtain approval for non-governmental organization to contract appraisal of the property; or, obtain appraisal of the property through the Service's Realty Division.

Objective D-2. Private Land Protection
Foster opportunities each year for developing reforestation and invasive control projects on 2-5 private lands on and surrounding LWMD units in priority conservation areas that add to developing a contiguous block of bottomland hardwood forest (Figures 15 and18). Focus particular attention on lands within and surrounding Handy Brake NWR.

Discussion: Most of the land in the WGC plain and the MAV is privately owned and must play an important role in the restoration and maintenance of native biodiversity and achievement of the goals and objectives of national and regional plans, such as the NAWMP and the Partners in Flight: Mississippi River Alluvial Valley Bird Conservation Plan. In an effort to address those objectives, the Service established a private lands program known as Partners for Fish and Wildlife. Through this program, the Service provides technical assistance and delivers financial assistance programs to private landowners. The North Louisiana NWR Complex has a private lands biologist responsible for implementing the Partners program in this area.

The Partners program also provides financial assistance to landowners wanting to restore wetlands. Landowners are limited to $25,000 of financial assistance per year. In the MAV, most projects involve the restoration of hydrology and hardwood reforestation. Vegetation on up to 30 percent of the area can be manipulated to maintain successional stages other than what would be expected to occur naturally. For example, up to 30 percent of the area could be managed for moist-soil management. The program favors projects located adjacent to refuges and within forest bird conservation areas.

The Louisiana Waterfowl Project is a partnership with other conservation organizations to provide water control structures to private landowners who traditionally flood harvested cropland and moist-soil areas in the winter period (November 15 through February 28). The program provides significant benefits for wintering waterfowl and water quality.

Other agencies, particularly in the Department of Agriculture, such as the Farm Services Agency (FSA) and Natural Resources Conservation Service (NRCS), have large programs that will restore wetland habitats in the MAV. The NRCS administers the Wetlands Reserve Program (WRP), which is a popular program that restores croplands to wetlands by restoring hydrology and reforestation and protects these areas through the acquisition of 30-year and perpetual easements. There are over 100,000 acres of WRP easements in Louisiana. A significant acreage is manageable water for waterfowl. The Service plays an important role in developing ranking criteria, evaluating sites, and working with private landowners to manage and maximize wetland values. The FSA administers the Cropland Resource Program (CRP), which provides 50 percent cost share to reforest wetland and highly erosive sites in the MAV. The program is competitive and qualifying lands are placed under a 15-year contract. Various other programs are also available.

Strategies:

- Mentor significant partnership to protect remnant prairies located next to Handy Brake NWR. Provide technical assisitance as needed.
- Consider a partners project with International Paper on leased land within Handy Brake NWR.
- Facilitate communications with energy companies and private landowners interested in carbon sequestration restoration on private lands.
- Annually review bottomland hardwood habitat areas ranked by LMVJV as high priority for reforestation and conservation.
- Private lands biologist would seek out interested landowners in areas of high priority for reforestation.
- Work through a variety of programs to provide technical and financial assistance necessary to provide additional migratory bird habitat to benefit refuge objectives, specifically wintering waterfowl habitat adjacent to the refuge.

- Work with the NRCS, FSA, private landowners, and other partners to designate conservation priority areas to provide incentives that will encourage landowners to implement practices that will benefit trust resources, refuge purposes, and MAV ecosystem goals.
- Develop cooperative invasive control projects. Communicate and meet a minimum of once a year with the Louisiana Statewide Exotic Species Task Force to identify new invaders, grant opportunities, cooperation possibilities, etc.

Objective D-3. Physical Resource Protection
Meet or exceed national standards for air and water quality on the refuge, when feasible.

Discussion: Although there are no indications that air quality is impaired in the refuge area, it should be a matter of concern to refuge managers, as air quality can be a limiting or debilitating factor in any ecosystem. Refuge activities that may produce episodic air quality problems should be viewed as a possible detriment to the health of the refuge and mitigation measures should be taken when possible.

The importance of water quality to a bottomland ecosystem cannot be overstressed. This refuge is greatly influenced by the Ouachita River and subsequently by the water quality it presents. The problems with water-related contaminants, primarily mercury, other than consumption advisories, are the effects they may be having on not only the fish species with elevated levels, but also those animals that use them as a primary food source. The annual backwater flooding of large portions of the refuge provide for poor water quality in the form of dystrophic conditions that are ideal for the methylation of mercury and for its availability to the food chain. As long as these conditions exist, the problem with mercury is likely to continue.

Strategies:

- Maintain contact with State environmental agencies (both Arkansas and Louisiana) to ascertain if air quality problems arise or are suspected.
- Do not undertake any activities that could adversely affect air quality locally in the refuge area.
- If those types of activities that may cause fugitive particulate emissions are necessary (i.e., burning, land treatments, and construction), then try to accomplish those activities in a manner that would lessen the effect if possible through best management practices.
- Regularly monitor databases, electronic or otherwise, from sources in Arkansas and Louisiana, which report on water quality in the Ouachita River.
- Become acquainted and develop a working relationship with environmental officials at the Georgia Pacific Mill in Crossett, Arkansas, so that concerns can be discussed and aired, resulting in possible solutions and assistance.
- Conduct or request assistance in contaminant monitoring (Hg) from the Louisiana Department of Environmental Quality (LDEQ) or other entities, such as local universities, for biota found in the refuge.
- Report water quality damaging incidents dealing with oil and gas production, barge operations, or any other activity to the LDEQ for investigation and resolution.
- Minimize the amount of turbid water being pumped from the Mollicy Unit to the Ouachita River as much as possible as it affects water quality for many miles downstream.

- Take whatever physical alterations are possible and practical to maintain water flow within refuge water bodies to avoid poor water quality during critical conditions of low flow and high temperatures.

Objective D-4. Natural Gas Resources
Conduct yearly, and as needed, discussions with LDEQ and Department of Natural Resources Conservation for gas well information; gas well operations; mercury warnings; and soil, water, and fish monitoring for contaminants.

Discussion: Numerous gas wells and pipelines are located on the refuge and are owned by private companies. In the event that the gas companies operating within the refuge carry on activities or practices that are contrary to the mission and goals of the refuge and cooperation is not forthcoming, then regulatory and law enforcement involvement should be sought. Saltwater contamination from such sites can be significant, extremely damaging, and poses a danger to the environment in those areas.

Strategies:

- 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 information kiosks on the refuge.
- If problems are suspected, Service will coordinate with LDEQ to search for funding and research opportunities to gain information on suspected contaminant problems.

Objective D-5. Watershed Protection
Work with local, State, and Federal partners to aid the restoration of hydrology on the Mollicy Unit of Upper Ouachita NWR by completing a geomorphologic and hydrologic assessment to breach the river levee.

Discussion: Upper Ouachita NWR is located within the Ouachita River Basin. The Ouachita River bisects the refuge for 13.7 miles and Upper Ouachita NWR extends 3.3 miles to the east and 16 miles to west. Three major reservoirs are located on the river in Arkansas. Felsenthal and Columbia locks and dams are located approximately two river miles north of the refuge in Arkansas and approximately ninety-eight river miles downstream from the refuge in Louisiana, respectively. Dams and rainfall in the river basin influence the river stage, and approximately 80 percent of the refuge is subject to annual flooding from December through May.

After the land on the east side was cleared, a large levee was constructed along the Ouachita River to protect some of the cropland from flooding. At that time, there were approximately 13,705 acres of cropland inside the levee and 2,574 acres of farmland outside the levee. The remaiing 2,850 acres include the levee, two reservoirs for rice irrigation, roads, river frontage, and abandoned fields. The levee has broken several times over the years, but has been repaired by previous landowners to prevent flooding at all but the highest river stages. The reforested fields outside the levee experience the highest flood depth, duration, and frequency. Rainwater runoff also accumulates inside the levee during the winter due to the depressional topography of the area. All of these factors contribute to the shallow flooding of croplands and moist-soil areas, producing extremely valuable migratory bird habitat.

In order to restore the natural hydrology on the Mollicy Unit and simultaneously provide the greatest wildlife benefits, the refuge needs to explore where the best place to breach the river levee would be. This proactive approach will ensure that the highest quality habitat will be achieved.

Strategies:

- Work with the NRCS, Corps of Engineers, Ducks Unlimited, and others to complete a geomorphologic and hydrological evaluation of existing refuge conditions, and to examine the potential beneficial and negative impacts from any proposed levee breaching, irrigation system modification or installation, or wetland construction, etc., on the refuge.
- Investigate/establish water quality baseline for the refuge. Coordinate with LDEQ to determine if sampling sites on the refuge are needed.
- Work with partners to restore the hydrology of the refuge where applicable and in the best interest of the Service, and contribute to the health of the entire watershed. Ensure that opportunities for fish and wildlife habitat are enhanced and do not materially detract from the purposes of the refuge.

Objective D-6. Cultural Resources
Each year comply with Section 106 of the National Historic Preservation Act or other pertinent historic preservation mandates 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 or disturbed within the last 50 years.

Discussion: Although none of the refuge sites covered by this CCP are known to be eligible for inclusion on the National Register of Historic Places at this time, the refuge will continue to protect any new or unknown resources.

Strategies:

- Maintain records of refuge survey data for cultural and archaeological sites.
- Monitor for vandalism and degradation to identified sites.
- Contact Regional Archaeologist prior to construction or significant ground disturbance projects, and complete a request for cultural resources review to determine appropriate steps necessary for compliance.
- Within 5 years of CCP approval, refuge manager or designee will look into taking the Archaeological Resources Protection Act training course.
- Ensure that cultural resources management and protection strategies are integrated into refuge management plans, such as fire and road maintenance.
- GIS layer for archaeological and historic sites will be integrated into the refuge's GIS database.
- Maintain data as confidential per National Historic Preservation Act and Archaeological Resources Protection Act.
- As archaeological and cultural resources are discovered, coordinate with the Regional Archaeologist for cataloging and archiving as appropriate.

Objective D-7. Law Enforcement
Develop and implement law enforcement procedures and include them in the various management plans in order to protect the refuge's resources.

Discussion: Protecting the natural resources of the Complex and ensuring the safety of refuge visitors are fundamental responsibilities of the Refuge System. The North Louisiana NWR Complex is currently accomplishing this with two collateral duty officers. In addition to natural resource violations, serious felonies, including homicides, rapes, assaults, and acts of arson, are occurring on refuges every year.

Strategies:

- Hire a park ranger (law enforcement) to protect natural resources and refuge visitors.
- Provide up-to-date training and equipment to all full-time and dual function officers.
- Develop Memorandums of Understanding with State and parish law enforcement agencies to facilitate cooperation and assistance in law enforcement activities. Update current Law Enforcement Plan.
- Provide education and outreach programs in the local community as part of a preventive law enforcement effort.
- Provide assistance to the Service's special agents and State conservation officers for off-refuge activities as requested.
- Establish and implement a protocol for site damage assessments and include it in the Cultural Resources Management Plan.
- Law enforcement will collaborate and coordinate with the State on regulatory issues or needs of either agency.

Objective D-8. Contaminants
Annually, eliminate, prevent, monitor, and mitigate 50-75 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 and funding allow.

Discussion: Contaminants can affect the environment in many ways. The refuge has the potential to receive contaminants from the oil and gas industry, barge traffic accidents, industrial and municipal effluents in the Ouachita River from upstream reaches, and naturally occurring mercury in the soils and sediments. Contaminants, such as saltwater, can affect water quality and may be damaging to the soil and subsequent plant diversity. None of these sources are known to be a significant problem at the current time. Dioxin was once a major concern to the area but changes in production methods at local mills have greatly reduced the problem by all accounts. Mercury contamination occurs in the soil from historic use at gas sites and is also naturally occurring from the weathering of geologic formations in the Ouachita Mountains. The manometer-related mercury contamination was addressed in the early 1990s and should no longer pose a serious problem. The naturally occurring mercury is believed to be the source of mercury contamination found in significant and above alert levels in fish from the refuge and the Ouachita River. The seasonal backwater flooding of the refuge provides optimum conditions for the contamination of the food chain by mercury. Not only are contaminated fish a problem for human consumers but also must be considered detrimental to all piscivorous species. Possible effects of this contamination to the resident wildlife are another subject worth pursuing. The Service began such studies in the early 1990s. Continuing that work or similar inquiries is appropriate given the levels of mercury seen in fish from the area.

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 illegal dumping. Seek to prosecute those who illegally dump within the refuge.
- Periodically test 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.

VISITOR SERVICES

GOAL E. Provide wildlife-dependent recreation opportunities where compatible and promote an appreciation of fish and wildlife resources in the Lower Mississippi River Ecosystem.

Discussion: The National Wildlife Refuge System Improvement Act of 1997, the organic legislation of the Refuge System, designates six priority wildlife-dependent 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.

Objective E-1. General
Develop and implement a Visitor Services' Plan that encompasses recommendations for current and future wildlife-dependent recreational visitor services and needs of visitors.

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 to do so in a manner that allows 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:

- Develop a plan that encompasses recommendations for current and future visitor services and recreation needs of visitors.
- Plan should reflect current legislation, Director's orders, initiatives, policy and the mission and purposes of the Service and of the refuge.
- Coordinate and collaborate with LDWF two to four times per year regarding public use programs, biological issues, and law enforcement coordination.
- Maintain gravel roads and parking lots at nine major access points.
- Develop project for graveling of refuge roads for visitor access.
- Add speed limit signs and traffic control signs where needed.
- Place more directional and road name signs both on and off the refuge and replace vandalized boundary signs. Place reflectors on ends of bridge rails.

Objective E-2. Hunting
Increase quality hunting opportunities on Upper Ouachita NWR by annually allowing deer, rabbit, squirrel, duck, goose, coot, quail, woodcock, turkey, raccoon, opossum, feral hog, coyote, and beaver hunting under LDWF and refuge-specific regulations to regulate resident game populations. Evaluate opening new limited hunting areas on other fee title lands within the LWMD.

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. Youth turkey and waterfowl hunts, will be held. 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 and waterfowl hunts. This will provide a good opportunity to introduce youth to hunting and foster a sense of appreciation and stewardship for the refuge and its mission of protecting fish, wildlife, and plants, while still providing for wildlife-dependent uses.

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.
- Update the Hunt Plan as needed to ensure a quality opportunity.
- Evaluate limited hunting on Handy Brake NWR and other fee title lands in the LWMD where feasible and needed to enhance wildlife populations and habitats.
- Revise the hunting brochure.
- Conduct special youth-only hunts for waterfowl and turkey to provide a unique opportunity for youth to gain an appreciation and understanding of the outdoors and wildlife.
- Conduct a lottery system for ten youths to hunt ducks on the first Saturday of the season in the closed area of the Mollicy Unit, using volunteers and staff in refuge blinds.
- Recruit volunteers and the National Wild Turkey Federation to assist with the turkey hunt.
- Increase white-tailed deer hunting opportunities on Upper Ouachita NWR, using the yearly evaluation of deer population and habitat.

Objective E-3. Hunting
Provide easily accessible information to and personal contact with hunters to strive for 80-95 percent compliance with refuge regulations.

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 explain wildlife-dependent recreational opportunities.
- Obtain additional base budget funds to add an additional park ranger (law enforcement) to current level.
- Increase presence of law enforcement officers in the field 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.

Objective E-4. Fishing
Provide quality fishing opportunities by maintaining and enhancing access areas, providing universally accessible areas, and creating opportunities for youth on Upper Ouachita NWR.

Discussion: The Service recognizes fishing 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. Fishing can promote a unique understanding and appreciation of nature.

Upper Ouachita NWR is part of the Ouachita River drainage basin and therefore is subject to mercury warnings. The refuge will maintain informational kiosks for contaminant warnings, as well as fishing regulations to provide a quality fishing experience for visitors. Presently, visitors have access to two concrete boat launches, but these need to be upgraded 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.

Strategies:

- Repair fishing pier at Harold Lake.
- Develop an annual monitoring method to evaluate level of visitor use and determine whether improvements or increases are needed. Obtain and use traffic counters at boat launch areas to estimate use.
- For ponds and lakes, name them on the map and then place a corresponding sign at the boat launch/fishing area.
- Improve boat launches as use increases.
- On west side fishing pier, develop universally accessible parking spot next to ramp.
- Make the fishing pier at Harold Lake universally accessible.
- Develop one universally accessible boat launch.
- As use increases, consider adding additional fishing pier(s) at the Mollicy Unit area (e.g., North Reservoir and Widgeon Pond).
- Work with youth programs, such as Girl Scouts, Boy Scouts, and schools, to encourage a broader participation in fishing events.
- 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.

Objective E-5. Wildlife Observation and Photography
Within five years of CCP approval, enhance opportunities for wildlife observation and photography by providing public access with minimal disturbance to wildlife and habitat.

Discussion: People often drive the River Road through the refuge along the west side of the river. Deer, squirrels, turkey and other birds, and other wildlife are frequently seen along this beautiful drive. Birders make up the majority of wildlife observers to date. A RONS project proposal has been approved to build a raised observation platform on the Mollicy Unit, which would allow public viewing of waterfowl and nesting bald eagles from a distance so as not to disturb the birds. The Mollicy Unit has unique habitat and provides a chance to observe many birds not commonly seen in the vicinity of the refuge. Moist-soil management attracts a variety of migrating shorebirds. Short-eared owls winter on the Mollicy Unit.

Strategies:

- Develop an observation tower on the Mollicy Unit.
- Develop two walking trails of varying lengths and loops for the area west of the River Road, and one in the vicinity of the RCW cluster.
- Promote wildlife observation and photography in collaboration with local groups and clubs.
- Add description of permitted activities and in-depth directions to the refuge on website.
- Evaluate areas of deer and migratory waterfowl use and determine whether additional viewing blinds could be installed for photography or educational purposes.

Objective E-6. Environmental Interpretation
Significantly increase the number of interpretive panels and displays to communicate the key resources and issues of Upper Ouachita and Handy Brake NWRs and fee title lands within the LWMD within eight years of CCP approval.

Discussion: Opportunities and information are provided to visitors to enable them to pursue wildlife observation, wildlife photography, and environmental 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 System 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 Upper Ouachita NWR due to annual flooding that normally inundates over 75 percent of the refuge. Signs that go under water become very unattractive and are hard to maintain. Currently, there is one large interpretive sign near a major access point on the Mollicy Unit which interprets the bottomland reforestation project. Another partnership sign is located at the southern access on the Mollicy Unit. A third sign interpreting moist-soil management has not yet been installed. The development of River Road as an auto tour will include interpretive signage and brochures.

Strategies:

- Develop interpretive panels for migratory songbirds, RCWs, bottomland hardwood forests, mixed pine-hardwoods, etc., and evaluate other potential areas for more interpretive materials.
- Place interpretive panels on walking trails, observation tower, parking area for Cheney Slough, fishing piers, and wildlife drive pullouts.
- In coordination with city planners and other conservation agencies, develop an interpretive display of conservation properties for the surrounding area of Bastrop, Louisiana.

Objective E-7. Environmental Education
Increase the refuge environmental education program by developing a seasonal environmental education loop trail in the vicinity of the RCW cluster.

Discussion: Environmental education fosters stewardship among our future caretakers. Environmental education will be increased to some degree to provide lending materials for local educators and to 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 refuge visitors are encouraged to utilize.

Biology/ecology classes from the University of Louisiana and Louisiana Tech University occasionally visit the Mollicy Unit of Upper Ouachita NWR because of its unique habitat. Other field trip requests are handled by the Refuge Complex interpretive ranger who works at the Environmental Education Center at Black Bayou Lake NWR. The Center includes the complex visitor center, the new Conservation Learning Center's educational facilities, equipment, nature trail, arboretum, and prairie demonstration area. Requests for information about the refuge are handled through the Complex Headquarters at D'Arbonne NWR.

Strategies:

- Continue to support education programs at Black Bayou Lake NWR.
- Make certain that education programs provide information about the Complex, as well as specific unique programs on Upper Ouachita and Handy Brake NWRs and lands within the LWMD.
- Create wildlife and habitat educational check-out kits for area teachers.
- Develop an environmental education nature loop trail near the RCW cluster.

Objective E-8. 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. Other public uses of the refuge include raccoon dog field trials and trapping (four permits issued in FY05). Nighttime raccoon hunting on horseback by special use permit occurs once a year during raccoon dog field trials. Four hunters hunted three nights in FY05. Currently, no firewood cutting is permitted on the refuge, but plans are to issue firewood cutting permits in the future (as part of forest habitat management). Requests for access to the refuge to conduct commercial photography have increased recently.

Strategies:

- Coordinate with Regional Office Visitor Services to develop procedures to address commercial photography.
- Monitor permitted activities to ensure compliance and assess the impact of the use on the refuge resources.
- Make sure there are up-to-date appropriate use forms and compatibility determinations for all uses.

REFUGE ADMINISTRATION

GOAL F. Secure and enhance staffing, funding, and facilities to maintain the integrity of habitats and wildlife resources of the Upper Ouachita and Handy Brake NWRs and lands within the LWMD in support of the National Wildlife Refuge System mission.

Discussion: The administrative functions include a wide array of activities that are critical to the mission of the National Wildlife Refuge System and the purpose of each 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. There is a need to add one biological technician, one forestry technician, one park ranger (law enforcement) and one maintenance worker. In addition, this Draft CCP supports the additional positions in the CCP for D'Arbonne NWR. Highest priority would be to add a forestry technician and maintenance worker to focus more on improving the upland pine and structure of bottomland forests on the refuges.

The next priority would be the position 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 two collateral duty officers who have Complex-wide responsibilities. The addition of one law enforcement position is critical with the increasing visitation and increasing public use activities.

Objective F-1. Staffing
Increase base funding of the Complex by 6 percent to cover mandated salary increases and maintain minimum refuge management needs and to add four additional staff positions.

Discussion: All of the staff positions referenced in this plan would be assigned to Upper Oachita and Handy Brake NWRs and the LWMD.

Strategies:

- Provide equal consideration to all stations within the Complex when funding and other resources become available.
- Obtain funding and recruit for the following new positions: biological technician, forestry technician, park ranger (law enforcement), and maintenance worker.
- Provide continuing education and training opportunities to all staff to ensure a highly competent and motivated team.
- Provide safe and efficient equipment and vehicles for refuge operations and maintenance.

Objective F-2. Facilities
Repair and maintain existing facilities and roads, and maintain refuge programs that can provide safe and efficient refuge operations.

Strategies:

- Repair and maintain facilities and roads.
- Implement RONS and SAMMS projects to maintain refuge resources.
- Coordinate road maintenance with Ouachita and Union Parishes' Police Juries.
- Maintain equipment in a safe and efficient operating status.
- Hire an additional full-time maintenance worker.

V. Plan Implementation

INTRODUCTION

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

To accomplish the purpose, vision, goals, and objectives contained in this Draft CCP/EA for Upper Ouachita and Handy Brake NWRs and the LWMD, this chapter identifies projects, funding and personnel needs, volunteers, partnerships opportunities, and step-down management plans. This chapter also covers the need for monitoring to determine management effects on wildlife populations, and the need for plan review and revision.

PROPOSED PROJECTS

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

FISH AND WILDLIFE POPULATION MANAGEMENT

Science-based Inventory and Monitoring of Plant and Animal Populations - Science-based inventories and monitoring of plant and animal populations are critical to ensuring the biological integrity of the NWRs and the LWMD. Information collected will serve as the basis for developing habitat management plans and will influence all management activities. A systematic inventorying and monitoring program will enable the refuge to make informed management decisions and valuable long-term contributions to national and regional objectives for waterfowl, shorebirds, wading birds, wintering forest and scrub/shrub birds, and resident wildlife. Standardized census and survey techniques will be employed and all data compiled into databases, including GIS for spatial analysis. This information is critical to formulating management actions and evaluating wetland restoration, forest habitat utilization, trends' analysis for migratory and resident wildlife, and other programs. All data will be shared with appropriate State and Federal partners in an effort to further ecosystem management. This project supports the wildlife biologist position identified in the Comprehensive Conservation Plan for D'Arbonne National Wildlife Refuge. The estimated first-year cost for this project: $30,000; Recurring cost: $10,000 (*Linkages: D'Arbonne Refuge CCP; and Goal A, Objectives A-1-24.)*

Improve Management of Endangered Species and Wildlife - Improve Upper Ouachita NWR's ability to manage for endangered species and other wildlife. Biological (GS-486-07) and forestry technicians (supported below) are needed to assist refuge staff with prescribed fire activities and fire break maintenance to improve endangered RCW habitat; to trap, band, and erect nest boxes for

wood ducks; and to increase surveys and monitoring for management impacts on migratory birds, reptiles, amphibians, butterflies, and fisheries. Recurring cost: $53,000; Special project cost: $65,000. *(Linkages: Goal A, Objectives A-1-24; and Goals B and C.)*

Determine Nesting Success of Priority Neotropical Migratory Songbirds - Improve Upper Ouachita NWR's ability to manage bottomland hardwood forests to increase the biological potential for nesting habitat of hooded warbler, Kentucky warbler, northern parula, Swainson's warbler, wood thrush, and prothonotary warbler species. Management practice 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 LDWF and a university. Point count surveys, nest searches, and vegetation and landscape analyses will be conducted for a minimum of three years. Recurring cost: $50,000; Special project cost: $300,000. *(Linkages: Goal A, Objectives A-5-6; and Goal B, Objectives B-1-2.)*

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 USGS 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 and its herpetologist, A.Carr, the refuge provides a good opportunity to further our understanding of alligator snapping turtle nesting requirements and components of successful nesting. These data are crucial in furthering our conservation efforts of this declining species. Recurring cost: $15,000; Special project cost: $30,000. *(Linkages: Goal A, Objective A-16; and Goals B and C.)*

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 two years of CCP approval. This project supports the D'Arbonne NWR CCP bat project. These two species of bats are of concern and their presence is documented on the refuge. Little information exists concerning their habitat needs. This information is imperative for making successful management decisions. The refuge will look into cooperative possibilities with USGS and universities for establishing a research project. Recurring Cost: $15,000; Special project cost: $60,000. *(Linkages: Goal A, Objective A-22; and Goal B, Objectives B-1 and B-2.)*

HABITAT MANAGEMENT

Habitat Management - Management of bottomland hardwood and upland pine/hardwood mixed habitats 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 reestablishing and improving forest inventories, evaluating wildlife habitat needs and prescribing treatments on the refuge, implementing GIS resources, and developing and implementing habitat management plans on Upper Ouachita NWR. This project supports the addition of a forestry technician (1 FTE, GS-7), a permanent maintenance worker (1 FTE, WG-4749-9), and associated equipment and supplies. Recurring cost: $90,000; Special project cost: $110,000. *(Linkages: Goal A, Objectives A-1-24; Goal B, Objectives B-1-4; and Goal F, Objective F-1.)*

Water Management System Operation - Man-made hydrological alterations have all but eliminated the natural flooding regimes that once supported historical numbers of waterfowl and shorebirds. In this altered floodplain, a system of levees, water control structures, and wells are necessary to provide dependable flooded habitats that correspond with the migration chronologies of migratory birds. To meet the needs of migratory birds, which are the primary purpose of the refuge, the timing of water management is critical to stimulate the production of desirable moist-soil plants and to control undesirable plants. Water management includes monitoring water flow, water levels, and pumping, via information in a GIS database, to more efficiently manage resources. This project will increase water management capabilities. To efficiently improve, manage, and maintain the water management system, this project includes the installation or replacement of additional water control structures ($50,000). Estimated first-year cost: $50,000; Recurring cost: $10,000. *(Linkages: Goal A, Objectives A-1-3; and Goal C, Objectives C-1-2.)*

Control Nuisance Wildlife - Upper Ouachita NWR has an established population of feral swine. The scientific literature has documented many adverse effects of feral swine on habitat productivity and reproduction of native wildlife. Being omnivores, feral swine utilize virtually every component of the habitat and directly compete with native wildlife, reducing carrying capacity and adversely affecting their reproduction and recruitment. Feral swine are compromising the refuge's efforts in wetland restoration, reforestation, and habitat management. This project would support a multi-faceted control program, including public hunting, trapping, and various other techniques. Water level management would be improved by controlling beavers on Upper Ouachita NWR. 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 our refuge neighbors. Additionally, beavers chew trees and seedlings, hampering reforestation efforts of staff members. This project supports one permanent maintenance worker (1 FTE, WG-4749-9), included in the Habitat Management Project above, and is needed to control beavers to prevent damage to forests and individual trees, and to prevent flooding damage to adjacent landowners. Recurring cost: $80,000;Special project cost: $97,500 *(Linkages: Goal A, Objectives A-1-24; Goal B, Objectives B-1-4; and Goal C, Objectives C-1-2.)*

Control Invasive Plants - Chinese tallow and Japanese climbing fern are established on Upper Ouachita NWR and are an imminent threat to wetland and upland habitats. Control of exotics here is no longer possible as a routine component of general refuge management both from a funding and staffing perspective. Chinese tallow grows quickly and shades out desirable planted species. Their fallen leaves are toxic to other plants. Without control, they will be the dominant species in many forested areas, thus eliminating natural diversity. Chinese tallow is particularly noticeable following logging operations and monitoring and treatment protocols must be developed. This project supports one maintenance worker (1 FTE, WG-4749-9), as described above in the Habitat Management Project, as well as equipment/supplies (primarily chemicals). Increased use of volunteers will be promoted, along with the private lands biologist, to investigate opportunities to establish partners' projects with adjacent landowners whose property is often a source of infestations. Environmental education and interpretation relative to invasive species will be promoted through brochures and/or an interpretive panel. Recurring cost: $53,000; Special project cost: $65,000. *(Linkages: Goal A, Objectives A-1-24; Goal B, Objectives B-1-4; and Goal C, Objectives C-1-2.)*

RESOURCE PROTECTION

Land Protection - Through a combination of fee title purchases from willing sellers and cooperative agreements and conservation easements with willing landowners, the Service will continue to purchase inholdings within the existing approved acquisition boundary. The Service will acquire sufficient interest in the identified lands to prevent conflicting land uses and to provide the management flexibility required

to protect and manage the habitat as a national wildlife refuge. Additionally, this project will eliminate numerous small inholdings and consolidate refuge boundaries, eliminating many administrative and public access issues. Lands within the LWMD, especially those lands in priority bird and Louisiana black bear conservation areas, will be targeted for protection. The acquired lands will be made available to the public for additional wildlife-dependent recreation. Potential funding sources for this project include the Migratory Bird Conservation Fund, Land and Water Conservation Fund, carbon sequestration, and cooperative efforts with various Service partners. The estimated cost of this project is $5-15 million. *(Linkage: Goal D, Objectives D-1-2.)*

Boundary Line Surveys and Posting - Several portions of the lands in the LWMD have not been surveyed and other portions have inadequate field points that preclude accurate boundary delineation. Registered surveys provide a legally defensible boundary line that is critical to resource protection and public relations, especially with regard to easement landowners. This project will fund boundary line surveys for all 36 easements, 7 fee-title lands, and 1 leased land at an estimated cost of $5,000 per mile. Project cost: $200,000; Recurring cost: $3,000. *(Linkage: Goal D, Objectives D-1-2.)*

Watershed Protection - Prior to its establishment, the area encompassing the Mollicy Unit of Upper Ouachita NWR was intensively farmed and a man-made levee constructed along the Ouachita River was repaired twice by previous landowners. A series of irrigation ditches, pumps, and water control structures were constructed to facilitate farming in this flood prone area. In order to try to restore the natural geomorphology on the Mollicy Unit of Upper Ouachita NWR and maintain current operations for wildlife, such as cooperative farming and waterfowl management, a thorough analysis of the geomorphology (including where to actively breach the levee), water quality, and contaminants will be accomplished with this project. The refuge will work with partners to restore the hydrology to this area of the refuge, where applicable and in the best interest of the Service, and contribute to the health of the entire watershed utilizing the refuge hydrological assessment, refuge water quality baseline survey, and other resulting studies. Ensure that opportunities for fish and wildlife habitat are enhanced and do not materially detract from the purposes of the refuge. Project cost: $200,000; Recurring cost: $10,000. *(Linkages: Goal D, Objectives D-3-8.)*

Safety and Resource Protection - Upper Ouachita and Handy Brake NWRs rely on one collateral duty law enforcement officer whose time is split among all the refuges within the Complex. Public use has continued to increase with hunting and fishing pressure on the refuge along with other issues requiring law enforcement, such as vandalism, compliance with access, and public use regulations. The refuges and LWMD are currently unable to adequately address safety and resource protection issues. The refuge needs to hire one full-time park ranger (GS-0025-7/9) ($140,000) to just begin to keep up with a growing population utilizing the refuge from public use to access issues on easement lands to gas lease compliance. Special project cost: $150,000; Recurring cost: $115,000 *(Linkages: Goals A, B, C, D, E, and F.)*

Cultural Resource Overview of the Refuge - Using available scientific and historic information, the selected contractor will author an interdisciplinary overview of the refuges' cultural landscape as it has changed over the past 15-20,000 years. The final technical report will include, at a minimum, sections about the area's geomorphology and hydrological regime, paleoenvironmental reconstruction, the area's cultural history, the scope and scale of past archaeological investigations on and near the refuge, a detailed list of the refuge's historic properties, and future research questions. Submission of the overview report will satisfy the cultural resource objectives listed in the Draft CCP/EA, as well as those listed in other Service documents. Using the information generated from the overview, as well as on-going scientific archaeological investigations of the area, the selected contractor will inventory and then evaluate the National Register's eligibility of historic properties located on the refuges. Recurring costs include conservation and protection of sites and

administrative needs for existing or new sites that are found. Recurring cost: $10,000; Special project cost: $75,000. *(Linkages: Goal D, Objective D-6.)*

VISITOR SERVICES

Improve Public Use Opportunities - Improve public use opportunities at Upper Ouachita and Handy Brake NWRs and other fee title lands in the LWMD by placing directional and interpretive signs at major visitor access points. The refuges have 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. Visitor amenities would be improved by adding interpretive panels and observation tower, obtaining environmental education equipment, and improving gravel boat launches by adding concrete. Recurring cost: $15,000; Special project cost: $250,000. *(Linkages: Goals A, B, C, and E.)*

REFUGE ADMINISTRATION

Administrative Support - Increase base budgeting for Upper Ouachita and Handy Brake NWRs to cover salaries with cost of living increases, and 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. Recurring cost: $28,000; Special project cost: $110,000. *(Linkages: Goals A-F.)*

Facilities Support - Provide annual costs for utilities, fuel, and other annual operating expenses. Recurring cost: $15,000. *(Linkages: Goal F, Objective F-2.)*

VOLUNTEERS

A volunteer program exists and will be enhanced during the life of this CCP. Volunteers will continue to be recruited to assist with youth turkey hunts and upkeep of Handy Brake NWR. The program will be enhanced for volunteers to help 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 Draft CCP/EA 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 refuges and the Lower Mississippi River Valley. Projects proposed in this Draft CCP/EA 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, LDWF, Louisiana Tech, Grambling University, and the University of Louisiana. 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.

Table 10. Summary of projects

Project Title	Special Project Cost	Recurring Annual Cost	Additional FTE
Science-based Inventory and Monitoring of Plant and Animal Populations	$30,000	$10,000	1
Improve Management of Endangered Species and Wildlife	$65,000	$53,000	
Determine Nesting Success of Priority Neotropical Migratory Songbirds	$300,000	$50,000	
Population Status and Management Impacts with Reptiles and Amphibians	$30,000	$15,000	
Bat Use of Bottomland Hardwood Forest	$60,000	$15,000	
Habitat Management	$110,000	$90,000	2
Water Management System Operation	$50,000	$10,000	
Control Nuisance Wildlife	$97,500	$80,000	
Control Invasive Plants	$65,000	$53,000	
Land Protection	$5-15 Million*	*	
Boundary Line Surveys and Posting	$200,000	$3,000	
Watershed Protection	$200,000	$10,000	
Safety and Resource Protection	$150,000	$115,000	1
Cultural Resource Overview of the Refuge	$75,000	$10,000	
Improve Public Use Opportunities	$250,000	$15,000	
Administrative Support	$110,000	$28,000	
Facilities Support	N/A	$15,000	
Grand Total			

** Cost not included in total and recurring annual cost unknown at this time.*

Step-Down Management Plans

A CCP is a strategic plan that guides the future direction of the refuge. A step-down management plan provides specific guidance on activities, such as habitat, fire, and visitor services management. These plans (Table 11) are also developed in accordance with the National Environmental Policy Act, which requires the identification and evaluation of alternatives and public review and involvement prior to their implementation.

Table 11. Refuge step-down management plans related to the goals and objectives of the comprehensive conservation plan

Plan	Completion Date	Revision Date
Master Plan	N/A	CCP will replace
Station Safety Plan	1998	2011
Law Enforcement Plan	1998	2009
Fishery Management Plan	2005	2010
Sign Plan	1992	2012
Fire Management Plan	2001	2011
Forest Management Plan	2002	2011
Water Management Plan	1997	2010
Nuisance Animal Control Plan	1992	2010
Biological Inventory and Monitoring Plan	1992	2009
Hunt Plan	2007	2013
Cultural Resource Protection Plan	2014*	2024
Habitat Management Plan	2011*	2021
Visitor Services Management Plan	1985	2010
Invasive Plant Management Plan	2012*	2022

** Indicates plan has not been completed as of publication of this CCP.*

MONITORING AND ADAPTIVE MANAGEMENT

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

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

PLAN REVIEW AND REVISION

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

SECTION B. ENVIRONMENTAL ASSESSMENT

I. Background

INTRODUCTION

The Fish and Wildlife Service prepared this Environmental Assessment (EA) for Upper Ouachita and Handy Brake National Wildlife Refuges (NWRs) and the Louisiana Wetlands Management District (LWMD) in compliance with the National Environmental Policy Act (NEPA) and the National Wildlife Refuge System Improvement Act of 1997. The National Wildlife Refuge System Improvement Act requires the development of comprehensive conservation plans for all refuges. Following a public review and comment period on this Draft CCP/EA, a final decision will be made by the Fish and Wildlife Service that will guide management actions and decisions on these refuges and the LWMD over the next 15 years, provide understanding about the refuges' fee and easement lands and management activities, and incorporate information and suggestions from the public and refuge partners.

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

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

The Final CCP is needed to address current management issues, to provide long-term management direction for the refuge, and to satisfy the legislative mandates of the National Wildlife Refuge System Improvement Act of 1997, which requires the preparation of a CCP for all national wildlife refuges.

PURPOSE AND NEED FOR ACTION

The purpose of the CCP and EA is to establish and implement management direction for Upper Ouachita and Handy Brake NWRs and the LWMD for the next 15 years.

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

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

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

DECISION FRAMEWORK

Based on the assessment described in this document, the Fish and Wildlife Service will select an alternative to implement the CCP for Upper Ouachita and Handy Brake NWRs and the LWMD. The Final CCP will include a Finding of No Significant Impact (FONSI), which is a statement explaining why the selected alternative will not have a significant effect on the quality of the human environment. This determination is based on an evaluation of the Service and the Refuge System mission, the purposes for which the refuges were established, and legal mandates. Assuming no significant impacts are found, implementation of the CCP will begin and will be monitored annually and revised when necessary.

PLANNING STUDY AREA

Upper Ouachita NWR is located in northeastern Louisiana. The northern boundary lies on the Louisiana-Arkansas State line. The refuge extends approximately 20 miles in a north-south direction along the Ouachita River, and its widest east-west dimension is approximately 16 miles. The southernmost point on the refuge is approximately 20 miles north of Monroe, Louisiana. Upper Ouachita NWR contains 42,594 acres with 26,304 acres in Union Parish and 16,290 acres in Morehouse Parish.

The LWMD was established in 1990 in response to growing Fish and Wildlife Service land-based responsibilities off of traditional refuges. The Wetlands Office is responsible for the administration of wetland easements and fee title land transfers from the USDA Farm Service Agency (FSA) and for the fall and winter leasing of privately owned wetlands in northeastern Louisiana. It also includes the first fee title tract transfer from the FSA to the Fish and Wildlife Service, with the establishment of Handy Brake National Wildlife Refuge in 1988. The LWMD includes 36 FSA easements, 7 fee title tracts and 1 lease that are concentrated in northeastern Louisiana (Figure 1) and encompasses 6 parishes (Table 2). The LWMD is spread across north Louisiana in 46 units, ranging in size from 3 acres to 1,000 acres (Table 2).

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

AUTHORITY, LEGAL COMPLIANCE, AND COMPATIBILITY

The Service developed this Draft CCP/EA in compliance with the National Wildlife Refuge System Improvement Act of 1997 and Part 602 (National Wildlife Refuge System Planning) of the Fish and Wildlife Service Manual. The actions described within this Draft CCP/EA also meet the requirements of NEPA. The refuge staff achieved compliance with NEPA through the involvement of the public and the incorporation of this EA in the Draft CCP, with a description of the alternatives considered and an analysis of the environmental consequences of the alternatives (Chapters III and IV). When fully

implemented, the CCP will strive to achieve the vision and purposes of Upper Ouachita and Handy Brake NWRs and the LWMD.

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

COMPATIBILITY

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

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

PUBLIC INVOLVEMENT AND THE PLANNING PROCESS

In accordance with Service guidelines and NEPA recommendations, public involvement has been a crucial factor throughout the development of the Draft CCP/EA for Upper Ouachita and Handy Brake NWRs and the LWMD. This Draft CCP/EA has been written with input and assistance from interested citizens, conservation organizations, and employees of local and State agencies. The participation of these stakeholders has been of great value in setting the management direction for Upper Ouachita and Handy Brake NWRs and the LWMD. 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.

In preparation for developing the Draft CCP/EA, a biological review and public use review were conducted in September 2004 and September 2005, respectively. Early in the process, the refuges identified a variety of issues, concerns, and opportunities that were provided to both review teams.

A notice of intent to prepare the Draft CCP/EA was published in the *Federal Register* in 2005 for Upper Ouachita NWR, and October 2005 for the LWMD. The public was notified in the local newspapers and media of two open house meetings to be held November 14 and 15, 2006, in Marion and Bastrop, Louisiana. In addition, information packets, including a letter of invite, public input workbook, and mailing list request form, were mailed to approximately 160 Federal, State, non-governmental agencies, local congressional members, and private individuals. In Marion, 23 individuals attended with comments and discussions among staff and public. In Bastrop, only five individuals attended. The *Bastrop Daily News* and the cable community board announced the

meeting to the public. However, a large thunderstorm occurred that evening, which may have minimized attendance. Of the workbooks, sixteen were returned along with seven notecards from the open houses, and two letters from private individuals.
A wide range of issues, concerns, and opportunities were identified and addressed during the planning process. Many issues that were important to the public fall outside the scope of the decision to be made during this planning process. In some instances, we cannot resolve issues some people have communicated to us. We have considered all issues throughout our planning process, and have developed a plan that attempts to balance the competing opinions regarding important issues.

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

II. Affected Environment

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

III. Description of Alternatives

FORMULATION OF ALTERNATIVES

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

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

DESCRIPTION OF ALTERNATIVES

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

ALTERNATIVE A (CURRENT MANAGEMENT)

Current management and public use would continue under this alternative. Refuge management programs would continue to be developed and implemented with limited baseline biological information and limited monitoring, for mainly migratory waterfowl. Wildlife surveys would still be completed for presence and absence of species and to alert refuge staff to large-scale changes in population trends. Cooperation with partners for monitoring waterfowl, eagle, fish, and deer herd health surveys would continue. Upland forest management would continue, focusing on red-cockaded woodpecker guidelines for minimizing hardwoods and maintaining a grassy understory in a portion of the mixed pine and upland forests. Bottomland hardwood forest management would continue at the current rate of thinning to maintain a closed canopy forest and retain as much water tupelo and bald cypress as possible. The open fields would continue with manipulating water levels for moist-soil and cooperative cropland management. Management for invasives would continue with opportunistic treatment and mapping. Partnerships would continue with LDWF for several biological programs, hunting regulations, and law enforcement issues. The Partners program would still develop projects with interested parties for carbon sequestration and invasives.

Hunting and fishing would continue to be the priority focus of public use on Upper Ouachita NWR, with no expansion of current opportunities. Current restrictions or prohibitions would remain. Environmental education, wildlife observation, and wildlife photography would be accommodated at

present levels, with a few interpretive sites added. Staffing would remain at the current level, but any vacancies in the current structure would be advertised and filled.

ALTERNATIVE B (PROPOSED ACTION)

Biological potential of historical habitats would be restored and enhanced with most management actions emphasizing natural ecological processes to foster habitat functions and wildlife populations. The biological program would be enhanced with inventories and monitoring so that adaptive management could be implemented for primarily migratory birds, but other species of wildlife as well. A close evaluation of migratory bird use and nesting success on the refuge would be evaluated with granting opportunities and partnerships. Partnerships would be developed to establish scientifically, valid protocols and to collaboratively work on research projects associated with information needed to manage habitats and wildlife, or, in other words, how forest management is affecting wildlife. Upland forest management would focus on restoring the biological integrity of a mixed hardwood/pine forest by promoting upland hardwood species and reducing pine basal area. The RCW Habitat Unit would be managed using a more historic fire regime while providing RCW habitat as required in the recovery guidelines. A historic fire regime would ultimately benefit RCWs by creating a more herbaceous understory. Bottomland hardwood forest management would be developed on an inventory defining current conditions that could be conducted in a logical and feasible manner. Bottoms would have management increased to open the canopy cover and increase understory vegetation. Water control structures and pumping capability would be improved to enhance moist-soil and cropland management for the benefit of wintering waterfowl. Invasives would be mapped and protocols for control established with the employment of a forester. Partnerships would continue to be fostered for several biological programs, hunting regulations, law enforcement issues, and research projects.

Public use would be similar to current management with a few improvements based on additional staffing and funding. Deer hunting would be allowed while monitoring the availability, diversity, and deer use of understory woody and herbaceous plants. This would allow the refuge to better understand the pressure being exerted on the habitat, and therefore make better habitat and harvest recommendations. On Upper Ouachita NWR, youth turkey hunting would be allowed, youth fishing events would be offered, and boat launch facilities would be improved. Environmental education and wildlife observation and photography would be accommodated at present levels, with minimal disturbance to wildlife and habitat and with an enhanced, interpretive nature trail, interpretive panels, and “check-out kits” developed for teachers. Law enforcement would be increased to gain better compliance with refuge regulations. Staffing would increase with four positions (biological technician, foresty technician, maintenance worker, and law enforcement) to increase biological inventory and monitoring, enhance forest management, increase invasives control, enhance public use program, and provide safe and compatible wildlife-dependent recreation.

ALTERNATIVE C (MINIMIZE MANAGEMENT AND PUBLIC USE)

This alternative is driven by reducing funding and staffing, with less emphasis on habitat and wildlife management and the public use program. The biological information would be enhanced and used to develop management programs that could be implemented less frequently, yet still accomplish the objectives. Extensive baseline inventories and monitoring programs would be conducted with several partners to provide a solid foundation of current conditions for refuge habitat and wildlife, while monitoring for changes in trends. Additional research projects would be implemented in the alternative by gaining granting opportunities and partnerships with other agencies and universities. Upland forest management would focus on RCW guidelines for minimizing hardwoods and maintaining a grassy understory in the entire mixed pine and upland forests, resulting in an intensive prescribed burning program to include

monitoring of forest conditions. Bottomland hardwood forest management would be developed using an intensive inventory to define current conditions and monitor natural successional changes. Management in the bottoms would be limited to promote natural succession, as defined in a revised Habitat Management Plan. The open field would be allowed to go through natural succession to bottomland hardwood forest and the moist-soil units would not be maintained. Invasives management would become a priority to establish baseline information of location and density and protocols for control. Partnerships would continue to be fostered for several biological programs, hunting regulations, law enforcement issues, and research projects.

Public use would be limited, with custodial-level maintenance. Public use would be monitored more closely for impacts to wildlife, and with negative impacts, new restrictions or closures would result. Deer hunting would be allowed when data demontrated the population was exceeding the habitat carrying capacity indicating a reduction was necessary. Monitoring of the deer population and associated habitat conditions would be implemented. Several species would no longer be hunted (e.g., quail, woodcock, feral hog, and coyote). Fishing would continue as under the current management alternative, but the open field would be closed to fishing during the wintering period and would be monitored for future impacts. Environmental education and wildlife observation and photography would be accommodated at present levels but access limited to July – October and February – April to minimize disturbance to migratory birds. Staffing would increase with four positions [biologist, forestry technician, and maintenance worker (2)] to handle the increase in biological inventory and monitoring, invasives' control, and fire program associated with implementing the RCW guidelines.

COMPARISON OF THE ALTERNATIVES BY ISSUE

ALTERNATIVES CONSIDERED BUT ELIMINATED FROM FURTHER ANALYSIS

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

MAXIMIZE PUBLIC USE

Maximizing public use over other mandates deviates from Service policy. The fundamental mission of the National Wildlife Refuge System is wildlife conservation: wildlife must come first in the management of refuges. The Service will allow and provide for public use of a refuge – to the extent possible – as long as these uses are compatible with this mission and the purposes for which the refuge was established. In the development of public use opportunities, appropriate, compatible wildlife-dependent recreational uses will be emphasized. However, public use must be at a level where wildlife populations and habitat are unharmed. At this time, the refuges' public use program is at a compatible level without additions.

Upper Ouachita and Handy Brake NWRs also have the aspect of being a component of the North Louisiana NWR Complex. A benefit of this is that additional public use opportunities can be provided at other units within the Complex. At times, a disadvantage is that funding and staffing levels are stretched thin among all the units of the Complex, also hindering additional public use opportunities being able to be provided at all units. For example, the Complex focuses an expanded program for environmental education and interpretation at the unit of Black Bayou Lake NWR, rather than smaller programs at several units within the Complex.

Table 12. Comparison of alternatives by management issues for Upper Ouachita and Handy Brake NWRs and the LWMD

Issues	Alternative A (Current Management)	Alternative B (Proposed)	Alternative C (Minimize Management and Use)
Goal A: Fish and Wildlife Population Management Promote the conservation and management of migratory bird diversity, resident wildlife, and species of special concern in support of national, regional, and ecosystem habitat and population goals.			
Objective A-1 - Migratory Waterfowl	Annually estimate species presence and abundance of wintering waterfowl on the Mollicy Unit from September – March.	Annually monitor, assess, and inventory species abundance, use period, and habitat use on the refuge to help evaluate and improve management for migrating/wintering waterfowl.	In conjunction with LMVJV, design and implement statistically valid estimate of wintering waterfowl species abundance, use period, and habitat use on the refuge.
Objective A-2 - Waterfowl Sanctuary	Maintain 9,734 acres(22%) of Upper Ouachita NWR and most of the lands within the LWMD as no waterfowl hunting areas.	Maintain 9,734 acres (22%) of Upper Ouachita NWR and most other fee title lands within the LWMD as no waterfowl hunting areas, using adaptive management for yearly regulations, delineations, and modifications.	Same as Alternative B but increase to 14,460 acres (33%) of refuge as waterfowl sanctuary. Handy Brake NWR and LWMD used exclusively for no waterfowl hunting area.
Objective A-3 - Resident/Nesting Waterfowl	Same as Alternative B, except wood duck boxes are maintained only when feasible on lands within LWMD. No banding on Handy Brake NWR/LWMD.	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 MAV and WGC plain.	Wood duck box program would be removed; however, the refuge would continue meeting or exceeding preseason wood duck banding quota.

Issues	Alternative A (Current Management)	Alternative B (Proposed)	Alternative C (Minimize Management and Use)
Objective A-4 - Mottled Duck	Current data does not exist.	Collect data to determine mottled duck use of refuge and status in northeast Louisiana and promote nesting, brood-rearing, and molting habitat where applicable.	Same as Alternative B.
Objective A-5 - Forest Breeding Birds	Annually determine neotropical migratory bird species presence on the refuge to maintain species lists and monitor for yearly, large-scale changes in species presence. Refuge staff or volunteers conduct point-count survey. Surveys do not exist on Handy Brake NWR and other lands in the LWMD.	Every 3 years determine neotropical migratory bird species relative abundance on the refuge and priority bird conservation areas within the LWMD to monitor for trends and regional comparisons.	Same as Alternative B.

Issues	Alternative A (Current Management)	Alternative B (Proposed)	Alternative C (Minimize Management and Use)
Objective A-6 - Forest Breeding Birds	No nesting productivity research conducted.	Determine nesting success of priority neotropical migratory birds (e.g., hooded warbler, Kentucky warbler, northern parula, Swainson's warbler, wood thrush, and prothonotary warbler) within 6 years of the approval of this CCP, and use production data as a baseline for comparison in future years as surrounding land cover changes.	Same as Alternative B.
Objective A-7 - Marshbirds	No surveys currently exist.	Determine status of marshbirds, particularly breeding king rails, in moist-soil areas and unharvested rice fields on the Mollicy Unit.	Same as Alternative B.

Issues	Alternative A (Current Management)	Alternative B (Proposed)	Alternative C (Minimize Management and Use)
Objective A-8 – Waterbirds	?	Annually, monitor species presence, habitat use, and abundance of colonial waterbirds, pelicans, and waders during post-breeding periods.	Same as Alternative B.
Objective A-9 - Grassland Birds	?	Monitor presence, abundance, and habitat use of wintering grassland bird species, such as Henslow and LeConte's sparrows, in open wetland and recently reforested habitats.	Same as Alternative B.
Objective A-10 - Scrub/Shrub Birds	Maintain records yearly of incidental observations of priority scrub/shrub species to monitor whether further management actions are needed.	Determine species presence, relative abundance, and habitat use of priority scrub/shrub species.	Same as Alternative B.
Objective A-11 - American Woodcock	American woodcock surveys are currently not conducted.	Determine use of open field habitat by American woodcock during winter and spring.	Same as Alternative B.

Issues	Alternative A (Current Management)	Alternative B (Proposed)	Alternative C (Minimize Management and Use)
Objective A-12 - Shorebirds	Annually, maintain records of incidental observations of American white pelicans and shorebirds on Upper Ouachita NWR.	Annually, monitor shorebird species presence, habitat use, and abundance during post-breeding periods	Same as Alternative B.
Objective A-13 - Mammals	Same as Alternative B.	Develop a comprehensive species list of mammals utilizing refuge lands.	Same as Alternative B.
Objective A-14 – Mammals	Monitor white-tailed deer herd health, age, and sex structure every 3 to 5 years to determine disease occurrence and carrying capacity on Upper Ouachita NWR.	Same as Alternative A.	Annually monitor white-tailed deer for abundance, trends, and effects on habitat to determine if management action is needed.
Objective A-15 - Amphibians and Reptiles	Maintain a species list of reptiles and amphibians utilizing the refuge based on opportunistic sightings each year and results of anuran call survey.	Same as Alternative A plus monitor impacts of forest management on amphibians and reptiles on Upper Ouachita NWR.	Monitor presence and abundance of amphibians and reptiles every 3 years for refuge trends by habitat type.
Objective A-16 - Amphibians and Reptiles	Record incidental sightings of nesting by alligator snapping turtles and other nesting turtles.	Survey potential habitat for indications of successful nesting by alligator snapping turtles and other nesting turtles.	Same as Alternative B.

Issues	Alternative A (Current Management)	Alternative B (Proposed)	Alternative C (Minimize Management and Use)
Objective A-17 - Butterflies and Moths	No surveys are currently conducted on refuge.	Inventory and create a species list and display of butterflies and moths utilizing the refuge.	Same as Alternative B.
Objective A-18 – Mussels	No surveys are currently conducted on refuge.	Inventory for mussels in refuge waters to determine whether species of concern or invasive species are present.	Same as Alternative B.
Objective A-19 – Fisheries	Surveys are conducted as needed on Upper Ouachita NWR only.	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.	Same as Alternative B.
Objective A-20 - Species of Special Concern (Bald Eagle)	Annually monitor past bald eagle nesting areas for nesting activity and monitor nesting success. When bald eagle nesting activity is confirmed, follow regional and national guidelines.	Same as Alternative A.	Same as Alternative A.

Issues	Alternative A (Current Management)	Alternative B (Proposed)	Alternative C (Minimize Management and Use)
Objective A-21 - Species of Special Concern (Red-cockaded Woodpecker)	Maintain and restore 200 acres of pine habitat around the one active RCW cluster and an additional 800 acres around 4 inactive recruitment clusters to achieve compliance with the ESA in accordance with RCW Recovery Plan Guidelines and conduct population monitoring, translocation, banding, and cavity maintenance.	Provide RCW foraging and nesting habitat and conduct population monitoring, nest monitoring, translocations, and cavity management on 1,220 acres of the RCW Habitat Area of Upper Ouachita NWR per guidelines in the RCW Recovery Plan (Figure 14). Restore upland hardwoods in the remaining 2,440 acres of mixed hardwood/pine forest.	Intensively manage for RCWs in 3,660 acres of upland forest by removing hardwoods, promoting pine, and burning intensively.
Objective A-22 - Species of Special Concern (Bats)	Annually monitor known Rafinesque's big-eared and southeastern Myotis bats' roost tree use and location on the refuge. Monitor known roost tree locations for yearly use.	Same as Alternative A plus conduct a research project to determine roost habits, reproductive success, and wintering roost location of Rafinesque's big-eared and southeastern Myotis bats on Upper Ouachita NWR.	Same as Alternative B.
Objective A-23 - Species of Special Concern (Louisiana Black Bear)	Support the Louisiana black bear recovery efforts and continue to provide habitat to support this species.	Same as Alternative A.	Same as Alternative A.

Issues	Alternative A (Current Management)	Alternative B (Proposed)	Alternative C (Minimize Management and Use)
Objective A-24 – Nuisance and Invasive Wildlife Species	Refuge staff opportunistically removes hogs and continues to allow limited regulated hunting and trapping of hogs on Upper Ouachita NWR.	Intensively remove nuisance and invasive species on Upper Ouachita and Handy Brake NWRs and other fee title lands where feasible using all control methods, including regulated hunting seasons (hogs only), opportunistic harvest by refuge staff, and large-scale trapping program. Monitor success of control methods and educate public about adverse effects of hogs on native wildlife and habitat.	Same as Alternative A.

Issues	Alternative A (Current Management)	Alternative B (Proposed)	Alternative C (Minimize Management and Use)
Goal B. Habitat Management Restore, enhance, manage, and maintain healthy bottomland hardwood and upland forests to support a natural diversity of plant and animal species and to foster the ecological integrity of the Lower Mississippi River Ecosystem.			
Objective B-1 - Bottomland Hardwood Forest	Comply with Forest Management Plan (USFWS 1988) to maintain current forest condition, to the best that available resources of staffing and funding allow, while maintaining 22,000 acres of existing bottomland hardwood forest with a basal area of 90-100 sq. ft/acre and 80-90% canopy cover.	Complete a Habitat Management Plan that will use the LMVJV Forest Working Group General Guidelines for Hardwood Forest Management as the desired future conditions and that will include a baseline inventory, entry schedule, and monitoring program.	Allow 38,000 acres of bottomland hardwood forests to grow through natural succession with no intervening management actions.
Objective B-2 - Bottomland Hardwood Forest	Continue to monitor reforestation survival.	Continue to monitor reforestation survival and include in the Habitat Management Plan strategies for future silvicultural treatments.	Design statistically valid monitoring program in the reforestation area to document survival, species diversity, density, etc., using random plots.
Objective B-3 - Upland Pine Forest	Maintain and restore 200 acres of pine habitat around the one active RCW cluster and an additional 800 acres around 4 inactive recruitment clusters to achieve compliance with the ESA in accordance with RCW Recovery Plan guidelines.	Manage 1,220 acres of pine habitat on west side of Upper Ouachita NWR for RCW habitat according to RCW Recovery Plan guidelines. Manage remaining upland pine habitat (2,440 acres) as a mixed hardwood/pine forest (Figure 14).	Intensively manage for RCWs in 3,660 acres of upland forest by removing hardwoods, promoting pine, and burning intensively to create a pine savannah with herbaceous understory.

Issues	Alternative A (Current Management)	Alternative B (Proposed)	Alternative C (Minimize Management and Use)
Objective B-4 - Invasive Plant Species	Opportunistically control invasive plant species as needed.	Foster opportunities each year for developing cooperative invasive plant species control projects with other agencies, private landowners, and corporations on lands adjacent to and on the refuge.	Same as Alternative A.
Goal C. Habitat Management Continue to serve as an important component of the Lower Mississippi River Ecosystem's complex of managed moist-soil and croplands that provide crucial wintering and migratory habitat for waterfowl, shorebirds, and other associated wildlife.			
Objective C-1 - Open Wetland Habitat	Manage 2,500 acres of open field, split annually between moist-soil units and crop fields (preferably rice), to provide high-quality food for wintering waterfowl populations.	Same as Alternative A.	Enhance and restore 2,500 acres of open field to bottomland hardwood forests of persimmon, willow oak, overcup oak, buttonbush, baldcypress, and water tupelo through natural succession.
Objective C-2 - Water Management	Utilize existing water control infrastructure and develop open wetland habitat management plan as necessary.	Complete an open wetland habitat management plan within 3 years of approval of this CCP.	Do not develop open wetland habitat management plan.

Issues	Alternative A (Current Management)	Alternative B (Proposed)	Alternative C (Minimize Management and Use)
Goal D. Resource Protection In collaboration with private landowners, LDWF, and other public and private organizations, strategically plan growth by connecting refuge lands or wetland management district units to provide wildlife benefits and conservation of archaeological resources and habitats where feasible for present and future generations.			
Objective D-1 - Refuge Land Protection	Obtain lands within current refuge boundaries as opportunities arise.	On Upper Ouachita NWR focus acquisitions on inholdings within the current refuge boundary with special emphasis on protecting the L.L.C. Tract and the Plum Creek Timber Company Tract.	Same as Alternative B.
Objective D-2 - Private Land Protection	Monitor opportunities for developing agreements for reforestation and invasive control on refuge lands and neighboring lands.	Foster opportunities each year for developing reforestation and invasive control projects on 2-5 private lands on and surrounding LWMD units in priority conservation areas that add to developing a contiguous block of bottomland hardwood forest (Figures 15 and 18). Focus particular attention on lands within and surrounding Handy Brake NWR.	Same as Alternative A.
Objective D-3 - Physical Resource Protection	Air and water quality on the refuges are monitored on an as-needed basis.	Meet or exceed national standards for air and water quality on the refuges, when feasible.	Same as Alternative B.

Issues	Alternative A (Current Management)	Alternative B (Proposed)	Alternative C (Minimize Management and Use)
Objective D-4 - Natural Gas Resources	Foster communication with LDEQ and Department of Natural Resource Conservation as issues arise and information requested.	Conduct yearly, and as needed, discussions with LDEQ and Department of Natural Resources Conservation for gas well information; gas well operations; mercury warnings; and soil, water, and fish monitoring for contaminants.	Same as Alternative B.
Objective D-5 - Watershed Protection	Respond to levee breach along the Ouachita River on a reactive basis.	Work with local, State, and Federal partners to aid the restoration of hydrology on the Mollicy Unit of Upper Ouachita NWR by completing a geomorphologic and hydrologic assessment to breach the river levee.	Same as Alternative A.
Objective D-6 - Cultural Resources	Same as Alternative B.	Each year comply with Section 106 of the National Historic Preservation Act or any other pertinent historic preservation mandates 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 or disturbed within the last 50 years.	Same as Alternative B.

Issues	Alternative A (Current Management)	Alternative B (Proposed)	Alternative C (Minimize Management and Use)
Objective D-7 - Law Enforcement	Continue reactive law enforcement activities. Share two collateral duty officers among Complex.	Develop and implement law enforcement procedures and include them in the various management plans to protect the refuge's resources.	Utilize existing law enforcement staff to protect resources.
Objective D-8 – Contaminants	Continue to react to incidences of contamination on an as needed basis.	Annually, eliminate, prevent, monitor, and mitigate 50-75% of each area of contamination of aquatic and terrestrial habitats that result from sources within the refuges at the earliest possible time that logistics and funding allow.	Same as Alternative B.
Goal E. Visitor Services Provide wildlife-dependent recreation opportunities where compatible and promote an appreciation of fish and wildlife resources in the Lower Mississippi River ecosystem.			
Objective E-1 - General	There is no approved Visitor Services' Plan.	Develop and implement a Visitor Services' Plan that encompasses recommendations for current and future wildlife-dependent recreation services.	Same as Alternative A. Develop a Visitor Services' Plan that outlines minimal or decreased public use.

Issues	Alternative A (Current Management)	Alternative B (Proposed)	Alternative C (Minimize Management and Use)
Objective E-2 - Hunting	Annually, allow deer, rabbit, squirrel, duck, goose, coot, quail, woodcock, raccoon, opossum, feral hog, coyote, and beaver hunting under LDWF and refuge-specific regulations. Monitor game populations and their impact on the habitat.	Increase quality hunting opportunities on Upper Ouachita NWR by annually allowing deer, rabbit, squirrel, duck, goose, coot, quail, woodcock, turkey, raccoon, opossum, feral hog, coyote, and beaver hunting under LDWF and refuge-specific regulations to regulate resident game populations. Evaluate opening new limited hunting areas on other fee title lands within the LWMD.	Same as Alternative A except decrease program where necessary.
Objective E-3 - Hunting	Provide easily accessible information to and personal contact with hunters to educate and enforce compliance with refuge regulations.	Provide easily accessible information to and personal contact with, hunters to strive for 80-95% compliance with refuge regulations.	Same as Alternative A.
Objective E-4 - Fishing	Maintain existing fishing access areas and opportunities.	Provide quality fishing opportunities by maintaining and enhancing access areas, providing universally accessible areas, and creating opportunities for youth on Upper Ouachita NWR.	Same as Alternative A.

Issues	Alternative A (Current Management)	Alternative B (Proposed)	Alternative C (Minimize Management and Use)
Objective E-5 - Wildlife Observation and Photography	Provide current opportunities for wildlife observation and photography while minimizing disturbance to wintering waterfowl and nesting migratory birds.	Enhance opportunities for wildlife observation and photography by providing public access with minimal disturbance to wildlife and habitat within five years of CCP approval.	Provide opportunities for wildlife observation and photography by providing public access year-round with minimal disturbance to wildlife and habitat.
Objective E-6 - Environmental Interpretation	Maintain interpretive panels and kiosk at Handy Brake NWR and interpretive signs at Upper Ouachita NWR.	Significantly increase the number of interpretive panels and displays to communicate the key resources and issues of Upper Ouachita and Handy Brake NWRs and fee title lands within the LWMD within eight years of CCP approval.	Same as Alternative B.
Objective E-7 - Environmental Education	Maintain a minimum environmental education program with lectures, field trips, and information provided on a case-by-case basis and per staff availability.	Increase the refuge environmental education program by developing a seasonal environmental education loop trail in the vicinity of the RCW cluster within five years of CCP approval.	Same as Alternative B.
Objective E-8 - Special Uses	Allow special uses (e.g., horseback riding, firewood cutting, and trapping) by permit to ensure compatibility with refuge purposes and mission.	Same as Alternative A.	Do not allow special uses unless necessary to fulfill the purposes for which the refuges were established.

Issues	Alternative A (Current Management)	Alternative B (Proposed)	Alternative C (Minimize Management and Use)
Goal F: Refuge Administration Secure and enhance staffing, funding, and facilities to maintain the integrity of habitats and wildlife resources of the Upper Ouachita and Handy Brake NWRs and lands within the LWMD in support of the National Wildlife Refuge System mission.			
Objective F-1 - Staffing	Utilize current staffing, funding, and facilities to support Upper Ouachita and Handy Brake NWRs and the LWMD.	Increase base funding of the Complex by 6% to cover mandated salary increases and maintain minimum refuge management needs, and to add 4 additional staff positions.to be assigned to Upper Ouachita and Handy Brake NWRs and the LWMD.	Same as Alternative A.
Objective F-2 - Facilities	Repair and maintain existing facilities, fences, and roads on an “as-needed basis” for the duration of this CCP to provide basic support for refuge staff and public safety.	Repair and maintain existing facilities and roads to maintain refuge programs that can provide safe and efficient refuge operations.	Same as Alternative A.

OTHER MANAGEMENT

All management activities that could affect natural resources, including subsurface mineral reservations, soil, water and air, and historical and archaeological resources, or that could affect utility lines and easements, would be managed to comply with all laws and regulations. The Service has a legal responsibility to consider the effects of its actions on cultural resources. Under all alternatives, the Service would manage these resources in accordance with public law and agency policy. Individual projects would require additional consultation with the Advisory Council on Historic Preservation and the State of Louisiana’s Historic Preservation Office. Additional consultation, surveys, and clearance would be required where project development is conducted on the refuges or when activities would affect properties that are listed or eligible for listing on the National Register of Historic Places.

IV. Environmental Consequences

OVERVIEW

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

EFFECTS COMMON TO ALL ALTERNATIVES

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

ENVIRONMENTAL JUSTICE

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

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

CLIMATE CHANGE

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

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

The land is a tremendous force in carbon sequestration. Terrestrial biomes of all sorts—grasslands, forests, wetlands, tundra, perpetual ice, and desert—are effective both in preventing carbon emissions and in acting as a biological "scrubber" of atmospheric carbon monoxide. The conclusions of the

Department of Energy's report noted that ecosystem protection is important to carbon sequestration and may reduce or prevent the loss of carbon currently stored in the terrestrial biosphere.

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

REGULATORY EFFECTS

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

LAND ACQUISITION

Funding for land acquisition <u>from willing sellers</u> within the approved acquisition boundary of Upper Ouachita and Handy Brake NWRs and the LWMD would come from the Land and Water Conservation Fund, the Migratory Bird Conservation Fund, Corps of Engineers mitigation programs, or donations from conservation and private organizations. Conservation easements and leases can be used to obtain the minimum interests necessary to satisfy refuge objectives if the refuge staff can adequately manage uses of the areas for the benefit of wildlife. The Service can negotiate management agreements with Federal, State, and local agencies, and accept conservation easements. Some tracts within the refuge acquisition boundary may be owned by other public or private conservation organizations. The Service would work with interested organizations to identify additional areas needing protection and provide technical assistance if needed. The acquisition of private lands is <u>entirely</u> contingent on the landowners and their willingness to participate.

CULTURAL RESOURCES

All alternatives afford additional land protection and low levels of development, thereby producing little negative effect on the refuges' cultural and historic resources. Potentially negative effects could include logging, construction of new trails or facilities, and development of water impoundments. In most cases, these management actions would require review by the Service's Regional Archaeologist in consultation with the State of Louisiana's Historic Preservation Office, as mandated by Section 106 of the National Historic Preservation Act. Therefore, the determination of whether a particular action within an alternative has the potential to affect cultural resources is an on-going process that would occur during the planning stages of every project.

Service acquisition of land with known or potential archaeological or historical sites provides two major types of protection for these resources: protection from damage by Federal activity and protection from vandalism or theft. The National Historic Preservation Act requires that any actions by a Federal agency which may affect archaeological or historical resources be reviewed by the State

Historic Preservation Office, and that the identified effects must be avoided or mitigated. The Service's policy is to preserve these cultural, historic, and archaeological resources in the public trust, and avoid any adverse effects wherever possible.

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

REFUGE REVENUE-SHARING

Annual refuge revenue-sharing payments to Upper Ouachita NWR in Union and Morehouse Parishes, Louisiana; LWMD (includes Handy Brake NWR) in Richland, Grant, Morehouse, West Carroll, East Carroll, and Natchitoches Parishes would continue at similar rates under each alternative. If lands are acquired and added to the refuge, the payments would increase accordingly.

OTHER EFFECTS

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

SUMMARY OF EFFECTS BY ALTERNATIVE

The following section describes the environmental consequences of adopting each refuge management alternative. The three alternatives share similarities with differences resulting from various types and levels of impacts. None of the proposed management activities would 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 refuges. Fire will be discussed for its impacts to soils and other attributes of the refuges 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 C 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 B will have some ground disturbing activities with forest management. Vegetative ground cover can be removed with forest machinery, allowing soils to be removed by runoff. The extent of this effect depends on the soil type. The kinds and intensities 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 under each alternative 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 B, the increased retention of snags and woody debris will

enhance soil organic material. Alternative C 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 travelling to gas wells, and potential site effects from brine runoff from the wells. Oversight and monitoring will mitigate these effects with quick alerts to problems and coordination with the producer to resolve any problems.

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

Recreational activities, in general, are less disruptive to soils than typical forest management activities; however, both horses and motorized vehicles in the forest have the potential to rut and compact soils. Horseback riding is only allowed under special use permits, and all-terrain vehicles (ATVs) are limited to trails and access roads in all three alternatives. Permitted motor vehicles are allowed only on improved roads in all three alternatives.

FIRE

Prescribed fires are used in all three alternatives, with the most extensive prescribed burn program in upland forest management under Alternative C. 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, which can all lead to soil erosion and nutrient leaching later with rains. However, burns in all three alternatives are generally conducted to burn at low-to-moderate intensities, limiting adverse impacts. Burning in Alternative B would be conducted to mimic the natural historic fire regime, which would burn in a patchy distribution. 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. The burning in all three alternatives would be conducted during the growing season, allowing for less chance of erosion problems.

HYDROLOGY

Fluctuating water levels is a priority factor in defining and constraining refuge resources and management. The Ouachita River 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 in all three alternatives; however, Alternative C encourages natural passive management of these resouces. In Alternative C only, water level fluctuations would be monitored to help define water availability for waterfowl foraging habitat. Restoration of the natural geomorphology along the Mollicy Unit will be completed in Alternative B if possible.

WATER QUALITY

Proposed refuge activities would likely only affect water quality by increasing the sediment load to the watershed to some degree. “Sediment increases can adversely affect fish productivity and diversity (Alexander and Hansen 1986), degrade drinking water, and affect recreational values. Changes in water nutrients or nutrient fluxes within streams as a result of management activities (silviculture practices) are minor…” (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.

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

With a more extensive burn program in Alternative B, erosion and sedimentation from plowed fire lines could potentially result in minor increases in sediment concentrations in the watershed.

All three alternatives have a degree of invasive plant control. Herbicide, however, is not applied directly to the water, so there would 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 would have the highest potential for impacts from smoke spreading from burn areas to reduce visibility and deposit particulate matter on the surrounding landscape.
The prescribed fire management would only affect air quality on a local scale with some particulate release and smoke management under all three alternatives. The U.S. Environmental Protection Agency (EPA) recognizes the need for wildland fire for sustaining ecological integrity while minimizing 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 (EPA 1998). 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 to 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 for all three alternatives would 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 Hardwood Forest

In all three alternatives the bottomland forest is managed to enhance the forest condition or integrity, with the least amount in Alternative C. 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 C will have the most intensive baseline inventory to define current conditions but will only monitor natural succession. In that alternative, active management is limited to allowing the forest to grow and succeed under only natural processes. A database will track changes in the forest composition in response to deep overflow, beaver damage, and other ecological processes such as storms. This alternative will result in a late seral stage forest sooner and less diverse for species and vertical structure. Most of refuge forest management resources will involve inventorying and monitoring.

Alternative B will have a moderate baseline inventory to define current conditions with active management using mechanical thinning to maintain a variety of early, mid- and late-seral stages. Late-seral stage components will be maintained at less basal area and canopy cover than Alternative C. This will open more patches in the forest for shrub and midstory species and 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 B. 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 aforestation plots are successful. Refuge forest management resources would increase for inventorying and monitoring and active forest management (thinning) compared to Alternative A.

Under Alternative B, a decrease in canopy cover and basal area would increase midstory and understory resulting in increased mast for game species, increased foraging habitat for wood ducks, and increased nesting habitat for Swainson's , Kentucky, and hooded warblers. During the flooded, overflow time of year there would be an increase in cover for spawning fish and their fry. Greater densities of snags and woody debris would increase nesting and foraging habitat for woodpeckers and bats under Alternative B. Vegetation effects will include a large increase in bottomland hardwood forest acreage over time with natural succession in Alternative C. Alternatives A and B will continue to maintain more diverse vegetation coverage with a moist-soil unit, grassy field, and patches of bottomland hardwood forest succession. Better management of water levels in moist-soil units will occur in Alternative B with an increase in resources and funding.

Mixed Pine and Hardwood Uplands

Under Alternative C, all of the upland forest would be managed for RCWs by promoting pines and herbaceous understory while removing hardwoods using frequent prescribed fire. Under Alternatives A and B, more hardwoods would be present than in Alternative C, however, in Alternative B, hardwoods would be selected and managed while reducing pine basal area in 2,440 acres of upland habitat. All three alternatives would provide RCW habitat; however, in Alternative C all upland habitat would be converted to RCW habitat to grow the population. In Alternative B, RCW habitat would be provided on 1,220 acres to support the existing group and four recruitment clusters; while also promoting an upland hardwood/pine forest in a separate 2,440-acre habitat unit. In Alternative A, RCW habitat would be provided for in approximately 1,000 acres with the remaining upland forest remaining in its current state of pine forest with some hardwoods interspersed. Under Alternative A, resources would not be available to promote a mature hardwood pine forest.

Invasives

Alternative B has a more intensive invasive species control program than Alternatives A and C. Under Alternative B, the hunting of hogs, beavers, and deer would positively impact wildlife habitat by promoting plant health and diversity, reducing hog wallowing, which destroys vegetation and compacts soils, and increasing tree seedling survival. Hunting of beavers would decrease their populations and, in effect, increase the health of forested wetlands. Feral hog populations would be reduced thereby decreasing predation of deer fawns, turkeys, and small mammals.

Alternative B should increase native flora in response to a decrease in invasive species. This should be much more visible in Alternative B than in A and C. Invasives will continue to increase in the reactive management approach in Alternative A and the lack of active or reactive control in Alternative C. After burning or thinning, invasive species move into disturbed sites. In Alternative B there is a comprehensive program for monitoring and controlling invasives in treatment areas, but not in Alternatives A or C.

WILDLIFE

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

Patches of early successional forest intermixed with mid-successional to mature forest provides nesting substrate for priority neotropical migratory birds, such as Swainson's, Kentucky, and hooded warblers, along with indigo buntings, yellow-breasted chats and white-eyed vireos. In years when the forest floods during spring, this vertical structure would provide excellent cover for spawning fish and their fry.

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 some forage and cover for some species. For the majority of wildlife, this vertical structure condition provides lower quality habitat than early or late seral stages, although a few species can utilize mid-stage conditions, such as red-eyed vireos, yellow-billed cuckoos, and blue-gray gnatcatchers.

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

Wintering and migratory waterfowl, other than wood ducks, may be less abundant with Alternative C since the locally important moist-soil unit and grassy field in Alternatives A and B would be restored to bottomland hardwood forests. However, wood duck foraging habitat would be increased in Alternative C. The reforestation of bottomland hardwood forest would increase the core acreage in Alternative C 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 B, huntable populations of locally favored game species (deer, turkey, squirrel, rabbit, quail) would be maintained and increased in relation to habitat capability, where possible and when desirable, and where increases would not be in conflict with other species management. Disturbance to non-hunted wildlife would increase slightly. However, significant disturbance would be unlikely. Mammals, including bats, are inactive during winter when hunting season occurs. These species are also nocturnal. Both of these qualities make hunter interactions with small mammals very rare.

Nongame wildlife species, such as early-successional neotropical migratory songbirds, woodpeckers, and reptiles and amphibians, would benefit the most under Alternative B. Populations of raccoon, coyote, and opossum would be decreased through hunting under this alternative. Depredation rates of songbirds, turkeys, turtles, and their nests would decrease. Critical components of nongame and game species habitats, such as snags, den trees, dead and down woody materials, and a variety of forest types and age classes, would be provided and coordinated with all other resource management activities. Deer and other early forest-stage species would be favored by the abundant grassy/forb understory in all three alternatives, but to a greater extent with the mosaic of habitat types in Alternative B. Woodpeckers and other species associated with mature forests would be supported by the older trees in Alternative B.

SPECIES OF CONCERN

All three alternatives provide habitat for the bald eagle, endangered red-cockaded woodpecker, and threatened Louisiana black bear. Alternative B combines biological integrity of the habitat and species management to a greater degree than Alternatives A and C.

Under Alternatives A and B, RCWs would be managed for the current goal of one family group in 1,220 acres of RCW habitat. Under Alternative C, the refuge would attempt to expand the population by creating an artificial habitat of pure pine forest savanna on 3,660 acres through hardwood removal and intensive frequent fire. The historic fire regime would have allowed more hardwood trees in wetter, depressional areas. This regime would be mimicked in Alternative B within the RCW Habitat Unit, while meeting the RCW Recovery guidelines.

Alternatives A, B or C would 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. Timber thinning would not occur in this area. The timing of flooding is such that during the nesting season users are unable to access the nest area. The nest is in an area not open to hunting. Monitoring of wintering and nesting bald eagles would continue to ensure that refuge activities are not adversely affecting the eagle population.

Adverse effects on Louisiana black bear would not occur under all alternatives. Bottomland hardwood forests would continue to dominate the landscape and provide habitat for this species. Timber thinning under Alternative B would enhance habitat for the Louisiana black bear.

RESOURCE PROTECTION

Volunteers and partnerships have proven effective in the management of Upper Ouachita and Handy Brake NWRs. All three alternatives would continue the use of volunteers to foster the implementation of the CCP. Partnerships would be increased in Alternative B to work with neighbors on invasive control and potential for Partners for Fish and Wildlife Projects.

Refuge administration for contaminants and management of mineral rights would be increased in Alternatives B and C, while a limited, periodic monitoring program would continue under Alternative A. With increased surveillance of gas production facilities, potential problems should be found sooner, leading to a faster response for resolving any problems.

VISITOR SERVICES

Management activities outlined under Alternative B are designed to improve and expand some wildlife-dependent public use opportunities, while Alternative C would reduce opportunities, and Alternative A would maintain current visitor program. Alternative B would provide more interpretation,

enhanced visitor access, and youth hunts. These activities would provide an indirect positive effect on fish and wildlife resources. Alternative C would limit hunting opportunities with a target threshold to instigate deer hunting and a larger waterfowl sanctuary. Alternative B would provide 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 A would continue the existing visitor program that is limited to available funds.

Presence of the public can be detrimental to wildlife from disturbance to activities that are important to survival. However, timing of disturbance, the species involved, and activity can all vary in what degree the wildlife is affected. As public use levels expand across time, unanticipated conflicts between user groups may occur. Experience has proven that time and space zoning (e.g., establishment of separate use areas, use periods, and restrictions on the number of users) is an effective tool in eliminating conflicts between user groups. The key is for refuge managers to monitor the public use program and the wildlife population trends to determine if there is a significant change. Alternative B has an increased monitoring program for several wildlife species and public use programs, whereas Alternative C 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 them to be designated compatible with the refuge purposes. All three alternatives provide an important no hunting zone for waterfowl to rest and feed without disturbance. Alternative C provides a larger no hunting zone that may or may not provide added benefits. On the visitor use side, these no hunting areas can enhance the use of adjacent areas by holding more birds closer to a hunting area to allow greater opportunities for hunting.

Under Alternative B, deer herd health surveys would provide scientific evidence of herd characteristics and habitat carrying capacity that would promote a healthy deer population with a sound buck to doe ratio. This would result in an opportunity for deer hunting on the Upper Ouachita NWR. The public would be allowed to harvest a renewable resource, and the refuge would be promoting a wildlife-dependent recreational opportunity that is compatible with the purpose for which the refuge was established. The public would have an increased awareness of Upper Ouachita NWR and the National Wildlife Refuge System under both Alternatives A and B. Under Alternative C, intensive deer surveys would be conducted to monitor the deer population. This alternative would limit opportunities for deer hunting to those times when the deer herd would surpass the target for habitat carrying capacity.

Fishing can also influence distribution, abundance, and productivity of waterbirds. However, on the Ouachita River and its tributaries, there are currently no known large waterbird colonies or rookeries that could be affected by fishing. The sanctuary on the Mollicy Unit is closed to fishing during the winter to protect wintering waterfowl from disturbance. 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).

Public use visits for wildlife observation and photography are currently very low on the refuges. This may be a use that increases in the future if additional opportunities are provided. Alternative A provides the current opportunities. Alternative B improves on the current opportunities by adding an observation tower and foot trail on Upper Ouachita NWR. Alternative C 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.

Wildlife observation and photography conducted in an ethical manner should have little or no impact on wildlife. However, these uses could produce negative effects if public visitation levels increase or if the public pursues rare species or approaches wildlife too closely (Pease et. al., 2005). These effects could differ depending upon which species is involved. Impacts ccould 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 C would have the least impact from wildlife observation and photography since the areas would be closed to access more than under Alternatives A or B. Alternatives A and B have similar levels of impacts with the opportunities being equal. Both alternatives could decrease the level of impacts by educating the public of how to use the viewing areas and trail so that they understand how their activities affect wildlife, and how staying on the trail would minimize impacts. Alternative B also has the added long-term benefit of providing wildlife interpretation panels on the proposed observation tower and along the foot trail.

Environmental education is a use that is prioritized at the sister unit, Black Bayou Lake National Wildlife Refuge. On Upper Ouachita and Handy Brake NWRs and other fee title land within the LWMD, 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. In Alternative A the impact may be even nonexistent due to staff being unavailable to provide tours on a case-by-case nature. In Alternatives B and C a few more visits a year may occur, but again, any impacts would be negligible. All three alternatives have some long-term benefits 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 B would increase biological, forestry, maintenance, and law enforcement staff. Alternative C does not have as much staff increase but does include biological, forestry, and maintenance staff. Alternative A would maintain current staff and continue to see a decrease in refuge operations and maintenance. A funding increase is also included for Alternatives B and C to support increased staff.

CUMULATIVE IMPACTS

A cumulative impact is defined as an impact on the natural or human environment, which results from the incremental impact of the proposed action when added to other past, present, and reasonably foreseeable future actions, regardless of which agency (federal or nonfederal) or person undertakes such other actions (40 CFR 1508.7). The proposed actions would have both direct and indirect effects; however, the cumulative effects of these actions are not expected to be substantial.

BIOLOGICAL RESOURCES

All of the alternatives are intended to maintain or improve biological resources on refuge lands, in northern Louisiana, and within the Lower Mississippi River Ecosystem. The biological integrity of the refuge would be protected under the proposed alternative, and the refuge purpose of conserving wetlands for wildlife would be achieved. The combination of our management actions with those of other organizations could result in significant, beneficial cumulative effects by (1) increasing protection and management for federal- and state-listed threatened or endangered species; (2) protecting upland and wetland habitats that are regionally declining; and (3) reducing invasive, exotic plants and animals.

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

CULTURAL RESOURCES

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

Under all of the alternatives, management practices on the refuge would consider potential historical resources. Projects requiring excavation are sampled using test pits in the affected area before work begins. Our regional archaeologist reviews annual prescribed burn plans before we implement them and, even then, we select methods to avoid impacts on any resources.

HUMAN RESOURCES

We expect none of the alternatives to have significant, adverse, cumulative impacts on the economy of northern Louisiana. Although Federal land acquisition reduces property tax revenue, it compensates affected towns with refuge revenue sharing payments, and should also reduce the costs of community services. Also, the acquisitions we propose make up only a small portion of any town. We expect increased refuge visitation and increased tourism to bring additional revenues to local communities, but we do not predict a significant increase in overall revenue in any area.

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

The Service defines facilities as: “Real property that serves a particular function(s) such as buildings, roads, utilities, water control structures, raceways, etc.” Under the proposed action, those facilities most utilized by the public are: roads, parking lots, trails and boat launching ramps. Maintenance or improvement of existing facilities (i.e., parking areas, roads, trails, and boat ramps) would cause minimal short-term impacts to localized soils and waters and may cause some wildlife disturbances and damage to vegetation. The facility maintenance and improvement activities described are periodically conducted to accommodate daily refuge management operations and general public uses, such as wildlife observation and photography. These activities would be conducted at times

(seasonal and/or daily) to cause the least amount of disturbance to wildlife. Siltation barriers would be used to minimize soil erosion, and all disturbed sites would be restored to as natural a condition as possible. During times when roads are impassible due to flood events or other natural causes, those roads, along with parking lots, trails, and boat ramps impacted by the event, would be closed to vehicular use.

RELATIONSHIP BETWEEN SHORT-TERM USES AND LONG-TERM PRODUCTIVITY

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

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

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

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

UNAVOIDABLE ADVERSE EFFECTS

Unavoidable adverse effects are those that could cause significant harm to the human environment and cannot be avoided, even with mitigation measures. We considered property tax losses to towns, increased visitation, and prescribed fire as the principal activities that could have unavoidable adverse effects. We described losses in property tax revenue to towns in "Human Resources," above. Although the impact on individual towns varies, none of the alternatives would contribute to a significant cumulative loss in any one town. Enhanced services and facilities for refuge visitors would draw more people to the area; in particular, we are predicting more groups would participate in our increased environmental education and interpretive programs. Even under a carefully designed program, increased visitation would cause higher levels of disturbance to wildlife, although most would occur in localized areas. We intend to manage our visitor use programs to minimize those effects. Because our programs would be implemented under conditions that comply with the State Clean Air Act and Federal EPA standards, we predict their effects would not be significant.

We would undertake biological monitoring as part of all alternatives, to enable our staff to adapt management actions and address any unforeseen situations. As a result, none of the alternatives would result in any significant unavoidable, adverse environmental impacts.

POTENTIAL IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

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

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

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

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

DIRECT AND INDIRECT EFFECTS OR IMPACTS

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

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

Other indirect effects that may result from implementing the proposed alternative include minor impacts from siltation due to the disturbance of soils and vegetation while expanding the water control structures, as well as expanding or creating new foot trails; construction of the observation tower and other visitor amenaties; and providing greater visitor access through improvements to the boat ramps.

The cumulative direct and indirect effects or impacts would be minimal and insignificant.

SHORT-TERM USES VERSUS LONG-TERM PRODUCTIVITY

The habitat protection and management actions under the proposed alternative are dedicated to maintaining the long-term productivity of refuge habitats. The benefits of this plan for long-term productivity far outweigh any impacts from short-term actions, such as the construction of observation towers and a visitor center, or creation of new trails. While these activities would cause short-term

negative impacts, the educational values and associated public support gained from the improved visitor experience would produce long-term benefits for the refuge's entire ecosystem.

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

V. Consultation and Coordination

OVERVIEW

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

The following meetings, contacts, and presentations were undertaken by the Fish and Wildlife Service during the preparation of the Draft CCP/EA.

CORE PLANNING TEAM MEMBERS

The core planning team included refuge staff from North Louisiana National Wildlife Refuge Complex, Upper Ouachita National Wildlife Refuge, and Central Louisiana National Wildlife Refuge Complex. This team was the primary decision-making team for the Draft CCP/EA. 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 Refuge Complex
- Kelby Ouchley, Deputy Project Leader, North Louisiana Refuge Complex
- Brett Hortman, Refuge Manager, Upper Ouachita National Wildlife Refuge
- Lindy Garner, Planning Biologist (former), North Louisiana Refuge Complex
- Tina Chouinard, Natural Resource Planner, Central Louisiana Refuge Complex
- Gypsy Gooding, Wildlife Biologist, North Louisiana Refuge Complex
- Steve Pagans, Forester, North Louisiana Refuge Complex
- Gay Brantley, Interpretive Ranger, North Louisiana Refuge Complex
- Chris Foster, Fire Management Officer, North Louisiana Refuge Complex
- Michael Renfrow, Private Lands Biologist, North Louisiana Refuge Complex

INTERDISCIPLINARY PLANNING TEAM MEMBERS

Several individuals supported the planning process with participation on the biological review team and visitor services' review team, and additional special-topic discussions. Their information provided additional biological support for developing objectives in the Draft CCP/EA. Some members are internal to the Service and provide additional policy guidance and support for objective development as well.

BIOLOGICAL REVIEW – SEPTEMBER 2004

- Frank Bowers, Regional Migratory Bird Coordinator, Migratory Birds, FWS
- Pat Stinson, Wildlife Biologist, Migratory Birds, FWS
- Chuck Hunter, Regional Biologist, Region 4, FWS
- Ken Clough, Realty Specialist, Migratory Bird Realty Office, FWS
- Jeff Denman, Forester, White River NWR, FWS
- Jon Wessman, Farm Bill Coordinator, Conway ES, FWS

- Cedric Doolittle, Fisheries Biologist, FWS
- Randy Wilson, Science Coordinator, Lower Mississippi Joint Venture, FWS
- Ryan Daniel, Fisheries Biologist, Louisian Department of Wildlife and Fisheries (LDWF)
- Kenny Ribbeck, Forester Supervisor, LDWF
- Jerald Owens, District Supervisor, LDWF
- John Carr, Herpetology Professor, University of Louisiana at Monroe
- Bill Vermillion, Biologist, Lafayette Ecological Services, FWS
- Kirk Cormier, Regional Manager, Louisian Department of Environmental Quality (LDEQ)
- John Posey, Contaminant Biologist, LDEQ
- Jim Dickson, Merritt Professor, Louisiana Tech University
- Gypsy Gooding, Wildlife Biologist, Upper Ouachita NWR, FWS
- Brett Hortman, Refuge Manager, Upper Ouachita NWR, FWS
- Kelby Ouchley, Deputy Project Leader, Upper Ouachita NWR, FWS
- Lindy Garner, Natural Resource Planner, Upper Ouachita NWR, FWS
- Chris Foster, Forester, Upper Ouachita NWR, FWS

VISITOR SERVICES' REVIEW – SEPTEMBER 2005

- Garry Tucker, Visitor Services and Outreach, FWS
- Ray Paterra, White River NWR, FWS
- Lindy Garner, North Louisiana Refuge Complex

OTHER CONTRIBUTORS

- Tom Foti, Ecologist, Arkansas Natural Heritage Commission
- Tom Edwards, Wildlife Biologist, FWS
- Jody Pagans, Botanist, Arkansas Natural Heritage Commission
- Ralph Costa, Red-cockaded Woodpecker Recovery Leader, FWS
- Rick Kanaski, Regional Archaeologist, FWS
- Bo Blackman, Information Technology, Louisiana Department of Natural Resources
- Dale Yocum, GIS Specialist, Lower Mississippi Valley Joint Venture, FWS
- Robert Grecko, GIS Specialist, FWS
- Evelyn Nelson, Writer/Editor, FWS

SECTION C. APPENDICES

Appendix A. Glossary

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

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

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

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

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

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

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

CFR: Code of Federal Regulations.

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

Comprehensive Conservation Plan (CCP):	A document that describes the desired future conditions of a refuge or planning unit and provides long-range guidance and management direction to achieve the purposes of the refuge; helps fulfill the mission of the Refuge System; maintains and, where appropriate, restores the ecological integrity of each refuge and the Refuge System; helps achieve the goals of the National Wilderness Preservation System; and meets other mandates (Service Manual 602 FW 1.6 E).
Concern:	See Issue.
Cover Type:	The present vegetation of an area.
Cultural Resource Inventory:	A professionally conducted study designed to locate and evaluate evidence of cultural resources present within a defined geographic area. Inventories may involve various levels, including background literature search, comprehensive field examination to identify all exposed physical manifestations of cultural resources, or sample inventory to project site distribution and density over a larger area. Evaluation of identified cultural resources to determine eligibility for the National Register follows the criteria found in 36 CFR 60.4 (Service Manual 614 FW 1.7).
Cultural Resource Overview:	A comprehensive document prepared for a field office that discusses, among other things, its prehistory and cultural history, the nature and extent of known cultural resources, previous research, management objectives, resource management conflicts or issues, and a general statement on how program objectives should be met and conflicts resolved. An overview should reference or incorporate information from a field office's background or literature search as described in Section VIII of the Cultural Resource Management Handbook (Service Manual 614 FW 1.7).
Cultural Resources:	The remains of sites, structures, or objects used by peoples of the past.
Designated Wilderness Area:	An area designated by the United States Congress to be managed as part of the National Wilderness Preservation System (Service Manual 610 FW 1.5).
Disturbance:	Significant alteration of habitat structure or composition. May be natural (e.g., fire) or human-caused events (e.g., aircraft overflight).
Ecosystem:	A dynamic and interrelating complex of plant and animal communities and their associated non-living environment.
Ecosystem Management:	Management of natural resources using system-wide concepts to ensure that all plants and animals in ecosystems are maintained at viable levels in native habitats and that basic ecosystem processes are perpetuated indefinitely.

Endangered Species (Federal):	A plant or animal species listed under the Endangered Species Act that is in danger of extinction throughout all or a significant portion of its range.
Endangered Species (State):	A plant or animal species in danger of becoming extinct or extirpated in the state within the near future if factors contributing to its decline continue. Populations of these species are at critically low levels or their habitats have been degraded or depleted to a significant degree.
Environmental Assessment (EA):	A concise public document, prepared in compliance with the National Environmental Policy Act, that briefly discusses the purpose and need for an action, alternatives to such action, and provides sufficient evidence and analysis of impacts to determine whether to prepare an environmental impact statement or finding of no significant impact (40 CFR 1508.9).
Environmental Impact Statement (EIS):	A detailed written statement required by section 102(2)(C) of the National Environmental Policy Act, analyzing the environmental impacts of a proposed action, adverse effects of the project that cannot be avoided, alternative courses of action, short-term uses of the environment versus the maintenance and enhancement of long-term productivity, and any irreversible and irretrievable commitment of resources (40 CFR 1508.11).
Estuary:	The wide lower course of a river into which the tides flow. The area where the tide meets a river current.
Finding of No Significant Impact (FONSI):	A document prepared in compliance with the National Environmental Policy Act, supported by an environmental assessment, that briefly presents why a Federal action will have no significant effect on the human environment and for which an environmental impact statement, therefore, will not be prepared (40 CFR 1508.13).
Goal:	Descriptive, open-ended, and often broad statement of desired future conditions that conveys a purpose but does not define measurable units (Service Manual 620 FW 1.6J).
Habitat:	Suite of existing environmental conditions required by an organism for survival and reproduction. The place where an organism typically lives.
Habitat Restoration:	Management emphasis designed to move ecosystems to desired conditions and processes, and/or to healthy ecosystems.
Habitat Type:	See Vegetation Type.
Improvement Act:	The National Wildlife Refuge System Improvement Act of 1997.

Informed Consent:	The grudging willingness of opponents to "go along" with a course of action that they actually oppose (Bleiker).
Issue:	Any unsettled matter that requires a management decision, e.g., an initiative, opportunity, resource management problem, threat to the resources of the unit, conflict in uses, public concern, or other presence of an undesirable resource condition (Service Manual 602 FW 1.6K).
Management Alternative:	See Alternative.
Management Concern:	See Issue.
Management Opportunity:	See Issue.
Migration:	The seasonal movement from one area to another and back.
Mission Statement:	Succinct statement of the unit's purpose and reason for being.
Monitoring:	The process of collecting information to track changes of selected parameters over time.
National Environmental Policy Act of 1969 (NEPA):	Requires all agencies, including the Service, to examine the environmental impacts of their actions, incorporate environmental information, and use public participation in the planning and implementation of all actions. Federal agencies must integrate NEPA with other planning requirements, and prepare appropriate NEPA documents to facilitate better environmental decision-making (40 CFR 1500).
National Wildlife Refuge System Improvement Act of 1997 (Public Law 105-57):	Under the Refuge Improvement Act, the U.S. Fish and Wildlife Service is required to develop 15-year comprehensive conservation plans for all national wildlife refuges outside Alaska. The Act also describes the six public uses given priority status within the NWRS (i.e., hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation).
National Wildlife Refuge System Mission:	The mission is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.

National Wildlife Refuge System: Various categories of areas administered by the Secretary of the Interior for the conservation of fish and wildlife, including species threatened with extinction; all lands, waters, and interests therein administered by the Secretary as wildlife refuges; areas for the protection and conservation of fish and wildlife that are threatened with extinction; wildlife ranges; games ranges; wildlife management areas; or waterfowl production areas.

National Wildlife Refuge: A designated area of land, water, or an interest in land or water within the System.

Native Species: Species that normally live and thrive in a particular ecosystem.

Notice of Intent (NOI): A notice that an environmental impact statement will be prepared and considered (40 CFR 1508.22). Published in the *Federal Register*.

Noxious Weed: A plant species designated by Federal or State law as generally possessing one or more of the following characteristics: aggressive or difficult to manage; parasitic; a carrier or host of serious insect or disease; or non-native, new, or not common to the United States, according to the Federal Noxious Weed Act (PL 93-639), a noxious weed is one that causes disease or had adverse effects on man or his environment and therefore is detrimental to the agriculture and commerce of the Untied States and to the public health.

Objective: A concise statement of what we want to achieve, how much we want to achieve, when and where we want to achieve it, and who is responsible for the work. Objectives derive from goals and provide the basis for determining strategies, monitoring refuge accomplishments, and evaluating the success of strategies. Making objectives attainable, time-specific, and measurable (Service Manual 602 FW 1.6N).

Plant Community: An assemblage of plant species unique in its composition; occurs in particular locations under particular influences; a reflection or integration of the environmental influences on the site such as soils, temperature, elevation, solar radiation, slope, aspect, and rainfall; denotes a general kind of climax plant community.

Preferred Alternative: This is the alternative that would best achieve the refuge purpose, vision, and goals. It would contribute to the Refuge System mission and address the significant issues, all within principles of sound fish and wildlife management.

Prescribed Fire: The application of fire to wildland fuels to achieve identified land use objectives (Service Manual 621 FW 1.7). May be from natural ignition or intentional ignition.

Priority Species: Fish and wildlife species that require protective measures and/or management guidelines to ensure their perpetuation. Priority species include the following: (1) State-listed and candidate species; (2) species or groups of animals susceptible to significant population declines within a specific area or statewide by virtue of their inclination to aggregate (e.g., seabird colonies); and (3) species of recreation, commercial, and/or tribal importance.

Public Involvement Plan: Broad long-term guidance for involving the public in the comprehensive planning process.

Public Involvement: A process that offers impacted and interested individuals and organizations an opportunity to become informed about, and to express their opinions on, Service actions and policies. In the process, these views are studied thoroughly and thoughtful consideration of public views is given in shaping decisions for refuge management.

Public: Individuals, organizations, and groups; officials of Federal, State, and local government agencies; Indian tribes; and foreign nations. It may include anyone outside the core planning team. It includes those who may or may not have indicated an interest in Service issues and those who do or do not realize that Service decisions may affect them.

Purposes of the Refuge: "The purposes specified in or derived from the law, proclamation, executive order, agreement, public land order, donation document, or administrative memorandum establishing, authorizing, or expanding a refuge, refuge unit, or refuge sub-unit." For refuges that encompass congressionally designated wilderness, the purposes of the Wilderness Act are additional purposes of the refuge (Service Manual 602 FW 106 S).

Recommended Wilderness: Areas studied and found suitable for wilderness designation by both the Director and Secretary, and recommended for designation by the President to Congress. These areas await only legislative action by Congress in order to become part of the Wilderness System. Such areas are also referred to as "pending in Congress" (Service Manual 610 FW 1.5).

Record of Decision (ROD): A concise public record of decision prepared by the Federal agency, pursuant to NEPA, that contains a statement of the decision, identification of all alternatives considered, identification of the environmentally preferable alternative, a statement as to whether all practical means to avoid or minimize environmental harm from the alternative selected have been adopted (and if not, why they were not), and a summary of monitoring and enforcement where applicable for any mitigation (40 CFR 1505.2).

Refuge Goal: See Goal.

Refuge Purposes:	See Purposes of the Refuge
Songbirds: (Also Passerines)	A category of birds that is medium to small perching landbirds. Most are territorial singers and migratory.
Step-down Management Plan:	A plan that provides specific guidance on management subjects (e.g., habitat, public use, fire, safety) or groups of related subjects. It describes strategies and implementation schedules for meeting CCP goals and objectives (Service Manual 602 FW 1.6 U).
Strategy:	A specific action, tool, technique, or combination of actions, tools, and techniques used to meet unit objectives (Service Manual 602 FW 1.6 U).
Study Area:	The area reviewed in detail for wildlife, habitat, and public use potential. For purposes of this CCP, the study area includes the lands within the currently approved refuge boundary and potential refuge expansion areas.
Threatened Species (Federal):	Species listed under the Endangered Species Act that are likely to become endangered within the foreseeable future throughout all or a significant portion of their range.
Threatened Species (State):	A plant or animal species likely to become endangered in the state within the near future if factors contributing to population decline or habitat degradation or loss continue.
Tiering:	The coverage of general matters in broader environmental impact statements with subsequent narrower statements of environmental analysis, incorporating by reference, the general discussions and concentrating on specific issues (40 CFR 1508.28).
U.S. Fish and Wildlife Service Mission:	Working with others to conserve, protect, and enhance fish and wildlife and their habitats for the continuing benefit of the American people.
Unit Objective:	See Objective.
Vegetation Type, Habitat Type, Forest Cover Type:	A land classification system based upon the concept of distinct plant associations.

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

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

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

Wilderness: See Designated Wilderness.

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

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

ACRONYMS AND ABBREVIATIONS

BCC	Birds of Conservation Concern
BRT	Biological Review Team
CCP	Comprehensive Conservation Plan
CFR	Code of Federal Regulations
cfs	cubic feet per second
DOI	Department of the Interior
DU	Ducks Unlimited
EA	Environmental Assessment
EE	Environmental Education
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
FR	Federal Register
FTE	Full-time Equivalent
FY	Fiscal Year
GIS	Global Information System
NEPA	National Environmental Policy Act
NRHP	National Register of Historic Places
NWR	National Wildlife Refuge
NWRS	National Wildlife Refuge System
PFT	Permanent Full-time
PUNA	Public Use Natural Area
RM	Refuge Manual
RNA	Research Natural Area
ROD	Record of Decision
RONS	Refuge Operating Needs System
RRP	Refuge Roads Program
Service	U.S. Fish and Wildlife Service (also, FWS)
TFT	Temporary Full Time
USC	United States Code
USFWS	U.S. Fish and Wildlife Service

Appendix B. References and Literature Citations

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Appendix C. Relevant Legal Mandates and Executive Orders

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

STATUE	DESCRIPTION
Bald and Golden Eagle Protection Act of 1940, as amended	Prohibits the possession, sale, or transport of any bald or golden eagle, alive or dead, or part, nest, or egg except as permitted by the Secretary of the Interior for scientific or exhibition purposes, or for the religious purposes of Indians.
Bankhead-Jones Farm Tenant Act of 1937	Directs the Secretary of Agriculture to develop a program of land conservation and utilization in order to correct maladjustments in land use and thus assist in such things as control of soil erosion, reforestation, conservation of natural resources, and protection of fish and wildlife. Some early refuges and hatcheries were established under authority of this Act.
Cave Resources Protection Act of 1988	Established requirements for the management and protection of caves and their resources on Federal lands, including allowing the land managing agencies to withhold the location of caves from the public, and requiring permits for any removal or collecting activities in caves on Federal lands.
Clean Air Act of 1970	Regulates air emissions from area, stationary, and mobile sources. This Act and its amendments charge Federal land managers with direct responsibility to protect the "air quality and related values" of land under their control. These values include fish, wildlife, and their habitats.
Clean Water Act of 1974, as amended	This Act and its amendments have as its objective the restoration and maintenance of the chemical, physical, and biological integrity of the Nation's waters. Section 401 of the Act requires that federally permitted activities comply with the Clean Water Act standards, State water quality laws, and any other appropriate State laws. Section 404 charges the U.S. Army Corps of Engineers with regulating discharge of dredge or fill materials into waters of the United States, including wetlands.
Coastal Barrier Resources Act of 1982 (CBRA)	Identified undeveloped coastal barriers along the Atlantic and Gulf coasts and included them in the John H. Chafee Coastal Barrier Resources System (CBRS). The objectives of the Act are to minimize loss of human life, reduce wasteful Federal expenditures, and minimize the damage to natural resources by restricting most Federal expenditures that encourage development within the CBRS.
Coastal Barrier Improvement Act of 1990	Reauthorized the CBRA and expanded the CBRS to include undeveloped coastal barriers along the Great Lakes and in the Caribbean, and established "Otherwise Protected Areas (OPAs)." The Service is responsible for maintaining official maps, consulting with Federal agencies that propose spending Federal funds within the CBRS and OPAs, and making recommendations to Congress about proposed boundary revisions.

STATUE	DESCRIPTION
Coastal Wetlands Planning, Protection, and Restoration (1990)	Authorizes the Director of the Fish and Wildlife Service to participate in the development of a Louisiana coastal wetlands restoration program, participate in the development and oversight of a coastal wetlands conservation program, and lead in the implementation and administration of a National coastal wetlands grant program.
Coastal Zone Management Act of 1972, as amended	Established a voluntary national program within the Department of Commerce to encourage coastal States to develop and implement coastal zone management plans and requires that "any Federal activity within or outside of the coastal zone that affects any land or water use or natural resource of the coastal zone" shall be "consistent to the maximum extent practicable with the enforceable policies" of a State's coastal zone management plan. The law includes an Enhancement Grants Program for protecting, restoring or enhancing existing coastal wetlands or creating new coastal wetlands. It also established the National Estuarine Reserve Research System, guidelines for estuarine research, and financial assistance for land acquisition.
Emergency Wetlands Resources Act of 1986	Authorized the purchase of wetlands from Land and Water Conservation Fund moneys, removing a prior prohibition on such acquisitions. The Act requires the Secretary to establish a National Wetlands Priority Conservation Plan and requires States to include wetlands in their Comprehensive Outdoor Recreation Plans. It enables transfers to the Migratory Bird Conservation Fund of amounts equal to import duties on arms and ammunition. It also established entrance fees at national wildlife refuges.
Endangered Species Act of 1973, as amended	Provides for the conservation of threatened and endangered species of fish, wildlife, and plants by Federal action and by encouraging the establishment of State programs. It provides for the determination and listing of threatened and endangered species and the designation of critical habitats. Section 7 requires refuge managers to perform internal consultation before initiating projects that affect or may affect endangered species.
Environmental Education Act of 1990	Established the Office of Environmental Education within the Environmental Protection Agency to develop and administer a Federal environmental education program in consultation with other Federal natural resource management agencies, including the Fish and Wildlife Service.

STATUE	DESCRIPTION
Estuary Protection Act of 1968	Authorized the Secretary of the Interior, in cooperation with other Federal agencies and the States, to study and inventory estuaries of the United States, including land and water of the Great Lakes, and to determine whether such areas should be acquired for protection. The Secretary is also required to encourage State and local governments to consider the importance of estuaries in their planning activities related to Federal natural resource grants. In approving any State grants for acquisition of estuaries, the Secretary was required to establish conditions to ensure the permanent protection of estuaries.
Estuaries and Clean Waters Act of 2000	Created a Federal interagency council that includes the Director of the Fish and Wildlife Service, the Secretary of the Army for Civil Works, the Secretary of Agriculture, the Administrator of the Environmental Protection Agency, and the Administrator for the National Oceanic and Atmospheric Administration. The Council is charged with developing a national estuary habitat restoration strategy and providing grants to entities to restore and protect estuary habitat to promote the strategy.
Food Security Act of 1985, as amended (Farm Bill)	Contains several provisions that contribute to wetland conservation. The Swampbuster provisions state that farmers who convert wetlands for the purpose of planting after enactment of the law are ineligible for most farmer program subsidies. It also established the Wetland Reserve Program to restore and protect wetlands through easements and restoration of the functions and values of wetlands on such easement areas.
Farmland Protection Policy Act of 1981, as amended	Minimizes the extent to which Federal programs contribute to the unnecessary conversion of farmland to non-agricultural uses. Federal programs include construction projects and the management of Federal lands.
Federal Advisory Committee Act (1972), as amended	Governs the establishment of and procedures for committees that provide advice to the Federal Government. Advisory committees may be established only if they will serve a necessary, nonduplicative function. Committees must be strictly advisory unless otherwise specified and meetings must be open to the public.
Federal Coal Leasing Amendment Act of 1976	Provided that nothing in the Mining Act, the Mineral Leasing Act, or the Mineral Leasing Act for Acquired Lands authorized mining coal on refuges.

STATUE	DESCRIPTION
Federal-Aid Highways Act of 1968	Established requirements for approval of Federal highways through wildlife refuges and other designated areas to preserve the natural beauty of such areas. The Secretary of Transportation is directed to consult with the Secretary of the Interior and other Federal agencies before approving any program or project requiring the use of land under their jurisdiction.
Federal Noxious Weed Act of 1990, as amended	The Secretary of Agriculture was given the authority to designate plants as noxious weeds and to cooperate with other Federal, State, and local agencies, farmers' associations, and private individuals in measures to control, eradicate, prevent, or retard the spread of such weeds. The Act requires each Federal land-managing agency, including the Fish and Wildlife Service, to designate an office or person to coordinate a program to control such plants on the agency's land and implement cooperative agreements with the States, including integrated management systems to control undesirable plants.
Fish and Wildlife Act of 1956	Establishes a comprehensive national fish, shellfish, and wildlife resources policy with emphasis on the commercial fishing industry, but also includes the inherent right of every citizen and resident to fish for pleasure, enjoyment, and betterment, and to maintain and increase public opportunities for recreational use of fish and wildlife resources. Among other things, it authorizes the Secretary of the Interior to take such steps as may be required for the development, advancement, management, conservation, and protection of fish and wildlife resources including, but not limited to, research, development of existing facilities, and acquisition by purchase or exchange of land and water or interests therein.
Fish and Wildlife Conservation Act of 1980, as amended	Requires the Service to monitor non-gamebird species, identify species of management concern, and implement conservation measures to preclude the need for listing under the Endangered Species Act.
Fish and Wildlife Coordination Act of 1958	Promotes equal consideration and coordination of wildlife conservation with other water resource development programs by requiring consultation with the Fish and Wildlife Service and the State fish and wildlife agencies where the "waters of a stream or other body of water are proposed or authorized, permitted or licensed to be impounded, diverted…or otherwise controlled or modified" by any agency under Federal permit or license.

STATUE	DESCRIPTION
Improvement Act of 1978	Passed to improve the administration of fish and wildlife programs. It amends several earlier laws, including the Refuge Recreation Act, the National Wildlife Refuge Administration Act, and the Fish and Wildlife Act of 1956. It authorizes the Secretary to accept gifts and bequests of real and personal property on behalf of the United States. It also authorizes the use of volunteers on Service projects and appropriations to carry out volunteer programs.
Fishery (Magnuson) Conservation and Management Act of 1976	Established Regional Fishery Management Councils comprised of Federal and State officials, including the Fish and Wildlife Service. It provides for regulation of foreign fishing and vessel fishing permits.
Freedom of Information Act, 1966	Requires all Federal agencies to make available to the public for inspection and copying administrative staff manuals and staff instructions; official, published and unpublished policy statements; final orders deciding case adjudication; and other documents. Special exemptions have been reserved for nine categories of privileged material. The Act requires the party seeking the information to pay reasonable search and duplication costs.
Geothermal Steam Act of 1970, as amended	Authorizes and governs the lease of geothermal steam and related resources on public lands. Section 15c of the Act prohibits issuing geothermal leases on virtually all Service administrative lands.
Lacey Act of 1900, as amended	Designed originally to help States protect their native game animals and to safeguard U.S. crop production from harmful foreign species. This Act prohibits interstate and international transport and commerce of fish, wildlife or plants taken in violation of domestic or foreign laws. It regulates the introduction to America of foreign species into new locations.
Land and Water Conservation Fund Act of 1948	Provides funding through receipts from the sale of surplus Federal land, appropriations from oil and gas receipts from the outer continental shelf, and other sources for land acquisition under several authorities. Appropriations from the fund may be used for matching grants to States for outdoor recreation projects and for land acquisition by various Federal agencies, including the Fish and Wildlife Service.

STATUE	DESCRIPTION
Marine Mammal Protection Act of 1972, as amended	Established a Federal responsibility to conserve marine mammals with management vested in the Department of the Interior for sea otter, walrus, polar bear, dugong, and manatee. The Department of Commerce is responsible for cetaceans and pinnipeds, other than the walrus. With certain specified exceptions, the Act established a moratorium on the taking and importation of marine mammals, as well as products taken from them.
Migratory Bird Conservation Act of 1929	Established a Migratory Bird Conservation Commission to approve areas recommended by the Secretary of the Interior for acquisition with Migratory Bird Conservation Funds. The role of the Commission was expanded by the North American Wetland Conservation Act to include approving wetlands acquisition, restoration, and enhancement proposals recommended by the North American Wetlands Conservation Council.
Migratory Bird Hunting and Conservation Stamp Act of 1934	Also commonly referred to as the “Duck Stamp Act,” it requires waterfowl hunters 16 years of age or older to possess a valid Federal hunting stamp. Receipts from the sale of the stamp are deposited into the Migratory Bird Conservation Fund for the acquisition of migratory bird refuges.
Migratory Bird Treaty Act of 1918, as amended	Implements various treaties and conventions between the U.S. and Canada, Japan, Mexico, and the former Soviet Union for the protection of migratory birds. Except as allowed by special regulations, this Act makes it unlawful to pursue, hunt, kill, capture, possess, buy, sell, purchase, barter, export, or import any migratory bird, part, nest, egg, or product.
Mineral Leasing Act for Acquired Lands (1947), as amended	Authorizes and governs mineral leasing on acquired public lands.
Minerals Leasing Act of 1920, as amended	Authorizes and governs leasing of public lands for development of deposits of coal, oil, gas, and other hydrocarbons; sulphur; phosphate; potassium; and sodium. Section 185 of this title contains provisions relating to granting rights-of-ways over Federal lands for pipelines.
Mining Act of 1872, as amended	Authorizes and governs prospecting and mining for the so-called “hardrock” minerals (such as gold and silver) on public lands.

STATUE	DESCRIPTION
National and Community Service Act of 1990	Authorizes several programs to engage citizens of the U.S. in full-and/or part-time projects designed to combat illiteracy and poverty, provide job skills, enhance educational skills, and fulfill environmental needs. Among other things, this law establishes the American Conservation and Youth Service Corps to engage young adults in approved human and natural resource projects, which will benefit the public or are carried out on Federal or Indian lands.
National Environmental Policy Act of 1969	Requires analysis, public comment, and reporting for environmental impacts of Federal actions. It stipulates the factors to be considered in environmental impact statements, and requires that Federal agencies employ an interdisciplinary approach in related decision-making and develop means to ensure that unqualified environmental values are given appropriate consideration, along with economic and technical considerations.
National Historic Preservation Act of 1966, as amended	It establishes a National Register of Historic Places and a program of matching grants for preservation of significant historical features. Federal agencies are directed to take into account the effects of their actions on items or sites listed or eligible for listing in the National Register.
National Trails System Act (1968), as amended	Established the National Trails System to protect the recreational, scenic and historic values of some important trails. National recreation trails may be established by the Secretaries of Interior or Agriculture on land wholly or partly within their jurisdiction, with the consent of the involved State(s), and other land managing agencies, if any. National Scenic and National Historic Trails may only be designated by an Act of Congress. Several national trails cross units of the National Wildlife Refuge System.
National Wildlife Refuge System Administration Act of 1966	Defines the National Wildlife Refuge System and authorizes the Secretary of the Interior to permit any use of an area provided such use is compatible with the major purposes(s) for which the area was established.
National Wildlife Refuge System Improvement Act of 1997	Amends the National Wildlife Refuge System Administration Act of 1966. This Act defines the mission of the National Wildlife Refuge System, establishes the legitimacy and appropriateness of the six priority ”wildlife-dependent” public uses, establishes a formal process for determining ”compatible uses” of Refuge System lands, identifies the Secretary of the Interior as responsible for managing and protecting the System, and requires the development of a comprehensive conservation plan for all refuges outside of Alaska.

STATUE	DESCRIPTION
Native American Graves Protection and Repatriation Act of 1990	Requires Federal agencies and museums to inventory, determine ownership of, and repatriate certain cultural items and human remains under their control or possession. The Act also addresses the repatriation of cultural items inadvertently discovered by construction activities on lands managed by the agency.
Neotropical Migratory Bird Conservation Act of 2000	Establishes a matching grants program to fund projects that promote the conservation of neotropical migratory birds in the United States, Latin America, and the Caribbean.
North American Wetlands Conservation Act of 1989	Provides funding and administrative direction for implementation of the North American Waterfowl Management Plan and the Tripartite Agreement on wetlands between Canada, the U.S. and Mexico. The North American Wetlands Conservation Council was created to recommend projects to be funded under the Act to the Migratory Bird Conservation Commission. Available funds may be expended for up to 50 percent of the United States share cost of wetlands conservation projects in Canada, Mexico, or the United States (or 100 percent of the cost of projects on Federal lands).
Refuge Recreation Act of 1962, as amended	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.
Partnerships for Wildlife Act of 1992	Establishes a Wildlife Conservation and Appreciation Fund to receive appropriated funds and donations from the National Fish and Wildlife Foundation and other private sources to assist the State fish and game agencies in carrying out their responsibilities for conservation of non-game species. The funding formula is no more that 1/3 Federal funds, at least 1/3 Foundation funds, and at least 1/3 State funds.
Refuge Revenue Sharing Act of 1935, as amended	Provided for payments to counties in lieu of taxes from areas administered by the Fish and Wildlife Service. Counties are required to pass payments along to other units of local government within the county, which suffer losses in tax revenues due to the establishment of Service areas.
Rehabilitation Act of 1973	Requires nondiscrimination in the employment practices of Federal agencies of the executive branch and contractors. It also requires all federally assisted programs, services, and activities to be available to people with disabilities.

STATUE	DESCRIPTION
Rivers and Harbors Appropriations Act of 1899, as amended	Requires the authorization by the U.S. Army Corps of Engineers prior to any work in, on, over, or under a navigable water of the United States. The Fish and Wildlife Coordination Act provides authority for the Service to review and comment on the effects on fish and wildlife activities proposed to be undertaken or permitted by the Corps of Engineers. Service concerns include contaminated sediments associated with dredge or fill projects in navigable waters.
Sikes Act (1960), as amended	Provides for the cooperation by the Departments of Interior and Defense with State agencies in planning, development, and maintenance of fish and wildlife resources and outdoor recreation facilities on military reservations throughout the U.S. It requires the Secretary of each military department to use trained professionals to manage the wildlife and fishery resource under his jurisdiction, and requires that Federal and State fish and wildlife agencies be given priority in management of fish and wildlife activities on military reservations.
Transfer of Certain Real Property for Wildlife Conservation Purposes Act of 1948	Provides that upon determination by the Administrator of the General Services Administration, real property no longer needed by a Federal agency can be transferred, without reimbursement, to the Secretary of the Interior if the land has particular value for migratory birds, or to a State agency for other wildlife conservation purposes.
Transportation Equity Act for the 21st Century (1998)	Established the Refuge Roads Program, requires transportation planning that includes public involvement, and provides funding for approved public use roads and trails and associated parking lots, comfort stations, and bicycle/pedestrian facilities.
Uniform Relocation and Assistance and Real Property Acquisition Policies Act (1970), as amended	Provides for uniform and equitable treatment of persons who sell their homes, businesses, or farms to the Service. The Act requires that any purchase offer be no less than the fair market value of the property.
Water Resources Planning Act of 1965	Established Water Resources Council to be composed of Cabinet representatives including the Secretary of the Interior. The Council reviews river basin plans with respect to agricultural, urban, energy, industrial, recreational, and fish and wildlife needs. The Act also established a grant program to assist States in participating in the development of related comprehensive water and land use plans.
Wild and Scenic Rivers Act of 1968, as amended	Selects certain rivers of the nation possessing remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values; preserves them in a free-flowing condition; and protects their local environments.

STATUE	DESCRIPTION
Wilderness Act of 1964, as amended	Directs the Secretary of the Interior to review every roadless area of 5,000 acres or more and every roadless island regardless of size within the National Wildlife Refuge System and to recommend suitability of each such area. The Act permits certain activities within designated Wilderness Areas that do not alter natural processes. Wilderness values are preserved through a “minimum tool” management approach, which requires refuge managers to use the least intrusive methods, equipment, and facilities necessary for administering the areas.
Youth Conservation Corps Act of 1970	Established a permanent Youth Conservation Corps (YCC) program within the Departments of Interior and Agriculture. Within the Service, YCC participants perform many tasks on refuges, fish hatcheries, and research stations.

EXECUTIVE ORDERS	DESCRIPTIONS
EO 11593, Protection and Enhancement of the Cultural Environment (1971)	States that if the Service proposes any development activities that may affect the archaeological or historic sites, the Service will consult with Federal and State Historic Preservation Officers to comply with Section 106 of the National Historic Preservation Act of 1966, as amended.
EO 11644, Use of Off-road Vehicles on Public Land (1972)	Established policies and procedures to ensure that the use of off-road vehicles on public lands will be controlled and directed so as to protect the resources of those lands, to promote the safety of all users of those lands, and to minimize conflicts among the various uses of those lands.
EO 11988, Floodplain Management (1977)	Prevent Federal agencies from contributing to the “adverse impacts associated with occupancy and modification of floodplains” and the “direct or indirect support of floodplain development.” In the course of fulfilling their respective authorities, Federal agencies “shall take action to reduce the risk of flood loss; to minimize the impact of floods on human safety, health and welfare; and to restore and preserve the natural and beneficial values served by floodplains.
EO 11989 (1977), Amends Section 2 of EO 11644	Directs agencies to close areas negatively impacted by off-road vehicles.
EO 11990, Protection of Wetlands (1977)	Federal agencies are directed to provide leadership and take action to minimize the destruction, loss of degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands.

EXECUTIVE ORDERS	DESCRIPTIONS
EO 12372, Intergovernmental Review of Federal Programs (1982)	Seeks to foster intergovernmental partnerships by requiring Federal agencies to use the State process to determine and address concerns of State and local elected officials with proposed Federal assistance and development programs.
EO 12898, Environmental Justice (1994)	Requires Federal agencies to identify and address disproportionately high and adverse effects of its programs, policies, and activities on minority and low-income populations.
EO 12906, Coordinating Geographical Data Acquisition and Access (1994), Amended by EO 13286 (2003). Amendment of EO's and other actions in connection w/ transfer of certain functions to Secretary of DHS.	Recommended that the executive branch develop, in cooperation with State, local, and Tribal governments, and the private sector, a coordinated National Spatial Data Infrastructure to support public and private sector applications of geospatial data. Of particular importance to CCP planning is the National Vegetation Classification System (NVCS), which is adopted, standard for vegetation mapping. Using NVCS facilitates the compilation of regional and national summaries, which in turn, can provide an ecosystem context for individual refuges.
EO 12962, Recreational Fisheries (1995)	Directs Federal agencies to improve the quantity, function, sustainable productivity, and distribution of U.S. aquatic resources for increased recreational fishing opportunities in cooperation with States and Tribes.
EO 13007, Native American Religious Practices (1996)	Provides for access to, and ceremonial use of, Indian sacred sites on Federal lands used by Indian religious practitioners and direction to avoid adversely affecting the physical integrity of such sites.
EO 13061, Federal Support of Community Efforts Along American Heritage Rivers (1997)	Established the American Heritage Rivers initiative for the purpose of natural resource and environmental protection, economic revitalization, and historic and cultural preservation. The Act directs Federal agencies to preserve, protect, and restore rivers and their associated resources important to our history, culture, and natural heritage.
EO 13084, Consultation and Coordination With Indian Tribal Governments (2000)	Provides a mechanism for establishing regular and meaningful consultation and collaboration with Tribal officials in the development of Federal policies that have tribal implications.

EXECUTIVE ORDERS	DESCRIPTIONS
EO 13112, Invasive Species (1999)	Directs Federal agencies to prevent the introduction of invasive species, detect and respond rapidly to and control populations of such species in a cost effective and environmentally sound manner, accurately monitor invasive species, provide for restoration of native species and habitat conditions, conduct research to prevent introductions and to control invasive species, and promote public education on invasive species and the means to address them. This EO replaces and rescinds EO 11987, Exotic Organisms (1977).
EO 13186, Responsibilities of Federal Agencies to Protect Migratory Birds. (2001)	Instructs Federal agencies to conserve migratory birds by several means, including the incorporation of strategies and recommendations found in Partners in Flight Bird Conservation plans, the North American Waterfowl Plan, the North American Waterbird Conservation Plan, and the United States Shorebird Conservation Plan, into agency management plans and guidance documents.

Appendix D. Public Involvement

SUMMARY OF PUBLIC SCOPING COMMENTS

The notice of intent to prepare the draft comprehensive conservation plan was published in the *Federal Register* in July 2005 for Upper Ouachita NWR, and in October 2005 for the Wetlands Management District and Handy Brake NWR. The public was notified in the local newspapers and media of two open house meetings to be held on November 14 and 15, 2005, in Marion and Bastrop, Louisiana. In addition, information packets, including a letter of invite, public input workbook, and mailing list request form were mailed to approximately 160 different Federal, State, non-governmental agencies, State congressional offices, the Federal delegation, and private individuals. In Marion, we had 23 individuals to attend and participate in discussions. In Bastrop, only 5 individuals attended. The *Bastrop Daily News* and the cable community board were used to inform the public of the meetings. The refuge does not seem to be used by the public on the east side near Bastrop as much as on the west side near Marion, and there was a large thunderstorm that evening in the area that may have minimized attendance. Of the workbooks, 16 were returned along with 7 note cards from the open houses, and 2 letters from private individuals

Major Issues Identified:

- Internally: How to effectively and efficiently maintain the upland pine and hardwood mix in a condition that complies with biological integrity policy and red-cockaded woodpecker recovery guidelines; loss of biological integrity of bottomland hardwoods and upland mixed pine/hardwood forests with an increase in Japanese climbing fern and Chinese tallow tree; best management practices for maintaining a healthy bottomland hardwood forest in an overflow refuge; migratory songbirds nesting habitat; beavers overpopulating the refuge and degrading areas of bottomland hardwood forest; carrying capacity of Upper Ouachita NWR in terms of management for white-tailed deer; and a unique situation of a need to evaluate options for if and when the Ouachita River levee breaks on the east side into the Mollicy Unit, and whether the refuge has the jurisdiction and opportunity to decide whether to repair the levee or allow natural flooding and the associated impacts.

- State: The LDWF is in agreement and supports the public use program on Upper Ouachita NWR. During the biological review, the State encouraged the refuge to increase the size of cuts in the forest management program for achieving greater amounts of sunlight to reach the forest floor that responds with increased understory for migratory birds. The State also urged the refuge to consider increasing the area open to hunting within the Mollicy unit. Refuge management stated that it would evaluate these opportunities during the comprehensive conservation planning process.

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

- Partners: Included above under Internal and State headings.

- Public: The Core Planning Team (refuge staff) reviewed the workbook responses to evaluate what it interpreted as significant issues. The team had to keep in mind that only 16 workbooks were returned out of approximately 160 mailed. Of those returned, most were from locals on the west side of Upper Ouachita NWR and, therefore, not necessarily a representative sampling of the Refuge System constituents. In the final list of significant issues, the team tried to take into account other issues or opportunities presented by national and/or regional viewpoints for and of the Refuge System.

  Overall, the workbooks had a few more comments than expected relative to management emphasis for endangered species, and more comments relative to fishing than to hunting. Responders did not express a concern with the prescribed burning program and urged more habitat management than what had been conducted in the past. There were not as many comments as anticipated relative to waterfowl management or "where are the ducks" comments. One surprising comment was the concern over the clean-up of the Ouachita River. This will need to be addressed to inform the public that the refuge has no jurisdiction over this clean-up.

  After reviewing all comments received from the workbooks and letters, and knowing the current refuge user, the core team pulled together a list of topics to be considered in the planning process. These are: 1) amount of all-terrain vehicle trails and access on the refuge; 2) whether horseback riding should be allowed on the refuge; 3) water control management and the associated constraints or opportunities; 4) number and condition of refuge access points and roads; and 5) different levels of bottomland hardwood forest management.

- Other: Issues dealing with deer hunting opportunities, fishing access, law enforcement, road signs, and wildlife observation opportunities have been noted, presently and in the past, but the Core Planning Team felt they were not significant issues that needed to be addressed by different alternatives. The Draft CCP will include objectives that address these issues.

Appendix E. Appropriate Use Determinations

Upper Ouachita National Wildlife Refuge Appropriate Use Determinations

An appropriate use determination is the initial decision process a refuge manager follows when first considering whether or not to allow a proposed use on a refuge. The refuge manager must find a use is appropriate before undertaking a compatibility review of the use. This process clarifies and expands on the compatibility determination process by describing when refuge managers should deny a proposed use without determining compatibility. If we find a proposed use is not appropriate, we will not allow the use and will not prepare a compatibility determination.

Except for the use noted below, the refuge manager must decide if a new or existing use is an appropriate refuge use. If an existing use is not appropriate, the refuge manager will eliminate or modify the use as expeditiously as practicable. If a new use is not appropriate, the refuge manager will deny the use without determining compatibility. Uses that have been administratively determined to be appropriate are:

- Six wildlife-dependent recreational uses - As defined by the National Wildlife Refuge System Improvement Act of 1997 (Improvement Act), the six wildlife-dependent recreational uses (hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation) are determined to be appropriate. However, the refuge manager must still determine if these uses are compatible.

- Take of fish and wildlife under State regulations - States have regulations concerning take of wildlife that include hunting, fishing, and trapping. We consider take of wildlife under such regulations appropriate. However, the refuge manager must determine if the activity is compatible before allowing it on a refuge.

Statutory Authorities for this policy:

National Wildlife Refuge System Administration Act of 1966, as amended by the National Wildlife Refuge System Improvement Act of 1997, 16 U.S.C. 668dd-668ee (Administration Act).

This Act provides the authority for establishing policies and regulations governing refuge uses, including the authority to prohibit certain harmful activities. The Act does not authorize any particular use, but rather authorizes the Secretary of the Interior to allow uses only when they are compatible and "under such regulations as he may prescribe." This law specifically identifies certain public uses that, when compatible, are legitimate and appropriate uses within the Refuge System. The law states "…it is the policy of the United States that…compatible wildlife-dependent recreation is a legitimate and appropriate general public use of the System…compatible wildlife-dependent recreational uses are the priority general public uses of the System and shall receive priority consideration in refuge planning and management; and…. when the Secretary determines that a proposed wildlife-dependent recreational use is a compatible use within a refuge, that activity should be facilitated…the Secretary shall…ensure that priority general public uses of the System receive enhanced consideration over other general public uses in planning and management within the System….." This policy implements the standards set in the Administration Act by providing enhanced consideration of priority general

public uses and ensuring other public uses do not interfere with our ability to provide quality, wildlife-dependent recreational uses.

Refuge Recreation Act of 1962, 16 U.S.C. 460k (Recreation Act)

This Act authorizes the Secretary of the Interior to "…administer such areas [of the System] or parts thereof for public recreation when in his judgment public recreation can be an appropriate incidental or secondary use." While the Recreation Act authorizes us to allow public recreation in areas of the Refuge System when the use is an "appropriate incidental or secondary use," the Improvement Act provides the Refuge System mission and includes specific directives and a clear hierarchy of public uses on the Refuge System.

Other statutes that establish refuges, including the Alaska National Interest Lands Conservation Act of 1980 (ANILCA) (16 U.S.C. 410hh - 410hh-5, 460mm - 460mm-4, 539-539e, and 3101 - 3233; 43 U.S.C. 1631 et seq.).

Executive Orders

We must comply with Executive Order (E.O.) 11644 when allowing use of off-highway vehicles on refuges. This EO requires that we: designate areas as open or closed to off-highway vehicles in order to protect refuge resources, promote safety, and minimize conflict among the various refuge users; monitor the effects of these uses once they are allowed; and amend or rescind any area designation as necessary based on the information gathered. Furthermore, E.O. 11989 requires us to close areas to off-highway vehicles when we determine that the use causes or will cause considerable adverse effects on the soil, vegetation, wildlife, habitat, or cultural or historic resources. Statutes, such as ANILCA, take precedence over executive orders.

Definitions:

Appropriate Use
A proposed or existing use on a refuge that meets at least one of the following four conditions:

1) The use is a wildlife-dependent recreational use as identified in the Improvement Act.
2) The use contributes to fulfilling the refuge purpose(s), the Refuge System mission, or goals or objectives described in a refuge management plan approved after October 9, 1997, the date the Improvement Act was signed into law.
3) The use involves the take of fish and wildlife under State regulations.
4) The use has been found to be appropriate as specified in Section 1.11.

Native American
American Indians in the conterminous United States and Alaska Natives (including Aleuts, Eskimos, and Indians) who are members of federally recognized tribes.

Priority General Public Use
A compatible wildlife-dependent recreational use of a refuge involving hunting, fishing, wildlife observation, wildlife photography, or environmental education and interpretation.

Quality
The criteria used to determine a quality recreational experience include:

- Promotes safety of participants, other visitors, and facilities.
- Promotes compliance with applicable laws and regulations and responsible behavior.
- Minimizes or eliminates conflicts with fish and wildlife population or habitat goals or objectives in a plan approved after 1997.
- Minimizes or eliminates conflicts with other compatible wildlife-dependent recreation.
- Minimizes conflicts with neighboring landowners.
- Promotes accessibility and availability to a broad spectrum of the American people.
- Promotes resource stewardship and conservation.
- Promotes public understanding and increases public appreciation of America's natural resources and our role in managing and protecting these resources.
- Provides reliable/reasonable opportunities to experience wildlife.
- Uses facilities that are accessible and blend into the natural setting.
- Uses visitor satisfaction to help define and evaluate programs.

Wildlife-Dependent Recreational Use
As defined by the Improvement Act, a use of a refuge involving hunting, fishing, wildlife observation, wildlife photography, and environmental education and interpretation.

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Upper Ouachita National Wildlife Refuge

Use: Cooperative Farming

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	YES	NO
(a) Do we have jurisdiction over the use?	x	
(b) Does the use comply with applicable laws and regulations (Federal, State, Tribal, and local)?	x	
(c) Is the use consistent with applicable executive orders and Department and Service policies?	x	
(d) Is the use consistent with public safety?	x	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	x	
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	x	
(g) Is the use manageable within available budget and staff?	x	
(h) Will this be manageable in the future within existing resources?	x	
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?	x	
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?	x	

Where we do not have jurisdiction over the use ["no" to (a)], there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ["no" to (b), (c), or (d)] may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. **Yes** x **No** ___

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate_____ **Appropriate** x___

Refuge Manager: _____ Date:_____

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.
If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.
If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor:_____Date:_____

A compatibility determination is required before the use may be allowed.

Appendix F. Compatibility Determinations

Upper Ouachita National Wildlife Refuge Compatibility Determinations

Uses: The following uses were found to be appropriate and considered for compatibility determination reviews: (1) Wildlife observation and photography; (2) Environmental education and interpretation; (3) Fishing; and (4) Cooperative farming. A description and anticipated biological impacts for each use are addressed separately in this compatibility determination.

Refuge Name: Upper Ouachita National Wildlife Refuge

Date Established: November 1978

Establishing and Acquisition Authority: Migratory Bird Conservation Act

Refuge Purpose: "….for the use as an inviolate sancturary, or for any other management purpose, for migratory birds" (16 U.S.C. 715d); and "….the conservation of the wetlands on the nation in order to maintain the public benefits they provide and to help fulfill international obligations contained in various migratory bird treaties and conventions…." (16 U.S.C. 3901(b)).

National Wildlife Refuge System Mission:

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

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

Other Applicable Laws, Regulations, and Policies:

Antiquities Act of 1906 (34 Stat. 225)
Migratory Bird Treaty Act of 1918 (15 U.S.C. 703-711; 40 Stat. 755)
Migratory Bird Conservation Act of 1929 (16 U.S.C. 715r; 45 Stat. 1222)
Migratory Bird Hunting Stamp Act of 1934 (16 U.S.C. 718-178h; 48 Stat. 451)
Criminal Code Provisions of 1940 (18 U.S.C. 41)
Bald and Golden Eagle Protection Act (16 U.S.C. 668-668d; 54 Stat. 250)
Refuge Trespass Act of June 25, 1948 (18 U.S.C. 41; 62 Stat. 686)
Fish and Wildlife Act of 1956 (16 U.S.C. 742a-742j; 70 Stat.1119)
Refuge Recreation Act of 1962 (16 U.S.C. 460k-460k-4; 76 Stat. 653)
Wilderness Act (16 U.S.C. 1131; 78 Stat. 890)
Land and Water Conservation Fund Act of 1965
National Historic Preservation Act of 1966, as amended (16 U.S.C. 470, et seq.; 80 Stat. 915)
National Wildlife Refuge System Administration Act of 1966 (16 U.S.C. 668dd, 668ee; 80 Stat. 927)
National Environmental Policy Act of 1969, NEPA (42 U.S.C. 4321, et seq; 83 Stat. 852)
Use of Off-Road Vehicles on Public Lands (Executive Order 11644, as amended by Executive Order 10989)
Endangered Species Act of 1973 (16 U.S.C. 1531 et seq; 87 Stat. 884)

Refuge Revenue Sharing Act of 1935, as amended in 1978 (16 U.S.C. 715s; 92 Stat. 1319)
National Wildlife Refuge Regulations for the Most Recent Fiscal Year (50 CFR Subchapter C; 43 CFR 3101.3-3)
Emergency Wetlands Resources Act of 1986 (S.B. 740)
North American Wetlands Conservation Act of 1990
Food Security Act (Farm Bill) of 1990 as amended (HR 2100)
Property Clause of the U.S. Constitution, Article IV 3, Clause 2
Commerce Clause of the U.S. Constitution, Article 1, Section 8
National Wildlife Refuge System Improvement Act of 1997 (Public Law 105-57, U.S.C. 668dd)
Executive Order 12996, Management and General Public Use of the National Wildlife Refuge System, March 25, 1996
Title 50, C.F.R., Parts 25-33
Archaeological Resources Protection Act of 1979
Native American Graves Protection and Repatriation Act of 1990

Compatibility determinations for each description listed were considered separately. Although for brevity, the preceding sections from "Uses" through "Other Applicable Laws, Regulations and Policies" are only written once within the plan, they are part of each descriptive use and become part of that compatibility determination if considered outside of the comprehensive conservation plan.

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. It is in anticipated that an increase in non-consumptive wildlife-dependent uses will occur over the next few years as facilities and access are provided.

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.

Construction of foot trails, boardwalks, observation platforms, and upgrading refuge roads will alter small portions of the natural environment. Proper planning prior to construction, sediment retention, and grade stabilization features will reduce negative impacts to wetlands and species of special concern. Impacts 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 is being made available for public review and comment in conjunction with the 30-day public review and comment period for the Draft Comprehensive Conservation Plan and Environmental Assessment (Draft CCP/EA) for Upper Ouachita and Handy Brake National Wildlife Refuges and the Louisiana Wetlands Management District. In order to solicit comments, refuge staff will place copies of the Draft CCP/EA at the public library and the refuge office, and will hold public meetings after release of the Draft CCP/EA. News releases will be sent to all local papers, stating the purpose of the Draft CCP/EA and supporting documents and how and where to send comments.

Determination (check one below):

_____ Use is Not Compatible

__X__Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility:

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

Justification:

Visitors have the opportunity to view and photograph many species of wildlife with relative ease at many places on the refuge. Opportunities exist for these activities by boat, by walking, or by driving the public roads.

Mandatory 15-Year Re-evaluation Date: _____

Description of Use: *Environmental Education and Interpretation*

Environmental education and interpretation activities include traditional environmental education, such as teacher or staff-led on-site field trips, off-site programs in classrooms, and interpretation of wildlife resources on the refuge. These activities are largely conducted at Black Bayou Lake NWR, 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 Upper Ouachita 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 is being made available for public review and comment in conjunction with the 30-day public review and comment period for the Draft Comprehensive Conservation Plan and Environmental Assessment (Draft CCP/EA) for Upper Ouachita and Handy Brake National Wildlife Refuges and the Louisiana Wetlands Management District. In order to solicit comments, refuge staff will place copies of the Draft CCP/EA at the public library and the refuge office, and will hold public meetings after release of the Draft CCP/EA. News releases will be sent to all local papers, stating the purpose of the Draft CCP/EA and supporting documents and how and where to send comments.

Determination (check one below):

_____ Use is Not Compatible

__X__Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility:

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

Justification:

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

Mandatory 15-Year Re-evaluation Date: _____

Description of Use: *Fishing*

Fishing was a traditional recreational use of the area that is now Upper Ouachita NWR prior to its inclusion in 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 except for inside the Mollicy Unit levee where it is open from March 1 to August 31. Fishing is conducted subject to regulations established by the Louisiana Department of Wildlife and Fisheries. Fishing is further restricted 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 is being made available for public review and comment in conjunction with the 30-day public review and comment period for the Draft Comprehensive Conservation Plan and Environmental Assessment (Draft CCP/EA) for Upper Ouachita and Handy Brake National Wildlife Refuges and the Louisiana Wetlands Management District. In order to solicit comments, refuge staff will place copies of the Draft CCP/EA at the public library and the refuge office, and will hold public meetings after release of the Draft CCP/EA. News releases will be sent to all local papers, stating the purpose of the Draft CCP/EA and supporting documents and how and where to send comments.

Determination (check one below):

_____ Use is Not Compatible

__X__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: _____

Description of Use: *Cooperative Farming*
Cooperative farming is utilized on the refuge to manage and maintain approximately 2,650 acres of waterfowl impoundment habitats that provide seasonally flooded crops and moist-soil units necessary to meet the refuge's waterfowl habitat objectives. This farming program is a critical component of the refuge's habitat management program. The refuge's cooperative farmers enter into annual cooperative farming agreements specifying what crops will be grown in specific fields for both the refuge and cooperative farmer's share. The cooperative farmer receives 80 percent of planted acres, while the refuge receives 20 percent of the planted acres. The refuge's crop share is strategically located in areas that can be flooded in the winter to provide waterfowl foraging habitat in support of North American Waterfowl Management Plan objectives for the Mississippi Alluvial Valley. At the present time, the refuge does not have the staff or equipment necessary to manage and maintain the acreage needed to meet its waterfowl foraging objectives without the assistance of the cooperative farming program. Refuge cooperative farming operations will continue under carefully regulated conditions.

Availability of Resources:

Based on a review of the refuge's budget allocated for this activity, there is adequate funding to ensure compatibility and to administer the use at its current level.

Anticipated Impacts of the Use:

Cooperative farmers grow rice and milo on the refuge under an annually updated cooperative farming agreement. Refuge crop shares are left standing in the field to provide high energy grain and forage primarily for wintering waterfowl. The cooperative farmers' harvested fields are also used extensively by snipe, shorebirds, geese, ducks, deer, and other wildlife. The majority of all cooperative farming takes place in the refuge's core waterfowl sanctuary area.

Cooperative farming results in some degree of soil erosion due to disking and planting operations. The impact of soil erosion on adjacent wetlands and water bodies is minimal because of maintained grass buffer strips around each field and the extensive use of flash board risers to retain and slowly release sediment-laden water. Cooperative farmers are allowed to use approved pesticides under a closely monitored pesticide use proposal system. Refuge-approved pesticides have low toxicity and fast biodegradation rates compared to other commonly used agricultural pesticides. Under approved label application rates and methods, approved pesticides should have minimal effect on the biological environment. However, the potential exists for misapplication or accidental spills of approved pesticides. During the past 10 years there have been no known pesticide accidents or pesticide-related wildlife mortality reported on the refuge. Careful monitoring of cooperative farmer pesticide use should further reduce any potential impacts from pesticide use on the refuge.

Public Review and Comment:

This compatibility determination is being made available for public review and comment in conjunction with the 30-day public review and comment period for the Draft Comprehensive Conservation Plan and Environmental Assessment (Draft CCP/EA) for Upper Ouachita and Handy Brake National Wildlife Refuges and the Louisiana Wetlands Management District. In order to solicit comments, refuge staff will place copies of the Draft CCP/EA at the public library and the refuge office, and will hold public meetings after release of the Draft CCP/EA. News releases will be sent to all local papers, stating the purpose of the Draft CCP/EA and supporting documents and how and where to send comments.

Determination (check one below):

Use is Not Compatible

__X__ Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility:

The cooperative farming program is regulated through annual cooperative farming agreements that specify the field crops to be grown, acceptable farming practices, and approved pesticide use procedures. Special conditions contained in each cooperative farming agreement provide the following requirements: (1) no fall disking allowed; (2) vegetative filter strips must be maintained around all fields and water bodies; (3) crops must be harvested by November 15; (4) no drainage of seasonally flooded habitat is allowed until after March 1; (5) crops will be planted in designated fields and not be manipulated in any way after maturity; and (6) only approved pesticides will be used when the level of pest occurrence is at the economic threshold level as indicated by crop scouting. Under these carefully controlled conditions, the cooperative farming program has been and is expected to continue to be compatible with the refuge's purposes.

Justification:

The cooperative farming actions as set forth in the Cropland Management Plan for Upper Ouachita NWR are in accordance with Service guidelines for the protection, management, and enhancement of habitats for wildlife populations on the refuge. Adherence to the Cropland Management Plan promotes the enhancement of habitats for migratory birds, threatened and endangered species, and resident wildlife.

Mandatory 10-Year Re-evaluation Date: _____

Approval of Compatibility Determinations

The signature of approval is for all compatibility determinations considered within the Comprehensive Conservation Plan for Upper Ouachita National Wildlife Refuge. If one of the descriptive uses is considered for compatibility outside of the comprehensive conservation plan, the approval signature becomes part of that determination.

Refuge Manager: _____
(Signature/Date)

Regional Compatibility Coordinator: _____
(Signature/Date)

Refuge Supervisor: _____
(Signature/Date)

Regional Chief, National Wildlife Refuge System, Southeast Region: _____
(Signature/Date)

Handy Brake National Wildlife Refuge Compatibility Determinations

Uses: The following uses were considered for compatibility determination reviews: (1) wildlife observation and photography; and (2) environmental education and interpretation.

Refuge Name: Handy Brake National Wildlife Refuge, Morehouse Parish, Louisiana

Date Established:

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

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

Other Applicable Laws, Regulations, and Policies:

Antiquities Act of 1906 (34 Stat. 225)
Migratory Bird Treaty Act of 1918 (15 U.S.C. 703-711; 40 Stat. 755)
Migratory Bird Conservation Act of 1929 (16 U.S.C. 715r; 45 Stat. 1222)
Migratory Bird Hunting Stamp Act of 1934 (16 U.S.C. 718-178h; 48 Stat. 451)
Criminal Code Provisions of 1940 (18 U.S.C. 41)
Bald and Golden Eagle Protection Act (16 U.S.C. 668-668d; 54 Stat. 250)
Refuge Trespass Act of June 25, 1948 (18 U.S.C. 41; 62 Stat. 686)
Fish and Wildlife Act of 1956 (16 U.S.C. 742a-742j; 70 Stat.1119)
Refuge Recreation Act of 1962 (16 U.S.C. 460k-460k-4; 76 Stat. 653)
Wilderness Act (16 U.S.C. 1131; 78 Stat. 890)
Land and Water Conservation Fund Act of 1965
National Historic Preservation Act of 1966, as amended (16 U.S.C. 470, et seq.; 80 Stat. 915)
National Wildlife Refuge System Administration Act of 1966 (16 U.S.C. 668dd, 668ee; 80 Stat. 927)
National Environmental Policy Act of 1969, NEPA (42 U.S.C. 4321, et seq; 83 Stat. 852)
Use of Off-Road Vehicles on Public Lands (Executive Order 11644, as amended by Executive Order 10989)
Endangered Species Act of 1973 (16 U.S.C. 1531 et seq; 87 Stat. 884)
Refuge Revenue Sharing Act of 1935, as amended in 1978 (16 U.S.C. 715s; 92 Stat. 1319)
National Wildlife Refuge Regulations for the Most Recent Fiscal Year (50 CFR Subchapter C; 43 CFR 3101.3-3)
Emergency Wetlands Resources Act of 1986 (S.B. 740)
North American Wetlands Conservation Act of 1990
Food Security Act (Farm Bill) of 1990 as amended (HR 2100)

Property Clause of the U.S. Constitution, Article IV 3, Clause 2
Commerce Clause of the U.S. Constitution, Article 1, Section 8
National Wildlife Refuge System Improvement Act of 1997 (Public Law 105-57, U.S.C. 668dd)
Executive Order 12996, Management and General Public Use of the National Wildlife Refuge System, March 25, 1996
Title 50, C.F.R., Parts 25-33
Archaeological Resources Protection Act of 1979
Native American Graves Protection and Repatriation Act of 1990

Compatibility determinations for each description listed were considered separately. Although for brevity, the preceding sections from "Uses" through "Other Applicable Laws, Regulations and Policies" are only written once within the plan, they are part of each descriptive use and become part of that compatibility determination if considered outside of the comprehensive conservation plan.

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 can only occur at the observation tower which is located at the only designated parking lot on the refuge.

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: $5,000/year

Monitoring costs: $1,000/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 could 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 by observers and photographers. However, because observers and photographers can only be in the parking lot or on the

observation tower, disturbance to wildlife is minuscule. Disturbance to trust species are expected to be minimal. Waterfowl use the emergent lake 120 meters away and do not seem to respond to activity at the observation tower. Short-term impacts to facilities, such as roads and trails, can be avoided by special closures due to unsafe conditions.

Long-term impacts:

These uses are 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 is being made available for public review and comment in conjunction with the 30-day public review and comment period for the Draft Comprehensive Conservation Plan and Environmental Assessment (Draft CCP/EA) for Upper Ouachita and Handy Brake National Wildlife Refuges and the Louisiana Wetlands Management District. In order to solicit comments, refuge staff will place copies of the Draft CCP/EA at the public library and the refuge office, and will hold public meetings after release of the Draft CCP/EA. News releases will be sent to all local papers, stating the purpose of the Draft CCP/EA and supporting documents and how and where to send comments.

Determination (check one below):

_____ Use is Not Compatible

__X__Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility:

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

Justification:

Visitors have the opportunity to view and photograph many species of wildlife with relative ease from the observation tower which is located off of a public road. During winter, thousands of waterfowl are easily seen from the observation tower.

Mandatory 15-Year Re-evaluation Date: _____

Description of Use: *Environmental Education and Interpretation*

Environmental education and interpretation activities include traditional environmental education, such as teacher or staff-led on-site field trips, off-site programs in classrooms, and interpretation of

wildlife resources on the refuge. These activities are largely conducted at Black Bayou Lake NWR, 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. On rare occasions, environmental education and interpretation activities occur on Handy Brake NWR.

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: $500/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 and the observation tower, impacts would be minimal.

Long-term impacts:

These uses are 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 is being made available for public review and comment in conjunction with the 30-day public review and comment period for the Draft Comprehensive Conservation Plan and Environmental Assessment (Draft CCP/EA) for Upper Ouachita and Handy Brake National Wildlife Refuges and the Louisiana Wetlands Management District. In order to solicit comments, refuge staff will place copies of the Draft CCP/EA at the public library and the refuge office, and will hold public meetings after release of the Draft CCP/EA. News releases will be sent to all local papers, stating the purpose of the Draft CCP/EA and supporting documents and how and where to send comments.

Determination (check one below):

_____ Use is Not Compatible

__X__Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility:

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

Justification:

Environmental education and interpretation are used to encourage citizens of all ages 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: _____

Approval of Compatibility Determinations

The signature of approval is for all compatibility determinations considered within the Comprehensive Conservation Plan for Handy Brake National Wildlife Refuge. If one of the descriptive uses is considered for compatibility outside of the comprehensive conservation plan, the approval signature becomes part of that determination.

Refuge Manager: _____
(Signature/Date)

Regional Compatibility Coordinator: _____
(Signature/Date)

Refuge Supervisor: _____
(Signature/Date)

Regional Chief, National Wildlife Refuge System, Southeast Region: _____
(Signature/Date)

Appendix G. Intra-Service Section 7 Biological Evaluation

Originating Person: Gypsy Gooding
Telephone Number: _318-726-4222
E-Mail: gypsy_gooding@fws.gov
Date: March 29, 2007
PROJECT NAME (Grant Title/Number): Upper Ouachita and Handy Brake National Wildlife Refuges and the Louisiana Wetlands Management District Comprehensive Conservation Plan

I. Service Program:
___ Ecological Services
___ Federal Aid
___ Clean Vessel Act
___ Coastal Wetlands
___ Endangered Species Section 6
___ Partners for Fish and Wildlife
___ Sport Fish Restoration
___ Wildlife Restoration
___ Fisheries
X__ Refuges/Wildlife

II. State/Agency: Louisiana

III. Station Name: Upper Ouachita and Handy Brake NWRs and the Louisiana Wetlands Management District

IV. Description of Proposed Action (attach additional pages as needed):
Implement the Comprehensive Conservation Plan (CCP) for Upper Ouachita and Handy Brake NWRs and the Louisiana Wetlands Management District by adopting the proposed alternative. This CCP directs the management of the refuge for the next 15 years.

Current management consists of maintaining pine basal area within red-cockaded woodpecker (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 20 percent of the ground cover. Controlled burning is currently conducted during March – May, with a 100 percent burn coverage objective, for the benefit of red-cockaded woodpeckers.

The Upper Ouachita NWR is proposing to manage 1,220 acres of RCW habitat on the western side of refuge according to RCW Recovery Guidelines. This area is characterized by native grasses and herbs, representing at least 40 percent of the ground cover. It is dense enough to carry growing season fires at least once every five years. Canopy hardwoods within RCW foraging partitions represent less than 30 percent of the total stem count in the overstory, providing contiguous foraging habitat for each cluster so that the habitat is not separated by more than 200 feet of non-foraging habitat. Fire and timber thinning is utilized 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 an 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 allow burning to occur in spring and in September and October, which is when the peak number of wildfires occurred historically. The RCW 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 would provide conditions that promote hardwoods in the drains and pines on the hills. This shift in fire timing would benefit the RCW if fires are allowed to burn naturally, which is entirely consistent with RCW management.

The proposed action would rely on patchiness of burns to achieve the objectives. A 100 percent coverage burn would 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 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 and 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.

The proposed action for the Louisiana black bear would be to continue keeping records of bear sightings and managing the forest according to the Desired Forest Conditions recommended by the Lower Mississippi Valley Joint Venture office.

V. Pertinent Species and Habitat:

A. Include species/habitat occurrence map: See Figure 19

B. Complete the following table:

Figure 19. Red-cockaded woodpecker species/habitat occurrence map

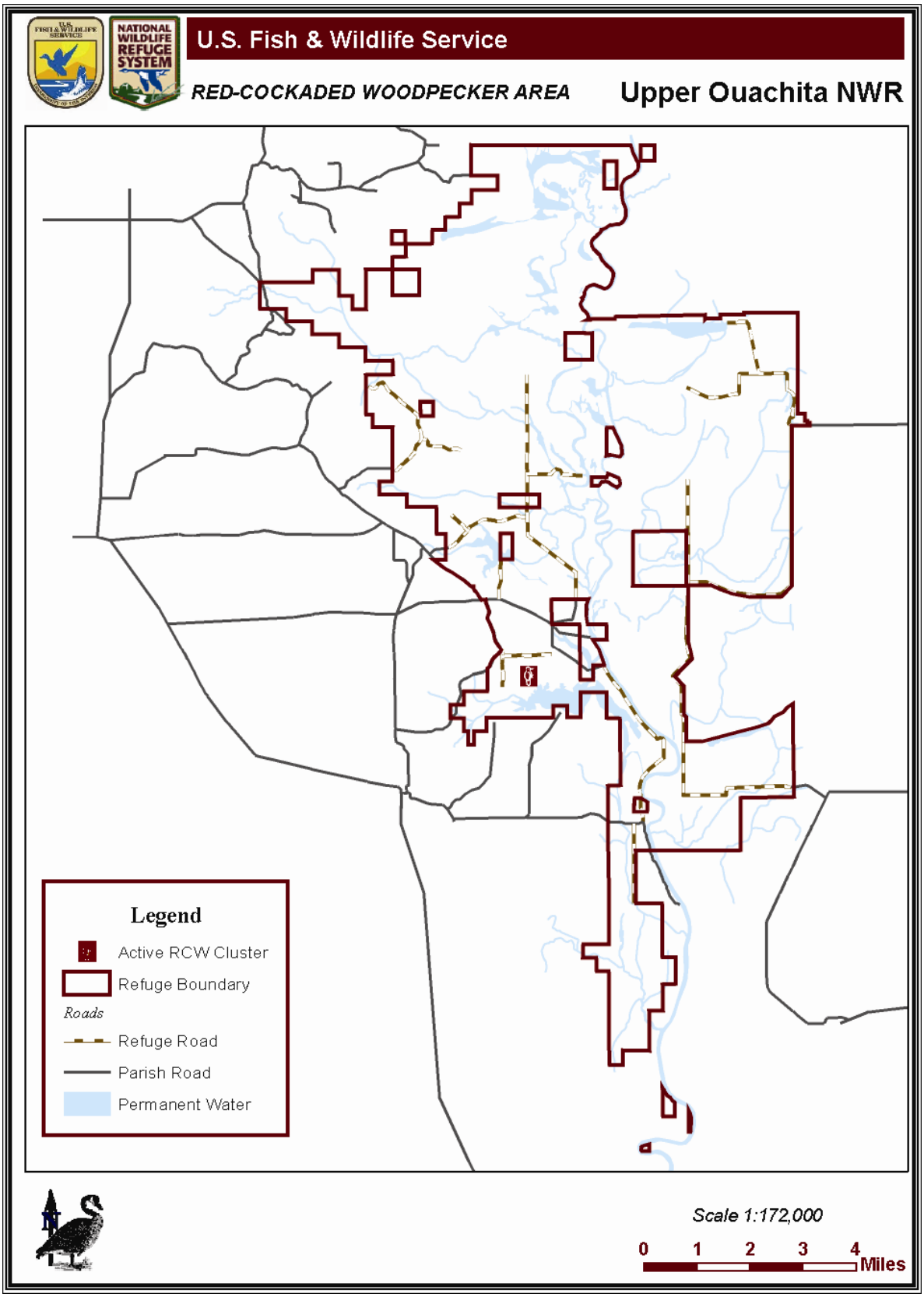


Table 1. Listed/proposed species/critical habitat that occur or may occur within the project area

SPECIES/CRITICAL HABITAT	STATUS[1]
Red-cockaded Woodpecker	E
Bald Eagle	No longer listed
Louisiana Black Bear	T

[1]STATUS: E=endangered, T=threatened, PE=proposed endangered, PT=proposed threatened, CH=critical habitat, PCH=proposed critical habitat, C=candidate species

VI. Location (attach map):

A. Ecoregion Number and Name: Lower Mississippi River Ecosystem

B. County and State: Union and Morehouse Parishes, Louisiana

C. Section, township, and range (or latitude and longitude): Woodpecker clusters are located in Sections 19 and 30 in T22N, R04E, and Section 25 in T22N, R03E. Habitat also includes Sections 2, 3, 13, 14, and 22 in T22N, R03E and Section 34 in T22N, R03E.

D. Distance (miles) and direction to nearest town: ~4 miles north of Sterlington, Louisiana

E. Species/habitat occurrence: Listed species and/or their critical habitat within the action area: One active group of federally endangered RCWs (*Picoides borealis*) on the western side of Upper Ouachita NWR in upland pine habitat.

Bald eagles (*Haliaeetus leucocephalus*) utilize the refuge mostly during the winter months, but also will nest during the spring. Usually five to seven eagles will use the refuge during winter, mostly at the Mollicy Unit, along the river, and at Fish and Moss Lakes. One active nest is known to occur at the Mollicy Unit in Shiloh Bayou.

Louisiana black bears (*Ursus americanus luteolus*) utilize the refuge infrequently as they pass through the area. However, the refuge anticipates more black bear use in the future. Black bears use a wide variety of habitat types and can be found anywhere on the refuge when flood waters are low. Large, hollow baldcypress and oak trees are present on the refuge and may be used as den trees by bears.

VII. 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 (Figure 20). 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 by providing 315 acres.

Basically the proposed action would produce habitat that is very similar to the open, park-like pine stands with the herbaceous understory that RCWs 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 an area closed to the public and is seasonally flooded. The nest is close to moist soil units that are farmed in some years. No disturbance by farming has been noticed. The birds typically nest successfully.

The proposed action would have no adverse effects on Louisiana black bears. If anything, black bears should benefit from the proposed action by creating a healthier, more structurally diverse forest with adequate numbers of den trees available.

B. Explanation of actions to be implemented to reduce adverse effects:

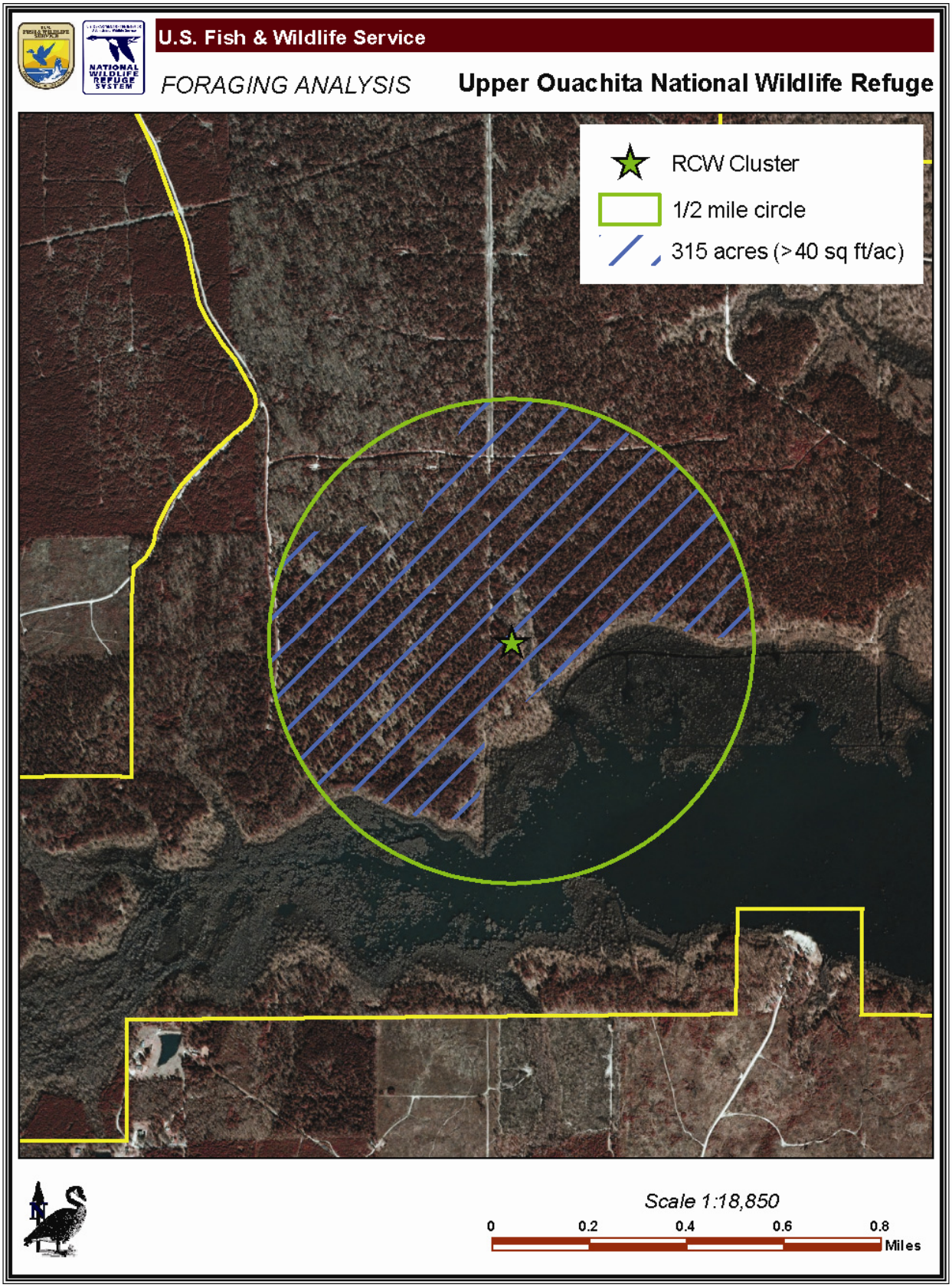
RCWs are more sensitive to hardwoods being in the nesting cluster than in their foraging habitat. For this reason, RCW management in the proposed action would exclude hardwood midstory and strictly limit hardwoods in the overstory within the 10-acre nesting cluster. In other words, hardwoods would not be promoted in the nesting cluster. Hardwoods would not constitute more than 30 percent in the foraging areas 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 would, this is not promoting hardwoods within the foraging area, because the foraging area is on the higher ground that would 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 would reduce the hardwood component; except for hardwood regeneration within the drains and depressions, which would 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 RCWs in favor of pine dominated habitat within the landscape.

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

Forest management would be conducted so that adequate numbers of den trees are left for black bears during harvest operations.

Figure 20. Red-cockaded woodpecker foraging analysis



VIII. Effect Determination and Response Requested:

Table 4. The effect determination and response requested for impacts to each proposed/listed species/critical habitat

SPECIES/ CRITICAL HABITAT	DETERMINATION[1]			RESPONSE[1] REQUESTED
	NE	NA	AA	
Red-cockaded Woodpecker		X		Concurrence
Bald Eagle		X		Concurrence
Louisiana Black Bear		X		Concurrence

[1]*DETERMINATION/RESPONSE REQUESTED:*

NE = no effect. This determination is appropriate when the proposed action will not directly, indirectly, or cumulatively impact, either positively or negatively, any listed, proposed, candidate species or designated/proposed critical habitat. Response Requested is optional but a AConcurrence@ is recommended for a complete Administrative Record.

NA = not likely to adversely affect. This determination is appropriate when the proposed action is not likely to adversely impact any listed, proposed, candidate species or designated/proposed critical habitat or there may be beneficial effects to these resources. Response Requested is a AConcurrence@.

AA = likely to adversely affect. This determination is appropriate when the proposed action is likely to adversely impact any listed, proposed, candidate species or designated/proposed critical habitat. Response Requested for listed species is AFormal Consultation@. Response Requested for proposed or candidate species is AConference@.

_____ _____

Signature (originating station) **date**

_____

Title

If the project description changes or incidental take exceeds that which has been exempted under Section 9 of the Act, then the Ecological Services Field Office must be contacted.

IX. Reviewing Ecological Services Office Evaluation:

A. Concurrence _____ Non-concurrence _____

B. Formal consultation required _____

C. Conference required _____

D. Informal conference required _____

E. Remarks (attach additional pages as needed):

_____ _____
Signature **date**

_____ _____
Title **office**

Appendix H. Wilderness Review

The Wilderness Act of 1964 defines a wilderness area as an area of Federal land that retains its primeval character and influence, without permanent improvements or human inhabitation, and is managed so as to preserve its natural conditions and which:

1. generally appears to have been influenced primarily by the forces of nature, with the imprint of man's work substantially unnoticeable;

2. has outstanding opportunities for solitude or primitive and unconfined types of recreation;

3. has at least 5,000 contiguous roadless acres or is of sufficient size to make practicable its preservation and use in an unimpeded condition; or is a roadless island, regardless of size;

4. does not substantially exhibit the effects of logging, farming, grazing, or other extensive development or alteration of the landscape, or its wilderness character could be restored through appropriate management at the time of review; and

5. may contain ecological, geological, or other features of scientific, educational, scenic, or historic value.

The lands within Upper Ouachita and Handy Brake National Wildlife Refuges and the Louisiana Wetlands Management District were reviewed for their suitability in meeting the criteria for wilderness, as defined by the Wilderness Act of 1964.

No lands were found to meet these criteria. Therefore, the suitability of refuge lands for wilderness designation is not further analyzed in this CCP.

Appendix I. Refuge Biota

North Louisiana Refuge Complex
Bird List

This list contains those species of birds thought to occur on lands owned by the 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 (*Efretta caerulea)*
Tricolored Heron (*Egretta tricolor)*
Cattle Egret (*Bubulcus ibis)*
Green Heron (*Butoroides virescens)*
Black-crowned Night-heron (*Nycticorax nycticorax)*
Yellow-crowned Night-heron (*Nyctanassa violacea)*

Ibises, Spoonbills, Storks, and New World Vultures

White Ibis (*Eudocimis albus)*
Roseate Spoonbill (*Ajaia ajaia)*
Wood Stork (*Mycteria americana)*
Black Vulture (*Coragyps atratus)*
Turkey Vulture (*Cathartes aura)*

Waterfowl

Greater White-fronted Goose (*Anser albifrons)*
Snow Goose (*Chen caerulescens)*
Ross's Goose (*Chen rossi)*
Canada Goose (*Branta canadensis*)
Black-bellied Whistling Duck (*Dendrocygna autumnalis*)
Wood Duck (*Aix sponsa)*
Gadwall (*Anas strepera)*
American Wigeon (*Anas americana)*
American Black Duck (*Anas rubripes)*
Mallard (*Anas platyrhynchos)*

Waterfowl

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 (*Porphyrula 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)*

Plovers

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 alpine)*
Semipalmated Sandpiper (*Calidris pusilla)*
Western Sandpiper (*Calidris mauri)*
Least Sandpiper (*Calidris minutilla)*
Pectoral Sandpiper (*Caladris 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 passerine)*
Eurasian Collared Dove (*Streptopelia decaocto)*

Cuckoos

Black-billed Cuckoo (*Coccyzus erythropthalmus)*
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)*

Owls

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 philadephicus)*
Red-eyed Vireo (*Vireo olivaceus)*

Jays and Crows

Blue Jay (*Cyanocitta cristata)*
American Crow (*Corvus brachyrhynchos)*
Fish Crow (*Corvus ossigragus)*

Larks

Horned Lark (*Eremophila alpestris)*

Martins and Swallows

Purple Martin (*Progne subis)*
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)*

Wood Warblers

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 lincolnii)*

Sparrows

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 (*Pheuticus 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 spurious)*
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 – Louisiana 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 (*Dedelphis 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, UO
*Red Bat (*Lasiurus borealis*)—DB, UO
*Seminole Bat (*Lasiurus seminolus*)—DB
Hoary Bat (*Lasiurus cinereus*)
*Evening Bat (*Nycticeius humeralis*)—DB
*Rafinesque's Big-eared Bat (*Coryrhincus rafinesquii*)—DB, UO
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 luecopus*)—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*)—DB, UO, LWMD

Procyonidae (Racoons)
*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*)—DB, 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 (*Macroclemys 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*) – BBL, 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 sexl*ineatus) – DB

Scincidae (Skinks)
*Little Brown Skink (*Scincella lateralis*) – BBL, DB
*Five-lined Skink (*Eumeces fasciatu*s) – BBL, DB
*Broad-headed 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*) – BBL, DB
*Broadbanded Water Snake (*Nerodia fasciata confluens*) – BBL
Graham's Crayfish Snake (*Regina grahamii*) – BBL
*Gulf Glossy Crayfish Snake (*Regina rigida sinicola*) – BBL, DB
*Midland Brown Snake (*Storeria dekayi wrightorum*) – BBL
Florida Red-bellied Snake (*Storeria occipitomaculata obscura*) – BBL
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, UO, DB
*Western Cottonmouth (*Agkistrodon piscivorus leucostoma*) – BBL, UO, DB
Western Pygmy Rattlesnake (*Sistrurus miliarius streckeri*)
*Timber Rattlesnake (*Crotalus horridis*) – UO, BBL

Proteidae (Waterdogs and Mudpuppies)
Red River Mudpuppy (*Necturus maculosus louisianensis*)

Amphiumidae (Amphiumas)
*Three-toed Amphiuma (*Amphiuma tridactlyum*) – BBL, 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*)

Bufonidae (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 sphenocephala*) – 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 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, 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

Anguillladae—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 Pickeral (*Esox americanus*)
*Chain Pickeral (*Esox niger*)—BBL, UO

Cyprinidae—Minnows
Goldfish
* Common Carp (*Cyprinus carpio*)—UO
*Cypress Minnow (*Hybognathus hayi*)—UO
*Silvery Minnow (*Hybognathus nuchalis*)—UO

Cyprinidae—Minnows
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 buchanani*)
*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 (*Carpiodes 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—Silversides
*Brook Silverside (*Labidesthes sicculus*)—BBL, UO

Percicthyidae—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*)

Cyprinidae—Minnows
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 the North Louisiana National Wildlife Refuge Complex according to various literature sources, specimens, and sightings.

Aceraceae
oxelder (*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 (A*ristolochia 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)*

Cuppressaceae
Eastern Red-cedar (*Juniperus virginiana)*

Ebonaceae
Persimmon (*Diospyrus virginiana)*

Ericaceae
Sparkleberry (*Vaccinium arboretum)*
Elliot's Blueberry (*Vaccinium elliotti)*
Deerberry (V*accinium stamineum)*
Large Cluster Blueberry (V*accinium 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 illinoiensis)*
Black Hickory (*Carya texana)*
Black Walnut (*Juglans nigra)*

Lauraceae
Sassafras (*Sassafras albidium)*
Spicebush (*Lindera benzoin)*

Loganiaceae
Carolina Jessemine (*Gelsemium sempervirens)*

Magnoliaceae
Sweetbay Magnolia (*Magnolia virginiana)*

Meliaceae
Chinaberry (*Melia azedarach)*

Moraceae
Osage-orange (*Maclura pumifera)*
Red Mulberry (*Morus rubra)*

Myricaceae
Waxmyrtle (*Myrica cerifica)*

Nyssaceae
Water Tupelo (*Nyssa aquatica)*
Blackgum (*Nyssa sylvatica)*

Oleaceae
Fringetree (*Chioanthus virginicus)*
Swamp Privet (*Forestiera acuminate)*
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)*
Trifoliate-orange (*Poncirus trifoliate)*

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 walterii)*

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 (C*allicarpa 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 J. List of Preparers

CORE PLANNING TEAM MEMBERS

The Core Planning Team included refuge staff from North Louisiana National Wildlife Refuge Complex, Upper Ouachita National Wildlife Refuge, and Central Louisiana National Wildlife Refuge Complex. This team was the primary decision-making team for the CCP. 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 NWR Complex
- Kelby Ouchley, Deputy Project Leader, North Louisiana NWR Complex
- Brett Hortman, Refuge Manager, Upper Ouachita NWR
- Lindy Garner, Planning Biologist (former), North Louisiana NWR Complex
- Tina Chouinard, Natural Resource Planner, Central Louisiana NWR Complex
- Gypsy Gooding, Wildlife Biologist, North Louisiana NWR Complex
- Steve Pagans, Forester, North Louisiana NWR Complex
- Gay Brantley, Interpretive Ranger, North Louisiana NWR Complex
- Chris Foster, Fire Management Officer, North Louisiana NWR Complex
- Michael Renfrow, Private Lands Biologist, North Louisiana NWR Complex

INTERDISCIPLINARY PLANNING TEAM MEMBERS

Several individuals supported the planning process with participation on the Biological Review Team and Visitor Services' Review Team, and additional special-topic discussions. Their information provided additional biological support for developing objectives in the CCP. Some members are internal to the Service and provided additional policy guidance and support for objective development as well.

BIOLOGICAL REVIEW – SEPTEMBER 2004

- Frank Bowers, Regional Migratory Bird Coordinator, Migratory Birds, FWS
- Pat Stinson, Wildlife Biologist, Migratory Birds, FWS
- Chuck Hunter, Regional Biologist, Region 4, FWS
- Ken Clough, Realty Specialist, Migratory Bird Realty Office, FWS
- Jeff Denman, Forester, White River NWR, FWS
- Jon Wessman, Farm Bill Coordinator, Conway ES, FWS
- Cedric Doolittle, Fisheries Biologist, FWS
- Randy Wilson, Science Coordinator, Lower Mississippi Joint Venture, FWS
- Ryan Daniel, Fisheries Biologist, Louisiana Department of Wildlife and Fisheries (LDWF)
- Kenny Ribbeck, Forester Supervisor, LDWF
- Jerald Owens, District Supervisor, LDWF
- John Carr, Herpetology Professor, University of Louisiana at Monroe
- Bill Vermillion, Biologist, Lafayette ES, FWS
- Kirk Cormier, Regional Manager, Louisian Department of Environmental Quality (LDEQ)
- John Posey, Contaminant Biologist, LDEQ

- Jim Dickson, Merritt Professor, Louisiana Tech University
- Gypsy Gooding, Wildlife Biologist, Upper Ouachita NWR
  Brett Hortman, Refuge Manager, Upper Ouachita NWR
- Kelby Ouchley, Deputy Project Leader, Upper Ouachita NWR
- Lindy Garner, Natural Resource Planner, Upper Ouachita NWR
  Chris Foster, Forester, Upper Ouachita NWR

VISITOR SERVICES REVIEW – SEPTEMBER 2005

- Garry Tucker, Visitor Services and Outreach, R4-RO
- Ray Paterra, White River NWR
- Lindy Garner, North Louisiana NWR Complex

OTHER CONTRIBUTORS

- Tom Foti, Ecologist, Arkansas Natural Heritage Commission
- Jody Pagans, Botanist, Arkansas Natural Heritage Commission
- Ralph Costa, Red-cockaded Woodpecker Recovery Leader, FWS
- Rick Kanaski, Regional Archaeologist, FWS
- Bo Blackman, Information Technology, Louisiana Department of Natural Resources
- Dale Yocum, GIS Specialist, Lower Mississippi Valley Joint Venture
- Robert Grecko, GIS Specialist, FWS
- Evelyn Nelson, Writer/Editor, FWS